## Competency-based education for CBSE

## Item Bank:

## Maths Class 9

September 2021

## Introduction for teachers

A bank of resources has been created to support teachers to develop and administer end-ofclass tests. These resources should be used together. You can view and download the following resources from http://cbseacademic.nic.in

- Learning ladder for maths
- Assessment specification for maths
- Sample lesson plans

This document is a compilation of the sample items for Maths class 9. There are 112 items. This item bank is supported by the assessment specification which sets out the end-of-class assessment requirements and the learning ladder for the subject which maps the CBSE syllabi content to the NCERT curriculum. The item index (page 7) shows how each item maps to the learning ladder content and the assessment objectives.

## What these assessment items can be used for

You can use the bank of questions in whatever way you wish but three main purposes have been identified:

- Create end-of-class assessments using the items from the bank to meet the requirements set out in the assessment specifications.
- Create end-of-topic tests using the items from the bank for when you finish teaching a topic.
- Use individual or groups of questions from the bank to create or add to worksheets for use in class and for homework.


## What is in this document

You will find linked questions and single questions which cover different aspects of the learning ladder content and different assessment objectives. You can use these questions to create your own assessments.

Each item in this document begins with the metadata (see Figure 1). The metadata gives details of the content, assessment objective coverage and the number of marks.

There is then a section showing any source material needed followed by the questions themselves and finally the mark scheme for the questions.

| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E | Content reference from the learning <br> ladder | Marks |
| :--- | :--- | :--- | :--- | :--- | :---: |
| Maths6AS1 | 1 |  | N | 6A1a Form and use algebraic expressions <br> (up to 2 variables, including use of <br> brackets) | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## How to use the assessment items

You can peruse the bank of items by flicking through this document and selecting questions you wish to use. However, if you are assessing specific content then you can use the learning ladder to identify this content and then use the item index (page 7) to find any items which cover that content.

Please note that not all of the content will have items. The item bank is only a sample of the questions which could be created so it may be necessary for you to write questions of your own to fill gaps.

When you find a relevant assessment item in this document, you can copy and paste the question(s) and any source material into a new Word document which will form the assessment or worksheet. Other questions from the bank can be copied and pasted to this document and an assessment or worksheet covering a range of items created. The questions can then easily be edited in the new document using Word and you can add any questions you write to best meet the needs of your classes.

Once the questions have been pasted into the new document the numbering of the items can be changed so that they run through 1,2 etc. There should be no need to change the numbering of parts (a), (b) etc. unless a question has been deleted.
You can create the mark schemes in the same way by copying the relevant section of the item documents and pasting them into a separate Word document which will form the mark scheme. Again, the question numbering will need to be amended. You can use these mark schemes to make sure that the marking is standardised, particularly if more than one teacher uses the assessment.

When creating an end-of-class test the teacher should use the assessment specification to identify the number of marks and questions needed, the balance of content to be covered and the weighting of the assessment objectives needed. You can then select items from the bank to build a test that meets the assessment specification and then order these in a logical manner so that it allows the students to work through the assessment. You should also add a front page with the assessment name and details of the number of marks and the length of the assessment. Again, the mark scheme can be created at the same time and question numbers will need to be amended.

When copying items from the bank care needs to be taken to keep the format and style of the items consistent including the spacing and layout and ensuring that the number of marks available for each question is clearly linked to the question.

## Assessment objectives

This document sets out the assessment objectives for CBSE mathematics and their percentage weighting for the CBSE end of year tests for the different classes from VI to X .

|  |  | Class |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| No. | Description of Assessment Objective | VI | VII | VIII | IX | X |
| AO1 | Demonstrate knowledge and understanding of <br> mathematical ideas, techniques and procedures. | $50-65$ | $50-65$ | $50-65$ | $40-55$ | $40-55$ |
| AO2 | Apply knowledge and understanding of <br> mathematical ideas, techniques and procedures <br> to classroom and real world situations | $35-50$ | $35-50$ | $35-50$ | $45-60$ | $45-60$ |

## Demonstrate knowledge and understanding of mathematical ideas, techniques and procedures.

Students should be able to recall and apply mathematical knowledge, terminology and definitions to carry out routine procedures or straightforward tasks requiring single or multi-step solutions in mathematical or everyday situations. At appropriate class levels this would include:

- working accurately with information presented in words, tables, graphs and diagrams
- using and interpreting mathematical notation correctly
- using a calculator to perform calculations where appropriate
- understanding and using systems of measurement in everyday use
- estimating, approximating and working to appropriate levels of accuracy, and converting between equivalent numerical forms
- using geometrical instruments to measure and to draw to appropriate levels of accuracy
- recognising and using spatial relationships in two and three dimensions


## Apply knowledge and understanding of mathematical ideas, techniques and procedures to classroom and real-world situations.

Students should be able to reason, interpret and communicate mathematically when solving problems. They should be able to analyse a problem, select a suitable strategy and apply appropriate techniques. At appropriate class levels this would include:

- presenting arguments and chains of reasoning in a logical and structured way
- assessing the validity of an argument
- interpreting and communicating information accurately, and changing from one form of presentation to another
- solving unstructured problems by putting them into a structured form
- recognising patterns in a variety of situations and forming generalisations
- applying combinations of mathematical skills and techniques using connections between different areas of mathematics
- making logical deductions, making inferences and drawing conclusions from given mathematical information, including statistical data
- interpreting results in the context of a given problem

Note: proportions for these AOs are presented as ranges. We suggest that the initial balance might use the high end of AO1 with the low end of AO2, moving over time towards increasing the proportion of AO2 over time as the new pedagogical approach is embedded.

## Item Index

| Assessment Content | Assessment Topic | File name | Question ID | A01 | AO2 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 9A1a | Algebra | Maths9GB4 | Maths9GB4 | 1 |  |
| 9A1a | Algebra | Maths9AN3 | Maths9AN3 | 1 |  |
| 9A1a | Algebra | Maths9SM6 | Maths9SM6a | 2 |  |
| 9A1a | Algebra | Maths9SM6 | Maths9SM6b | 2 |  |
| 9A1b | Algebra | Maths9DP10 | Maths9DP10 | 4 | 1 |
| 9A1c | Algebra | Maths9RS6 | Maths9RS6a | 1 |  |
| 9A1c | Algebra | Maths9RS6 | Maths9RS6b |  | 2 |
| 9A1c | Algebra | Maths9RS6 | Maths9RS6c | 1 |  |
| 9A1c | Algebra | Maths9RS6 | Maths9RS6d | 1 |  |
| 9A1c | Algebra | Maths9MS5 | Maths9MS5a | 2 |  |
| 9A1c | Algebra | Maths9JJ4 | Maths9JJ4 |  | 1 |
| 9A1c | Algebra | Maths9JJ8 | Maths9JJ8b |  | 3 |
| 9A1c | Algebra | Maths9AN7 | Maths9AN7 | 2 | 3 |
| 9A1c | Algebra | Maths9AG3 | Maths9AG3 |  | 4 |
| 9A2a | Algebra | Maths9NM2 | Maths9NM2 | 1 |  |
| 9A2a | Algebra | Maths9NM3 | Maths9NM3 | 1 |  |
| 9A2a | Algebra | Maths91M8 | Maths9IM8a | 2 |  |
| 9A2a | Algebra | Maths91M8 | Maths9IM8b | 1 |  |
| 9A2a | Algebra | Maths9DP2 | Maths9DP2 | 1 |  |
| 9A2a | Algebra | Maths9DP3 | Maths9DP3 | 1 |  |
| 9A2a | Algebra | Maths9GB5 | Maths9GB5a | 1 |  |
| 9A2a | Algebra | Maths9GB5 | Maths9GB5b | 1 |  |
| 9A2a | Algebra | Maths9GB5 | Maths9GB5c | 1 |  |
| 9A2a | Algebra | Maths9AG4 | Maths9AG4a |  | 2 |
| 9A2a | Algebra | Maths9AG4 | Maths9AG4b | 1 |  |
| 9A2a | Algebra | Maths9AG4 | Maths9AG4c | 1 |  |
| 9A2a | Algebra | Maths9AG7 | Maths9AG7a | 2 |  |
| 9A2a | Algebra | Maths9AG7 | Maths9AG7b | 2 |  |
| 9A2a | Algebra | Maths9JJ7 | Maths9JJ7a | 2 |  |
| 9A2a | Algebra | Maths9JJ7 | Maths9JJ7b |  | 3 |
| 9A2a | Algebra | Maths9AN6 | Maths9AN6 | 4 |  |
| 9A2a | Algebra | Maths9RS4 | Maths9RS4 | 1 | 1 |
| 9A2a | Algebra | Maths9DP9 | Maths9DP9 | 2 | 1 |
| 9A2b | Algebra | Maths9CN2 | Maths9CN2 | 1 |  |
| 9C1a | Coordinate geometry | Maths9NK2 | Maths9NK2 | 1 |  |
| 9C1a | Coordinate geometry | Maths9NK6 | Maths9NK6a | 1 |  |
| 9C1a | Coordinate geometry | Maths9NM7 | Maths9NM7a | 1 |  |
| 9C1a | Coordinate geometry | Maths91M3 | Maths9IM3 | 1 |  |
| 9C1a | Coordinate geometry | Maths9GB2 | Maths9GB2 | 1 |  |
| 9C1a | Coordinate geometry | Maths9AG5 | Maths9AG5a | 1 |  |
| 9C1a | Coordinate geometry | Maths9AG5 | Maths9AG5b |  | 2 |
| 9C1a | Coordinate geometry | Maths9JJ2 | Maths9JJ2 | 1 |  |


| 9C1a | Coordinate geometry | Maths9RS1 | Maths9RS1 | 1 |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 9C1a | Coordinate geometry | Maths9SK4 | Maths9SK4 | 1 |  |
| 9C1a | Coordinate geometry | Maths9RM4 | Maths9RM4 | 1 |  |
| 9C1a | Coordinate geometry | Maths9DP5 | Maths9DP5 | 2 |  |
| 9C1a | Coordinate geometry | Maths9RS2 | Maths9RS2 | 2 |  |
| 9C1a | Coordinate geometry | Maths9JJ6 | Maths9JJ6 | 3 |  |
| 9C1a | Coordinate geometry | Maths9SM8 | Maths9SM8a | 1 | 1 |
| 9C1a | Coordinate geometry | Maths9SM8 | Maths9SM8b | 1 | 1 |
| 9C1a | Coordinate geometry | Maths9AN5 | Maths9AN5 | 3 | 2 |
| 9G2a | Geometry | Maths9SM3 | Maths9SM3 | 1 |  |
| 9G2a | Geometry | Maths9CN1 | Maths9CN1 | 1 |  |
| 9G2a | Geometry | Maths9BS1 | Maths9BS1 | 1 |  |
| 9G2a | Geometry | Maths9LK1 | Maths9LK1 | 1 |  |
| 9G6e | Geometry | Maths9MS6 | Maths9MS6a | 1 |  |
| 9G2a | Geometry | Maths9MS6 | Maths9MS6b | 2 |  |
| 9G6b | Geometry | Maths9MS6 | Maths9MS6c |  | 3 |
| 9G2c | Geometry | Maths9NK8 | Maths9NK8a | 1 |  |
| 9G2a | Geometry | Maths9NK8 | Maths9NK8b | 3 |  |
| 9G2a | Geometry | Maths9NM8 | Maths9NM8a | 1 | 1 |
| 9G2a | Geometry | Maths9NM8 | Maths9NM8b | 2 | 1 |
| 9G2a | Geometry | Maths9BS7 | Maths9BS7a | 1 | 1 |
| 9G4b | Geometry | Maths9BS7 | Maths9BS7b |  | 5 |
| 9G2b | Geometry | Maths91M1 | Maths9IM1 | 1 |  |
| 9G2b | Geometry | Maths9MS4 | Maths9MS4 | 1 |  |
| 9G2b | Geometry | Maths9LK5 | Maths9LK5 | 2 |  |
| 9G2b | Geometry | Maths9BS6 | Maths9BS6a | 3 |  |
| 9G2b | Geometry | Maths9BS6 | Maths9BS6b |  | 4 |
| 9G2c | Geometry | Maths9MS3 | Maths9MS3 | 1 |  |
| 9G2c | Geometry | Maths9LK6 | Maths9LK6a | 2 |  |
| 9G2c | Geometry | Maths9LK6 | Maths9LK6b | 1 |  |
| 9G3d | Geometry | Maths9CN3 | Maths9CN3 | 1 |  |
| 9G3d | Geometry | Maths9CN5 | Maths9CN5a |  | 4 |
| 9G3f | Geometry | Maths9CN5 | Maths9CN5b |  | 2 |
| 9G3e | Geometry | Maths9LK3 | Maths9LK3 | 1 |  |
| 9G3e | Geometry | Maths9BS4 | Maths9BS4 |  | 1 |
| 9G3e | Geometry | Maths91M5 | Maths9IM5 | 1 | 1 |
| 9G6f | Geometry | Maths9DP4 | Maths9DP4 | 1 |  |
| 9G4e | Geometry | Maths9NM7 | Maths9NM7b | 2 | 1 |
| 9G4f | Geometry | Maths9IM7 | Maths9IM7 |  | 3 |
| 9G6b | Geometry | Maths9LK2 | Maths9LK2 | 1 |  |
| 9G6b | Geometry | Maths9NM1 | Maths9NM1 |  | 1 |
| 9G6b | Geometry | Maths9BS8 | Maths9BS8a | 1 | 2 |
| 9G6b | Geometry | Maths9BS8 | Maths9BS8b |  | 4 |
| 9G6e | Geometry | Maths9LK7 | Maths9LK7a |  | 2 |
| 9G6e | Geometry | Maths9LK7 | Maths9LK7b | 1 |  |
| 9G6b | Geometry | Maths9LK8 | Maths9LK8 |  | 3 |


| 9G6h | Geometry | Maths9LK9 | Maths9LK9a |  | 2 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 9G6h | Geometry | Maths9LK9 | Maths9LK9b | 1 |  |
| 9G6e | Geometry | Maths9LK10 | Maths9LK10a | 1 |  |
| 9G6e | Geometry | Maths9LK10 | Maths9LK10b | 1 |  |
| 9G6e | Geometry | Maths9LK10 | Maths9LK10c | 1 |  |
| 9G6e | Geometry | Maths9LK10 | Maths9LK10d | 1 |  |
| 9G6e | Geometry | Maths9CN7 | Maths9CN7a | 2 |  |
| 9G6e | Geometry | Maths9CN7 | Maths9CN7b |  | 2 |
| 9G3e | Geometry | Maths9CN7 | Maths9CN7c |  | 2 |
| 9G4f | Geometry | Maths9CN8 | Maths9CN8 | 2 | 3 |
| 9G6h | Geometry | Maths9CN9 | Maths9CN9a | 2 |  |
| 9G6f | Geometry | Maths9CN9 | Maths9CN9b |  | 3 |
| 9G6h | Geometry | Maths9MS8 | Maths9MS8a | 2 |  |
| 9G6h | Geometry | Maths9MS8 | Maths9MS8b |  | 5 |
| 9G6h | Geometry | Maths9AN1 | Maths9AN1 |  | 1 |
| 9M1a | Mensuration | Maths9RS3 | Maths9RS3 | 2 |  |
| 9M2a | Mensuration | Maths9AN9 | Maths9AN9a | 1 | 1 |
| 9M1a | Mensuration | Maths9AN9 | Maths9AN9b |  | 2 |
| 9M1a | Mensuration | Maths9RS5 | Maths9RS5 |  | 3 |
| 9M2a | Mensuration | Maths9IM6 | Maths9IM6a | 1 |  |
| 9M2a | Mensuration | Maths9IM6 | Maths9IM6b |  | 2 |
| 9M2a | Mensuration | Maths9JJ3 | Maths9JJ3 | 1 |  |
| 9M2a | Mensuration | Maths9AN2 | Maths9AN2 |  | 1 |
| 9M2a | Mensuration | Maths9SM5 | Maths9SM5a | 1 | 1 |
| 9M2a | Mensuration | Maths9SM5 | Maths9SM5b | 1 | 1 |
| 9M2a | Mensuration | Maths9DP8 | Maths9DP8a | 1 | 1 |
| 9M2a | Mensuration | Maths9DP8 | Maths9DP8b | 3 | 1 |
| 9M2a | Mensuration | Maths9RS8 | Maths9RS8a |  | 2 |
| 9M2a | Mensuration | Maths9RS8 | Maths9RS8b |  | 2 |
| 9M2a | Mensuration | Maths9RS8 | Maths9RS8c |  | 2 |
| 9M2a | Mensuration | Maths9AG1 | Maths9AG1 | 1 | 2 |
| 9M2a | Mensuration | Maths9AG2 | Maths9AG2 | 2 | 2 |
| 9M2a | Mensuration | Maths9GB7 | Maths9GB7 | 2 | 2 |
| 9M2a | Mensuration | Maths9GB8 | Maths9GB8 | 2 | 2 |
| 9M2a | Mensuration | Maths9JJ9 | Maths9JJ9 | 2 | 2 |
| 9M2a | Mensuration | Maths9NK6 | Maths9NK6b |  | 3 |
| 9M2a | Mensuration | Maths9GB3 | Maths9GB3 |  | 3 |
| 9N1a | Number systems | Maths9SM2 | Maths9SM2 | 1 |  |
| 9N1a | Number systems | Maths9JJ8 | Maths9JJ8a | 3 |  |
| 9N1c | Number systems | Maths9NK1 | Maths9NK1 | 1 |  |
| 9N1e | Number systems | Maths9MS2 | Maths9MS2 | 1 |  |
| 9N1e | Number systems | Maths9NK5 | Maths9NK5a | 2 |  |
| 9N1f | Number systems | Maths9NK5 | Maths9NK5b | 2 |  |
| 9N1e | Number systems | Maths9NM5 | Maths9NM5a | 2 |  |
| 9N1f | Number systems | Maths9NM5 | Maths9NM5b | 2 |  |
| 9N1e | Number systems | Maths9CN6 | Maths9CN6a |  | 1 |


| 9N1f | Number systems | Maths9CN6 | Maths9CN6b |  | 1 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 9N1b | Number systems | Maths9CN6 | Maths9CN6c |  | 2 |
| 9N1e | Number systems | Maths9LK11 | Maths9LK11 |  | 4 |
| 9N1e | Number systems | Maths9LK12 | Maths9LK12a |  | 2 |
| 9N1e | Number systems | Maths9LK12 | Maths9LK12b |  | 2 |
| 9N1e | Number systems | Maths9MS5 | Maths9MS5b |  | 6 |
| 9N1f | Number systems | Maths9IM4 | Maths9IM4 | 1 |  |
| 9N1f | Number systems | Maths9SM1 | Maths9SM1 | 1 |  |
| 9N1f | Number systems | Maths9BS2 | Maths9BS2 | 1 |  |
| 9N1f | Number systems | Maths9LK4 | Maths9LK4 | 1 |  |
| 9N1f | Number systems | Maths9BS5 | Maths9BS5 | 1 | 1 |
| 9S1a | Statistics and probability | Maths9RS7 | Maths9RS7a | 1 |  |
| 9S1a | Statistics and probability | Maths9RS7 | Maths9RS7b | 1 |  |
| 9S1a | Statistics and probability | Maths9RS7 | Maths9RS7c | 1 |  |
| 9S1b | Statistics and probability | Maths9NM6 | Maths9NM6a | 1 |  |
| 9S1b | Statistics and probability | Maths9NM6 | Maths9NM6b | 3 |  |
| 9S1b | Statistics and probability | Maths9IM9 | Maths9IM9a | 1 | 1 |
| 9S1b | Statistics and probability | Maths91M9 | Maths9IM9b | 1 |  |
| 9S1b | Statistics and probability | Maths9AN8 | Maths9AN8a | 3 |  |
|  |  | Maths9AN8 | Maths9AN8b | 3 |  |
| 9S1b | Statistics and probability | Maths9NK3 | Maths9NK3 |  | 1 |
| 9S1b | Statistics and probability | Maths9JJ1 | Maths9JJ1 |  | 1 |
| 9S1b | Statistics and probability | Maths9DP7 | Maths9DP7 | 2 | 1 |
| 9S2a | Statistics and probability | Maths9NK7 | Maths9NK7a | 1 |  |
| 9S1b | Statistics and probability | Maths9NK7 | Maths9NK7b |  | 3 |
| 9S1b | Statistics and probability | Maths9JJ5 | Maths9JJ5a | 2 |  |
| 9S1b | Statistics and probability | Maths9JJ5 | Maths9JJ5b |  | 4 |
| 9S1c | Statistics and probability | Maths9GB6 | Maths9GB6 | 1 | 1 |
| 9S2a | Statistics and probability | Maths9NM4 | Maths9NM4 | 1 |  |
| 9S2a | Statistics and probability | Maths91M2 | Maths9IM2 | 1 |  |
| 9S2a | Statistics and probability | Maths9AN4 | Maths9AN4 | 1 |  |

## Maths9GB4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9GB4 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9GB4 | 1 |  | E | 9A1a Identify factors and multiples of <br> constant, linear, quadratic and cubic <br> polynomials | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to factorise a given quadratic polynomial and identify its factors

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 Which of the following is a factor of $p(x)=3 x^{2}-2-5 x$ ?
A. $x-1$
B. $x+1$
C. $x-3$
D. $3 x+1$
(Total marks 1)

## Mark scheme

1 Which of the following is a factor of $p(x)=3 x^{2}-2-5 x$ ?
A. $x-1$
B. $x+1$
C. $x-3$
D. $3 x+1$

| Answer | Guidance |
| :--- | :--- |
| D. $3 x+1$ | A1 - Correct answer only |
|  | Explanation: $3 x^{2}-5 x-2=(x-2)(3 x+1)$ |
|  | $\Rightarrow(x-2)$ and $(3 x+1)$ are factors of $p(x)$ |

## Maths9AN3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AN3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9AN3 | 1 |  | N | 9A1a Identify factors and multiples of <br> constant, linear, quadratic and cubic <br> polynomials | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to factorize a quadratic polynomial.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1
The area of a rectangle is $6 x^{2}+5 x-6$. The possible dimensions of its length and breadth are:
A. $(2 x-3),(3 x-2)$
B. $(2 x+3),(3 x-2)$
C. $(2 x-3),(3 x+2)$
D. $(2 x+3),(3 x+2)$

## Mark scheme

1 The area of a rectangle is $6 x^{2}+5 x-6$. The possible dimensions of its length and breadth are:
A. $(2 x-3),(3 x-2)$
B. $(2 x+3),(3 x-2)$
C. $(2 x-3),(3 x+2)$
D. $(2 x+3),(3 x+2)$

| Answer | Guidance |
| :--- | :--- |
| B. $(2 x+3)(3 x-2)$ | A1: Correct answer only |
|  |  |
|  | Other acceptable answers: |
|  | B, $(2 x+3),(3 x-2)$ or $(3 x-2)(2 x+3)$ |

## Maths9SM6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9SM6 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9SM6a | 2 |  | N | 9A1a Identify factors and multiples <br> of constant, linear, quadratic and <br> cubic polynomials | 2 |
| Maths9SM6b | 2 |  | N | 9A1a Identify factors and multiples <br> of constant, linear, quadratic and <br> cubic polynomials | 2 |
| Total marks | 4 |  |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the concept of factorisation of a quadratic equation.

## Question(s)

1 Two students in class of IX named Ria and Ravya were assigned a polynomial by their maths teacher. The polynomial was $p(x)=x^{2}-5 x+6$.

They were asked to express this polynomial as product of factors. Both applied factorisation by splitting the middle term and got different answer.
Riya's answer:(x-3) (x-2)
Ravya's answer: ( $x+3$ ) ( $x-2$ ).

1 (a) Find out whose answer is correct and show factorisation.
(2 marks)
1 (b) Find the value of $p(-1)$.

## Mark scheme

| 1 (a) Find out whose answer is correct and show factorisation. |  |
| :---: | :---: |
| Answer | Guidance |
| $\begin{align*} p(x) & =x^{2}-5 x+6  \tag{1}\\ & =x^{2}-3 x-2 x+6 \\ & =(x-3)(x-2) \tag{1} \end{align*}$ | M1 for valid method (factorise again, or multiply the two expressions out) <br> A1 for correct answer (Riya) - dependent on seeing some working. |
| 1 (b) Find the value of $\mathrm{p}(-1)$ |  |
| Answer | Guidance |
| $\begin{align*} & p(x)=x^{2}-5 x+6 \\ & p(-1)=(-1)^{2}-5(-1)+6  \tag{1}\\ & =1+5+6 \\ & =12 \tag{1} \end{align*}$ | M1 for substitution <br> A1 for correct answer |

## Maths9DP10

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9DP10 |
|  |  |  |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9DP10 | 4 | 1 | C | 9A1b Use the Remainder and Factor <br> Theorems, including to factorise a <br> cubic polynomial, and to <br> identify zeroes of a polynomial. | 5 |

## Item purpose

This question assesses the ability of the student to find the value of a given polynomial at given values of variable.

## Sources and diagrams

## Question

1 If $\mathrm{p}(\mathrm{x})=\mathrm{x}^{3}+3 \mathrm{x}^{2}-2 \mathrm{x}+4$, then find the value of $\mathrm{p}(2)+\mathrm{p}(-2)-\mathrm{p}(0)$.
Show your working.
(Total marks
5)

## Mark scheme

1 If $p(x)=x^{3}+3 x^{2}-2 x+4$, then find the value of $p(2)+p(-2)-p(0)$. Show your working.

| Answer | Guidance |
| :--- | :--- |
| 28 | M1 for finding $\mathrm{p}(2)$ |


| $p(2)=8+12-4+4=20 \quad(1)$ |  |
| :--- | :--- |
| $p(-2)=-8+12+4+4=12 \quad(1)$ | M1 for finding $p(-2)$ |
| $p(0)=4 \quad(1)$ | M1 for finding $p(0)$ |
| $p(2)+p(-2)-p(0)=20+12-8=28 \quad(2)$ | M1 for correct calculation |

## Maths9RS6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9RS6 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :--- | :--- | :---: |
| Maths9RS6a | 1 |  | c | 9A1c Recall of algebraic expressions <br> and identities. | 1 |
| Maths9RS6b | 2 | N | 9A1c Recall of algebraic expressions <br> and identities. | 2 |  |
| Maths9RS6c | 1 |  | N | 9A1c Recall of algebraic expressions <br> and identities. | 1 |
| Maths9RS6d | 1 |  | N | 9A1c Recall of algebraic expressions <br> and identities. | 1 |
| Total marks | $\mathbf{3}$ | $\mathbf{2}$ |  |  | $\mathbf{5}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the concept of factorisation, finding value of a polynomial in real life situation.

## Source(s)

Source information: book/journal, author, publisher, website link etc.

## Question(s)

1 Two brothers Ashish and Amit wanted to start a business together. They decided to share their amount depending upon the variable expenditure. The amount of two partners is given by the expression $12 x^{2}+11 x-15$., which is the product of their individual share factors.
On the basis of the above information answer the following questions

1 (a) Find total expenditure of Ashish and Amit when $x=$ Rs 100.

1 (b) Find individual share factor of Ashish and Amit in terms of $x$.
(2 marks)
1 (c) Find the value of $x$ if their shares are equal.

1 (d) Find the sum of their expenditure in terms of $x$.

## Mark scheme

| 1 (a) Find total expenditure of Ashish and Amit when $x=$ Rs 100. |  |
| :--- | :--- |
| Answer | Total expenditure $=12 x^{2}+11 x-15$ Guidance <br> Put $x=100$  |
| $\qquad$$=12 \times 100 \times 100+1100-15$  <br>  $=120000+1100-15$ | A1 For correct answer |
|  |  |
| 1 (b) Find individual share factor of Ashish and Amit in terms of $x$ |  |


| Answer | Guidance |
| :---: | :---: |
| $\begin{align*} & 12 x^{2}+11 x-15 \\ = & 12 x^{2}+20 x-9 x-15  \tag{i}\\ = & 4 x(3 x+5)-3(3 x+5) \\ = & (3 x+5)(4 x-3) \end{align*}$ <br> Share of Ashish and Amit are either $(3 x+5)$ and $(4 x-3)$ or $(4 x-3)$ and $(3 x+5)$ respectively. | M1 For splitting the middle term correctly <br> A1 For correct factors |
| 1 (c) Find the value of $x$ if their shares are equal. |  |
| Answer | Guidance |
| According to the question, if their shares are equal $\begin{aligned} & 4 x-3=3 x+5 \\ & 4 x-3 x=5+3 \\ & x=8 \end{aligned}$ | A1 for correct answer |
| 1 (d) Find the sum of their shares in terms of $x$. |  |
| Answer | Guidance |
| Sum of their shares $\begin{aligned} & =4 x-3+3 x+5 \\ & =7 x+2 \end{aligned}$ | A1 For correct addition |

## Maths9MS5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9MS5 |
|  |  |  |


| Item identity | A01 marks | AO2 marks | C/N/E* | Content Reference(s) | Marks |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Maths9MS5a | 2 |  | N | 9A1c Recall of algebraic expressions and identities. Verification of identities: | 2 |
| Maths9MS5b |  | 6 | N | 9N1e Rationalization (with precise meaning, i.e. that the denominator is an integer) of real numbers of the type $\frac{1}{\pi+b \sqrt{x}}$ and $\frac{1}{\sqrt{x}+\sqrt{5}}$ (where $x$ and $y$ are natural numbers and a and b are integers. | 6 |
| Total marks | 2 | 6 |  |  | 8 |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge of evaluating irrational numbers using Rationalisation

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1

$$
\text { If } x=3-2 \sqrt{2} \text { and } y=3+2 \sqrt{2}
$$

1 (a) Evaluate : $x^{2}+y^{2}$
(2 marks)

1 (b) Evaluate : $\left(x^{2}-\frac{1}{x^{2}}\right)\left(x^{2}+\frac{1}{x^{2}}\right)$
(5 marks)
(Total marks 7)

## Mark scheme

| (a) Evaluate $: x^{2}+y^{2}$ <br> Answer <br> 34 <br> M1 Evaluating the value of $x y$ <br> M1 Evaluating the value of <br> $x^{2}+y^{2}=(x+y)^{2}-2 x y$ <br> A1 Evaluating $x y-(1$ Mark $)$ <br> A2 Evaluating $x^{2}+y^{2}=(x+y)^{2}-2 x y=34$ <br> $-(1$ Mark $)$ |  |
| :--- | :--- |
| Answer Evaluate $:\left(x^{2}-\frac{1}{x^{2}}\right)\left(x^{2}+\frac{1}{x^{2}}\right)$ |  |
| $(-24 \sqrt{2})^{* 32}$ | Guidance <br> M1 Evaluating $x-\frac{1}{x}$ <br> M1 Evaluating $x^{2}-\frac{1}{x^{2}}$ <br> M1 Evaluating $x^{2}+\frac{1}{x^{2}}$ |

## Maths9JJ4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9JJ4 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9JJ44 |  | 1 | C | 9A1c Recall of algebraic expressions and <br> identities | 1 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the ability of student to use basic identities in polynomials.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 If $x+y=7, x^{2}+y^{2}=26.5$, then find the value of $\sqrt{x y}$ ?
A. 3.35
B. 4.74
C. 11.25
D. 22.50

## Mark scheme

1 If $x+y=7, x^{2}+y^{2}=25$, then find the value of $\sqrt{ }(\mathrm{xy})$ ?
A. 3.35
B. 4.74

| C. 11.25 <br> D. 22.50 |  |
| :--- | :--- |
| Answer | Guidance |
| A. 3.35 | 1 Mark for the correct answer |

## Maths9JJ8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9JJ8 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9JJ8a | 3 |  | N | 8G1b Draw and interpret 2D <br> representations of 3D shapes | 3 |
| Maths9JJ8b |  | 3 | N | 9A1c Recall of algebraic expressions <br> and identities <br> 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones | 3 |
| Total <br> marks | $\mathbf{3}$ | $\mathbf{3}$ |  |  | $\mathbf{6}$ |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the ability of the students to construct and interpret bar graphs.

## Sources and diagrams



## 20 cm

## Question(s)

1 Joan has a $20 \mathrm{~cm} \times 20 \mathrm{~cm}$ square card board with him. He wanted to make a box by cutting the squares of integral length from the corner and by folding the flaps along the sides

1 (a) What are the possible different sizes of the boxes Joan can make. List all such boxes?

1 (b) What is the volume of the box if Joan cuts a square of side xcm from each corner?
(3 marks)
(Total marks 6)

## Mark scheme

1(a) What are the possible different sizes of the boxes Joan can make. List all such boxes?

| Answer | Guidance |
| :--- | :--- |
| $18 \times 18 \times 1$ | M1-for writing at least sizes of 3 different boxes. |
| $16 \times 16 \times 2$ | M1-for writing at least sizes of 6 different boxes. |
| $14 \times 14 \times 3$ | A1-for writing all the 9 possible sizes. |
| $12 \times 12 \times 4$ |  |


| $\begin{array}{\|l\|} \hline 10 \times 10 \times 5 \\ 8 \times 8 \times 6 \\ 6 \times 6 \times 7 \\ 4 \times 4 \times 8 \\ 2 \times 2 \times 9 \end{array}$ |  |
| :---: | :---: |
| 1(b) What is the volume of the box if Joan cuts a square of side $\times$ cm from each corner? |  |
| Answer | Guidance |
| $\begin{aligned} & \text { Volume }=(20-2 x)^{2}(x) \\ & =\left(4 x^{3}-80 x^{2}+400 x\right) \mathrm{cm}^{3} \\ & =4\left(x^{3}-20 x^{2}+100 x\right) \mathrm{cm}^{3} \end{aligned}$ <br> Any of these is acceptable. | .M1- Volume of the cuboids $=$ length $x$ breadth $x$ height <br> M1- finding length $=20-2 x$, breadth $20-2 x$ and height $=x$ and volume $=(20-2 x)^{2}(x)$ or equivalent form <br> A1- for correct Volume. <br> Don't penalize if $\mathrm{cm}^{3}$ is not written. <br> Don't penalize if final answer is not simplified by taking 4 common |

## Maths9AN7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AN7 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9AN7 | 2 | 3 | N | 9A1c Recall of algebraic expressions <br> and identities. Verification of identities: <br> and their use in factorization of <br> polynomials | 5 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the student's ability to apply algebraic identities to solve polynomials.

## Question

1

$$
\text { If } x^{2}+\frac{1}{x^{2}}=34, \text { and } x>0, \text { find the value of } x^{3}+\frac{1}{x^{3}}-9 . \text { Show all the steps. }
$$

(Total marks 5)

## Mark scheme

1 If $x^{2}+\frac{1}{x^{2}}=34$, find the value of $x^{3}+\frac{1}{x^{3}}-9$. Show all the steps.

| Answer | Guidance |
| :--- | :--- |
| 189 |  |
| $x^{2}+\frac{1}{x^{2}}=34$ |  |


| $\left(x+\frac{1}{x}\right)^{2}=x^{2}+\frac{1}{x^{2}}+2$ | M1: Stating the correct identity $(a+b)^{2}$ |
| :---: | :---: |
| $=34+2=36$ <br> So, $x+\frac{1}{x}=6$ (or -6 , discounted as $\mathrm{x}>0$ ) | M1: Finding correct value of $x+\frac{1}{x}$ |
| Cubing both sides $\left(x+\frac{1}{x}\right)^{3}=6^{3}$ |  |
| $x^{3}+\frac{1}{x^{3}}+3\left(x+\frac{1}{x}\right)=216$ | M 1 : Stating the correct identity $(a+b)^{3}$ |
| $x^{3}+\frac{1}{x^{3}}+3 \times 6=216$ | M1: Finding correct value of $x^{3}+\frac{1}{x^{3}}$ |
| $x^{3}+\frac{1}{x^{3}}=198$ | A1: Correct answer of expression. |
| $x^{3}+\frac{1}{x^{3}}-9=198-9=189$ |  |

## Maths9AG3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AG3 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9AG3 |  | 4 | C | 9A1c Recall of algebraic expressions <br> and identities. Verification of identities <br> and their use in factorization of <br> polynomials. | 4 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the logical thinking in daily life and how the concept of factorisation is applicable.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

Ashima donated a certain amount of money to a blind school.
Her friend Manya wanted to know the amount donated by her, but Ashima did not disclose the amount she donated, instead she gave her a hint that if $\left(x+\frac{1}{x}\right)=$ Rs. 7 then the amount donated by her is Rs. $\left(x^{3}+\frac{1}{x^{3}}\right)$.

Find the amount donated by Ashima to the school.
(4 marks)
(Total marks 4)

## Mark scheme

1 Ashima donated a certain amount of money to a blind school.

Her friend Manya wanted to know the amount donated by her, but Ashima did not disclose the amount she donated, instead she gave her a hint that if $\left(x+\frac{1}{x}\right)=$ Rs. 7 then the amount donated by her is Rs. $\left(x^{3}+\frac{1}{x^{3}}\right)$.

Find the amount donated by Ashima to the school

| Answer | Guidance |
| :--- | :--- |
| Rs. 322 | M $1\left(x+\frac{1}{x}\right)^{3}=7^{3}$ |
|  | M $1 x^{3}+\frac{1}{x^{3}}+3 x \frac{1}{x}\left(x+\frac{1}{x}\right)=343$ |
|  | M 1 Put value of $x+\frac{1}{x}$ in above |
|  | A $1 x^{3}+\frac{1}{x^{3}}=322$ |

## Maths9NM2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NM2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9NM2 | 1 |  | N | 9A2a Identify the solutions of a linear <br> equation in two variables (x,y) as a straight <br> line including where $x$ or y is a constant i.e. <br> the equation has only one variable. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the fact that every point on the graph of a linear equation in two variables is a solution of the linear equation.

## Sources and diagrams

| $x$ | -1 | 0 | 1 | 2 |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  | $y$ | -3 | -1 | 1 | 3 |

## Question

1 Which equation fits the data given in the above table?
A. $y=x-2$
B. $y=2 x-1$
C. $y=3 x-3$
D. $y=x+1$

## Mark scheme

1 Which equation fits the data given in the above table?
A. $y=x-2$
B. $y=2 x-1$
C. $y=3 x-3$
D. $y=x+1$

| Answer | Guidance |
| :--- | :--- |
| B. $y=2 x-1(1)$ | A1 - 1 mark for correct answer |
| All the values given in the table satisfy the <br> equation $y=2 x-1$ |  |

## Maths9NM3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NM3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9NM3 | 1 |  | N | 9A2a Identify the solutions of a linear <br> equation in two variables (x,y) as a straight <br> line including where $x$ or y is a constant i.e. <br> the equation has only one variable. | 1 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the property of equations of lines parallel to the $x$-axis and $y=-a x i s$ and the line passing through the origin.

## Sources and diagrams



## Question

1 In the rectangular coordinate system given above, the shaded region is bounded by straight lines. Which of the following is not an equation of one of the boundary lines?
A. $x-y=0$
B. $x=1$
C. $x+2 y=2$
D. $x=0$

## Mark scheme

1 In the rectangular coordinate system given above, the shaded region is bounded by straight lines. Which of the following is not an equation of one of the boundary lines?
A. $x-y=0$
B. $x=1$
C. $x+2 y=2$
D. $x=0$

| Answer | Guidance |
| :--- | :--- |
| A. $x-y=0$ (1) | A1-1 mark for correct answer |
| Observation: |  |
| The line $x-y=0$ is the same as $y=x$ <br> which passes through the origin and runs <br> diagonally. |  |
| All other lines represent a boundary of the <br> shaded region. |  |

## Maths91M8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9IM8 |


| Item identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E}$ | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9IM8a | 2 |  | C | 9A2a - Identify the solutions of a <br> linear equation in two variables (x, y) <br> as a straight line. | 3 |
| Maths9IM8b | 1 |  | C | 9A2a - Identify the solutions of a <br> linear equation in two variables (x, y) <br> as a straight line. |  |
| Total marks | $\mathbf{3}$ |  |  |  | $\mathbf{3}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to find solutions and plot a linear graph in two variables.

## Question(s)

1 (a) Which points given below satisfy the equation $2 x+3 y=12$ ?
i. $(-6,8)$
ii. $(6,-8)$
iii. $(3,2)$

1 (b) Plot the graph of the equation $2 x+3 y=12$ on the graph sheet provided

## Mark scheme

1 (a) Which points given below satisfy the equation $2 x+3 y=12$ ?
i. $(-6,8)$

| ii. $(6,-8)$ <br> iii. $(3,2)$ |  |
| :---: | :---: |
| Answer | Guidance |
| $\begin{aligned} & \text { i. \& iii. } \\ & (-6,8) \&(3,2) \quad(2) \end{aligned}$ | M 1 for ( $-6,8$ ) <br> M2 for (3, 2) <br> Correct response only |
| 1 (b) Plot the graph of the equation $2 x+3 y=12$ on the graph sheet provided |  |
| Answer | Guidance |
|  | M 1 <br> Plotting the graph correctly <br> Accept different points also, if correct, but labelling not required. <br> Equation not needed (not asked for) |

## Maths9DP2

This assessment item is designed to assess the end of class assessments for CBSE schools

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9DP2 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9DP2 | 1 |  | N | 9A2a Identify the solutions of <br> a linear equation in two variables $(x, y)$ <br> as a straight line, including <br> where $x$ or $y$ is a constant i.e. the <br> equation has only one variable. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

This question assesses the ability of the student to identify a linear equation in one variable.

## Sources and diagrams

## Question

1 Which of the following is a linear equation in one variable?
A. $2 x+3 y=0$
B. $x^{2}=5 x+3$
C. $5 x=y^{2}+3$
D. $2 \mathrm{x}+5=11$

## Mark scheme

| 1 Which of the following is a linear equation in one variable? |  |
| :--- | :--- |
| Answer | Guidance |
| D. $2 \mathrm{x}+5=11$ | A1 for correct answer |

## Maths9DP3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class |  | Question reference/Filename |  | required, $\mathrm{N}={ }^{*} \mathrm{C}=$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Maths | 9 |  | Maths9DP3 |  |  |
| Item identity | A01 marks | AO2 marks | C/N/E* | Content Reference(s) | Marks |
| Maths9DP3 | 1 |  | E | 9A2a Identify the solutions of a linear equation in two variables $(x, y)$ as a straight line, including where $x$ or $y$ is a constant i.e. the equation has only one variable. | 1 |

## Item purpose

This question assesses the ability of the student to form a linear equation.

## Sources and diagrams

## Question

1 The cost of book (x) exceeds twice the cost of pen (y) by 10 rupees. This statement can be expressed as linear equation as:
A. $x-2 y-10=0$
B. $2 x-y-10=0$
C. $2 x+y-10=0$
D. $x-2 y+10=0$

## Mark scheme

1 The cost of book (x) exceeds twice the cost of pen (y) by 10 rupees. This statement can be expressed as linear equation as:
A. $x-2 y-10=0$
B. $2 x-y-10=0$
C. $2 x+y-10=0$
D. $x-2 y+10=0$

| Answer | Guidance |
| :--- | :--- |
| A. $x-2 y-10=0$ | M1 for correct answer |

## Maths9GB5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9GB5 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9GB5a | 1 |  | E | 9A2a Identify the solutions of a linear <br> equation in two variables (x, y) as a <br> straight line, including where x or y is <br> a constant i.e. the equation has only <br> one variable. | 1 |
| Maths9GB5b | 1 |  | E | 9A2a Identify the solutions of a linear <br> equation in two variables (x, y) as a <br> straight line, including where x or y is <br> a constant i.e. the equation has only <br> one variable. | 1 |
| Maths9GB5c | 1 |  | E | 9A2a Identify the solutions of a linear <br> equation in two variables (x, y) as a <br> straight line, including where x or y is <br> a constant i.e. the equation has only <br> one variable. | 1 |
| Total marks | $\mathbf{3}$ |  |  |  |  |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to identify solutions of a linear equation in one and two variables, and formulate equation on the basis of the acquired information

## Sources and diagrams



Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1
In the given graph two lines, line 1 and line 2 are drawn.

1 (a) What is the equation of line 1 ?

1 (b) What is the equation of line 2 ?

1 (c) Write the common solution of the two lines.

## Mark scheme

| 1 (a) What is the equation of line 1? |  |
| :--- | :--- |
| Answer | Guidance |
| $x-3=0$ <br> Accept $x=3 \quad(1)$ | A1 - only for correct answer |
| 1 (b) What is the equation of line 2? |  |
| Answer |  |
| $x-y=0 \quad(1)$ <br> Accept $x=y$ or $y=x$ or $y-x=0$ | Guidance |
| 1 (c) Write the common solution of the two lines. |  |
| Answer | Guidance |
| (3, 3) (1) | A1 - Only for correct answer |

## Maths9AG4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AG4 |
|  |  |  |


| Item identity | A01 marks | AO2 marks | C/N/E* | Content Reference(s) | Marks |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Maths9AG4a |  | 2 | E | 9A2a Identify the solutions of a linear equation in two variables ( $x, y$ ) as a straight line, including where $x$ or $y$ is a constant i.e. the equation has only one variable. | 2 |
| Maths9AG4b | 1 |  | N | 9A2a Identify the solutions of a linear equation in two variables ( $\mathrm{x}, \mathrm{y}$ ) as a straight line, including where $x$ or $y$ is a constant i.e. the equation has only one variable. | 1 |
| Maths9AG4c | 1 |  | N | 9A2a Identify the solutions of a linear equation in two variables ( $x, y$ ) as a straight line, including where $x$ or $y$ is a constant i.e. the equation has only one variable. | 1 |
| Total marks | 2 | 2 |  |  | 2 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the concept of linear equation in different conditions.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1(a) Draw the graph of $3 x-2=0$ and $2 y-1=0$

1(b) Say whether the lines in the graph intersect each other or not.

1(c) What relationship do you observe between the lines?

## Mark scheme

1 (a) Draw the graph of $3 x-2=0$ and $2 y-1=0$

| Answer | Guidance |
| :--- | :--- |
|  | M $1 x=\frac{2}{3}=0.7$ and $y=\frac{1}{2}=0.5$ <br> A 1 Correct graph along with scale. |
| 1 (b) Say whether the lines in the graph intersect each other or not. |  |
| Answer | Guidance |
| Yes | A 1 Yes |
| 1 (c) What relationship do you observe between the lines? |  |
| Answer | Guidance |
| Perpendicular | A 1 Perpendicular to each or forms right <br> angle with each other. |

## Maths9AG7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AG7 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9AG7a | 2 |  | E | 9A2a Identify the solutions of a linear <br> equation in two variables (x, y) as a <br> straight line, including where $x$ or y is a <br> constant i.e. the equation has only one <br> variable | 2 |
| Maths9AG7b | 2 |  | E | 9A2a Identify the solutions of a linear <br> equation in two variables $(x, y)$ as a <br> straight line, including where $x$ or y is a <br> constant i.e. the equation has only one <br> variable | 2 |
| Total marks | 4 |  |  |  | 4 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses that how linear equations will be used in daily life situations and how the concept is applicable to the given situations.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 Mrs. Sharma lost her purse containing Rs 50 and Rs 100 notes amounting to Rs 1500 in a market.

1(a) Represent the above situation as a linear equation in two variables.
(2 marks)
1(b)

Draw the graph of above equation.

## Mark scheme

1 (a) Represent the above situation as a linear equation in two variables.

| Answer | Guidance |
| :--- | :--- |
| $x+2 y=30$ | M 1 Let no. of Rs 50 note be $x$ and no. of <br> Rs. 100 notes be $y . ~(a c c e p t ~ a n y ~ v a r i a b l e ~$ |
| labels) |  |
|  | A $150 x+100 y=1500$ <br> OR <br> $x+2 y=30$ |

1 (b) Draw the graph of above equation and mention the type of graph obtained.


## Maths9JJ7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9JJ7 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9JJ7a | 2 |  | N | 9A2a Identify the solutions of a linear <br> equation in two variables $(x, y)$ as a <br> straight line, including where $x$ or $y$ is <br> a constant $i . e$. the equation has only <br> one variable. | 2 |
| Maths9JJ7b |  | 3 | N | 9A2a Identify the solutions of a linear <br> equation in two variables $(x, y)$ as a <br> straight line, including where $x$ or $y$ is <br> a constant $i . e$. the equation has only <br> one variable. | 3 |
| Total marks | $\mathbf{2}$ | $\mathbf{3}$ |  |  | $\mathbf{5}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of the students to construct and interpret bar graphs.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1 Consider the linear equation $11 x-2 y=35$

1 (a) If $(p, p+5)$ is a solution of the linear equation $11 x-2 y=35$, find the value of $p$ ?

1 (b) Draw the graph of the linear equation $11 x-2 y=35$.

## Mark scheme

1(a) If $(p, p+5)$ is a solution of the linear equation $11 x-2 y=35$, find the value of $p$ ?

| Answer | Guidance |
| :--- | :--- |
| $\mathrm{p}=5$ | M1-for using the concept that <br> $(\mathrm{p}, \mathrm{p}+5)$ is a solution, so it <br> satisfies the equation. |
| $11 x-2 y=35$ | A1- for simplifying and finding <br> the correct answer as 5 |
| $11 p-2(p+5)=35$ | Also, if a student find the |
| $11 p-2 p-10=35$ |  |
| $9 p=45$ | correct answer using trial and |
| $p=5$ | error method give full marks. |

1(b) Draw the graph of the linear equation $11 x-2 y=39$.


## Maths9AN6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AN6 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9AN6 | 4 |  | N | 9A2a Identify the solutions of a linear <br> equation in two variables (x, y) as a <br> straight line, including where x or y is a <br> constant i.e., the equation has only one <br> variable. | 4 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to plot a linear graph and identify intercepts on axes.

## Sources and diagrams

|  |  |  |  |
| :---: | :---: | :---: | :---: |
| x | 1 | 2 |  |
| y | 1 | 3 |  |

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1
The following values of $x$ and $y$ are thought to satisfy a linear equation.
Draw the graph using the values of $x$ and $y$ as given in the table above.
Find the points at which the graph cuts:
A. $x$-axis
B. $y$-axis

## Mark scheme

1 The following values of $x$ and $y$ are thought to satisfy a linear equation. Draw the graph using the values of $x$ and $y$ as given in the table above. Find the points at which graph cuts
A. $x$-axis
B. $y$-axis

| Answer | Guidance |
| :--- | :--- |
| A. x-axis at $(0.5,0)$ |  |
| B. y-axis at $(0,-1)$ | M1: Correctly plotting (1,1) |
|  | A1: Correctly plotting $(2,3)$ <br> $(0.5,0)$ <br> A1: Correct mention of point on y-axis at $(0$, <br> $-1)$ |
|  |  |
|  | Marks should not be deducted if students <br> show points $(0.5,0)$ and $(0,-1)$ on the graph <br> itself instead of stating them. |

## Maths9RS4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9RS4 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9RS4 | 1 | 1 | E | 9A2a Identify the solutions of a linear <br> equation in two variables $(x, y)$ as a <br> straight line, including where $x$ or $y$ is a <br> constant i.e. the equation has only one <br> variable. | 2 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses basic knowledge of pair of linear equation in two variables

## Source(s)

Source information: book/journal, author, publisher, website link etc.

## Question

Ravi took a cab to go to his office. The cab fare is as follows:
For the first kilometre, the fare is Rs 50 and for the subsequent distance it is Rs 10 per kilometre.

Take the distance covered as $x \mathrm{~km}$ and total fare as Rs y , form a linear equation in two variables.

If Ravi covered 7 km then how much fare he has to pay?

## Mark scheme

Ravi took a cab to go to his office. The cab fare is as follows: for the first kilometre, the fare is Rs 50 and for the subsequent distance it is Rs 10 per kilometre. Take the distance covered as x km and total fare as Rs y , form a linear equation in two variables.
If Ravi covered 7 km then how much fare he has to pay?

| Answer | Guidance |
| :--- | :--- |
| Total distance $=x \mathrm{~km}$ | M1 For forming correct equation |
| Total fare $=$ Rs $y$ | A1 For the correct amount |
| Fare for first km $=$ Rs 50 | Don't cut marks if Rs is not written in final <br> answer. |
| According to the question |  |
| $50+(x-1) 10=y$ |  |
| $50+10 x-10=y$ |  |
| $10 x-y+40=0 \ldots \ldots .$. (i) |  |
| Now if total distance is 7 km |  |
| Total fare $=10 \times 7+40=y$ |  |
| Or $y=70+40$ |  |
| $Y=R s 110$ |  |

## Maths9DP9

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9DP9 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9DP9 | 2 | 1 | C | 9A2a Identify the solutions of a linear <br> equation in two variables $(x, y)$ as a <br> straight line, including where $x$ or $y$ is a <br> constant i.e., the equation has only one <br> variable. | 3 |

## Item purpose

This question assesses the ability of the student to solve the linear equation in two variables.

## Sources and diagrams

$\square$

## Question

1 Find the value of ' $m$ ' if $(-m, 3)$ is a solution of equation $4 x+9 y$ $-3=0$. Show your working.
(Total marks 3)

## Mark scheme

1 Find the value of ' $m$ ' if $(-m, 3)$ is a solution of equation $4 x+9 y-3=0$. Show your working.

| Answer | Guidance |
| :--- | :--- |
| $m=6$ | M1 for substituting correct values |
| $4(-m)+9(3)-3=0$ OR | M1 for correct calculation |
| $-4 m+27-3=0$ |  |
| $m=24 / 4=6$ |  |
| $m=6$ |  |$\quad$ A1 for correct answer $\quad$.

## Maths9CN2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9CN2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9CN2 | 1 |  | C | 9A2b Solve problems from real life, including <br> problems on Ratio and Proportion, using both <br> algebraic and graphical methods. | 1 |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses use the fact that the sum of the angles in a triangle is 180.

## Sources and diagrams



## Question

1
In the given figure $\mathrm{x}, \mathrm{y}, \mathrm{z}$ are angles on a line such that $\frac{x}{y}=2$ and $\frac{x}{z}=3$.
Find the angles $x, y, z$ rounded to the nearest degree.
A. $98,49,33$
B. $99,50,31$
C. $97,33,50$
D. $98,49,32$

## Mark scheme

1 In the given figure $\mathrm{x}, \mathrm{y}, \mathrm{z}$ are angles on a line such that $\frac{x}{y}=2$ and $\frac{x}{z}=3$. Find the angles $\mathrm{x}, \mathrm{y}$, $z$ rounded to one decimal place.
A. $98,49,33$
B. $99,50,31$
C. $97,33,50$
D. $98,49,32$

| Answer | Guidance |
| :--- | :--- |
| A. $98,49,33$ | A1 For the correct answer |
| $x=6 a, y=3 a, z=2 a, 11 a=180, a=16.36 \ldots$ | No penalty to be imposed for 33, 49, 98 (any <br> order). |
| $x=98, y=49, z=33$ |  |$\quad$|  |
| :--- |

## Maths9NK2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NK2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9NK2 | 1 |  | E | 9C1a Use standard notations and plot <br> points in the plane. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the reflection of coordinates along $x$ axis.

## Sources and diagrams



Source information if copied: https://study.com/

## Question

1 According to the diagram above, the dot represents Raily's school on the city map.

Marita's house is exactly at a mirror image of the school along the horizontal road represented in the diagram as the $x$ axis.

Which of the following represents the coordinates of Marita's house?
A. $(3,2)$
B. $(-3,-2)$
C. $(3,-2)$
D. $(2,-3)$

## Mark scheme

1 According to the diagram above, the dot represents Raily's school on the city map. Marita's house is exactly at a mirror image of the school along the horizontal road represented in the diagram as x axis. Which of the following represents the coordinates of Marita's house?
A. $(3,2)$
B. $(-3,-2)$
C. $(3,-2)$
D. $(2,-3)$

| Answer | Guidance |
| :--- | :--- |
| B. $(-3,-2)$ | M1 - Coordinates of the school $(-3,2)$ <br> Reflection along $x$ axis $(-3,-2)$ as the <br> reflected point will be in the third Quadrant <br> A1 -1 mark for correct answer |

## Maths9NK6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NK6 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9NK6a | 1 |  | N | 9C1a Use standard notations and plot <br> points in the plane. | 1 |
| Maths9NK6b |  | 3 | N | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right circular <br> cylinders/cones. | 3 |
| Total marks | $\mathbf{1}$ | $\mathbf{3}$ |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses reading of coordinates and applying the concept of mensuration and coordinate Geometry

## Sources and diagrams



## Question(s)

1
$1 \quad$ What is the relationship between point $P$ and point $P$ ' in the given
(a) graphical representation of the points?

1 If the points $P, P^{\prime}, Q, Q$ are four corners of a cricket practice field,
(b) name the shape of the field and hence find the area of the field in square units.
(Total marks 4)

## Mark scheme

1 (a) What is the relationship between point $P$ and point $P$ ' in the given graphical representation of the points?

| Answer | Guidance |
| :--- | :--- |
| Point Marking | $M 1-P$ and $P^{\prime}$ are reflection points with <br> Looking at the graph <br> $P$ respect to $x$ axis $P^{\prime}$ are reflection points with respect <br> to $x$ axis |
| $M 2-P$ and $P^{\prime}$ are mirror images with <br> respect to $x$ axis <br> to $x$ axis |  |

1 (b) If the points $P, P^{\prime}, Q, Q$ ' are four corners of a cricket practice field, name the shape of the field and hence find the area of the field in square meters.

| Answer | Guidance |
| :--- | :--- |
| Point Marks | M1 - |
| The shape of the field is Trapezoid | Step 1 - Identification of shape - Trapezoid <br> /Trapezium - 1 mark |
| Area of Trapezoid <br> $=(\text { Average of parallel sides })^{*}$ Height of <br> the trapezoid. | Step 2 - Formula of Area - $(\mathrm{a}+\mathrm{b}) / 2 * \mathrm{~h}$ <br> Step 3 - Deduce the measurement from the <br> graph for 2 sides ( counting the squares) <br> between P-P' and Q-Q' |


| From the graph: <br> Side 1 ( $\mathrm{P}-\mathrm{P}^{\prime}$ ) $=4$ units <br> Side $2\left(\mathrm{Q}-\mathrm{Q}^{\prime}\right)=14$ units <br> Distance between two sides / height of the trapezoid = 5 units <br> Area $=(4+14) / 2 * 5$ <br> Area $=9 * 5=45$ units | And horizontal distance between the sides /height =5 units <br> A1-3 marks <br> A2 - If the shape is correctly identified and measurements are also correct but calculation error. - 2 marks <br> A3 - If only shape identified but formula and measurements are incorrect - 1 mark <br> M2 - Identification of shape - Trapezoid <br> Counting of squares within the shape approximately 90 squares. <br> A1-3 marks |
| :---: | :---: |

## Maths9NM7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NM7 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9NM7a | 1 |  | E | 9C1a Use standard notations and plot <br> points in the plane. | 1 |
| Maths9NM7b | 2 | 1 | E | 9G4e Use the fact that: In a <br> parallelogram, the diagonals bisect <br> each other and conversely. | 3 |
| Total marks | $\mathbf{3}$ | $\mathbf{1}$ |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of plotting the points on rectangular coordinate plane, the use of basic characteristic of a rhombus and the use of mensuration- concept such as area of a right angled triangle=1/2 (product of two perpendicular sides) in coordinate geometry.

## Sources and diagrams



## Question(s)

1 Given points are $A(0,2), B(3,0), C(0,-2)$ and $D(-3,0)$
1 (a) Plot the points $A, B, C$ and $D$ on a graph
(1 mark)
1 (b) Name the figure ABCD obtained by joining the points, and find the area of the figure ABCD.

## Mark scheme

1 (a) Plot the points A, B, C and D on a graph.

| Answer | Guidance |
| :--- | :--- |
| Point Marking | MA 1- <br> 1 mark for plotting the points on a graph <br> Plot the points $(0,2),(3,0),(0,-2)$ and $(-$ <br> 3,0) on a graph paper as shown on the <br> diagram above. (1) |
|  | A1-1 mark for correct plotting of the points. |

1 (b) Name the figure ABCD obtained by joining the points, and find the area of the figure $A B C D$.

| Answer | Guidance |
| :--- | :--- |
| Join the points $A(0,2), B(3,0), C(0,-2)$ | $M 1-$ Joining the points and identifying the <br> and $D(-3,0)$. |
| figure so obtained. 1 mark |  |
| The figure so obtained is a Rhombus. | $M 1$ - Identifying the symmetry of the 4 right <br> angled tringles within the rhombus and area <br> (Using the property: Diagonals of a <br> rhombus bisect each other at right angle) |

Area of the rhombus $=4 \times \frac{1}{2}(O B \times O A)$ $=2(3 \times 2)=12$ square units, where $\mathrm{O}(0,0)$ refers to origin in the graph.
Final answer= 12 square units.
of the rhombus $=4 \times$ Area of one of the triangles

- 1 mark

M2- Area of the rhombus $=4 \times \frac{1}{2}(O B \times O A)$ $2(3 \times 2)=12$ square units, where $O(0,0)$ refers to origin in the graph.

Simplification and final answer- 1 mark

A2- 3 marks

## Maths9IM3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | IX | Maths9IM3 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :--- | :--- | :---: |
| Maths9IM3 | 1 |  | E | 9C1a use standard notations and plot <br> points in the plane. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the strategy to locate points in a Cartesian plane

## Sources and diagrams



## Question

1 Identify the coordinates of point Q.
A. $\mathrm{Q}(2,5)$
B. $Q(-2,5)$
C. $Q(-2,-5)$
D. $Q(2,-5)$

## Mark scheme

| 1 Identify the coordinates of point $Q$. <br>  <br> A. $Q(2,5)$ <br> B. $Q(-2,5)$ <br> C. $Q(-2,-5)$ <br> D. $Q(2,-5)$ |  |
| :--- | :--- |
| Answer | Guidance |
| D. $(2,-5) \quad(1)$ | M1 for choosing correct option. <br> Accept d), $d,(2,-5)$ |

## Maths9GB2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9GB2 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| *C |  |  |  |  |  |
| Maths9GB2 | 1 |  | E | 9C1a Use standard notations and plot <br> points in the plane. | 1 |

Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to interpret and write correct coordinates of a point

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 In a Cartesian plane, what are the coordinates of a point $P$ that is 3 units to the left of origin and 2 units below the origin?
A. $(3,2)$
B. $(-3,2)$
C. $(-3,-2)$
D. $(3,-2)$

## Mark scheme

1 In a Cartesian plane, what are the coordinates of a point $P$ that is 3 units to the left of origin and 2 units below the origin?
A. $(2,3)$
B. $(-2,3)$
C. $(-2,-3)$
D. $(2,-3)$

| Answer | Guidance |
| :--- | :--- |
| C. $(-3,-2) \quad(1)$ | A1 - Correct answer only |

## Maths9AG5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AG5 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9AG5a | 1 |  | N | 9C1a Use standard notations and plot <br> points in the plane | 1 |
| Maths9AG5b |  | 2 | E | 9C1a Use standard notations and plot <br> points in the plane | 2 |
| Total marks | $\mathbf{1}$ | $\mathbf{2}$ |  |  | $\mathbf{3}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the concept of coordinate geometry and its use in real life world.

## Sources and diagrams



## Question

1 In a Cartesian plane a child is standing at certain point $P$ and his mother is standing at a point $O$. The coordinates of point O are $(0,0)$

1(a) What are the coordinates of the child?

1(b) What is the distance between the child and his mother?

## Mark scheme

| 1 (a) What are the coordinates of the child? |  |
| :--- | :--- |
| Answer | Guidance |
| $(4,3)$ | A 1 (4,3) |
| 1 (b) What is the distance between the child and his mother? |  |
| Answer | Guidance |
| 5 unit | M 1 Distance $=\sqrt{x^{2}+y^{2}}$ |
|  | A 1 Distance $=\sqrt{25}=5$ unit |

## Maths9JJ2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9JJ2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :--- |
| Maths9MJJ2 | 1 |  | N | 9C1a Use standard notations and plot <br> points in the plane. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of student to identify the position of a point in a coordinate plane

## Sources and diagrams

$\square$
Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 In which quadrant does the point (-7, -9) lie?
A. I Quadrant
B. II Quadrant
C. III Quadrant
D. IV Quadrant

## Mark scheme

| 1 In which quadrant does the point (-7, -9) lie? |  |
| :--- | :--- |
| Answer | Guidance |
| III Quadrant | 1 Mark for the correct answe |

## Maths9RS 1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9RS1 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9RS1 | 1 |  | E | 9C1a Use standard notations and plot <br> points in the plane. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses basic knowledge of coordinate geometry

## Source(s)

$\square$

Source information: book/journal, author, publisher, website link etc.

## Question

1 Coordinate of a point A $\left(\frac{13}{2}, 5\right)$ and $\mathrm{B}\left(4,-\frac{2}{13}\right)$.
The value of (abscissa of $A$ ) - (ordinate of $B$ ) is:
A. $\frac{165}{26}$
B. $-\frac{165}{26}$
C. $\frac{173}{26}$
D. $-\frac{173}{26}$

## Mark scheme

1 The coordinates of two points are $\mathrm{A}\left(\frac{13}{2}, 5\right)$ and $\mathrm{B}\left(4,-\frac{2}{13}\right)$.
The value of (abscissa of A ) - (ordinate of B ) is

| Answer | Guidance |
| :--- | :--- |
| C. $\frac{173}{26}$ | A1 For correct answer |

## Maths9SK4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9SK4 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9SK4 | 1 |  | N | 9C1a Use standard notations and plot points <br> in the plane. | 1 |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge of co-ordinate geometry

## Source(s)

Source information: book/journal, author, publisher, website link etc.

## Question

1 The mid-point of the line segment joining the points $A(-2,8)$ and $B(-6,-4)$ is
A. $(-4,-6)$
B. $(2,6)$
C. $(4,2)$
D. $(-4,2)$

## Mark scheme

| 1 The mid-point of the line segment joining the points $A(-2,8)$ and $B(-6,-4)$ is |  |
| :--- | :--- |
| A. $(-4,-6)$ |  |
| B. $(2,6)$ |  |
| C. $(4,2)$ |  |
| D. $(-4,2)$ | Guidance |
| Answer | A1 for correct answer |
| D $(-4,2)$ |  |

## Maths9RM4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9RM4 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9RM4 | 1 |  | C | 9C1a Use standard notations and plot <br> points in the plane. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses finding the midpoint coordinates

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 The midpoint of the line segment joining the points $P(0,6)$ and $Q(4,0)$ is given by:
A. $(0,0)$
B. $(2.3)$
C. $(3,2)$
D. $(4,6)$

## Mark scheme

1 The midpoint of the line segment joining the points $P(0,6)$ and $Q(4,0)$ is given by:
A. $(0,0)$
B. $(2.3)$
C. $(3,2)$
D. $(4,6)$

| Answer | Guidance |
| :--- | :--- |
| B. $(2,3)$ | A 1 for correct answer. |

## Maths9DP5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9DP5 |
|  |  |  |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9DP5 | 2 |  | E | 9C1a Use standard notations and plot <br> points in the plane. | 2 |

The question assesses the ability of the student to understand the names and terms associated with the coordinate plane and to locate the coordinates of a point.

## Sources and diagrams

$\square$

## Question

On environment day, class-9 students got five plants of mango, silver oak, orange, banyan and amla from soil department. Students planted the plants and noted their locations as ( $\mathrm{x}, \mathrm{y}$ ). Observing the graph given above, answer the following question:

Find the coordinates of location point of orange tree. Also write that in which quadrant do these coordinates lie?
(2 marks)
(Total marks 2)

## Mark scheme

| 1 Find the coordinates of location point of orange tree. Also write that in which quadrant <br> do these coordinates lie? |  |
| :--- | :--- |
| Answer | Guidance |
| $(3,4)$ | A1 |
| $1^{\text {st }}$ quadrant | A1 |

## Maths9RS2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9RS2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9RS2 | 2 |  | E | 9C1a Use standard notations and plot <br> points in the plane. | 2 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses basic knowledge of coordinate geometry

## Source(s)



## Question(s)

$1 \quad \mathrm{PQR}$ is an equilateral triangle.
Coordinates of Point $Q$ and $R$ are $(-4,0)$ and $(4,0)$ respectively.

Find the coordinate of point $P$.
(2 marks)
(Total marks 2)

## Mark scheme

$1 \quad \mathrm{PQR}$ is an equilateral triangle. Coordinates of Point Q and R are ( $-4,0$ ) and (4,0) respectively. Find the coordinate of point $P$.

| Answer | Guidance |
| :---: | :---: |
| As PQR is an equilateral triangle <br> So $P Q=Q R=P R$ <br> From figure <br> QR = 8 unit $P Q=P R=8 \text { unit }$ <br> Let point of intersection of both axis is O . <br> In triangle POR, using Pythagoras theorem $\begin{gathered} P R^{2}=P O^{2}+O R^{2} \\ 8^{2}=P O^{2}+4^{2} \\ P O^{2}=64-16 \\ =48 \\ P O=\sqrt{48}=4 \sqrt{3} \text { unit } \end{gathered}$ <br> Coordinate of point $P=(0,4 \sqrt{3})$ | M1 For using Pythagoras theorem <br> A1 For writing correct coordinates. <br> Can consider coordinate as $(0, \sqrt{48})$ also. |

## Maths9JJ6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9JJ6 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E}$ | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9JJ6 | 3 |  | N | 9C1a Use standard notations and plot <br> points in the plane. <br> 8M2a Find the area of a trapezium | 3 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of the students to construct and interpret bar graphs.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1 Find the area of the polygon obtained by joining the points $(1,3),(5,6),(12,3)$, and $(8,6)$ on coordinate plane.
(Total marks 3)

## Mark scheme

1 Find the area of the polygon obtained by joining the points (1, 3), (5, 6), (12, 3), and (8, 6) on coordinate plane.

Answer Guidance

| 21 square units |  |
| :---: | :---: |
|  | M1-for plotting the points correctly and labelling. <br> Don't penalize if the student didn't label the points as $A, B, C, D$. <br> M 2 - joining the points and identifying that it is a trapezium. <br> A1-for finding area of trapezium as 21 square units <br> Don't penalize if square units is not mentioned. |

## Maths9SM8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9SM8 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E}$ | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9SM8a | 1 | 1 | N | 9C1a Use standard notations and <br> plot points in the plane. | 2 |
| Maths9SM8b | 1 | 1 | N | 9C1a Use standard notations and <br> plot points in the plane. | 2 |
| Total marks | 2 | 2 |  |  | 4 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the correct location of point on the cartesian plane.

## Sources and diagrams



Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1 Observe the above given grid and answer the following questions:
(a) Find the sum of abscissa of coordinates of $A$ and $B$.
(2 marks)
If $A B C D$ represents the vertices of a rectangle.
Plot the point D and write its coordinates.
1(b)
(2 marks)
(Total marks 4)

## Mark scheme

1 (a) Find the sum of abscissa of coordinates of $A$ and $B$.

| Answer | Guidance |
| :--- | :--- |
| Abscissa of $A=2$ | M1 for correct identification of abscissas. |
| Abscissa of $B=5 \quad(1)$ | A1 for correct answer. |
| Sum $=7 \quad(1)$ |  |

1 (b) If ABCD represents the vertices of a rectangle.
Plot the point D and write its coordinates.

| Answer | Guidance |
| :--- | :--- |
| Plotting of D in grid. (1) | A1 for plotting correct point. |
|  | A1 for writing correct coordinate. |

$\square$

## Maths9AN5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AN5 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9AN5 | 3 | 2 | N | 9C1a Use standard notations and plot <br> points in the plane. | 5 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to solve for a given coordinate and identify its quadrant.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1
If the coordinates of a point M are $(-2,9)$, which can also be expressed as (1+s, $\left.t^{2}\right)$ and $t>0$, then find the coordinates of $P(2 s,-3 t)$ and $Q\left(s^{2}, 1-t\right)$.

Also find which quadrants these points lie in.

## Mark scheme

1 If the coordinates of a point M are ( $-2,9$ ), which can also be expressed as ( $1+\mathrm{s}, \mathrm{t}^{2}$ ) and $t>0$, then find the coordinates of $P(2 s,-3 t)$ and $Q\left(s^{2}, 1-t\right)$.

Also find which quadrants these points lie in.


## Maths9SM3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9SM3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9SM3 | 1 |  | N | 9G2a Identify and calculate with <br> vertically opposite angles when two <br> lines intersect, and corresponding, <br> alternate and interior angles when a <br> transversal intersects two parallel lines. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the identification of sum of co-interior angles as supplementary and hence lines are parallel.

## Sources and diagrams

$\square$

## Question

1 Observe the figure and state which lines are parallel.
(1 mark)
(Total marks 1)

## Mark scheme

| 1 Observe the figure and state which lines are parallel? |  |
| :--- | :--- |
| Answer | Guidance |
| BC and ED (1) | M1 for correct answer |
|  |  |

## Maths9CN1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9CN1 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9CN1 | 1 |  | C | 9G2a Identify and calculate with vertically <br> opposite angles when two lines intersect, <br> and corresponding, alternate and interior <br> angles when a transversal intersects two <br> parallel lines. | 1 |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to find supplementary angles.

## Question

1 An angle is equal to one fourth of its supplement. Its measure is:
A. $60^{\circ}$
B. $30^{\circ}$
C. $18^{\circ}$
D. $36^{\circ}$

## Mark scheme

1 An angle is equal to one fourth of its supplement. Find its measure?
A. $60^{\circ}$
B. $30^{\circ}$
C. $18^{\circ}$
D. $36^{\circ}$

| Answer | Guidance |
| :--- | :--- |
| D. $36^{\circ}$ | A1 For the correct answer |
| $x+4 x=180$, so $5 x=180, x=36$ | Alternate answer to be accepted: 36 |

## Maths9BS1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9BS1 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9BS1 | 1 |  | N | 9G2a Identify and calculate with <br> vertically opposite angles when two <br> lines intersect | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge of intersecting lines, Vertically opposite angles.

## Sources and diagrams



## Question

1 In the figure above, find the value of $y$
A. 60
B. 45
C. 30
D. 15

## Mark scheme

1 In the figure above, find the value of $y$
A. 60
B. 45
C. 30
D. 15

| Answer | Guidance |
| :--- | :--- |
| D. 15 | A1: Correct answer or option |

## Maths9LK1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK1 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9LK1 | 1 |  | N | 9G2a Identify and calculate with <br> vertically opposite angles when two <br> lines intersect, and corresponding, <br> alternate and interior angles when a <br> transversal intersects two parallel lines. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of the student to use properties of parallel lines in a simple context.

Source(s)


## Question(s)

1 In the given figure, $A B \| C D$ and $B C \| E D$. Find the value of $x$
A. $115^{\circ}$
B. $65^{\circ}$
C. $25^{0}$
D. none of these

## Mark scheme

| 1 In the given figure, $\mathrm{AB} \\| \mathrm{CD}$ and $\mathrm{BC} \\| \mathrm{ED}$. Find the value of x |  |
| :--- | :--- |
| A. $115^{0}$ |  |
| B. $65^{\circ}$ |  |
| C. $25^{\circ}$ |  |
| D. none of these |  |
| Answer (1 mark) |  |
| B. $65^{0}$ | Guidance |

## Maths9MS6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9MS6 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |  |  |
| :--- | :---: | :---: | :---: | :--- | :---: | :---: | :---: |
| Maths9MS6a | 1 |  | N | 9G6e Be able to prove, and use the <br> fact that: The angle subtended by <br> an arc at the centre is double the <br> angle subtended by it at any point on <br> the remaining part of the circle. | 1 |  |  |
| Maths9MS6b | 2 |  | N | 9G2a Classify angles: acute, right <br> angled, obtuse, reflex | 2 |  |  |
| Maths9MS6c |  | 3 | N | 9G6b Be able to use the fact that: <br> The perpendicular from the centre of <br> a circle to a chord bisects the chord <br> and conversely, the line drawn <br> through the centre of a circle to <br> bisect a chord is perpendicular to the <br> chord. | 3 |  |  |
| Total marks | $\mathbf{3}$ | $\mathbf{3}$ |  |  |  |  |  |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses knowledge about the angle made by arcs and properties of chord of a circle

Sources and diagrams


Not to scale
Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1 The angle subtended by an arc BC of a circle cantered at O is $2 \alpha+50^{\circ}$.

1 (a) Find $\angle \mathrm{BAC}$ in terms of $\alpha$.

1 (b) If $\alpha=30^{\circ}$, find the reflex angle of $\angle B O C$
(2 marks)
1 (c) If the length of the chord of the circle $A B=16 \mathrm{~cm}$ and is at the distance of 15 cm from the centre of the circle, then find the radius of the circle
(Total marks 6)

## Mark scheme

| 1 (a) Find $\angle$ BAC in terms of $\alpha$ |  |
| :--- | :--- |
| Answer | Guidance |
| $\alpha+25^{\circ}$ | A1 1 mark for correct answer <br> Mark may be awarded if degree symbol is <br> missing |


| 1 (b) If $\alpha=30^{\circ}$, find the reflex angle of $\angle \mathrm{BOC}$ |  |
| :--- | :--- |
| Answer | Guidance |
| $250^{\circ}$ | M1 Finding $\angle \mathrm{BOC}$ <br> M1 Finding the reflex angle of $\angle \mathrm{BOC}$ <br> A1 $\angle \mathrm{BOC}=110^{\circ}-1$ Mark <br> A2: Reflex of $\angle \mathrm{BOC}=360^{\circ}-110^{\circ}=250^{\circ}-1$ <br> Mark <br> Mark may be awarded if degree symbol is <br> missing |
| 1 (c) If the length of the chord of the circle AB $=16 \mathrm{~cm}$ and is at the distance of 15 cm <br> from the centre of the circle, then find the radius of the circle |  |
| Answer | Guidance <br> 17 cm <br> M1 Finding BD <br> Theorem <br> A1: $\mathrm{BD}=8 \mathrm{~cm}-1 \mathrm{Mark}$ <br> $\mathrm{A} 2: O A=O B=17 \mathrm{~cm}-2$ Marks |

## Maths9NK8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NK8 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9NK8a | 1 |  | N | 9G2c Know and use that if a side of a <br> triangle is produced, the exterior angle <br> formed is equal to the sum of the <br> two interior opposite angles. | 1 |
| Maths9NK8b | 3 |  | N | 9G2a Identify and calculate with vertically <br> opposite angles when two lines intersect, <br> and corresponding, alternate and interior <br> angles when a transversal intersects two <br> parallel lines. | 3 |
| Total marks | $\mathbf{4}$ |  |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses properties of parallel lines, and triangles

## Sources and diagrams



## Question(s)

1
1 (a) State the relationship between angle ' $x$ ', ' $y$ ' \& $127^{\circ}$.

1 (b) Find the measures of all angles of the $\triangle P Q R$ in the above figure if the two lines $A B$ and $C D$ are parallel.

## Mark scheme

1 (a) State the relationship between angle ' $x$ ', ' $y$ ' \& $127^{\circ}$

| Answer | Guidance |
| :--- | :--- |
| In $\triangle P Q R \quad \mathrm{x}+\mathrm{y}=127^{\circ}$ | MA 1- By exterior angle property |
| Exterior angle property of triangles | $\mathrm{x}+\mathrm{y}=127^{\circ}$ |
|  | $\mathrm{A} 1-$ Correct relation -1 mark |

1 (b) Find the measures of all angles of the $\triangle P Q R$ in the above figure if the two lines $A B$ and CD are parallel

| Answer | Guidance |
| :--- | :--- |
| Point Marks | M1 - Use of alternate interior angle and the <br> If $A B$ and CD are parallel then: <br> transversals and angle sum property |
| $X=50^{\circ}$ - Alternate angles are equal |  |
| when lines are parallel and PQ is the <br> transversal | $x=50^{\circ}, y=77^{\circ} \quad \mathrm{z}=53^{\circ}$ |
|  | $A 1=3$ marks |

$50^{\circ}+\mathrm{y}=127^{\circ}$ - Alternate angles are equal when lines are parallel and $P R$ is the transversal
$y=127^{\circ}-50^{\circ}=77^{\circ}$

Third Angle $\mathrm{z}=180^{\circ}-(77+50)=53^{\circ}$

A2 - 2 marks ( two angles are correct and one is incorrect)

A3 - 1 mark (one is correct)
A4 - Zero if all incorrect

M2 - Use of alternate interior for $x$, Linear pair for $z$, angle sum property for $y$ )

## Maths9NM8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NM8 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E}$ | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9NM8a | 1 | 1 | E | 9G2a Identify and calculate with <br> vertically opposite angles when two <br> lines intersect, and corresponding, <br> alternate and interior angles when a <br> transversal intersects two parallel lines. | 2 |
| Maths9NM8b | 2 | 1 | E | 9G2a Identify and calculate with <br> vertically opposite angles when two <br> lines intersect, and corresponding, <br> alternate and interior angles when a <br> transversal intersects two parallel lines. | 3 |
| Total marks | $\mathbf{3}$ | $\mathbf{2}$ |  |  | $\mathbf{5}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses

- the ability of identifying and applying the concept of linear pair of angles, Vertically opposite angles.


## Sources and diagrams



Fig 1


Fig 2

## Question(s)

1 (a) 1 (a) In figure 1 (given above) $\angle A P C=100^{\circ}$ and $\angle B P D=146^{\circ}$. Find $\angle C P D$

1 (b) In figure 2 (Given above) if $A B$ and $C D$ are straight lines intersecting at $O$ and $O E$ is perpendicular to CD, find the values of angles $x$ and $y$.
(Total marks 5)

## Mark scheme

1 (a) In figure 1 (given above), $\angle B P C+\angle C P D=146^{\circ}$ and $\angle A P D+\angle C P D=100^{\circ}$ Find $\angle C P D$

| Answer | Guidance |
| :--- | :--- |
| Point Marking | M 1- <br> Use of the Linear pair Axiom concept <br> Let $\angle C P D=x^{0}$ |
| (can be implied) |  |
| • $\angle B P C=146^{0}-x^{0}$ |  |
| - $\angle B P D=100^{0}-x^{0}$ | A1-1 mark for correct answer. |
| • $146^{0}-x^{0}+100^{0}-x^{0}+x^{0}=180^{0}$ |  |
| • $x=66^{0}(1)$ |  |
| (Using the concept of Linear pair |  |
| Axiom) | Correct answer only 2 marks. |
|  |  |

1 (b) In figure 2 (Given above) if $A B$ and $C D$ are straight lines intersecting at $O$ and $\angle D O E=90^{\circ}$, then find the values of angles $\mathrm{x}, \mathrm{y}$ and z .

| Answer | Guidance |
| :---: | :--- |
| $\angle D O E+x+5 x=180^{\circ}$ |  |
| $90+6 x=180^{\circ}$ |  |
| $x=15^{\circ}$ | M1 - Use of the Linear pair Axiom |
| concept |  |
| To find the value of x |  |



## Maths9BS7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9BS7 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9BS7a | 1 | 1 | N | 9G4c Use the fact that: In a <br> parallelogram opposite angles are <br> equal, and conversely <br> 9G2a Identify and calculate with <br> vertically opposite angles when two <br> lines intersect, and corresponding, <br> alternate and interior angles when a <br> transversal intersects two parallel <br> lines. | 2 |
| Maths9BS7b |  | 5 | N | 9G4d Use the fact that: A <br> quadrilateral is a parallelogram if a <br> pair of its opposite sides is parallel <br> and equal. <br> 9G4b Use the fact that: In a <br> parallelogram opposite sides are <br> equal, and conversely. | 5 |
| Total marks | $\mathbf{1}$ | $\mathbf{6}$ |  | $\mathbf{7}$ |  |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the knowledge of the properties of a Parallelogram.

## Sources and diagrams

## Diagram 1(a)



Diagram 1 (b)


## Question(s)

1
1 (a) In the diagram 1(a), ABCD and AEFG are two parallelograms.
If $\angle \mathrm{BCD}=75^{\circ}$, determine $\angle \mathrm{AGF}$

1 (b) In diagram 1(b) , $A B\|D E, A B=D E, A C\| D F$ and $A C=D F$.
Prove that $B C \| E F$ and find the value of $E F$, if $B C=4 \mathrm{~cm}$.

## Mark scheme

| 1 (a) In the diagram 1(a), ABCD and AEFG are two parallelograms. If $\angle B C D=55^{\circ}$, determine $\angle \mathrm{AGF}$ |  |
| :---: | :---: |
| Answer | Guidance |
| $\angle \mathrm{AGF}=105^{\circ}$ | M1: Opposite angles of a parallelogram are equal $\angle \mathrm{A}=\angle \mathrm{C}=75$ $\begin{aligned} & \angle \mathrm{A}=\angle \mathrm{F}=75 \\ & \angle \mathrm{~F}+\angle \mathrm{G}=180 \end{aligned}$ <br> A1: $\angle \mathrm{G}=105^{\circ}$ <br> Alternative method of property of parallel lines can be considered too. |
| 1 (b) In diagram 2, $\mathrm{AB} \\| \mathrm{DE}, \mathrm{AB}=\mathrm{DE}, \mathrm{AC}\| \| \mathrm{DF}$ and $\mathrm{AC}=\mathrm{DF}$. Prove that $\mathrm{BC}\|\mid \mathrm{EF}$ and find the value of $E F$, if $B C=4 \mathrm{~cm}$. |  |
| Answer | Guidance |
| The value of EF $=4 \mathrm{~cm}$ | M1: $\quad A B\|\mid D E, A B=D E$, (Given) <br> $\therefore A B E D$ is a parallelogram. <br> ( Opposite sides are parallel and equal) <br> M1: $A D=B E$ and $A D$ II $B E$ <br> M1: $A C \\| D F$ and $A C=D F \quad$ (Given) <br> $\therefore$ ACFD is a parallelogram. <br> ( Opposite sides are parallel and equal) <br> $\therefore A D=C F$ and $A D$ II CF <br> M1: From (1) and (2) $B E=C F, B E I I C F$ <br> $\therefore \mathrm{BEFC}$ is a Parallelogram. <br> A 1: BC II EF (opposite sides of a Parallelogram are equal) $\begin{aligned} & \mathrm{BC}=\mathrm{EF} \\ & \mathrm{BC}=\mathrm{EF}=4 \mathrm{~cm} \end{aligned}$ |

## Maths91M1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9IM1 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :---: | :---: | :--- | :---: |
| Maths9IM1 | 1 | N | 9G2b Be able to prove, and use the fact <br> that the sum of the angles in a triangle is <br> $180^{\circ}$ | 1 |  |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the understanding of mathematical statements particularly related to geometrical concepts of lines and triangles.

## Sources and diagrams



## Question

1 Find the measure of $\angle P B C$
A. $37^{0}$
B. $53^{\circ}$
C. $57^{0}$
D. $63^{\circ}$

## Mark scheme

1 Find the measure of the indicated angle.

| Answer | Guidance |
| :--- | :--- |
| B. $53^{0}(1)$ | M1 for choosing correct option. <br> Accept b), b, $53,53^{\circ}$ |

## Maths9MS4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9MS4 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E}$ | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9MS4 | 1 |  | N | 9G2b Be able to prove, and use the <br> fact that the sum of the angles in a <br> triangle is $180^{\circ}$. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the result on angles of a triangle

## Sources and diagrams

$\square$

## Question

1 The angles of a triangle are in the ratio $3: 5: 7$. The smallest angle of the triangle is
A. $12^{\circ}$
B. $36^{\circ}$
C. $60^{\circ}$
D. $84^{\circ}$

## Mark scheme

| 1 The angles of a triangle are in the ratio $3: 5: 7$. The smallest angle of the triangle <br> is <br> A. $12^{\circ}$ <br> B. $36^{\circ}$ <br> C. $60^{\circ}$ <br> D. $84^{\circ}$ |  |
| :--- | :--- |
| Answer | Guidance |
| B. $36^{\circ}$ | A1 For Correct answer |

## Maths9LK5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK5 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9LK5 | 2 |  | N | 9G2b Be able to prove, and use the <br> fact that the sum of the angles in a <br> triangle is $180^{\circ}$. | 2 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to use angle sum property of a triangle

## Source(s)

$\square$

Source information: book/journal, author, publisher, website link etc.

## Question(s)

1 If the angles of a triangle are $\left(x-40^{\circ}\right),\left(x-20^{\circ}\right)$ and $\left(\frac{x}{2}-10^{\circ}\right)$ then find the value of $x$. Give your answer in degrees.

## Mark scheme

1 If the angles of a triangle are $\left(x-40^{\circ}\right),\left(x-20^{\circ}\right)$ and $\left(\frac{x}{2}-10^{\circ}\right)$ then find the value of $x$. Give your answer in degrees.

| Answer | Guidance |
| :--- | :--- |
| $\mathrm{X}=100^{\circ}$ | M1 to use the angle sum property of a |
| $\left(\mathrm{x}-40^{\circ}\right)+\left(\mathrm{x}-20^{\circ}\right)+\left(\frac{x}{2}-10^{\circ}\right)=180^{\circ}$ | triangle. |
| $\frac{5 x}{2}-70^{\circ}=180^{\circ}$ |  |
| $\frac{x}{2}=50^{\circ} \Rightarrow \mathrm{x}=100^{\circ}$ | A1 to find the correct value of x. |

## Maths9BS6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9BS6 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9BS6a | 3 |  | N | 9G2b Be able to prove, and use the <br> fact that the sum of the angles in a <br> triangle is $180^{\circ}$. | 3 |
| Maths9BS6b |  | 4 | N | 9G2b Be able to prove, and use the <br> fact that the sum of the angles in a <br> triangle is $180^{\circ}$. | 4 |
| Total marks | $\mathbf{3}$ | $\mathbf{4}$ |  |  | $\mathbf{7}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the properties of a triangle

## Sources and diagrams



Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1 (a) Angles of a triangle are in the ratio 2:4:3. What is the smallest angle?

1 (b) In the figure above, the bisectors of angles B and C of a triangle ABC and intersect each other at the point D and $\angle \mathrm{A}=50^{\circ}$. Find the value of $\angle \mathrm{BDC}$.
(Total marks 7)

## Mark scheme

| 1 (a) Angles of a triangle are in the ratio $2: 4: 3$. What is the smallest angle? |  |
| :--- | :--- |
| Answer | Guidance |
| Smallest angle is $40^{\circ}$ | $\begin{array}{l}\text { M1 : Taking common ratio as } x \text { and } \\ \text { M1: using the property of sum of interior } \\ \text { angles of a triangle is } 180^{\circ} \text { and finding } x \\ 2 x+4 x+3 x=180^{\circ} \\ 9 x=180^{\circ} \\ x=20^{\circ}\end{array}$ |
| A1: Finding the smallest angle $2 x=40^{\circ}$ |  |$\}$


|  | $\begin{aligned} & \angle \mathrm{DBC}+\angle \mathrm{DCB}=90^{\circ}-\frac{1}{2} \angle \mathrm{~A} \ldots \\ & \text { (1) } \\ & \text { M1: In } \triangle \mathrm{BDC} \\ & \text { (2) } \angle \mathrm{BDC}+\angle \mathrm{DBC}+\angle \mathrm{DCB}=180 \ldots \\ & \text { Substituting (1) in (2) } \\ & \text { M1: } \angle \mathrm{BDC}+90^{\circ}-\frac{1}{2} \angle \mathrm{~A}=180 \\ & \mathrm{~A} 1: \quad \angle \mathrm{BDC}+90^{\circ}-\frac{1}{2} \times 50=180 \\ & \quad \angle \mathrm{BDC}=115^{\circ} \end{aligned}$ <br> Children can adopt any other correct method too. <br> But the basic property Sum of angles of a Triangle is $180^{\circ}$ should be used. |
| :---: | :---: |

## Maths9MS3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9MS3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9MS3 | 1 |  | N | 9G2c Know and use that if a side of a <br> triangle is produced, the exterior angle <br> so formed is equal to the sum of the <br> two interior opposite angles. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge of the result on exterior angle of a triangle
Sources and diagrams


## Question

1 An exterior angle of a triangle is $130^{\circ}$ and the two interior opposite angles are equal. Find each of these angles

## Mark scheme

1 In the above diagram an exterior angle of a triangle is $130^{\circ}$ and the two interior opposite angles are equal. Find each of these angles

|  | Guidance |
| :--- | :--- |
| $65^{\circ}$ | A1 For Correct answer |

## Maths9LK6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK6 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9LK6a | 2 |  | N | 9G2c Know and use that if a side of a <br> triangle is produced, the exterior angle <br> so formed is equal to the sum of the <br> two interior opposite angles. | 2 |
| Maths9LK6b | 1 |  | N | 9G2c Know and use that if a side of a <br> triangle is produced, the exterior angle <br> so formed is equal to the sum of the <br> two interior opposite angles. | 1 |
| Total marks | $\mathbf{3}$ |  |  |  | $\mathbf{3}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to use exterior angle property of a triangle.

## Source(s)



## Question(s)

1 In the given figure $\angle A B D$ is an exterior angle of $\triangle A B C$.

1 (a) Find the value of $x$
(2 marks)
1 (b) Find the measure of $\angle \mathrm{ABC}$

## Mark scheme

1 (a) Find the value of $x$

| Answer | Guidance |
| :--- | :--- |
| $x=3$ | M1 to use the properties of exterior of a <br> Exterior angle of triangle is equal to sum <br> of non-adjacent interior angles. <br> Therefore $3 x^{2}+2 x+1=2 x^{2}+1+3 x+6$ <br> $\Rightarrow x^{2}-x-6=0$ <br> $\Rightarrow(x-3)(x+2)=0$ <br> $\Rightarrow x=3,-2$ |
| But $x$ is not negative. <br> $x=3$ |  |

1 (b) Find the measure of $\angle A B C$

| Answer | Guidance |
| :--- | :--- |
| $146^{\circ}$ | A1 to write correct value of $\angle A B C$. |
| $\angle A B D=3 x^{2}+2 x+1$ |  |
| Put $x=3$ |  |
| $\angle A B D=27+6+1=34^{\circ}$ |  |
| Therefore $\angle A B C=180^{\circ}-34^{\circ}=146^{\circ}$ |  |

## Maths9CN3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9CN3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9CN3 | 1 |  | N | 9G3d Use the fact that: Two right triangles <br> are congruent if the hypotenuse and a side <br> of one triangle are equal (respectively) to <br> the hypotenuse and a side of the other <br> triangle. (RHS Congruence) | 1 |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the understanding of RHS Criteria

## Sources and diagrams



Source: Google

## Question

1 In the given figure $\triangle \mathrm{ACB}$ is congruent to $\Delta$ DFE by which rule.
A. SAS
B. SSA
www.britishcouncil.org
C. RHS
D. ASA

## Mark scheme

1 In the given figure ACB is congruent to DFE by which rule.
A. SAS
B. SSA
C. RHS
D. ASA

| Answer | Guidance |
| :--- | :--- |
| C. RHS | A1 For the correct answer |
|  | Alternate answer to be accepted |
|  | RHS |

## Maths9CN5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9CN5 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E <br> $*$ | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9CN5a |  | 4 | N | 9G3d Use the fact that: Two right <br> triangles are congruent if the <br> hypotenuse and a side of one triangle <br> are equal (respectively) to the <br> hypotenuse and a side of the other <br> triangle. (RHS Congruence) | 4 |
| Maths9CN5b |  | 2 | N | 9G3f Use the fact that: The sides <br> opposite to equal angles of a triangle <br> are equal | 2 |
| Total marks |  | $\mathbf{6}$ |  |  | $\mathbf{6}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to use the RHS criteria and the fact that the sides opposite to equal angles of a triangle are equal

## Sources and diagrams

$\square$

## Question(s)

1 In the given figure, $\mathrm{AP}=\mathrm{BQ}, \mathrm{PR}=\mathrm{QS} . \angle \mathrm{APS}=\angle \mathrm{BQR}=90^{\circ}$
Show that

1 (a) $\quad \triangle \mathrm{APS} \cong \triangle \mathrm{BQR}$. Give reason and also mention the criteria of congruence

1 (b) If $\angle \mathrm{ASP}=45^{\circ}$, what can you say about RQ and BQ . Give reason to support your answer.
(2 marks)
(Total marks 6)

## Mark scheme

| 1 <br> (a) $\operatorname{Show}$ that <br> (APS $\cong \triangle B Q R . ~ G i v e ~ r e a s o n ~ a n d ~ a l s o ~ m e n t i o n ~ t h e ~ c r i t e r i a ~ o f ~ c o n g r u e n c e ~$ |  |
| :--- | :--- |
| Answer | Guidance |
|  |  |
| AP=BQ(Given) | MI For reason |
| $P R=Q S($ Given $)$ | M1 For reason |
| Adding RS to both sides |  |
| $P R+R S=Q S+R S$ | M1 For Reason |
| $P S=Q S$ |  |
| $\angle A P S=\angle B Q R=90$ | A1 For correct Criteria |
| $\triangle A P S \cong \triangle B Q R(R H S$ Criteria) |  |

(b) If $\angle \mathrm{ASP}=45^{\circ}$, what can you say about RQ and BQ. Give reason to support your answer.

| Answer | Guidance |
| :--- | :--- |
| If $\angle \mathrm{ASP}=45^{\circ}$ | M1 for finding $\angle \mathrm{QBR}=\angle \mathrm{BRQ}$ |
| Then $\angle \mathrm{BRQ}=45^{\circ}$ (As $\triangle \mathrm{APS} \cong \triangle \mathrm{BQR}$ by CPCT |  |
|  | $\angle \mathrm{ASP}=\angle \mathrm{BRQ}$ ) |
| So In $\triangle \mathrm{BQR}$ | A1 Correct reason |
| $\angle \mathrm{BRQ}+\angle \mathrm{BQR}+\angle \mathrm{QBR}=180$ (Angle sum property of | Note: It is not necessary to write all |
| steps |  |

## Maths9LK3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9LK3 | 1 |  | N | 9G3e Be able to prove, and to use the <br> fact that: The angles opposite to equal <br> sides of a triangle are equal. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of the student to find the vertex angle of a isosceles triangle.

## Source(s)

B
 C

## Question(s)

1
In the above triangle, $A B C$ is an isosceles triangle with $A B=A C$. If the vertex angle is twice the sum of the base angles, then find the vertex angle of the triangle.
A. $30^{\circ}$
B. $120^{\circ}$
C. $60^{\circ}$
D. none of these

## Mark scheme

| 1 In the above triangle, ABC is an isosceles triangle with $\mathrm{AB}=\mathrm{AC}$. If the vertex angle is |  |
| :--- | :--- |
| twice the sum of the base angles, then find the vertex angle of the triangle. |  |
| A. $30^{\circ}$ |  |
| B. $120^{\circ}$ |  |
| C. $60^{\circ}$ |  |
| D. none of these | (1 mark) |
| Answer | Auidance |
| B. $120^{0}$ |  |
| Let each base angle of an isosceles correct answer |  |
| triangle be $x^{0}$. |  |
| Then vertex angle $=2\left(x^{0}+x^{0}\right)=4 x^{0}$ |  |
| Then by angle sum property of a triangle |  |
| $x^{0}+x^{0}+4 x^{0}=180^{0}$ |  |
| $6 x^{0}=180^{\circ}$ and $x^{0}=30^{\circ}$ and $4 x^{0}=120^{\circ}$ |  |

## Maths9BS4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9BS4 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :--- | :---: | :---: | :--- | :---: |
| Maths9BS4 |  | 1 | N | 9G3e Be able to prove, and to use the <br> fact that: The angles opposite to equal <br> sides of a triangle are equal. <br> 9G6h Be able to use the fact that: The <br> sum of either of the pair of the opposite <br> angles of a cyclic quadrilateral is 180 <br> and its converse. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge of circles and its properties

## Sources and diagrams


D

Not to scale

## Question

1
In the given circle , if $\mathrm{BD}=\mathrm{DC}$, and $Đ B C D=25^{\circ}$, then what is $Đ B A C$ ?
A. $25^{\circ}$
B. $50^{\circ}$
C. $80^{\circ}$
D. $100^{\circ}$

## Mark scheme

| 1 In the given circle , if $\mathrm{BD}=\mathrm{DC}$, and $\angle \mathrm{BCD}=25^{\circ}$, then what is $\angle \mathrm{BAC}$ |  |
| :--- | :--- |
| Answer | Guidance |
| B. $50^{\circ}$ | A1 For correct answer |

## Maths91M5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9IM5 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9IM5 | 1 | 1 | N | 9G3e Be able to prove, and to use the <br> fact that the angles opposite to equal <br> sides of a triangle are equal | 2 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to use the fact that the angles opposite to equal sides of a triangle are equal

## Sources and diagrams



Diagram not to scale

## Question

1
$\triangle \mathrm{ABC}$ is an isosceles triangle in which $\mathrm{AB}=\mathrm{AC}$. If $\angle A=36^{\circ}$.
Find the measure of $\angle C$.

## Mark scheme

$1 \triangle \mathrm{ABC}$ is an isosceles triangle in which $\mathrm{AB}=\mathrm{AC}$. If $\angle A=36^{\circ}$, find the measure of $\angle C$.

| Answer | Guidance |
| :---: | :---: |
| Solution: $\begin{gather*} \angle A+\angle B+\angle C=180^{\circ} \\ \angle B+\angle C=180^{\circ}-36^{\circ} \\ =144^{\circ} \tag{1} \end{gather*}$ | M 1 for correct sum of $\angle B+\angle C$ Accept 144, 144 degrees |
| $\begin{align*} \text { Since } \angle B & =\angle C \\ \angle C & =\frac{144^{\circ}}{2}=72^{\circ} \tag{1} \end{align*}$ | A1 for the measure of $\angle C$ Accept 72, 72 degrees |

## Maths9DP4

This assessment item is designed to assess the end of class assessments for CBSE schools.

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

Item purpose

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9DP4 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9DP4 | 1 |  | E | 9G6f Be able to use the fact <br> that: Angles in the same segment of a <br> circle are equal. | 1 |

This question assesses the ability of the student to use the fact that: Sum of the angles of a triangle is 180 degree and angles in the same segment of a circle are equal.

## Sources and diagrams



## Question

1
In the figure given above, if angle $\mathrm{CAB}=69^{\circ}$, and angle $\mathrm{CBA}=31^{\circ}$, find the value of angle ADB.
A. $60^{\circ}$
B. $75^{\circ}$
C. $80^{\circ}$
D. $90^{\circ}$

## Mark scheme

| 1 In the figure given above, if angle $\mathrm{ABC}=69^{\circ}$, and angle $\mathrm{ACB}=31^{\circ}$ then, find the value |  |
| :--- | :--- |
| of angle BDC . |  |
| A. $60^{\circ}$ |  |
| B. $75^{\circ}$ |  |
| C. $80^{\circ}$ |  |
| D. $90^{\circ}$ | Guidance |
| Answer | A1 for correct answer only |
| $80^{\circ}$ |  |

## Maths91M7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9IM7 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9IM7 |  | 3 | E | 9G4f Use the fact that in a triangle, the <br> line segment joining the mid points of <br> any two sides is parallel to the third <br> side and is half of it and (motivate) its <br> converse. | 3 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the understanding of usage of the converse of midpoint theorem

## Sources and diagrams



Note: The triangle PQR is a right - angled triangle. TS and QR are parallel lines.

## Question

1 In the given right $\triangle P Q R, T$ is the midpoint of $P Q$ and $T S \| Q R . Q R=16 \mathrm{~cm}$, $R P=12 \mathrm{~cm}$.

Find the area of $\triangle \mathrm{PST}$.

## Mark scheme

| 1 In the given right $\triangle P Q R, T$ is 12 cm . <br> Find the area of $\triangle \mathrm{PST}$. | t of $P Q$ and $T S \\| Q R . Q R=16 \mathrm{~cm}, R P=$ |
| :---: | :---: |
| Answer | Guidance |
| $\begin{align*} & P S=\frac{P R}{2}=6 \mathrm{~cm}  \tag{1}\\ & T S=\frac{Q R}{2}=8 \mathrm{~cm}  \tag{1}\\ \text { Area } \triangle \mathrm{PTS}= & \left(\frac{1}{2} \times 6 \times 8\right) \mathrm{cm}^{2} \\ = & 24 \mathrm{~cm}^{2} \tag{1} \end{align*}$ | M1 for correct value of PS <br> M2 for correct value of TS <br> A1 for Area $\triangle P T S=24 \mathrm{~cm}^{2}$ <br> Accept 24, 24 sq cm |

## Maths9LK2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9LK2 | 1 |  | C | 9G6b Be able to use the fact that: The <br> perpendicular from the centre of a circle <br> to a chord bisects the chord and <br> conversely, the line drawn through the <br> centre of a circle to bisect a chord is <br> perpendicular to the chord. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of the student to find the distance of the chord from the centre.

## Source(s)



## Question(s)

1 If $A D=8.2 \mathrm{~cm}$ and $A B=8 \mathrm{~cm}$ then find the distance of $A B$ from the centre.
A. 9 cm
B. 0.09 cm
C. 0.009 cm
D. 0.9 cm
(Total marks 1)

## Mark scheme

1 If $A D=8.2 \mathrm{~cm}$ and $A B=8 \mathrm{~cm}$ then find the distance of $A B$ from the centre.
A. 9 cm
B. 0.09 cm
C. 0.009 cm
D. 0.9 cm

| Answer | Guidance |
| :--- | :--- |
| D. 0.9 cm | A1 - to write correct answer |
| $d^{2}+4^{2}=4.1^{2}$ |  |
| $d=\sqrt{0.81}=0.9$ |  |

## Maths9NM1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NM1 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9NM1 |  | 1 | C | 9G6b Be able to use the fact that <br> perpendicular from the centre of a circle to <br> a chord bisects the chord. | 1 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the properties involving the method of finding distance of a chord from centre of the circle.

## Sources and diagrams



## Question

1 In the figure given above, $A B$ is a diameter of a circle and $A C$ is a chord.
If $A B=34 \mathrm{~cm}, A C=30 \mathrm{~cm}$, the distance of $A C$ from the centre of the circle is:
A. 17 cm
B. 15 cm
C. 4 cm
D. 8 cm
(1 mark)
(Total marks 1)

## Mark scheme

1 In the figure given above, $A B$ is a diameter of a circle and $A C$ is a chord. If $A B=34 \mathrm{~cm}$, $A C=30 \mathrm{~cm}$, the distance of $A C$ from the centre of the circle is:
A. 17 cm
B. 15 cm
C. 4 cm
D. 8 cm

|  |  |
| :--- | :--- |
| Draw OD $\perp A C$ |  |
| (Perpendicular from the centre bisects the <br> chord) <br> $A D=15 \mathrm{~cm}, A O=17 \mathrm{~cm}$ <br> $O D=\sqrt{17^{2}-15^{2}}=8 \mathrm{~cm}$ |  |

## Maths9BS8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9BS8 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9BS8a | 1 | 2 | E | 9G6b Be able to use the fact that: The <br> perpendicular from the centre of a <br> circle to a chord bisects the chord and <br> conversely, the line drawn through the <br> centre of a circle to bisect a chord is <br> perpendicular to the chord | 3 |
| Maths9BS8b |  | 4 | C | 9G6b Be able to use the fact that: The <br> perpendicular from the centre of a <br> circle to a chord bisects the chord and <br> conversely, the line drawn through the <br> centre of a circle to bisect a chord is <br> perpendicular to the chord <br> 9A2a Identify the solutions of a linear <br> equation in two variables $(x, y)$ as a <br> straight line, including where $x$ or $y$ is <br> a constant i.e. the equation has only <br> one variable. | 4 |
| Total marks | $\mathbf{1}$ | $\mathbf{6}$ |  |  |  |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge of the properties of circles.

## Sources and diagrams

Diagram 1 (a)


Diagram 1 (b)


## Question(s)

1
1 (a) In the Figure $1(\mathrm{a})$, if $A C=5 \mathrm{~cm}, C D=8 \mathrm{~cm}$ and $A B$ is perpendicular to $C D$, then find the length $B E$

1 (b) In the Figure 1(b) $A B$ and $A C$ are two chords of a circle of radius $r$ such that $A B=2 A C$.
If the distances of $A B$ and $A C$ from the centre are 3 cm and 6 cm respectively, find the radius $r$ up to 3 decimal places

## Mark scheme

1(a) In the Figure $1(\mathrm{a})$, if $A C=5 \mathrm{~cm}, C D=8 \mathrm{~cm}$ and $A B$ is perpendicular to $C D$, then find BE


1(b) $A B$ and $A C$ are two chords of a circle of radius $r$ such that $A B=2 A C$. If the distances of $A B$
and $A C$ from the centre, are 3 cm and 6 cm respectively. Find the radius $r$ (Find value up to 3 places of decimal)

| Answer | Guidance |
| :---: | :---: |
| Radius $=6.708 \mathrm{~cm}$ | M1: |
|  | Perpendicular drawn from centre of a circle to the chord , bisects the chord. |
|  | In $\triangle \mathrm{OAE}, \mathrm{OA}=\mathrm{r}, \mathrm{AC}=x$ and $\mathrm{AB}=2 x$ |
|  | Perpendicular drawn from centre of a circle to the chord ,bisects the chord |
|  | M1: $\ln \triangle$ OAE |
|  | $r^{2}=(x / 2)^{2}+6^{2}$ |


|  |  |
| :--- | :--- |
|  | $\ln \triangle \mathrm{OAD}$ <br> $r^{2}=(x)^{2}+3^{2}$ <br> M1: Solving we get $3 r^{2}=135$ <br> $r=\sqrt{45}$ |
|  | A1: $r=6.708 \mathrm{~cm}$ |
|  |  |

## Maths9LK7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK7 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9LK7a |  | 2 | N | 9G6e Be able to prove, and use the <br> fact that: The angle subtended by an <br> arc at the centre is double the angle <br> subtended by it at any point on the <br> remaining part of the circle. | 2 |
| Maths9LK7b | 1 |  | N | 9G6e Be able to prove, and use the <br> fact that: The angle subtended by an <br> arc at the centre is double the angle <br> subtended by it at any point on the <br> remaining part of the circle. | 1 |
| Total marks | $\mathbf{1}$ | $\mathbf{2}$ |  |  | $\mathbf{3}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to use the theorem angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.
Sources and diagrams

## Source(s)



## Question(s)

1 In the given figure $\angle \mathrm{PQR}=100^{\circ}$

1 (a) Find the measure of $\angle \mathrm{POR}$
(2 marks)

1 (b) Find the measure of $\angle \mathrm{OPR}$

## Mark scheme

1 (a) Find the measure of $\angle \mathrm{POR}$

| Answer | Guidance |
| :--- | :--- |
| $\angle \mathrm{POR}=100^{\circ}$ | M1 to find the reflex $\angle \mathrm{POR}$ |
| Here reflex $\angle \mathrm{POR}=2 \angle \mathrm{PQR}=2 \mathrm{P} 100^{\circ}=$ |  |
| $200^{\circ}$ |  |
| (since angle subtended by an arc at the <br> centre is double the angle subtended by it |  |


| at any point on the remaining part of the <br> circle) <br> Therefore, $\angle P O R=360^{\circ}-200^{\circ}=160^{\circ}$ | A1 to find the correct value of $\angle \mathrm{POR}$ in <br> degree. |
| :--- | :--- |
| 1 (b) Find the measure of $\angle \mathrm{OPR}$ |  |
| Answer $10^{\circ}$ | Guidance |
| $\angle O P R=30^{\circ}$ <br> In $\triangle O P R, O P=O R ~($ radii of the same <br> circle) |  |
| Therefore,$\angle O P R=\angle O R P------($ (i) |  |
| In $\triangle O P R, \angle O P R+\angle O R P+\angle P O R=180^{\circ}$ <br> From (i) <br> $\angle O P R+\angle O P R=180^{\circ}-160^{\circ}$ <br> $2 \angle O P R=20^{\circ}$ <br> $\angle O P R=10^{\circ}$ | A1 to write correct value of $\angle O P R$. |

## Maths9LK8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK8 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9LK8 | 3 | N | 9G6b Be able to use the fact that: The <br> perpendicular from the centre of a circle <br> to a chord bisects the chord and <br> conversely, the line drawn through the <br> centre of a circle to bisect a chord is <br> perpendicular to the chord | 3 |  |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the ability to use the perpendicular from the centre of a circle to a chord bisects the chord.

## Source(s)



## Question(s)

1 If the radius of a circle is $5 \mathrm{~cm}, \mathrm{AB}=6 \mathrm{~cm}$ and $\mathrm{CD}=8 \mathrm{~cm}$ then determine PQ
(3 marks)
(Total marks 3)

## Mark scheme

1 In the diagram, PQ is perpendicular to both AB and CD , and goes through the centre of the circle, O .

If the radius of a circle is $5 \mathrm{~cm}, \mathrm{AB}=6 \mathrm{~cm}$ and $\mathrm{CD}=8 \mathrm{~cm}$ then determine PQ .

| Answer | Guidance |
| :---: | :---: |
| $\mathrm{PQ}=7 \mathrm{~cm}$ <br> Since, the perpendicular from the centre of a circle to a chord bisects the chord. <br> Therefore, $P$ and $Q$ are mid points of $A B$ and $C D$ respectively. $\begin{aligned} & A P=P B=1 / 2 A B=3 \mathrm{~cm} \\ & \text { and } C Q=Q D=1 / 2 C D=4 \mathrm{~cm} \end{aligned}$ <br> In right $\triangle \mathrm{OAP}$ and OCQ by using Pythagoras theorem $\begin{aligned} & O A^{2}=O P^{2}+A P^{2} \text { and } O C^{2}=O Q^{2}+C Q^{2} \\ & O P^{2}=5^{2}-3^{2} \quad O Q^{2}=5^{2}-4^{2} \\ & O P^{2}=16 \\ & \Rightarrow O P=4 \quad \text { and } O Q=3 \\ & P Q=O P+O Q=(4+3)=7 \mathrm{~cm} \end{aligned}$ | M1 to use the perpendicular from the centre of a circle to a chord bisects the chord <br> M1 to find the correct value of OP and OQ by Pythagoras theorem <br> A1 to find correct value of PQ . |

## Maths9LK9

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK9 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9LK9a | 2 | N | 9G6h Be able to use the fact that: The <br> sum of either of the pair of the <br> opposite angles of a cyclic <br> quadrilateral is $180^{\circ}$ and its converse. | 2 |  |
| Maths9LK9b | 1 |  | N | 9G6h Be able to use the fact that: The <br> sum of either of the pair of the <br> opposite angles of a cyclic <br> quadrilateral is $180^{\circ}$ and its converse. | 1 |
| Total marks | $\mathbf{1}$ | $\mathbf{2}$ |  |  | $\mathbf{3}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to use the fact that the sum of either of the pair of the opposite angles of a cyclic quadrilateral is $180^{\circ}$.

## Source(s)



## Question(s)

1 In the given figure $\angle \mathrm{DBC}=70^{\circ}$ and $\angle \mathrm{BAC}=50^{\circ}$.

1 (a) Find the measure of $\angle B C D$
(2 marks)

1 (b) If $A B=B C$, then find the measure of $\angle E C D$
(1 mark)
(Total marks 3)

## Mark scheme

1 (a) Find the measure of $\angle B C D$

| Answer | Guidance |
| :---: | :---: |
| $\angle B C D=60^{\circ}$ <br> Given $\angle \mathrm{DBC}=70^{\circ}$ and $\angle \mathrm{BAC}=50^{\circ}$ $\angle \mathrm{CBD}$ and $\angle \mathrm{CAD}$ are angles on the same segment CD <br> Therefore $\angle \mathrm{CBD}=\angle \mathrm{CAD}$ $\angle C A D=70^{\circ}$ <br> Now $\angle \mathrm{BAD}=\angle \mathrm{BAC}+\angle \mathrm{CAD}$ $\Rightarrow \angle B A D=50^{\circ}+70^{\circ}=120^{\circ}$ <br> Since $A B C D$ is a cyclic quadrilateral. $\begin{gathered} \angle \mathrm{BAD}+\angle \mathrm{BCD}=180^{\circ} \\ 120^{\circ}+\angle \mathrm{BCD}=180^{\circ} \\ \angle \mathrm{BCD}=60^{\circ} \end{gathered}$ | M1 to use the properties of circle that is angles on same segment are equal and opposite angles of a cyclic quadrilateral is supplementary. <br> A 1 to find the correct value of $\angle \mathrm{BCD}$. |


| 1 (b) If $A B=B C$, then find the measure of $\angle E C D$ |  |
| :--- | :--- |
| Answer | Guidance |
| If $A B=A C$, then in $\triangle A B C$, we have  <br> $\angle A C B=\angle B A C$  |  |
| $\Rightarrow \angle A C B=50^{\circ}$  <br> Therefore $\angle E C D$ $=\angle B C D-\angle A C B$ <br>  $=60^{\circ}-50^{\circ}=10^{\circ}$ | A1 to write correct value of $\angle E C D$. |

## Maths9LK10

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK10 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9LK10a | 1 |  | N | 9G6e Be able to prove, and use the fact <br> that: The angle subtended by an arc at <br> the centre is double the angle subtended <br> by it at any point on the remaining part of <br> the circle. | 1 |
| Maths9LK10b | 1 |  | N | 9G6e Be able to prove, and use the fact <br> that: he angle subtended by an arc at the <br> centre is double the angle subtended by it <br> at any point on the remaining part of the <br> circle. | 1 |
| Maths9LK10c | 1 |  | N | 9G6e Be able to prove, and use the fact <br> that: The angle subtended by an arc at <br> the centre is double the angle subtended <br> by it at any point on the remaining part of <br> the circle. | 1 |
| Maths9LK10c | 1 |  | N | 9G6e Be able to prove, and use the fact <br> that: The angle subtended by an arc at <br> the centre is double the angle subtended <br> by it at any point on the remaining part of <br> the circle. | 1 |
| Total marks | $\mathbf{4}$ |  |  |  |  |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to use angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.

## Source(s)



## Question(s)

1 Three STD booth are placed at A, B and C in the figure and these are operated by handicapped persons. These three booth are equidistant from each other as shown in the figure

1 (a) Find the measure of $\angle \mathrm{BAC}$

1 (b) Find the measure of $\angle \mathrm{BOC}$

1 (c) Find the sum of $\angle \mathrm{OBC}$ and $\angle \mathrm{OCB}$

1 (d) If $A B=8 \mathrm{~cm}$, find the value of $(B C+C A)$

## Mark scheme

| 1 (a) Find the measure of $\angle \mathrm{BAC}$ |  |
| :---: | :---: |
| Answer | Guidance |
| $\angle B A C=60^{\circ}$ <br> Since $\triangle A B C$ is an equilateral triangle. | A1 to find the correct value of $\angle B A C$. |
| 1 (b) Find the measure of $\angle B O C$ |  |
| Answer | Guidance |
| $\angle \mathrm{BOC}=120^{\circ}$ <br> Since the angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle. | A1 to write correct value of $\angle \mathrm{BOC}$. |
| 1 (c) Find the sum of $\angle \mathrm{OBC}$ and $\angle \mathrm{OCB}$ |  |
| Answer | Guidance |
| $\begin{aligned} & 60^{\circ} \\ & \angle B O C+\angle O C B=30^{\circ}+30^{\circ}=60^{\circ} \end{aligned}$ <br> $\triangle \mathrm{BOC}$ is an isosceles triangle. | A1 to write correct value of $\angle \mathrm{OBC}+\angle \mathrm{OCB}$. |
| 1 (d) If $A B=8 \mathrm{~cm}$, find the value of ( $B C+C A$ |  |
| Answer | Guidance |
| 16 cm <br> $\triangle \mathrm{ABC}$ is an equilateral triangle. Therefore $B C+C A=16 \mathrm{~cm}$ | $A 1$ to write correct value of BC +CA. |

## Maths9CN7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9CN7 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9CN7a | 2 |  | N | 9G6e Be able to prove, and use the <br> fact that: The angle subtended by an <br> arc at the centre is double the angle <br> subtended by it at any point on the <br> remaining part of the circle | 2 |
| Maths9CN7b |  | 2 | N | 9G6e Be able to prove, and use the <br> fact that: The angle subtended by an <br> arc at the centre is double the angle <br> subtended by it at any point on the <br> remaining part of the circle | 2 |
| Maths9CN7c |  | 2 | N | 9G3e Be able to prove, and to use the <br> fact that: The angles opposite to equal <br> sides of a triangle are equal. | 2 |
| Total marks | $\mathbf{2}$ | $\mathbf{4}$ |  |  | $\mathbf{6}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to calculate angle subtended by an arc at the centre and the angle subtended by an arc at any point on the remaining part of the circle

## Sources and diagrams



## Question(s)

1 Four friends Rima, Sita, Mohan and Sohan are sitting on the circumference of a circular park. Their locations are marked by points $A, P, Q$ and $R$.

Rohit joins them and sits at the centre of the circular park, so he is equidistant from all the other friends. His position is marked as O.

They are sitting in such a way that $\angle P Q R=110^{\circ}$.

1 (a) What is the measure of reflex of $\angle \mathrm{POR}$. Give reason
(2 marks)
1 (b) What is the measure of $\angle \mathrm{PAR}$ ? Give reason
(2 marks)
1 (c) Find $\angle$ OPR. Give reason

## Mark scheme

| (a) What is the measure of reflex of $\angle \mathrm{POR}$. Give reason |  |
| :--- | :--- |
| Answer | Guidance |
|  | M1 reason |
| Reflex $\angle \mathrm{POR}=220^{\circ}$ | A1 Correct answer |
| (Angle subtended by an arc at the centre <br> is double the angle subtended by it in the <br> remaining part of the circle) |  |

1(b) What is the measure of $\angle$ PAR? Give reason

| Answer | Guidance |
| :--- | :--- |
| Reflex $\angle P O R=220^{\circ}$ | MI Reason |
| $\mathrm{SO} \angle \mathrm{POR}=140^{\circ}$ |  |
| Hence $\angle P A R=70^{\circ}$ | (Angle subtended by an arc at the centre <br> is double the angle subtended by it in the <br> remaining part of the circle) |
| Alternative: use $P Q R=110$ (given) and <br> opposite angles in cyclic quadrilateral add <br> to 180. |  |

1(c) Find $\angle O P R$. Give reason

| Answer | Guidance |
| :--- | :--- |
| $\mathrm{OP}=\mathrm{OR}($ Radius - | M1 reason |
| $\angle \mathrm{OPR}+\angle \mathrm{POR}+\angle \mathrm{ORP}=180^{\circ}($ Sum of |  |
| angles of a triangle $)$ |  |
| $\mathrm{OP}=\mathrm{OR}$ |  |
| $\mathrm{So} \angle \mathrm{OPR}=\angle \mathrm{ORP}($ angles opposite equal |  |
| sides are equal $)$ |  |
| So $2 \angle \mathrm{OPR}+\angle \mathrm{POR}=180^{\circ}$ |  |
| $2 \angle \mathrm{OPR}=180-140=40^{\circ}$ | A1 Correct answer |
| $\angle O P R=20^{\circ}$ |  |

## Maths9CN8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9CN8 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E** | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9CN8 | 2 | 3 | N | 9G4f Use the fact that: In a triangle, the line <br> segment joining the mid points of any two <br> sides is parallel to the third side and in half of <br> it and (motivate) its converse. <br> 9G4d Use the fact that: A quadrilateral is a <br> parallelogram if a pair of its opposite sides is <br> parallel and equal. | 5 |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to calculate sides of triangles

## Sources and diagrams



## Question

1 Prove that the line segment joining the mid-points of two sides of a triangle is parallel to the third side of the triangle

## Mark scheme

| 1 Prove that the line segment joining the mid-points of two sides of a triangle is parallel |  |
| :--- | :--- |
| to the third side of the triangle |  |
| Answer | Guidance |
|  |  |
| B |  |
| Construction : Extend the line segment joining points $D$ and $E$ to $F$ |  |
| such that $D E=E F$ and join CF. |  |
| Proof: In $\triangle A E D$ and $\triangle C E F$ |  |
| $D E=E F(G i v e n)$ |  |
| $\angle A E D=\angle C E F($ Vertically opposite angles) |  |
| $A E=C E(E$ is the midpoint of $A C)$ |  |
| $A D E D \cong \triangle C E F(S A S)$ |  |
| $\angle D A E=\angle F C E(C P C T)$ |  |


| Since alternate interior angles are equal so |  |
| :---: | :---: |
| AB \|| CF | M1 For congruence criteria |
| $A D=B D$ ( $D$ is mid point ) |  |
| $B \mathrm{D}=\mathrm{CF}$ |  |
| BD \|| CF |  |
| So BDFC is a parallelogram As one pair of side is parallels and equal | M1 For reason |
| So DF \|| BC |  |
| i.e DE \|| $B C$ | A1 for proving parallelgram |

## Maths9CN9

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9CN9 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9CN9a | 2 |  | E | 9G6h Be able to use the fact that: The <br> sum of either of the pair of the opposite <br> angles of a cyclic quadrilateral is $180^{\circ}$ and <br> its converse. | 2 |
| Maths9CN9b |  | 3 | E | 9G6f Be able to use the fact that: Angles <br> in the same segment of a circle are equal. | 3 |
| Total marks | $\mathbf{2}$ | $\mathbf{3}$ |  |  | $\mathbf{5}$ |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability that if The sum of either of the pairs of the opposite angles of a quadrilateral is $180^{\circ}$ then it is cyclic.

## Sources and diagrams

$\square$

## Question(s)

1 (a) In quadrilateral $A B C D$, the sum of angles $A B C$ and $A D C$ is $180^{\circ}$.
Is ABCD a cyclic quadrilateral?
Give reason to justify your answer

1 (b) If $\angle \mathrm{DBC}=55^{\circ}$ and $\angle \mathrm{BAC}=45^{\circ}$ Find $\angle \mathrm{BCD}$.

## Mark scheme

1 (a) In quadrilateral ABCD, the sum of angles ABC and ADC is $180^{\circ}$.
Is ABCD a cyclic quadrilateral?
Give reason to justify your answer

| Answer | Guidance |
| :--- | :--- |
| If the sum of opposite angles of a quadrilateral <br> is 180 then the quadrilateral is cyclic. <br> Yes vertices of the quadrilateral lie on the circle | M1 for reason |
|  | A1 for correct answer |


| Answer | Guidance |
| :--- | :--- |
| $\angle D B C=55^{\circ}$ | M1 for reason |
| $\angle D A C=55^{\circ}$ (Angles in the same segment of the | M1 for reasonA1 for correct answer |
| circle) | Alternate method: |
|  | $\angle B D C=\angle B A C=45$ (Angles in the same |
| $\angle B A C=45^{\circ}$ | segment of the circle) |
| $\angle D A B=\angle D A C+\angle B A C=45^{\circ}+55^{\circ}=100$ | In $\triangle B D C$ |
| $\angle B C D+\angle D A B=180(O p p o s i t e$ angles of a |  |
| cyclic quadrilateral) | $\angle B D C+\angle D B C+\angle B C D=180$ (Angle sum |
|  | property of triangle) <br> $\angle B C D=180-45-55=80$ |
| $\angle B C D=180-100=80$ |  |

## Maths9MS8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9MS8 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9MS8a | 2 |  | N | 9G6h Be able to use the fact that: <br> The sum of either of the pair of the <br> opposite angles of a cyclic <br> quadrilateral is $180^{\circ}$ and its <br> converse | 2 |
| Maths9MS8b |  | 5 | N | 9G6h Be able to use the fact that: <br> The sum of either of the pair of the <br> opposite angles of a cyclic <br> quadrilateral is $180^{\circ}$ and its <br> converse | 5 |
| Total marks | $\mathbf{2}$ | $\mathbf{5}$ |  |  | $\mathbf{7}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge about properties of cyclic quadrilateral

Sources and diagrams


Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

$1 \quad A B C D$ is a cyclic quadrilateral. PQRS is a quadrilateral formed by the internal angle bisectors of the angles of ABCD.

1 (a) If $\angle \mathrm{A}=90^{\circ}, \angle \mathrm{B}=x^{\circ}, \angle \mathrm{C}=y^{\circ}, \angle \mathrm{D}=110^{\circ}$, Evaluate $x+y$
(2 marks)
1 (b) Prove that the quadrilateral PQRS is also cyclic.
(5 marks)
(Total marks 7)

## Mark scheme

| 1 (a) If $\angle \mathrm{A}=90^{\circ}, \angle \mathrm{B}=x^{\circ}, \angle \mathrm{C}=y^{\circ}, \angle \mathrm{D}=110^{\circ}$, Evaluate $x+y$ |  |
| :--- | :--- |
| Answer | Guidance |
| $180^{\circ}$ | M 1 : Getting the value of $x$ and $y$ |
|  | M 2 : Getting the value of $x+y$ |
|  | A1: Value of $\mathrm{x}=70^{\circ}$ and $\mathrm{y}=90^{\circ}-1$ mark |
|  | A2: Value of $\mathrm{x}+\mathrm{y}=160^{\circ}-1$ Mark |
|  |  |


| 1 (b) Prove that the quadrilateral PQRS is also cyclic. |  |
| :--- | :--- |
| Answer | Guidance |
| Proving the sum of opposite angles $=$ <br> $180^{\circ}$ | M1: Identifying the angle measures of <br> quadrilateral PQRS <br> M1:Proving the sum of opposite angles of <br> quadrilateral $=180^{\circ}$ <br> A1: Identifying the angle measures of angles <br> in quadrilateral PQRS -3 marks <br> A2: Proving Sum of opposite angles of <br> quadrilateral PQRS $=180^{\circ}-2$ marks |

## Maths9AN1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AN1 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9AN1 |  | 1 | E | 9G6h (Be able to use the fact that: The <br> sum of either of the pair of the opposite <br> angles of a cyclic quadrilateral is $180^{\circ}$ <br> and its converse. | 1 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the student's ability to identify and use properties of cyclic quadrilaterals.

## Sources and diagrams


(Figure not to scale)
Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 In the figure below, $P, Q, R$ and $S$ are points on the circle and $T$ is a point inside the circle on PQ. $\angle \mathrm{PQR}=80^{\circ}$. Which of the following is definitely true?
(i) $\angle \mathrm{PTR}=80^{\circ}$
(ii) $\angle \mathrm{PSR}=100^{\circ}$
A. only (i)
B. only (ii)
C. both (i) and (ii)
D. neither (i) nor (ii)

## Mark scheme

1 In the figure below, $P, Q, R$ and $S$ are points on the circle and $T$ is a point inside the circle. $\angle \mathrm{PQR}=80^{\circ}$. Which of the following is definitely true?
(iii) $\angle \mathrm{PTR}=80^{\circ}$
(iv) $\angle \mathrm{PSR}=100^{\circ}$
A. only (i)
B. only (ii)
C. both (i) and (ii)
D. neither (i) nor (ii)

| Answer | Guidance |
| :--- | :--- |
| B. only (ii) | A1: Correct answer only |
| Opposite angles add to 180, but T can be <br> anywhere on PQ, inside the circle, so <br> PTR will be greater than 80. | Do not penalize the student if he writes (ii) <br> only or B. |

## Maths9RS3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9RS3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9RS3 | 2 |  | E | 9M1a Calculate the area of a triangle <br> using Heron's formula | 2 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses basic to find area of triangle using Heron's formula.

## Source(s)

$\square$

Source information: book/journal, author, publisher, website link etc.

## Question(s)

1 If in a triangle ( $s-a$ ), ( $s-b$ ) and ( $s-c$ ) are $150 \mathrm{~m}, 100 \mathrm{~m}$ and 20 m respectively, then find the sides $a, b$ and $c$ of the triangle, where $s$ is the semi perimeter of the triangle
(2 marks)
(Total marks 2)

## Mark scheme

1 If in a triangle ( $\mathrm{s}-\mathrm{a}$ ), ( $\mathrm{s}-\mathrm{b}$ ) and ( $\mathrm{s}-\mathrm{c}$ ) is $150 \mathrm{~m}, 100 \mathrm{~m}$ and 20 m then find the sides a, $b$ and $c$ of the triangle, where $s$ is the semi perimeter of the triangle.

| Answer | Guidance |
| :--- | :--- |
| According to the question | M1 To get till equation (i) |


| $s-a=150 \mathrm{~m}$ | A1 getting correct answer of $\mathrm{a}, \mathrm{b}$ and c |
| :--- | :--- |
| $\mathrm{s}-\mathrm{b}=100 \mathrm{~m}$ |  |
| $\mathrm{~s}-\mathrm{c}=20 \mathrm{~m}$ |  |
| we know $s=\frac{a+b+c}{2}$ or $\mathrm{a}+\mathrm{b}+\mathrm{c}=2 \mathrm{~s} \ldots \ldots$. (i) |  |
| $\mathrm{s}-\mathrm{a}+\mathrm{s}-\mathrm{b}+\mathrm{s}-\mathrm{c}=150+100+20$ |  |
| $3 \mathrm{~s}-(\mathrm{a}+\mathrm{b}+\mathrm{c})=270$ |  |
| Or 3s $-2 \mathrm{~s}=270($ from eq 1) |  |
| $\mathrm{S}=270$ |  |
| Now $\mathrm{s}-\mathrm{a}=150$ |  |
| $270-\mathrm{a}=150$ |  |
| Or $\mathrm{a}=120 \mathrm{~m}$ |  |
| Similarly $\mathrm{b}=170 \mathrm{~m}$ |  |
| And $\mathrm{c}=250 \mathrm{~m}$ |  |

## Maths9AN9

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AN9 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C} / \mathbf{N} / \mathbf{E}^{*}$ | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9AN9a | 1 | 1 | C | 9M2a Calculate the surface areas <br> and volumes of cubes, cuboids, <br> spheres (including hemispheres) <br> and right circular cylinders/cones. | 2 |
| Maths9AN9b |  | 2 | C | 9M1a Calculate the area of a <br> triangle using Heron's formula <br> (without proof) and its application in <br> finding the area of a quadrilateral. | 2 |
| Maths9AN9c | 2 | 1 | C | 8M4a Find the surface area of <br> cuboids and cylinders | 3 |
| Total marks | $\mathbf{3}$ | $\mathbf{4}$ |  |  | $\mathbf{7}$ |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses student's ability to apply formulae of Surface area and volumes to solve real word problems.

## Sources and diagrams



Not to scale
Figure 1: Chocolate box


Diagram not drawn to scale

Figure 2: Lid of the box
Figures not to scale

## Question(s)

Twenty-four spherical shaped chocolates are arranged in an open cuboidal box in four
1 rows and six columns. Each chocolate has a radius of 1.2 cm . The 24 chocolates fit perfectly in the box with each chocolate touching the ones around it or the sides of the box.

1 (a) Calculate the volume of 24 chocolates inside the box.
(2 marks)
1 (b) The lid of the box (Figure 2) has a triangular design as shown in figure above. The triangle has sides $10 \mathrm{~cm}, 9 \mathrm{~cm}$ and 7 cm . Find the area of the triangular design.
(2 marks)
1 (c) Calculate the outer Surface area of the open box in Figure 1 correct to two decimal places.

## Mark scheme

| 1 (a) Calculate the volume of 24 chocolates inside the box. |  |
| :--- | :--- |
| Answer | Guidance |
| 1 (a) $173.717 \mathrm{~cm}^{3}$ |  |
| Volume of sphere $=\frac{4}{3} \pi r^{3}$ | M1: using formula for sphere |
| Volume of 24 chocolates $=24 \times \frac{4}{3} \pi(1.2)^{3}$ <br> $=173.717 \mathrm{~cm}^{3}$ | A1: to find correct answer |

1 (b) The lid of the box (Figure 2) has a triangular design as shown in figure above. The triangle has sides $10 \mathrm{~cm}, 9 \mathrm{~cm}$ and 7 cm . Find the area of the triangular design.

| Answer | Guidance |
| :--- | :--- |
| $30.6 \mathrm{~cm}^{2}$ |  |
| a $=10 \mathrm{~cm}$ |  |
| $\mathrm{~b}=9 \mathrm{~cm}$ |  |
| $\mathrm{c}=7 \mathrm{~cm}$ |  |
| $\mathrm{~s}=\frac{a+b+c}{2}$ |  |
| $=\frac{10+9+7}{2}$ | M1: finding correct semi-perimeter |
| $=13 \mathrm{~cm}$ |  |
| Area of design $=\sqrt{s(s-a)(s-b)(s-c)}$ |  |
| $=\sqrt{13(13-10)(13-9)(13-7)}$ |  |
| $=\sqrt{13 \times 3 \times 4 \times 6}$ |  |
| $=\sqrt{936}$ |  |
| $=30.59 \mathrm{~cm}$ |  |


|  | Do not penalize the student for omitting units. |
| :---: | :---: |
| 1 (c) Calculate the outer Surface area of the open box in Figure 1 correct to two decimal places. |  |
| Answer | Guidance |
| 1 (c) $253.44 \mathrm{~cm}^{2}$ |  |
| Diameter of 1 chocolate $=1.2 \times 2=2.4$ cm <br> Length of the box $(I)=2.4 \times 6=14.4 \mathrm{~cm}$ <br> Breadth of the box $(b)=2.4 \times 4=9.6 \mathrm{~cm}$ <br> Height of the box $(h)=2.4 \mathrm{~cm}$ | M1: to calculate the correct values of length, breadth and height of the cuboidal box. |
| $\begin{aligned} & \text { Surface area of open box = Area of side } \\ & \text { faces }+ \text { base } \\ & =2 h(I+b)+I \times b \\ & =2 \times 2.4 \times(14.4+9.6)+14.4 \times 9.6 \\ & =2 \times 2.4 \times 24+138.24 \\ & =115.2+138.24 \\ & =253.44 \mathrm{~cm}^{2}(\text { accept } 253.4 \text { or } 253) \end{aligned}$ | M1: to correctly use the expression to calculate the area of 5 faces of the box. <br> A1: correct answer |
| Alternatively, <br> Students can calculate the |  |
| Surface area of open box $=$ TSA- area of the top face $\begin{aligned} & =2(I \times b+b \times h+h \times I)-I \times b \\ & =2(14.4 \times 9.6+9.6 \times 2.4+2.4 \times 14.4)- \\ & 14.4 \times 9.6 \\ & =2(138.24+23.04+34.56)-138.24 \\ & =391.68-138.24 \\ & =253.44 \mathrm{~cm}^{2} \end{aligned}$ | Do not penalize the student for omitting units. |

## Maths9RS5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9RS5 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9RS5 |  | 3 | C | 9M1a Calculate the area of a triangle <br> using Heron's formula | 3 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses basic knowledge of heron's formula.

## Source(s)

Source information: book/journal, author, publisher, website link etc.

## Question(s)

1
The sides of a triangular park of a school are $120 \mathrm{~m}, 100 \mathrm{~m}$ and 110 m .

The school principal gave a contract to a company to plant grass in the park at the rate of Rs 4500 per hectare.

How much does the school have to pay to the company? Give your answer to the nearest 100 Rs.

## Mark scheme

1. The dimensions of a triangular park of a school are $120 \mathrm{~m}, 100 \mathrm{~m}$ and 110 m .

The school principal gave a contract to a company to plant grass in the park at the rate of Rs 4500 per hectare.

How much does the school have to pay to the company? Give your answer to the nearest 100 Rs.

| Answer | Guidance |
| :---: | :---: |
| $\text { Semi perimeter }=\frac{120+100+110}{2}=\frac{330}{2}=165$ <br> Area of triangle $\begin{gathered} =\sqrt{165(165-120)(165-100)(165-110)} \\ =\sqrt{165 \times 45 \times 65 \times 55} \\ =825 \sqrt{39}=825 \times 6.245 \\ =5152.12 \ldots \text { square metre } \\ (1 \text { hectare }=10000 \text { sq } \mathrm{m}) \\ =0.5152 \text { hectare } \end{gathered}$ <br> Cost of planting trees $=4500 \times 0.5152$ $\text { = Rs } 2318 \text { = Rs } 2300 \text { (to nearest }$ <br> Answers which rounded intermediate values may come to something other than 2318, but should round to 2300 . | M1 For using correct Heron's formula and putting values <br> A1 area of triangle in hectare <br> A1 Cost of planting trees |

## Maths91M6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9IM6 |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9IM6a | 1 |  | C | 9M2a - Calculate the surface areas <br> and volumes of cubes, cuboids, <br> spheres (including hemispheres) and <br> right circular cylinders / cones. | 1 |
| Maths9IM6b |  | 2 | C | 9M2a - Calculate the surface areas <br> and volumes of cubes, cuboids, <br> spheres (including hemispheres) and <br> right circular cylinders / cones. | 2 |
| Total marks | $\mathbf{1}$ | $\mathbf{2}$ |  |  | $\mathbf{3}$ |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the understanding of volumes of different right circular cylinders.

## Sources and diagrams



Figure not to scale

## Question(s)

1 The cylinder shown in the figure has radius 10 cm and its volume is $6600 \mathrm{~cm}^{3}$.

1 (a) What is the formula for finding the volume of a cylinder?

1 (b) Find the height of the cylinder. (Take $\pi=\frac{22}{7}$ )

## Mark scheme

| 1 (a) What is the formula for finding the volume of a cylinder? |  |
| :---: | :---: |
| Answer | Guidance |
| $V=\pi r^{2} h$ | A 1 <br> Correct response only |
| 1 (b) Find the height of the cylinder. (Take $\pi=\frac{22}{7}$ ) |  |
| Answer | Guidance |
| $\begin{aligned} & \text { Radius }=10 \mathrm{~cm} \\ & \text { Volume }=6600 \mathrm{~cm}^{3} \\ & \frac{22 \times 10 \times 10 \times h}{7}=6600 \\ & \frac{6600 \times 7}{22 \times 100}=h \\ & \frac{46200}{2200}=h \\ & 21=\mathrm{h} \end{aligned}$ | M 1 $h=\frac{46200}{2200}$ or equivalent <br> A 1 $h=21 \mathrm{~cm}$ <br> Accept $\mathrm{h}=21$ |
| Answer: $h=21 \mathrm{~cm}$ |  |

## Maths9JJ3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9JJ3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9JJ3 | 1 |  | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right circular <br> cylinders/cones. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of student to use the relationship between diagonal and side of a cube and hence find the volume.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

Find the volume of the cube if its diagonal is $\sqrt{33} \mathrm{~cm}$ ?
A. $3.32 \mathrm{~cm}^{3}$
B. $3.648 \mathrm{~cm}^{3}$
C. $11 \mathrm{~cm}^{3}$
D. $36.48 \mathrm{~cm}^{3}$

## Mark scheme

1 Find the volume of the cube if its diagonal is $\sqrt{33} \mathrm{~cm}$ ?
A. $3.32 \mathrm{~cm}^{3}$
B. $3.648 \mathrm{~cm}^{3}$
C. $11 \mathrm{~cm}^{3}$
D. $36.48 \mathrm{~cm}^{3}$

| Answer | Guidance |
| :--- | :--- |
| D. $36.48 \mathrm{~cm}^{3}$ | 1 mark for the correct answer |
|  |  |

## Maths9AN2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AN2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :---: | :---: | :--- | :---: |
| Maths9AN2 |  | 1 | E | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to calculate the percentage change in the volume of a cube under change in its edge.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 If each edge of a cube is increased by $25 \%$, the percentage increase in its surface area is
A. $25 \%$
B. 48.75 \%
C. $50 \%$
D. 56.25 \%

## Mark scheme

1 If each edge of a cube is increased by $25 \%$, the percentage increase in its surface area is
A. $25 \%$
B. $48.75 \%$
C. 50 \%
D. $56.25 \%$

| Answer | Guidance |
| :--- | :--- |
| D. $56.25 \%$ | A1: Correct answer only |
| $1.25^{2}=1.5625$, so $56.25 \%$ increase | Do not penalize the student for missing the <br> percentage sign. Please accept answers (D) <br> or $56.25 \%$ |

## Maths9SM5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9SM5 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9SM5a | 1 | 1 | C | 9M2a Calculate the surface areas <br> and volumes of cubes, cuboids. | 2 |
| Maths9SM5b | 1 | 1 | C | 9M2a Calculate the surface areas <br> and volumes of cubes, cuboids. | 2 |
| Total marks | $\mathbf{2}$ | $\mathbf{2}$ |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the correct application of formula of a cuboid.

## Sources and diagrams



Diagram not drawn to scale

Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1 Raju went to the market and bought a cuboidal box of volume $105 \mathrm{~cm}^{3}$. The dimensions of box are $7 \mathrm{~cm} \times 3 \mathrm{~cm} \times \mathrm{y} \mathrm{cm}$, as shown in the diagram.
1 (a) Find y

1 (b) Raju wants to cover four faces of the box by coloured paper, leaving top and bottom uncovered. How much square cm of paper is required to cover it?

## Mark scheme

| 1 (a) Find y |  |
| :---: | :---: |
| Answer | Guidance |
| $\begin{align*} & \text { Volume }=1 \times b \times h \\ & 105=7 \times 3 \times \text { y }  \tag{1}\\ & y=5 \mathrm{~cm} \text { (1) } \end{align*}$ | M1 for equating correct values in the formula <br> A1for calculating correct value of $y$. |
| 1 (b) Raju wants to cover the four faces of the box (leaving top and bottom) by coloured paper. How much square cm of paper is required to cover it? |  |
| Answer | Guidance |
| $\begin{align*} 2(l+b) \times h & =2(7+5) \times 3 \quad(1) \\ & =72 \text { square } \mathrm{cm} . \tag{1} \end{align*}$ | M1 for attempting to take area of 4 sides <br> A1 for correct answer |

## Maths9DP8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9DP8 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9DP8a | 1 | 1 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 2 |
| Maths9DP8b | 3 | 1 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 4 |
| Total marks | $\mathbf{4}$ | $\mathbf{2}$ |  |  | $\mathbf{6}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

This question assesses the ability of the student to understand how to break a problem into component parts and calculate volume and total surface area of a cuboid, and use proportion in a real-world context.

## Sources and diagrams

## Questions

1 Meera's bedroom has 3 closets. The first closet measures 4 ft . in length, 3 ft . in width and 7 ft . in height. The second closet measures 5 ft . length, 2 ft . in width and 7 ft . in height. And the third closet measures 5 ft . in length, 5 ft in width and 4 ft in height. (Use $1 \mathrm{ft}=30 \mathrm{~cm}$ )

1 (a) She wants to keep winter clothes in the closet having maximum space. In which closet should she keep them in ? Show your working.

1 (b) Calculate the total surface area of all the three closets. Write your answer in meter squares.

## Mark scheme

| 1 (a) She wants to keep winter clothes in the closet having maximum space. In which closet she should keep? |  |
| :---: | :---: |
| Answer | Guidance |
| In third closet volume of first closet $=1 \times b x h=4 \times 3 \times 7=84$ volume of second closet $=5 \times 2 \times 7=70$ volume of third closet $=5 \times 5 \times 4=100$ third closet will have maximum space. | M1 - to find volume of all three closets. <br> A1 for correct answer <br> Don't penalise if unit is omitted. |
| 1 (b) Calculate the total surface area of all the three closets. Write your answer in meter squares. |  |
| Answer | Guidance |
| TSA of first Closet $=2$ (lb+bh+hl) $2(12+21+28)=122$ square ft TSA of second Closet= 2 ( $\mathrm{lb}+\mathrm{bh}+\mathrm{hl}$ ) $2(10+14+35)=118$ square ft TSA of third Closet= 2 (lb+bh+hl) $2(25+20+20)=130$ square ft TSA of all the three closets= $122+118+130=370$ square $\mathrm{ft}=370 \mathrm{x}$ $(30 / 100)^{2}=33.3$ square meters <br> 370 square ft OR 33.3 square metres | M1 to find SA of a cuboid and A3 for calculations being correct (1 each for up to 2 correct and last mark for correct total) |

## Maths9RS8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9RS8 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :---: | :---: | :--- | :---: |
| Maths9RS8a | 2 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 2 |  |
| Maths9RS8b | 2 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 2 |  |
| Maths9RS8c |  | 2 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 2 |
| Total marks |  | $\mathbf{6}$ |  |  | $\mathbf{6}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge of surface area and volume of solid shapes

## Source(s)

$\square$

Source information: book/journal, author, publisher, website link etc.

## Question(s)

1 A cylinder vessel of radius 18 cm and height 70 cm is half filled with water. Rohan put a spherical ball in the vessel. By doing this the height of water raised 24 cm . On the basis of this find answer of the following questions:

1 (a)
Find the radius of the sphere.

1 (b)
Find the capacity of cylindrical vessel in litres.
1 (c)
If Rohan wanted to paint the sphere with blue colour then find the cost of painting at the rate of Rs 57 per square cm .

## Mark scheme

1 (a) Find the radius of the sphere.

| Answer | Guidance |
| :--- | :--- |
| Let radius of sphere is R cm <br> Volume of sphere = volume of water raised in cylinder <br> $\frac{4}{3} \pi R^{3}=\pi r^{2} h$ | M1 For equating volume <br> of sphere and volume of <br> cylinder <br> A1 for finding correct <br> radius |
| $\qquad$$\frac{4}{3} \pi R^{3}=\pi 18^{2} \times 24$ <br> $R^{3}=18 \times 18 \times 18$ |  |
| $\qquad$ |  |


| 1 (b) Find the capacity of cylindrical vessel in litres. |  |
| :---: | :---: |
| Answer | Guidance |
| $\begin{aligned} & \begin{aligned} & \mathrm{r}=18 \mathrm{~cm}, \mathrm{~h}=70 \mathrm{~cm} \\ & \text { Capacity of cylindrical vessel }=\pi r^{2} h \\ &=\frac{22}{7} \times 18^{2} \times 70 \\ &=22 \times 18 \times 18 \times 10 \\ &=71,280 \mathrm{~cm}^{3} \\ &=712.8 \text { litre }(1 \text { litre }=1000 \end{aligned} \\ & \text { cubic } \mathrm{cm}) \end{aligned}$ | M1 For putting correct values in the formula <br> A1 writing final answer in litres <br> Note student can use value of $\pi$ as 3.14 also, will consider answer in that case also. |
| 1 (c) If Rohan wanted to paint the sphere with blue colour then find the cost of painting at the rate of 5 paise per square cm . |  |
| Answer | Guidance |
| $\begin{aligned} & \text { Surface area of sphere }=4 \pi r^{2} \\ & \qquad \begin{aligned} = & 4 \times \frac{22}{7} \times 18 \times 18 \\ = & \frac{28512}{7} \\ = & 4073.14 \mathrm{sq} . \mathrm{cm} \end{aligned} \\ & \begin{aligned} & \text { Cost of painting }=4073.14 \times 5 \\ &=4073.14 \times 5=20365.7 \text { paise } \\ &= \text { Rs } 203.65 \end{aligned} \end{aligned}$ | M1 for putting correct values in the formula <br> A1 for finding the correct cost of painting. |

## Maths9AG1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AG1 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9AG1 | 1 | 2 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 3 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the logical thinking of student and their knowledge application.

## Sources and diagrams



## Question

Astha is playing with building blocks which are cube shaped. She builds a structure as shown above. If the edge of a cube is 3 cm , find the volume of the structure built by Astha in $\mathrm{cm}^{3}$.

## Mark scheme

1 Astha is playing with building blocks which are cube shaped. She builds a structure as shown above. If the edge of a cube is 3 cm , find the volume of the structure built by Astha in $\mathrm{cm}^{3}$.

| Answer | Guidance |
| :--- | :--- |
| $405 \mathrm{~cm}^{3}$ | M 1 Volume of one cube $=(\text { edge })^{3}=3^{3}=27$ <br> $\mathrm{~cm}^{3}$ |
|  | M 1 Volume of structure $=$No. of cubes $X$ <br> Volume of one <br> cube. |
|  | A 1 Volume $=15 \times 27=405 \mathrm{~cm}^{3}$ |

## Maths9AG2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AG2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9AG2 | 2 | 2 | E | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right circular <br> cylinders/cones. | 4 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the practical knowledge of student and how he or she able to apply his or her knowledge in different applications of daily life situations.

## Sources and diagrams



[^0]
## Question

1 A child playing with clay forms a spherical ball with a radius of 3 cm . After some time he recasts the same spherical ball into a cylindrical pillar with a radius of 1 cm . Find the height of the new formed pillar. (Use $\pi=\frac{22}{7}$ )
(4 marks)
(Total marks 4)

## Mark scheme

1 A child playing with clay forms a spherical ball with a radius of 3 cm . After some time he recasts the same spherical ball into a cylindrical pillar with a radius of 1 cm . Find the height of the new formed pillar. (Use $\pi=\frac{22}{7}$ )

| Answer | Guidance |
| :--- | :--- |
| Height $=36 \mathrm{~cm}$ | M 1 Volume of Sphere $=$ Volume of Cylinder |
|  | M 1 Volume of Sphere $=\frac{4}{3} \pi r^{3}$ |
|  | M 1 Volume of Cylinder $=\pi r^{2} h$ |
|  | A $1 \frac{4}{3} X \pi X 27=\pi X 1 X h$ |
|  | $h=36 \mathrm{~cm}$ |

## Maths9GB7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9GB7 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9GB7 | 2 | 2 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 4 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to interpret a real-word problem, break given information into smaller components to apply/calculate surface area of a compound shape and apply his/her understanding.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 The diameter of a cylindrical roller is 90 cm and its length is 110 cm long.

If it takes 560 complete revolutions to level a children's playground, find the cost of levelling the playground at the rate of ₹ 500 per square metre.
(Use $\pi=3.14$ )
(Total marks 4)

## Mark scheme

1 The diameter of a cylindrical roller is 90 cm and its length is 110 cm long, If it takes 560 complete revolutions to level a children's playground, find the cost of levelling the playground at the rate of ₹ 5 per square metre.
(Use $\pi=3.14$ )

| Answer | Guidance |
| :--- | :--- |
| ₹ 870408 <br> 000 | M1 A1 for area levelled in 1 revolution <br> Area $=2 \pi r h=2 \times 3.14 \times 45 \times 110=31086 \mathrm{~cm}^{2}$ <br> or $3.1086 \mathrm{~m}^{2}$ |
|  | A1 - to find area levelled in 560 revolutions <br> Explanation: <br> Area $\times 560$ revolutions $=17408160 \mathrm{~cm}^{2}$ or 870410 or ₹ 870 <br> $1740.82 \mathrm{~m}^{2}$ |
|  | M1 A1 - to find cost of levelling by using <br> correct conversion of area or cost per sq. m |
|  | Explanation: <br> Total area $\times 5$ per $\mathrm{m}^{2}=17408160 \times \frac{5}{10000} \mathrm{or}$ <br> $1740.82 \times 500=870410$ |
|  | Intermediate rounding will lose 1 mark <br> overall. |

## Maths9GB8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9GB8 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9GB8 | 2 | 2 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 4 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to apply concept of surface area and volume to calculate for a hemisphere in a given situation

## Sources and diagrams



Source information if copied: https://brainly.in/question/33179133

## Question

1 A hemispherical bowl is made up of 1 cm thick bamboo sheet. The outer diameter of the bowl is 20 cm .

Find the cost of painting the inside of the bowl at the rate of ₹ 8 per square cm .
(Use $\pi=3.14$ )

## Mark scheme

1. A hemispherical bowl is made up of 1 cm thick bamboo sheet. The outer diameter of the bowl is 20 cm , then find the volume of the bamboo used to make the tank. Find the cost of painting the inside of the bowl at the rate of ₹ 2 per square cm .
(Use $\pi=3.14$ )

| Answer | Guidance |
| :--- | :--- |
| $r=9 \mathrm{~cm}$ <br> Surface area $=2 \pi r^{2}=508.68 \mathrm{~cm}^{2}$ | M1 A1 - to find correct inner radius and use <br> correct formula to find surface area of <br> hemispherical bowl <br> Cost of painting $=508.68 \mathrm{~cm}^{2} \times 2$ <br> $=₹ 1017.36$ |
| Accept answer ₹ 1017 or ₹ 1020 | M1 $1-$ for calculating the cost of painting <br> the hemispherical bowl |
|  |  |

## Maths9JJ9

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9JJ9 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9JJ9 | 2 | 2 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones. | 4 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the ability of the students to construct and interpret bar graphs.

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 Sarah is collecting water for irrigating her agricultural land from a canal 2 m deep, 10 m wide and the water flows through the canal at a rate of $2 \mathrm{~km} / \mathrm{hr}$.

In every minute she is collecting $\frac{1}{10}^{\text {th }}$ of the water flowing through the canal and storing it in a cubical tank.

If her tank will be fully filled with water in 2 hours, what is the dimension of her tank?

## Mark scheme

1 Sarah is collecting water for irrigating her agricultural land from a canal 2 m deep, 10 m wide and the water flows through the canal at a rate of $2 \mathrm{~km} / \mathrm{hr}$. In every minute she is collecting $\frac{1}{10}^{\text {th }}$ of the water flowing through the canal and storing it in a cubical tank. If her tank will be fully filled with water in 2 hours, what is the dimension of her tank? (all decimal numbers should be rounded to two decimal places)

| Answer | Guidance |
| :--- | :--- |
| $20 \mathrm{~m} \times 20 \mathrm{~m} \times 20 \mathrm{~m}$ | M1 -4 km length of water passing |
|  | M1 - calculating water stored as $1 / 10 \times 10 \times$ |
| $2 \times 4000$ |  |
|  | A1 - volume of tank $=8000 \mathrm{~m}^{3}$ |
|  | A1 - dimensions of tank - cube of side 20 |
|  | m. |

## Maths9GB3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9GB3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :---: | :---: | :--- | :---: |
| Maths9GB3 |  | 3 | C | 9M2a Calculate the surface areas and <br> volumes of cubes, cuboids, spheres <br> (including hemispheres) and right <br> circular cylinders/cones | 3 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to visualise/generate and compute volume of a solid shape (cone) out of a two-dimensional figure

## Sources and diagrams



Source information if copied: https://www.cuemath.com/measurement/right-circular-conebasics/

## Question

1
In a right triangle of given dimensions is revolved about one of its side as shown in the figure.
What is the volume of the solid figure so obtained?
(Use $\pi=\frac{22}{7}$ )
(Total marks 3)

## Mark scheme

1 A right triangle of given dimensions is revolved about one of its side as shown in the figure. What is the volume of the solid figure so obtained?
(Use $\pi=\frac{22}{7}$ )

| Answer | Guidance |
| :--- | :--- |
| $314.29 \mathrm{~cm}^{3}$ | M1 - to find correct radius and height of the <br> cylinder <br> Also accept rounded off answer 314.3 <br> $\mathrm{cm}^{3}$ (or 314.16 or 314.2) |
|  | M1 to find volume of cone, using correct <br> formula <br> A1 - to answer rounded off and in correct <br> unit $\left(\mathrm{cm}^{3}\right)$ <br> Calculation $=\frac{1}{3} \times \frac{22}{7} \times 5^{2} \times 12=314.28571$ <br> $\mathrm{~cm}^{3}$ <br> Do not penalise for using $\pi$ on calculator <br> $($ gives 314.159....) |

## Maths9SM2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9SM2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9SM2 | 1 |  | N | 9N1a Representation of natural <br> numbers, integers, rational numbers <br> (both terminating and non-terminating <br> recurring decimals | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the understanding of decimal expansions of rational numbers.

## Question

1
The number 0.318564318564318564 $\qquad$ is:
A. a natural number
B. an integer
C. a rational number
D. an irrational number

Mark scheme

| 1 The number $0.318564318564318564 \ldots . .$. is: |  |
| :--- | :--- |
| Answer | Guidance |
| C. a rational number (1) | M1 for choosing correct option. |
| Because it is a recurring decimal | Accept C), C, (C) |

## Maths9NK 1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NK1 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9NK1 | 1 |  | N | 9N1c Know that some numbers such as <br> $\sqrt{2}$ and $\sqrt{3}$ are not rational | 1 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the distinguishing property of Irrational Numbers

## Question

1 The decimal expansion of an irrational number is?
A. Terminating Decimal
B. Recurring Decimal
C. Either Terminating or Non- Terminating
D. Non- Terminating and Non- Recurring

## Mark scheme

1 The decimal expansion of an irrational number is?
A. Terminating Decimal
B. Recurring Decimal
C. Either Terminating or Non- Terminating
D. Non- Terminating and Non- Recurring

| Answer | Guidance |
| :--- | :--- |
| D. Non- Terminating and Non- Recurring | A1 - 1 mark for correct answer |

## Maths9MS2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9MS2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E}$ | Content Reference(s) | Marks |
| :--- | :--- | :--- | :--- | :--- | :---: |
| Maths9MS2 | 1 |  | N | 9N1e Rationalization (with precise <br> meaning, i.e. that the denominator is an <br> integer) of real numbers of the type <br> where x and y are natural numbers and <br> a and b are integers. | 1 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the knowledge of expressing irrational numbers as surds
Sources and diagrams
$\square$
Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 Evaluate: $8 \sqrt{15} \div 2 \sqrt{3}$
(Total marks 1)

## Mark scheme

1 Evaluate: $8 \sqrt{15} \div 2 \sqrt{3}$

| Answer | Guidance |
| :--- | :--- |
| $4 \sqrt{5}$ | A1 For correct answer |

## Maths9NK5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NK5 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9NK5a | 2 |  | N | 9N1e Rationalization (with precise <br> meaning, i.e. that the denominator is <br> an integer) of real numbers of the type <br> where x and y are natural numbers <br> and a and b are integers. | 2 |
| Maths9NK5b | 2 |  | N | 9N1f Laws of exponents to include <br> rational exponents with positive real <br> bases. | 2 |
| Total marks | 4 |  |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the properties and simplification process of Real Numbers

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1
1 (a) What would be the denominator after rationalizing $\frac{7}{5 \sqrt{3}-5 \sqrt{2}}$ ?
1 (b) Express $\sqrt[4]{\sqrt[3]{3}} 3^{2}$ as a single exponent. Show your work

## Mark scheme

| 1 (a) What would be the denominator af | er rationalizing $\frac{7}{5 \sqrt{3}-5 \sqrt{2}}$ ? |
| :---: | :---: |
| Answer | Guidance |
| Point Marking <br> Rationalizing Factor will be $(5 \sqrt{ } 3+5 \sqrt{ } 2)$ <br> Product of $(5 \sqrt{ } 3-5 \sqrt{ } 2) *(5 \sqrt{ } 3+5 \sqrt{ } 2)$ <br> Apply Identity $(a+b)(a-b)=\left(a^{2}-b^{2}\right)$ $\begin{aligned} & =(5 \sqrt{ } 3)^{2}-(5 \sqrt{ } 2)^{2} \\ & =(25 * 3)-(25 * 2) \\ & 25(3-2) \end{aligned}$ <br> 25 | MA 1- <br> Identity of Rationalizing Factor $(5 \sqrt{ } 3+5 \sqrt{ } 2)$ <br> Use of Identity Apply Identity $(a+b)(a-b)=\left(a^{2}-b^{2}\right)$ <br> Product of $(5 \sqrt{ } 3-5 \sqrt{ } 2) *(5 \sqrt{ } 3+5 \sqrt{ } 2)$ <br> Apply Identity $(a+b)(a-b)=\left(a^{2}-b^{2}\right)$ $\begin{aligned} & =(5 \sqrt{ } 3)^{2}-(5 \sqrt{ } 2)^{2} \\ & =(25 * 3)-(25 * 2) \\ & 25(3-2)=25 \end{aligned}$ <br> M2- <br> Direct use of $(5 \sqrt{ } 3)^{2}-(5 \sqrt{ } 2)^{2}$ <br> $(25 * 3)-(25 * 2)$ <br> 25 (3-2) <br> 25 <br> A1 Correct Solution - 2 marks <br> A2 - Only R F - 1 mark <br> A3 - None correct - Zero |
| 1 (b) Evaluate: $\sqrt[4]{\sqrt[3]{3}}{ }^{2}$ Show your work |  |
| Answer | Guidance |
| Point Marks $\begin{aligned} & \sqrt[4]{3} 3^{2} \\ & =\left(\left(3^{2}\right)^{1 / 3}\right)^{1 / 4}=3^{2 / 12} \\ & =3^{1 / 6} \end{aligned}$ <br> Final Answer $=3^{1 / 6}$ | M1 - Use of laws of exponents (Multiplication of all roots and power) - 1 mark <br> Simplification $3^{2 / 12}$ <br> Final reduction to lowest form $3^{1 / 6}-1$ mark <br> A1-2 marks |

## Maths9NM5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NM5 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9NM5a | 2 |  | N | 9N1e Rationalization (with precise <br> meaning, i.e. that the denominator is an <br> integer) of real numbers of the type <br> $\frac{2}{a+b} \sqrt{2} \frac{2}{\sqrt{x}+\sqrt{y}}$ <br> numbers and a and b are integers. | 2 |
| Maths9NM5b | 2 |  | N | 9N1f Laws of exponents to include <br> rational exponents with positive real <br> bases. | 2 |
| Total marks | 4 |  |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the properties and simplification process of Real Numbers

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1
1 (a) Express $\frac{6}{3 \sqrt{2}-2 \sqrt{3}}$ with rational denominator.
(2 marks)
1 (b) Express $\sqrt[4]{\sqrt[3]{2^{2}}}$ as a single exponent. Show your work.
(2 marks)
(Total marks 4)

## Mark scheme

1 (a) Express $\frac{6}{3 \sqrt{2}-2 \sqrt{3}}$ with rational denominator.

| Answer | Guidance |
| :---: | :---: |
| Point Marking <br> Rationalizing Factor will be $(3 \sqrt{ } 2+2 \sqrt{ } 3)$ <br> (1) <br> Product of $(3 \sqrt{ } 2-2 \sqrt{ } 3) \times(3 \sqrt{ } 2+2 \sqrt{ } 3)$ <br> Apply Identity $(a+b)(a-b)=\left(a^{2}-b^{2}\right)$ $\begin{aligned} & =(3 \sqrt{ } 2)^{2}-(2 \sqrt{ } 3)^{2} \\ & =\left(9^{*} 2\right)-\left(4^{*} 3\right) \\ & =18-12 \\ & =6(1) \end{aligned}$ | MA 1- <br> Identification of Rationalizing factor $(3 \sqrt{ } 2+2 \sqrt{ } 3)$ $\text { Product of }(3 \sqrt{ } 2-2 \sqrt{ } 3) \times(3 \sqrt{ } 2+2 \sqrt{ } 3)$ <br> Apply Identity $(a+b)(a-b)=\left(a^{2}-b^{2}\right)$ $\begin{aligned} & =(3 \sqrt{ } 2)^{2}-(2 \sqrt{ } 3)^{2} \\ & =\left(9^{*} 2\right)-\left(4^{*} 3\right) \\ & =18-12 \\ & =6 \end{aligned}$ <br> MA2- <br> Direct use of $(3 \sqrt{ } 2)^{2}-(2 \sqrt{ } 3)^{2}$ $\begin{aligned} & =(9 * 2)-(4 * 3) \\ & =18-12 \\ & =6 \end{aligned}$ <br> A1 Correct Solution - 2 marks <br> A2 - Only Rationalising factor - 1 mark <br> A3 - None correct - Zero |

1 (b) Express $\sqrt[4]{\sqrt[3]{2^{2}}}$ as a single exponent. Show your work.

| Answer | Guidance |
| :--- | :--- |
| Point Marks | M1 - Use of laws of exponents ( |
| $\sqrt[4]{\sqrt[3]{2^{2}}}$ | Multiplication of all roots and power) - 1 |
| $=\sqrt[4]{\left(2^{2}\right)^{\frac{1}{3}}}$ | mark |
|  | Simplification and |
|  | Final answer in the form $2^{\frac{1}{6}}-1$ mark |

$=\left(2^{\frac{2}{3}}\right)^{\frac{1}{4}}$
$=2^{\frac{2}{3} \times \frac{1}{4}}$
$=2^{\frac{1}{6}}$

Final Answer $=2^{\frac{1}{6}}(1)$

## Maths9CN6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9CN6 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :---: | :---: | :--- | :---: |
| Maths9CN6a |  | 1 | C | 9N1e Rationalization (with precise <br> meaning, i.e. that the denominator is <br> an integer) of real numbers of the type <br> where x and y are natural numbers <br> and a and b are integers | 1 |
| Maths9CN6b |  | 1 | C | 9N1f Laws of exponents to include <br> rational exponents with positive real <br> bases. | 1 |
| Maths9CN6c |  | 2 | N | 9N1bKnow that a rational number is a <br> terminating decimal if the only prime <br> factors of the denominator are 2 and / <br> or 5, otherwise it is a recurring <br> decimal | 2 |
| Total marks |  | $\mathbf{4}$ |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to apply various operations to rational numbers and convert recurring decimal numbers in the form $p / q$

## Question(s)

1 (a) Find the value of $\frac{1+\sqrt{3}}{-1+\sqrt{3}}$ correct to three decimal places.

1 (b) Determine the value of $6^{0} \sqrt[3]{1+\frac{37}{3^{3}}}$ correct to two decimal places.

1 (c) Show that $1.999 \ldots \ldots$ is equal to 2 .

## Mark scheme

1 (a) Find the value of $\frac{1+\sqrt{3}}{-1+\sqrt{3}}$ correct to three places of decimal.

| Answer | Guidance |
| :---: | :---: |
| $\frac{1+\sqrt{3}}{-1+\sqrt{3}}=3.732$ | A1 Correct answer |
| 1(b) Determine the value of $6^{0} \sqrt[3]{1+\frac{37}{3^{3}}}$ up to two places of decimal |  |
| Answer | Guidance |
| $6^{0} \sqrt[3]{1+\frac{37}{3^{3}}}=1.33$ | A1 Correct answer |
| 1 (c) Show that $1.999 \ldots \ldots$ is equal to 2 . |  |
| Answer | Guidance |
| $\begin{align*} & \text { Let } x=1.9999999 \ldots \ldots .  \tag{1}\\ & 10 x=19.9999 \ldots .  \tag{2}\\ & \text { Sub }(1) \text { from }(2) \\ & 10 x-x=19.9999 \ldots-1.999999 \ldots \ldots \\ & 9 x=18 \\ & x=\frac{18}{9}=2 \end{align*}$ | M1 For the method <br> A1 Correct answer |

## Maths9LK11

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK11 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9LK11 | 4 | N | 9N1e Rationalization (with precise <br> meaning, i.e. that the denominator is an <br> integer) of real numbers of the type | 4 |  |
| $\frac{2}{a+b \sqrt{x} \frac{2 n d}{\sqrt{x}+\sqrt{y}} \text { ( where } \mathrm{x} \text { and y are natural }}$numbers and a and b are integers. |  |  |  |  |  |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to rationalize the denominator.

## Source(s)

$\square$

## Question(s)

1
Simplify $\frac{7 \sqrt{3}}{\sqrt{10}+\sqrt{3}}-\frac{2 \sqrt{5}}{\sqrt{6}+\sqrt{5}}-\frac{3 \sqrt{2}}{\sqrt{15}+3 \sqrt{2}}$

Mark scheme

| 1 Simplify $\frac{7 \sqrt{3}}{\sqrt{10}+\sqrt{3}}-\frac{2 \sqrt{5}}{\sqrt{6}+\sqrt{5}}-\frac{3 \sqrt{2}}{\sqrt{15}+3 \sqrt{2}}$ |  |
| :--- | :--- |
|  |  |
| Answer | Guidance |



## Maths9LK12

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK12 |
|  |  |  |


| Item identity | A01 marks | AO2 marks | C/N/E* | Content Reference(s) | Marks |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Maths9LK12a |  | 2 | C | 9N1e Rationalization (with precise meaning, i.e. that the denominator is an integer) of real numbers of the type $\frac{1}{a+b \sqrt{x}}$ and $\frac{1}{\sqrt{x}+\sqrt{y}}$ (where $x$ and $y$ are natural numbers and $a$ and $b$ are integers. | 2 |
| Maths9LK12b |  | 2 | C | 9N1e Rationalization (with precise meaning, i.e. that the denominator is an integer) of real numbers of the type $\frac{2}{a+b \cdot \sqrt{x}}$ and $\frac{1}{\sqrt{x+}+\sqrt{5}}$ (where $x$ and $y$ are natural numbers and $a$ and $b$ are integers. | 2 |
| Total marks |  | 4 |  |  | 4 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability to rationalize the denominator.

## Source(s)

$\square$

## Question(s)

1 If $x=1-\sqrt{2}$ then find the value of
1 (a) $\quad x+\frac{1}{x}$ with a rational denominator (2 marks)
1 (b) $\quad x^{2}+\frac{1}{x^{2}}$ with a rational denominator

## Mark scheme

1 (a) $x+\frac{1}{x}$ (up to three decimal places)

| Answer | Guidance |
| :--- | :--- |
| -2.828 |  |
| $x=1-\sqrt{2}$ | M1 to rationalise and to find the value of $1 / x$ |
| then $\frac{1}{x}=\frac{1}{1-\sqrt{2}}$ and rationalising the |  |

$\frac{1}{x}=\frac{1}{1-\sqrt{2}} \times \frac{1+\sqrt{2}}{1+\sqrt{2}}$
$=\frac{(1+\sqrt{2})}{1^{2}-\sqrt{2}^{2}}=\frac{(1+\sqrt{2})}{1-2}=-(1+\sqrt{2})$
Therefore $x+\frac{1}{x}=(1-\sqrt{2})+\{-(1+\sqrt{2})\}$

$$
\begin{aligned}
& =1-\sqrt{2}-1-\sqrt{2}=-2 \sqrt{2} \\
& =-2 \times 1.414=-2.828
\end{aligned}
$$

A1 to find the correct value of $x+\frac{1}{x}$

1 (b) $x^{2}+\frac{1}{x^{2}}$

| Answer | Guidance |
| :--- | :--- |
| 6 |  |
| $x^{2}=(1-\sqrt{2})^{2}=1-2 \sqrt{2}+2=3-2 \sqrt{2}$ (i) | M1 for finding the value of $x^{2}$ and $1 / x^{2}$ |
| $\frac{1}{x^{2}}=\left\{-(1+\sqrt{2})^{2}\right\}=1+2 \sqrt{2}+2=3+2 \sqrt{2}$ |  |
| (ii) |  |
| By adding (i) and (ii) |  |
| $x^{2}+\frac{1}{x^{2}}=3-2 \sqrt{2}+3+2 \sqrt{2}=6$ | A1 to write correct value of $x^{2}+\frac{1}{x^{2}}$. |

## Maths9IM4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9IM4 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths91M4 | 1 |  | N | 9N1f Laws of exponents to include <br> rational exponents with positive real <br> bases | 1 |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the application of logical reasoning in classifying real numbers, proving their properties and using them in different situations.

## Question

1 Find the value of $343^{\frac{-1}{3}}$.
A. -7
B. $\frac{-1}{7}$
C. $\frac{1}{7}$
D. 7

## Mark scheme

1 Find the value of $343^{\frac{-1}{3}}$
A. -7
B. $\frac{-1}{7}$
C. $\frac{1}{7}$
D. 7

| Answer | Guidance |
| :--- | :--- |
| C. $\frac{1}{7}$ | M1 for choosing correct option. <br> Accept c), c, $\frac{1}{7}$ |

## Maths9SM1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9SM1 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9SM1 | 1 |  | N | 9N1f Laws of exponents to include <br> rational exponents with positive real <br> bases. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the understanding of conversion of a number into exponential form.

## Question

1 The earth has a surface area of approximately $510100000 \mathrm{~km}^{2}$. Express this in SI units (in square m).
A. $5.101 \times 10^{8} \mathrm{~m}^{2}$
B. $5.101 \times 10^{11} \mathrm{~m}^{2}$
C. $5.101 \times 10^{14} \mathrm{~m}^{2}$
D. $5101 \times 10^{11} \mathrm{~m}^{2}$
(2 marks)
(Total marks 2)

## Mark scheme

1. The earth has a surface area of approximately $510100000 \mathrm{~km}^{2}$.Express it in SI units. (in square m).

| Answer | Guidance |
| :--- | :--- |
| C. $5.101 \times 10^{14} \mathrm{~m}^{2}$ | M1 for choosing correct option. <br> Accept C), C, (C) |

## Maths9BS2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9BS2 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9BS2 | 1 |  | N | 9N1f Laws of exponents to include <br> rational exponents with positive real <br> bases. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge of exponents and laws of exponents. ...

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1
What is the value of $\left(1^{3}+2^{3}+3^{3}\right)^{\frac{1}{2}}$
A. 4
B. 6
C. 8
D. 10

## Mark scheme

1 What is the value of $\left(1^{3}+2^{3}+3^{3}\right)^{\frac{1}{2}}$
A. 4
B. 6
C. 8
D. 10

| Answer | Guidance |
| :--- | :--- |
| B. 6 <br> $1^{3}+2^{3}+3^{3}=36$, and $36^{1 / 2}=6$ | A1 : For correct answer |

## Maths9LK4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9LK4 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9LK4 | 1 |  | N | 9N1f Laws of exponents to include <br> rational exponents with positive real <br> bases. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of the student to use the laws of exponents to solve the examples.

## Source(s)

$\square$

Source information: book/journal, author, publisher, website link etc.

## Question(s)

$1 \quad$ Find the value of $\sqrt[4]{(256)^{-3}}$
A. $1 / 64$
B. $1 / 16$
C. $1 / 4$
D. 16

## Mark scheme

1 Find the value of $\sqrt[4]{(256)^{-3}}$
A. $1 / 64$
B. $1 / 16$
C. $1 / 4$
D. 16

| Answer | Guidance |
| :--- | :--- |
| A. $1 / 64$ | A1 - to write correct answer |
|  |  |

## Maths9BS5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9BS5 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :---: | :--- | :---: |
| Maths9BS5 | 1 | 1 | N | 9N1f Laws of exponents to include <br> rational exponents with positive real <br> bases. | 2 |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the knowledge of rationalisation of Surds.
Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1

$$
\text { Simplify: } \sqrt[4]{81}-8 \sqrt[3]{216}+15 \sqrt[5]{32}+\sqrt{225}
$$

## Mark scheme

| $\sqrt{4}$ Simplify: |  |
| :--- | :--- |
| Answer | Guidance |
| 0 | $\sqrt[4]{81}-8 \sqrt[3]{216}+15 \sqrt[5]{32}+\sqrt{225}+15 \sqrt[5]{32}+\sqrt{225}$ <br> $M 1: 3-8 \times 6+15 \times 2+15$ <br> $3-48+15+30$ <br> A1: $=0$ <br> (Total marks 2) |

## Maths9RS7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9RS7 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :--- | :--- | :--- | :---: |
| Maths9RS7a | 1 |  | N | 9S1a collection of data | 1 |
| Maths9RS7b | 1 |  | N | 9S1a collection of data | 1 |
| Maths9RS7c | 1 |  | N | 9S1a collection of data | 1 |
| Total marks | $\mathbf{3}$ |  |  |  | $\mathbf{3}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the concept of collection of data and interpret the data.

## Source(s)

Source information: book/journal, author, publisher, website link etc.

## Question(s)

1 The weights of new born babies in kg are recorded by a hospital to maintain their records. On a particular day following weights are recorded:

$$
3.4,2.7,2.5,3.7,2.1,3.5,2.7,2.2,4.0,2.6,3.3,3.0,3.1,
$$

1 (a)
Find the range of the data.

1 (b) How many babies weigh below 3.0 kg .

1 (c) What is the mean weight.

## Mark scheme

1 (a) Find the range of the data
(1 mark)

| Answer | Guidance |
| :--- | :--- |
| Range | $=$ Highest observation - lowest observation |
|  | $=4.0-2.1$ |
|  | $=1.9 \mathrm{~kg}$ |$\quad$ A1 For correct answer $\quad$ (

1 (b) How many babies weigh below 3.0 kg
(1 mark)

| Answer | Guidance |
| :--- | :--- |
| 6 babies weigh less than 3 kg | A1 For correct answer |

1 (c) What is the mean weight.
(1 mark)

| Answer | Guidance |
| :--- | :--- |
| Mean weight $=$ sum of all observation $/$ total number of <br> observation | A1 for correct answer <br> Allow 2.98, 3.0 and 3 as <br> correct values |
| $\qquad=\frac{38.8}{13}=2.9846 \ldots \mathrm{~kg}=3.0 \mathrm{~kg}$. | \begin{tabular}{l}
\end{tabular} |

## Maths9NM6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NM6 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9NM6a | 1 |  | N | 9S1b Presentation of data - construct <br> and interpret bar graphs. | 1 |
| Maths9NM6b | 3 |  | N | 9S1b Presentation of data - construct <br> and interpret bar graphs | 3 |
| Total marks | $\mathbf{4}$ |  |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the analysis and interpretation of data from the given bar graph

## Sources and diagrams



[^1]
## Question

1 Read the above bar graph and answer the following questions.
1 (a) What was the quantity of wheat production in the year 1990-91?

1 (b) What is the difference between the maximum and minimum production of wheat in the time span of 1988-93

## Mark scheme

| 1 (a) What was the quantity of wheat production in the year 1990-91? |  |
| :--- | :--- |
| Answer | Guidance |
| Point Marking <br> Length of the bar graph for the year 1990- <br> $91=55$ | MA 1- |
| Interpretation of data from the bar graph <br> is 55 lakh tons. (1) | A1-1 mark for correct answer. |

1 (b) What is the difference between the maximum and minimum production of wheat in the time span of 1988-93

| Answer | Guidance |
| :--- | :--- |
| In the year 1991-92, production of wheat <br> is maximum and is equal to 65 lakh tons. <br> (1) | M1 - Use of interpretation of data from the <br> bar graph - 1 mark <br> In the year 1989-90, production of wheat <br> is minimum and is equal to 25 lakh tons. <br> (1) |
| M1 - Use of interpretation of data from the <br> bar graph - 1 mark <br> The difference between the maximum <br> and minimum production= 65 lakh tons - <br> 25 lakh tons = 40 lakh tons (1) | M2-Simplification and final answer-1 mark |
|  | A2- 3 marks |

## Maths91M9

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9IM9 |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9IM9a | 1 | 1 | C | 9S1b - Presentation of data - <br> construct and interpret bar graphs | 2 |
| Maths9IM9b | 1 |  | C | 9S1b - Presentation of data - <br> construct and interpret bar graphs | 1 |
| Total marks | $\mathbf{2}$ | $\mathbf{1}$ |  |  | $\mathbf{3}$ |

* $\mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either


## Item purpose

The question assesses the understanding and ability to interpret data from bar graphs and plot them correctly.

## Sources and diagrams



## Question(s)

1 Sonia runs a library in her neighbourhood. She keeps a track of the number of children's books issued each month. The graph shows the number of children's book issued over a period of five months, from November to March next year.

1 (a) If the total number of books issued over these five months is 85 , how many children's books were issued in the month of February?

1 (b) Draw and complete the graph on the graph paper provided.
(1 mark)
(Total marks 3)

## Mark scheme

1 (a) If the total number of books issued over these five months is 85 , how many children's books were issued in the month of February?

| Answer | Guidance |
| :---: | :---: |
| Total books issued in 5 months $\quad=85$ <br> Sum of the books shown in the graph $=72$ (1) <br> Therefore, books issued in Feb21 = 85-72 $=13$ <br> Answer: 13 <br> (1) | M1 Sum of given frequencies <br> Correct response only <br> A1 <br> Correct response only |
| 1 (b) Draw and complete the graph on the graph paper provided. |  |
| Answer | Guidance |
| Complete graph with correct heights and width (1) | M1 Correct depiction of bar heights |
|  |  |

## Maths9AN8

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AN8 |
|  |  |  |


| Item identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9AN8a | 3 |  | N | 9S1b Presentation of data - <br> construct and interpret bar graph | 3 |
| Maths9AN8b | 3 |  | E | 7N3c Convert between percentages, <br> fractions and decimals | 3 |
| Total marks | $\mathbf{6}$ |  |  |  | $\mathbf{6}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses student's ability to represent and interpret data using Bar graph .

## Sources and diagrams

|  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Political <br> Party | A | B | C | D | E | F |  |
| Seats won | 75 | 55 | 37 | 29 | 10 | 37 |  |

Source information: Xam idea Mathematics - IX

## Question(s)

1 Given above are the seats won by different political parties in the polling outcome of the state assembly elections.

1 (a) Draw a bar graph to represent the polling results.

1 (b) Which political party won the largest number of seats? Calculate the percentage of seats won by that party.

## Mark scheme

1 (a) Draw a bar graph to represent the polling results.


1 (b) Which political party won the largest number of seats? Calculate the percentage of seats won by that party.

| Answer | Guidance |
| :--- | :--- |
| Party A, 30.68\% |  |
| PARTY A | A1: correct answer only |
|  | Other acceptable answers are A, Party A etc |
| Total seats $=243$ |  |


|  | M1: Calculating the correct number of total <br> seats. |
| :--- | :--- |
| Percentage of seats won by A  <br> $=\frac{75}{243} \times 100$ A1: Correct answer of percentage <br> $=30.68 \%$ (accept $30.7 \%, 31 \%)$  | Do not penalize the student if the <br> percentage sign is omitted. |

## Maths9NK3

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NK3 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :--- | :---: | :---: | :--- | :---: |
| Maths9NK3 |  | 1 | E | 9S1b Presentation of data - construct and <br> interpret bar graphs | 1 |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the understanding of basic elements of grouped data in statistics

## Sources and diagrams

## Question

1 If ' $m$ ' is the mid-point and ' $I$ ' is the lower-class limit of a class in a continuous frequency distribution. What is the upper-class limit of the class?
A. $2 m+1$
B. $2 m-1$
C. $m-1$
D. $m-21$
(1 mark)
(Total marks 1)

## Mark scheme

1 If ' $m$ ' is the mid-point and ' $l$ ' is the lower-class limit of a class in a continuous frequency distribution. What is the upper-class limit of the class?

A $2 m+1$
B $2 \mathrm{~m}-1$
C m-1
D $m-21$

| Answer | Guidance |
| :--- | :--- |
| B. $2 \mathrm{~m}-1$ | A1 - 1 mark for correct answer |
| Example 5-15 Class Interval | No explanation required |
| Mid point $=10$ |  |
| 2 * mid point $=20$ |  |
| I $=5$ |  |
| hence Upper limit $=20-5=15$ |  |

## Maths9JJ1

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9JJ1 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | $\mathbf{C / N / E *}$ | Content Reference(s) | Marks |
| :--- | :--- | :---: | :---: | :--- | :--- |
| Maths9JJ1 |  | 1 | N | 9S1b Presentation of data - construct and <br> interpret bar graphs | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of student to interpret bar graphs

## Sources and diagrams



## Question

1 The Bar Graph shows the month of birthday of class 9 students in a school. Which month has the most birthdays?
A. May
B. June
C. September
D. October

## Mark scheme

| 1 The Bar Graph shows the month of birthday of class 9 students in a school. Which <br> month has the most birthdays? |  |
| :--- | :--- |
| Answer | Guidance |
| B. June | 1 mark for the correct answer |
|  |  |

## Maths9DP7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9DP7 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9DP7 | 2 | 1 | C | 9S1b Presentation of data - construct <br> and interpret bar graphs, histograms <br> (with varying base lengths), frequency <br> polygons for data given in various forms: <br> ungrouped / grouped data in list or <br> tables. | 3 |

*Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

This question assesses the ability of the student to interpret the given data.

## Sources and diagrams

## Question

1 A costumer can withdraw cash as per the table given below from an ATM 8 times without charges.

| S.NO. | Type of Debit Card | Minimum <br> amount | Maximum <br> amount |
| :--- | :--- | :--- | :--- |
| 1 | CLASSICAL | RS. 100 | RS.20,000 |
| 2 | MAESTRO | RS.100 | RS.20.000 |
| 3 | GLOBAL | RS. 100 | RS.40,000 |
| 4 | GOLD INTERNATIONAL | RS.100 | RS.50,000 |
| 5 | PLATINUM INTERNATIONAL | RS.100 | RS.100,000 |

An Indian family has all 5 kinds of cards.

If all 5 cards are needed to be used maximum number of times, then how many times in all will all 5 cards be used? Also, calculate how much money in all could be withdrawn if all cards are used maximum number of times?
(3 marks)
(Total marks 3)

## Mark scheme

| 1 If all 5 cards are used the maximum number of times without charge, then how many |
| :--- |
| times in all will all cards be used? Also, calculate how much money in all could be |
| withdrawn if all cards are used the maximum number of times without charge? |
| Answer |
| 40 times |
| RS $1,840,000$ Guidance $5 \times 8=40$ <br>  M1 for showing <br>  $20,000+20,000+40,000+50,000+100,000=230,000$ or <br> some attempt to calculate amount on different  <br> cards.  <br>  $230,000 \times 8=1,840,000$ <br>  A1 for correct answer. <br>  Don't penalise if rupees is not written. |

## Maths9NK7

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NK7 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9NK7a | 1 |  | N | 10S2a Calculate probabilities based on <br> scenarios involving equally likely <br> outcomes. | 1 |
| Maths9NK7b |  | 3 | N | 9S1b Presentation of data - <br> construct and interpret bar graphs | 3 |
| Total marks | $\mathbf{1}$ | $\mathbf{3}$ |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the concept of probability and Mean of data

## Sources and diagrams



Source information if copied: https://www.teachoo.com/

## Question(s)

1 (a) From a group of 20 boys and 18 girls, a child is selected to represent the school in an interschool debate competition. Find the probability of this child being a girl.
(1 mark)

1 (b) The bar graph shown above shows gender distribution in St. Mira's Public School in Mumbai. Which gender outnumbers the other and by how much, if all levels are considered from Class 5 to Class 9 ?

## Mark scheme

1 (a) From a group of 20 boys and 18 girls, a child is selected to represent the school in an interschool debate competition. Find the probability of this child being a girl.

| Answer | Guidance |
| :--- | :--- |
| Number of students $-20+18=38$ | MA 1- Use of appropriate formula |
| Number of Girls -18 | Denominator -38 |
| $\mathrm{P}($ Girl being chosen $)=18 / 38$ | Numerator -18 |
| $\mathrm{P}($ Girl $)=9 / 19$ | Ratio $=18 / 38=9 / 19$ |
|  | A1- Correct Answer -1 mark |
|  |  |

1(b) The bar graph shown above shows gender distribution in St. Mira's Public School in Mumbai. Which gender outnumbers the other and by how much, if all levels are considered from Class 5 to Class 9 ?

| Answer | Guidance |
| :--- | :--- |
| Point Marks | M1 - |
| Step 1- Observation of Graph | Step 1-Observation and identification of |
| represents Girls in each Class level. | Total girls for each class |
| Class 5-30 | Step 2-Observation and identification of |
| Class $6-35$ | Total Boys for each class |


| Class $7-20$ | Step 3 - Addition of all classes for each <br> gender \& calculate the difference. |
| :--- | :--- |
| Class $8-25$ | A1 -Explanation and correct steps to reach <br> the answer - 3 marks |
| Step2 |  |
| Boys in each Class level. | A2 - Correct steps but incorrect answer due <br> to error in last step -2 marks |
| Class $5-20$ | A3 - Step1 correct, Step 2 and 3 incorrect - <br> 1 mark <br> Class $6-40$ <br> Class $7-25$ <br> Class $8-35$ <br> Class $9-20$ |
| A4- None correct - Zero |  |
| Step3 |  |
| Total Girls- $30+35+20+25+40=150$ |  |
| Total Boys $-20+40+25+35+20=140$ |  |
| Girls Outnumber Boys by 10 |  |

## Maths9JJ5

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9JJ5 |
|  |  |  |


| ltem <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9JJ5a | 2 |  | N | 9N3d Calculate a number as a <br> percentage of another | 2 |
| Maths9JJ5b |  | 2 | N | 9S1b Presentation of data - construct <br> and interpret bar graphs | 2 |
| Total <br> marks | $\mathbf{2}$ | $\mathbf{2}$ |  |  | $\mathbf{4}$ |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of the students to construct and interpret bar graphs.

## Sources and diagrams

| Items | Grocery | Education | Water | Medicine | Fuel | Entertainment | Miscellaneous | Electricity | Mobile |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Expenditure <br> (in thousands) | 8 | 7 | 1 | 2 | 3 | 2 | 3 | 2 | 2 |

Source information if copied: book/journal, author, publisher, website link etc.

## Question(s)

1 A family with a monthly income of Rs. 30,000 had planned the expenditure per month under various heads as shown the table above.

1 (a) What percentage of the total monthly income is allotted for Grocery and Education?

1 (b) Represent the given information using a Bar Graph.

## Mark scheme

1(a) What percentage of the total monthly income is allotted for Grocery and Education?

| Answer | Guidance |
| :--- | :--- |
| $50 \%$ | M1- Percentage = (total <br> expenditure for grocery and <br> education/total monthly income) <br> x100 |
| A1: 1 mark for correct answer total of 30) | Don't penalize if \% symbol is not <br> written. |

1(b) Represent the given information using a Bar Graph.

| Answer | Guidance |
| :---: | :---: |
| Monthly expenditure | A1 for graph structure (items and scale shown) <br> A1 for bars plotted correctly. |

## Maths9GB6

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9GB6 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :---: | :---: | :--- | :---: |
| Maths9GB6 | 1 | 1 | C | 9S1c Calculate mean, median and <br> mode of ungrouped data. | 2 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to calculate median of a given data in real-life context

## Sources and diagrams

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1
The heights (in cm ) of ten students of a study group are as follows:
$155,160,145,149,150,147,145,152,144$, and 148
Find the median height of the group of students.
(Total marks 2)

## Mark scheme

1 The heights (in cm ) of ten students of a study group are as follows:
$155,160,145,149,150,147,145,152,144$, and 148
Find the median height of the group of students

| Answer | Guidance |
| :--- | :--- |
| 148.5 cm | M1 - for attempt to order heights to identify <br> $5^{\text {th }} \& 6^{\text {th }}$ |


| Accept 148.5, without mention of unit | A1 for correct answer |
| :--- | :--- |
|  | Explanation: Ascending order: 144, 145, |
|  | $145,147,148,149,150,152,155,160$ |
|  | Median $=\frac{5 \text { th }+6 \text { th observation }}{2}=148.5 \mathrm{~cm}$ |

## Maths9NM4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9NM4 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9NM4 | 1 |  | C | 9S2a Calculate estimates of <br> probabilities based on observed <br> frequency of outcomes. | 1 |

*C = Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the ability of computing the probability of an event from a given frequency distribution table.

## Sources and diagrams

|  | Outcomes | 3 heads | 2 heads | 1 head | No head |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  | Frequency | 56 | 144 | 154 | 46 |

## Question

1 Three coins are tossed simultaneously 400 times with the frequencies of different outcomes as given in the above table. The probability of getting at least 2 heads is best estimated as:
A. 0.36
B. 0.14
C. 0.385
D. 0.5

1 Three coins are tossed simultaneously 400 times with the frequencies of different outcomes as given in the above table. The probability of getting at least 2 heads is:
A. 0.36
B. 0.14
C. 0.385
D. 0.5

| Answer | Guidance |
| :--- | :--- |
| D. 0.5 (1) | $\mathrm{A} 1-1$ mark for correct answer |
| Required Probability: |  |
| $\mathrm{P}(2$ heads or 3 heads $)=\mathrm{P}(2$ heads $)+\mathrm{P}(3$ |  |
| heads $)=\frac{144}{400}+\frac{56}{400}=\frac{200}{400}=0.5$ |  |
| Alternately, |  |
| $\mathrm{P}($ getting at least 2 heads $)=\mathrm{P}($ getting 2 or |  |
| more heads $)=\frac{144+56}{400}=\frac{200}{400}=0.5$ |  |

## Maths91M2

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9IM2 |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths91M2 | 1 |  | N | 9S2a Calculate estimates of <br> probabilities based on observed <br> frequency of outcomes. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the understanding of calculating empirical probability.

## Sources and diagrams



## Question

1
A fair spinning wheel is numbered from 1 to 12 . What is the probability of spinning a number which is a perfect square?
A. $\frac{1}{6}$
B. $\frac{1}{4}$
C. $\frac{1}{3}$
D. $\frac{1}{2}$

## Mark scheme

1 A fair spinning wheel is numbered from 1 to 12 . What is the probability of spinning a number which is a perfect square?

| Answer | Guidance |
| :--- | :--- |
| B. $\frac{1}{4}$ (1) Squares are 1, 4 and 9 | M1 for choosing correct option. |
| Accept b), b, $\frac{1}{4}$ |  |

## Maths9AN4

This assessment item is designed to assess the end of class assessments for CBSE schools.

| Subject | Class | Question reference/Filename |
| :--- | :--- | :--- |
| Maths | 9 | Maths9AN4 |
|  |  |  |


| Item <br> identity | AO1 <br> marks | AO2 <br> marks | C/N/E* | Content Reference(s) | Marks |
| :--- | :---: | :--- | :---: | :--- | :---: |
| Maths9AN4 | 1 |  | C | 9S2a Calculate estimates of <br> probabilities based on observed <br> frequency of outcomes. | 1 |

${ }^{*} \mathrm{C}=$ Calculator required, $\mathrm{N}=$ Calculator not allowed, $\mathrm{E}=$ Either

## Item purpose

The question assesses the student's ability to calculate empirical probability under given outcomes of an event.

## Sources and diagrams

|  |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Outcome | 1 | 2 | 3 | 4 | 5 | 6 |
| Frequency | 42 | 65 | 50 | 53 | 60 | 30 |

Source information if copied: book/journal, author, publisher, website link etc.

## Question

1 A die is thrown 300 times with frequencies of outcomes of $1,2,3,4,5$ and 6 as given in the table above. The best estimate of the probability of getting an even number is:
A. $\frac{35}{75}$
B. $\frac{36}{75}$
C. $\frac{37}{75}$
D. $\frac{38}{75}$

## Mark scheme

1 A die is thrown 300 times with frequencies of outcomes of $1,2,3,4,5$ and 6 as given in the following table. The best estimate of the probability of getting an even number is:
A. $\frac{35}{75}$
B. $\frac{36}{75}$
C. $\frac{37}{75}$
D. $\frac{38}{75}$

| Answer | Guidance |
| :--- | :--- |
| C. $\frac{37}{75}$ | A1: Correct answer only |
|  |  |
|  | Other acceptable answers: |
|  | C, $\frac{37}{75}$ |

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