



Curriculum Aligned Competency Based Test Items Mathematics Class - 8

Central Board of Secondary Education

Table of Contents

► Test Item

1	Rational Numbers	03
2	Linear Equations in One Variable	06
3	Understanding Quadrilaterals	10
4	Practical Geometry	14
5	Data Handling	17
6	Squares and Square Roots	21
7	Cubes and Cube Roots	24
8	Comparing Quantities	27
9	Algebraic Expressions and Identities	30
10	Visualising Solid Shapes	34
11	Mensuration	37
12	Exponents and Powers	41
13	Direct and Inverse Proportions	44
14	Factorisation	47
15	Introduction to Graphs	50
16	Playing with Numbers	54

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 1

Rational Numbers

An audit is an official checking of the financial records of a company. It is done by an authorised person who is not an employee of the company. The person who does the audit is called an auditor. An auditor checks the expenses and income made by the company every year. Mohit audited a company with 50 employees. The company records show its annual turnover (annual income) is ₹100 million, and taxes have been paid according to government norms.

SAS21M08Q0101

- 1 Mohit observed that one-fifth of the employees have an annual salary of less than ₹ 400,000. How many employees have an annual salary of less than ₹ 400,000?

SAS21M08Q0102

- 2 This year, the company spent 20% of their income on office maintenance, 40% on paying salaries to their employees and 10% on miscellaneous things (including taxes). The rest of the amount is the profit gained by the company. How much profit did the company earn this year?

SAS21M08Q0103

- 3 According to government norms, a company has to pay a tax of 6% of the total annual income. Mohit said, 'The tax amount paid by the company this year is one-third the amount paid last year.' What was the tax amount paid last year?

Robin writes the properties of rational numbers as –

Property 1: For any two rational number x and y , $x + y = y + x$

Property 2: For any two rational number x and y , $x - y = y - x$

Property 3: For any two rational number x and y , $x/y = y/x$

Property 4: For any two rational number x and y , $x \times y = y \times x$

SAS21M09Q0104

- 4 Which properties written by Robin are incorrect? Why are they incorrect?

SAS21M08Q0105

- 5 Which of the following set of rational numbers lies between -2 and 3 ?

A. $-\frac{5}{2}$, $\frac{3}{7}$, $\frac{2}{3}$, and $\frac{13}{5}$

B. $-\frac{4}{2}$, $\frac{3}{7}$, $\frac{2}{3}$, and $\frac{20}{5}$

C. $-\frac{6}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{2}$

D. $-\frac{1}{3}$, $-\frac{6}{5}$, $\frac{8}{7}$, and $\frac{10}{9}$

SAS21M09Q0106

- 6 Is the statement 'All integers are rational numbers but all rational numbers are not integers' correct? Give examples to support your answer.

SAS21M09Q0107

- 7 There is a two-digit odd number which is not a prime number. When the digits of the number are reversed and added to the number itself, the resultant is a perfect square. What is the number?

SAS21M08Q0108

- 8 An integer is added to its multiplicative inverse. Which of the following statement is valid for the resultant number?

- A. It is an integer
- B. It is a fraction
- C. It is always one
- D. It is a rational

SAS21M08Q0109

- 9 Which letter represents the approximate position of $P + \frac{1}{8}$ on the number line?



- A. Q
- B. R
- C. S
- D. T

SAS21M09Q0110

- 10 Simplify:

$$-\frac{8}{9} \times \left(\frac{3}{7} + \frac{7}{4} \right)$$

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 2

Linear Equations in One Variable

An event management company organises events for its clients. The company takes care of the venue, decoration, and catering. The information used for the calculation of the cost for an event is given in the tables below.

Venue	Capacity (number of people)	Size (in square metres)	Rate (in dollars)
Venue 1 (Closed space)	250	150	650
Venue 2 (Closed space)	250 - 500	200	1000
Venue 3 (Open courtyard)	500 - 2000	7500	3000

Decoration	Charges (per square meter)
Basic	0.5 dollars
Standard	1 dollars
Premium	1.5 dollars

Catering service charges are 30 dollars per head. For organising an event for 250 guests in the closed space with basic decoration and catering, the cost calculation equation is $725+30x$.

SAS21M08C0201

- Write an equation for the cost calculation of organising an event in Venue 2 with premium decoration and catering.

SAS21M08C0202

- 2 The event management company makes a profit of 40% on the venue, 50% on catering and 10% on decoration. How much is the profit in organising an event for 200 guests at Venue 1 with basic decoration?

SAS21M08C0203

- 3 What is the cost (in dollars) of organising an event for 300 people, in the open courtyard with standard decoration and catering?

- A. 1625
B. 10200
C. 15000
D. 19500

SAS21M08C0204

- 4 In an event with more than 1000 guests and standard decoration, a client gets a 20% deduction in catering charges. He pays an amount of 39300 dollars for the event. How many guests did the client invite?

In order to attract more customers, the event management company offers chauffeur driven cars. They provide two services Elite and Premium. Below are the prices offered for the services.

Elite servicesFixed charges – 33 zedsAdditional – 3 zeds per kilometre**Premium services**Fixed charges – 22 zedsAdditional – 4 zeds per kilometre

SAS21M08C0205

- 5 Which pair of linear equation shows the cost of Elite services (P) and Premium services (Q) for x kilometres?

- A. $P = 33$ dollars ; $Q = 22$ dollars
- B. $P = 33x$ dollars ; $Q = 22x$ dollars
- C. $P = 33x + 3$ dollars ; $Q = 22x + 4$ dollars
- D. $P = 33 + 3x$ dollars ; $Q = 22 + 4x$ dollars

SAS21M08C0206

- 6 A client wants to avail car services for 24 kilometres (round trip). Which service would be economical? Justify your choice.

Mohit is an entrepreneur. He started a start-up with an investment of 14,600 dollars. The monthly operating cost of his start-up is given in the table.

Operations	Expenses (in dollars)
Rent	1000
Electricity	100
Overheads (other expenses)	400
Average salary per person	500

He hired four people to run the operations. He was able to earn only operating cost in the first two months. From the third month onward, he earned an average of 1200 dollars per month above the operating cost.

SAS21M08C0207

- 7 After how many months, did Mohit recover his investment?

SAS21M08C0208

- 8 Mohit hired some more employees once he recovered his investment. Write an algebraic expression to show his operating cost after hiring.

SAS21M08C0209

- 9 A linear equation can be written as $ax + b = 0$, where a and b are constants.
Write the equation $3(x - 1) = 5(2x + 1)$ in the form of $ax + b = 0$.

Sasha solves a linear equation.
Her work is shown below.

$$2x - 3 = \frac{x}{2} - 5$$

$$2(2x - 3) = x - 5 \dots \text{Step 1}$$

$$4x - 6 = x - 5 \dots \text{Step 2}$$

$$4x - x = 6 - 5 \dots \text{Step 3}$$

$$3x = 1 \dots \text{Step 4}$$

$$x = \frac{1}{3}$$

SAS21M08C0210

- 10 Is Sasha's solution correct? If not, in which step did Sasha make an error.

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 3

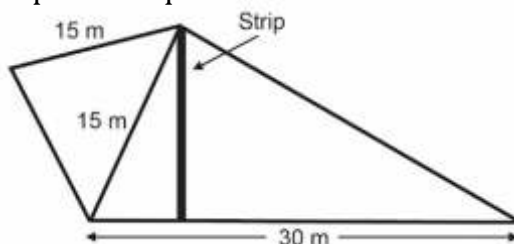
Understanding Quadrilaterals

The floor of a house can be made by laying wooden planks parallel to one another. Anuj uses planks of length and width 150 cm and 30 cm, respectively, for making the floor of his house.

SAS21M08S0301

- 1 The floor of his study is rectangular, 4.5 m long and 3 m wide.
What is the minimum number of planks required to cover its floor?

Anuj lays a wooden floor for a kite-shaped room. He places the strips such that they are perpendicular to the longest side of the room vertically. One strip is shown in the figure.
What is the minimum number of planks required to cover its floor?

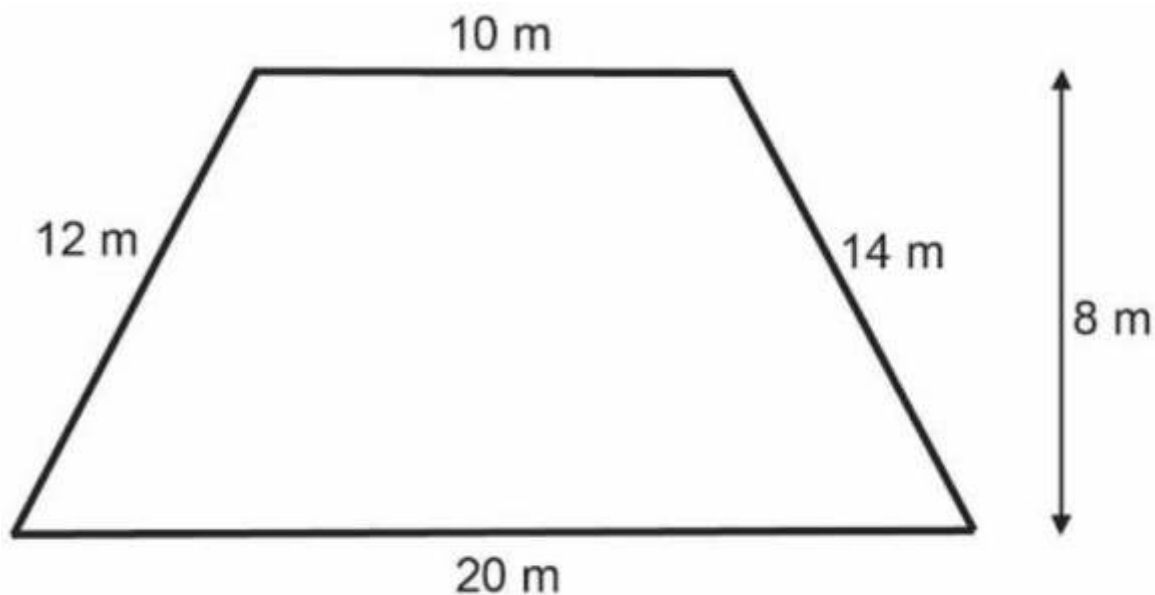


SAS21M08S0302

- 2 What is the approximate length (in m) of the strip in the figure?

- A. 10
- B. 14.6
- C. 15
- D. 22.5

Another floor in Anuj's house is in the shape of a trapezium.



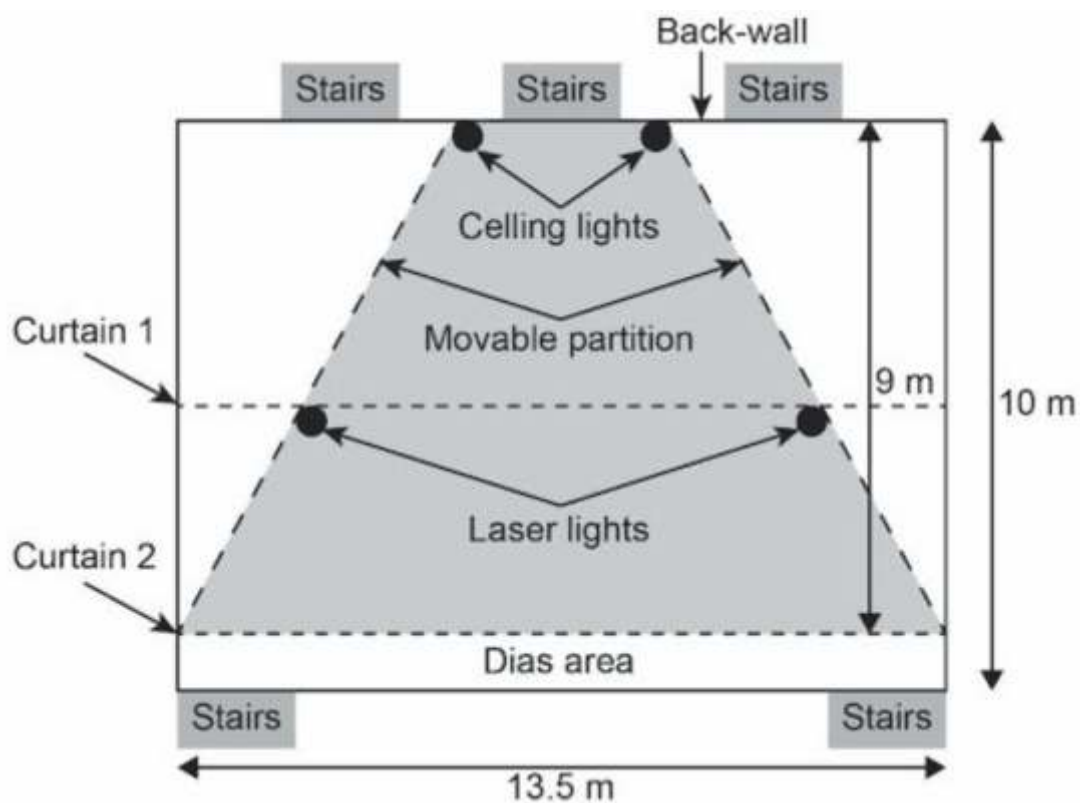
SAS21M08S0303

- 3 The floor is divided into two parts having equal areas to lay planks. In each area, different colour planks are used. Suggest a way in which it could be done.

SAS21M08S0304

- 4 Anuj has two pairs of planks of different lengths. Which geometric shape should he make with the four planks to enclose the maximum area?

The figure below shows the layout of a rectangular stage in an auditorium. Two movable flexible partitions of equal lengths mark the performance area. The shaded portion in the figure below shows the performance area.



The movable partitions divide the back-wall into three equal parts.

SAS21M08S0305

- 5 Which of these is the angle between the movable partition and the back-wall?

A. 30°
B. 45°
C. 60°
D. 90°

SAS21M08S0306

- 6 The ceiling lights can turn by 90° along the vertical plane. To cover only the performance area, what is the maximum angle the lights can turn along the horizontal plane?

SAS21M08S0307

- 7 The performance area is in the shape of trapezium. The performance area can be divided into two congruent halves.

Which property should the trapezium have to ensure congruent halves?

- A. It should have four sides
- B. It should have two parallel sides
- C. It should have a pair of equal side lengths
- D. It should have two parallel sides of unequal lengths

SAS21M08S0308

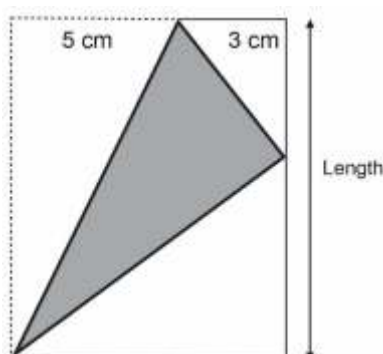
- 8 The dotted line representing Curtain 1 joins the mid-points of the movable partitions. What is the length of the curtain line between the movable partitions?

SAS21M08S0309

- 9 Two laser light beams are flashed from the two ends of the Curtain 1 line. The beams intersect each other at the mid-point of the Curtain 2 line. At what angle to Curtain 1 line are the light beams flashed?

- A. 0°
- B. 45°
- C. 60°
- D. 120°

Vanita folds a rectangular sheet. The folded sheet is shown below.



SAS21M08S0310

- 10 What is the length of the sheet?

- A. 8 cm
- B. $\sqrt{10}$ cm
- C. 10 cm
- D. 12 cm

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 4

Practical Geometry

To construct a quadrilateral using a straight edge and compass, information about the length of the sides, angles or diagonal lengths are required.

SAS21M08S0401

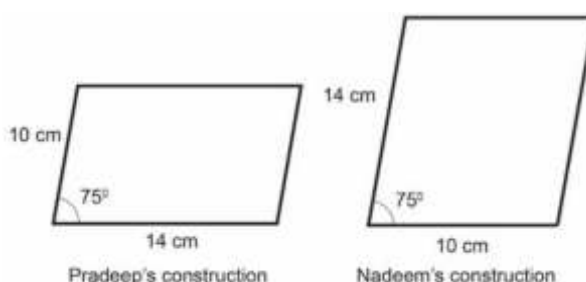
- 1 Palak wants to construct a quadrilateral in which lengths of three different sides and one diagonal are fixed. What other information does she require to construct a unique quadrilateral?

SAS21M08S0402

- 2 Which of the following quadrilaterals requires minimal measurement information along with knowledge of quadrilateral properties for its construction?

- A. Square
- B. Rectangle
- C. Rhombus
- D. Kite

Pradeep and Nadeem have been provided with the information below to construct a parallelogram. The lengths of the sides of the parallelogram are 10 cm and 14 cm. The angle between the two adjacent sides is 75° .



SAS21M08S0403

- 3 Are their parallelograms identical? Justify your answer.

SAS21M08S0404

- 4 Why do Pradeep and Nadeem's parallelograms look different?

An architect draws a layout plan before actual construction. Layouts contain all of the components of a final map as graphical elements.

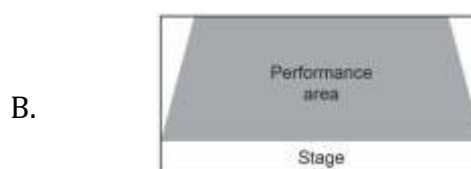
An architect wants to draw a layout plan for a rectangular stage. The stage is divided into multiple sections. The performance section is created on the stage with the help of movable flexible partitions. The performance section is in the shape of an isosceles trapezium.

SAS21M08S0405

- 5 What measurement information is required to draw the outer boundaries of the stage layout?

SAS21M08S0406

- 6 The length of the altitude of the performance section is at least 1 metre less than the smaller side of the stage. Which of the following cannot be the rough sketch of the layout depicting the stage and the performance area according to the given condition?



SAS21M08S0407

7 Which measurements are required to draw the performance section of the stage in the layout?

- A. Lengths of the parallel sides and equal sides
- B. Length of the non-parallel side and angle of inclination of parallel and non-parallel sides
- C. Lengths of the parallel sides and angle of inclination of parallel and non-parallel sides
- D. Lengths of one parallel side and diagonal

SAS21M08S0408

8 Anannya needs to calculate the length of the curtain to be installed between the mid-points of the two moving partitions. Which of the following shows the process that can give the required length?

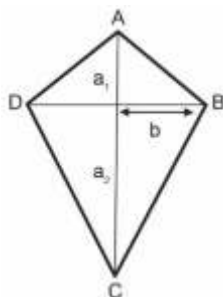
- A. Calculate the average of the moving partition length
- B. Calculate the average of all sides of the trapezium
- C. Calculate the average of the lengths of the parallel sides
- D. Calculate the average diagonal lengths

SAS21M08S0409

9 Venu wants to construct a quadrilateral ABCD, $AB = 4$ cm, $BC = 5$ cm, $CD = 6.5$ cm and $\angle B = 105^\circ$ and $\angle C = 80^\circ$. She made a rough sketch with the given information. Which of the following can be her next step?

- A. Construct a triangle with the given lengths for the three sides.
- B. Construct a triangle with the given lengths for the three sides and two included angles.
- C. Draw one of the given lengths for a side as a base with the two given angles at the endpoints.
- D. Draw a baseline of arbitrary length and construct given angles at its endpoints.

Kittu constructs a kite with sides 4 cm and 10 cm.



SAS21M08S0410

10 Which of the following statements is true for the kite?

- A. $2b > 14$
- B. $a_2 > 10$
- C. $a_1 + b < 4$
- D. $a_1 + a_2 < 14$

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 5

Data Handling

An online grocery delivery service records month-wise customer purchase details. A monthly record for the number of customers according to order values is given in the table below.

Amount	Number of Customer
500-999	100
1000-1499	250
1500-1999	150
2000-2499	300
2500-2999	225
3000-3499	175
3500-3999	50
More than 4000	25

SAS21M08D0501

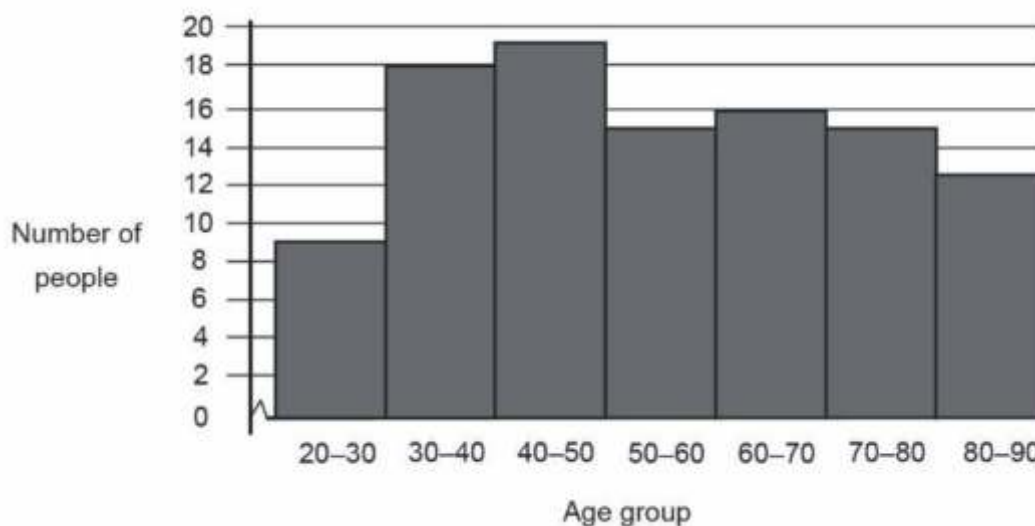
- 1 The online grocery delivery service gives a 10% discount to the customers who order groceries for more than Rs. 1999. How many customers were eligible for the 10% discount?

A. 725
B. 775
C. 925
D. 1275

SAS21M08D0502

- 2 A discount coupon worth Rs. 500 is offered on order values more than Rs. 3499 for the next purchase of minimum value Rs. 1000. How much total discount is offered?

An eye camp is organised in a village. The graph below shows the number of people who came for eye check-ups during the camp.



SAS21M08D0503

3 For which age group the most eye check-ups were done during the camp?

- A. 20-30
- B. 30-40
- C. 40-50
- D. 80-90

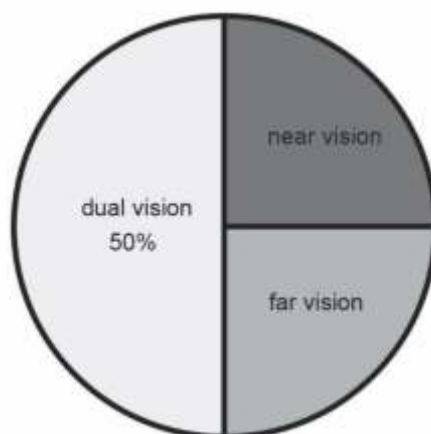
SAS21M08D0504

4 How many people got their eyes checked in the camp?

SAS21M08D0505

5 Rajneesh said that, 'Lesser number of people from the 20-40 years age group got their eyes checked than people from the 50-70 years age group'. Is Rajneesh correct? Justify your answer.

Spectacles were recommended for 80% people who got their eyes checked.
The graph given below shows the percentage of people with recommendations for different types of spectacles.



SAS21M08D0506

- 6 How many people were recommended dual vision spectacles?

SAS21M08D0507

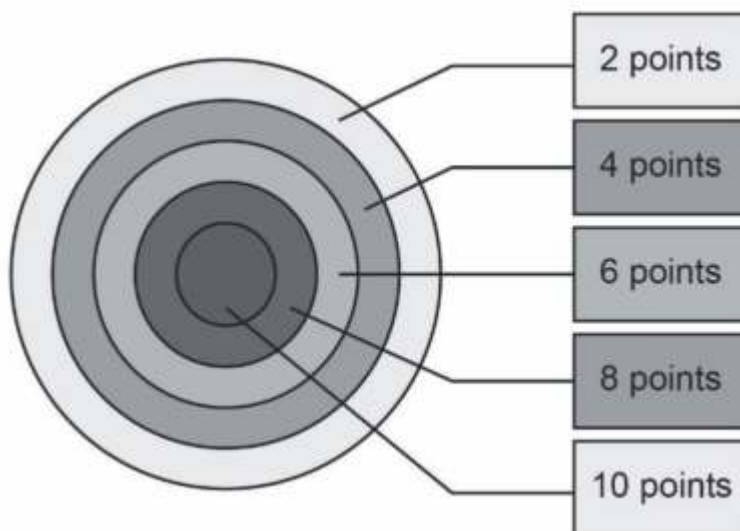
- 7 In the camp, a pair of spectacles is available for Rs. 200.
All the people who were recommended near vision spectacles bought it in the camp.
How much money was collected from the sale of near vision spectacles?

SAS21M08D0508

- 8 Which of the following conclusions can be drawn from the given data?

- A. All the people of the village had their eyes checked in the camp.
- B. More females had their eyes checked in the camp than males.
- C. Most of the people who had their eyes checked in the camp had vision problems.
- D. More people in the age group 30–40 had vision problems than in other age groups.

In an archery game, the points awarded for hitting a circular region on the board is shown in the figure below.



No point is given when an arrow misses the board.

SAS21M08D0509

9 What is the probability of getting 6 points in a single shot?

- A. $\frac{1}{5}$
- B. $\frac{1}{6}$
- C. $\frac{3}{5}$
- D. $\frac{1}{2}$

SAS21M08D0510

10 What is his probability of scoring more than 14 in the next two shots?

- A. $\frac{2}{36}$
- B. $\frac{4}{36}$
- C. $\frac{6}{36}$
- D. $\frac{9}{36}$

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 6

Squares and Square Roots

For a school performance, an equal number of students are to be arranged in each row and column. 9 students can be arranged as shown in Arrangement 1.



Arrangement 1

SAS21M08N0601

- 1 How many students can be added in a row/column in Arrangement 1 for 625 students?

SAS21M08N0602

- 2 The teachers organising the performance think that it will be difficult to arrange 625 students in one group. They think of dividing the group into two square arrangements. How many students can be there in each arrangement?

SAS21M08N0603

- 3 Which of the following symmetric arrangement cannot be used to represent a squared number?



SAS21M08N0604

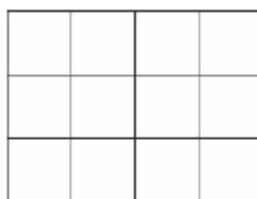
- 4 What is the difference between squares of any two consecutive numbers? Justify your answer.

SAS21M08N0605

- 5 Which of the following is the odd one?

- A. $100+20+20+4$
B. $400+40+40+4$
C. $900+60+60+4$
D. $1400+80+80+4$

The rectangle below is made of unit squares.



SAS21M08N0606

- 6 What are the possible ways of converting it into a square?

SAS21M08N0607

- 7 The sum of Geetha's age and the square of her brother's age is 54. What is Geetha's age?

SAS21M08N0608

- 8 Which of the following is **not** a unit digit of a square number?

- A. 0
- B. 4
- C. 6
- D. 8

SAS21M08N0609

- 9 Are squares natural numbers? Explain.

SAS21M08N0610

- 10 How is the repeated subtraction method in dividing two numbers and finding square roots different?

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 7

Cubes and cube roots

Interlocking cubes come in different colours. Different shapes can be created by joining them.



Sasha is making a large cube using small interlocking cubes.
She starts with a yellow cube and then fits one layer of red cubes around it to make the large cube.

SAS21M08N0701

1 What is the number of red cubes used?

- A. 9
- B. 18
- C. 26
- D. 27

SAS21M08N0702

2 Sasha considers the red layer as the first layer on the yellow cube. Which equation can be used to find the number of red cubes?

- A. $6x^2$
- B. x^3
- C. $x^3 + 1$
- D. $2(x+2)^2 + 4x^2 + 4x$

SAS21M08N0703

- 3 The red cube is surrounded by a layer of green cubes. The resulting figure is also a cube. What is the number of green cubes used?

SAS21M08N0704

- 4 Shubham puts x layers around the yellow cube. How many small cubes did he use on the top-most face of the large cube so formed?

SAS21M08N0705

- 5 Akshat has 35 interlocking cubes of the same colour. He made two large cubes of different side lengths using up all the small cubes. How many small cubes will be found along each side of the two large cubes made by him? Write in the space provided below.

_____ cubes and _____ cubes

SAS21M08N0706

- 6 The cube of a number is divided by the number itself. The result is 36. What is the number?

- A. 4
B. 6
C. 36
D. 216

SAS21M08N0707

- 7 What is the value of $\sqrt[3]{64} - \frac{1}{\sqrt[3]{64}}$?

SAS21M08N0708

- 8 For which value of x is the equation true?

$$\sqrt[3]{(-8)} - \sqrt[3]{(x)} = 4$$

- A. 4
- B. -64
- C. -216
- D. 216

SAS21M08N0709

- 9 What is the value of $\frac{\sqrt[3]{64} + \sqrt[3]{125}}{\sqrt[3]{27}}$?

- A. 2
- B. 3
- C. 4
- D. 9

SAS21M08N0710

- 10 Solve $\sqrt[3]{(27)} + \sqrt[3]{(-27)}$?

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 8

Comparing Quantities

A cinema hall has a seating capacity of 350 people. On Monday, 200 seats were booked for a show.

SAS21M08N0801

- 1 What is the ratio of booked seats to the total number of seats?

SAS21M08N0802

- 2 What is the percentage of unbooked seats for the show on Monday?

SAS21M08N0803

- 3 A new movie was released on Friday, 150 seats were booked that day. The booking for the movie increased to 300 seats on Saturday. What was the percent increase in the number of seats booked on Saturday?

- A. 2%
B. 100%
C. 150%
D. 200%

SAS21M08N0804

- 4 The cost of a ticket for the show is Rs. 250. Ayush got a 20% discount on buying a ticket through online booking. How many rupees did Ayush pay for the ticket?

A. Rs. 25
B. Rs. 50
C. Rs. 200
D. Rs. 300

SAS21M08N0805

- 5 Outside the cinema hall, Neeraj has a stall that sells a pack of popcorn for Rs. 200. The government charges 18% GST on selling of goods or services. The price at which Neeraj sells popcorn includes GST.

How much GST (in rupees) is charged on selling one pack of popcorn? (Give your answer correct up to one decimal place)

SAS21M08N0806

- 6 The cost price of raw materials used by Neeraj for making one pack of popcorn is Rs. 20, the cost of packaging used to carry popcorn is Rs. 5 and the cost of preparation of popcorn Rs. 10 per pack. What is Neeraj's profit percentage on selling popcorn?

SAS21M08N0807

- 7 Mayank deposited Rs. 50,000 in a bank for 5 years. At the end of first year, an amount of Rs. 3000 is added as interest in Mayank's account. At the end of fifth year, he had a sum of Rs. 66,911.27 in his account.

SAS21M08N0808

- 8 What is the rate of interest given by the bank on the sum of money in Mayank's account?

SAS21M08N0809

- 9 At the end of one year, Riya gets Rs. 21,200 from the bank. She gets the same rate of interest on deposited money as Mayank gets from the bank. What is the principal sum (in rupees) Riya deposited with the bank?
- A. Rs. 15,200
B. Rs. 18,200
C. Rs. 19,928
D. Rs. 20,000

SAS21M08N0810

- 10 Asha has some money to spare. She wants to deposit Rs. 15,000 for 3 years and Rs. 10,000 for 8 years in a bank to earn interest. She has two banks to choose from. Bank A gives an interest of 6% per annum compounded annually and bank B gives 7% per annum simple interest. Which bank is a better choice for depositing Rs. 15,000? Justify your choice.

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 9

Algebraic expressions and identities

Restoration is a kind of repair process in which a house or a building is returned to its original condition. Restoration normally involves repairing damages in walls, repairing or replacing old equipment, removing old carpets and refinishing floors with materials and processes that were used to make the original form.

SAS21M08N0901

- 1** Before fitting a new carpet on the floor, the old carpet needs to be removed.
A contractor offers to remove the old carpet at a rate of Rs. 10 per m^2 from a room x m wide and y m long.

Which expression gives the total cost of removing the old carpet from the room?

- A. Total cost = $10xy$
- B. Total cost = $100xy$
- C. Total cost = $10(x + y)$
- D. Total cost = $10x + y$

SAS21M07N0902

- 2** Ramya decided to replace the old carpet of her house with a new one.
Given below are the costs to fit the carpet in the house.

Type of carpet

Type	Cost per m^2
Type 1	Rs. 20
Type 2	Rs. 25
Type 3	Rs. 30

Synthetic adhesive or glue costs Rs. 300 per bottle, each bottle can be used for fitting a 2 m^2 carpet.

Labour charges for fitting the carpet is Rs. 50 per m^2 .

Ramya chooses the second type for the floor of her house.

Which calculation will the contractor use to correctly workout the cost of carpeting the floor of Ramya's house (given the length of the room is $x \text{ m}$ and breadth is $y \text{ m}$)?

- A. $25(x+y) + 50(x+y) + 300x(x+y)$
- B. $25x^2y^2 + 50xy + 300$
- C. $25xy + 50xy + 600xy$
- D. $25xy + 50xy + 150xy$

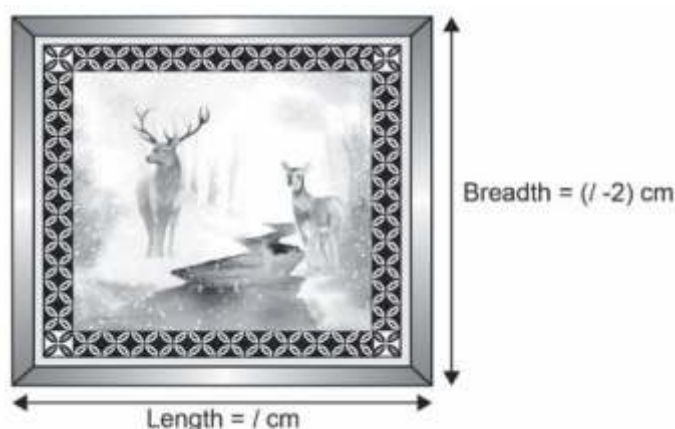
SAS21M08N0903

- 3 Ramya knows that the width of the floor is 3 m less than its length. Give the algebraic expression to calculate the area of the floor.

SAS21M08N0904

- 4 The contractor offers a 5% discount on the total cost of removing the old carpet and 7% discount on the total cost of fitting the new carpet if they get the contract for both services.
What will be the cost to get both the jobs done to carpet a 20 m^2 floor with the third type of carpet?

Given below is the picture of a rectangular painting with a 5 cm wide black border.



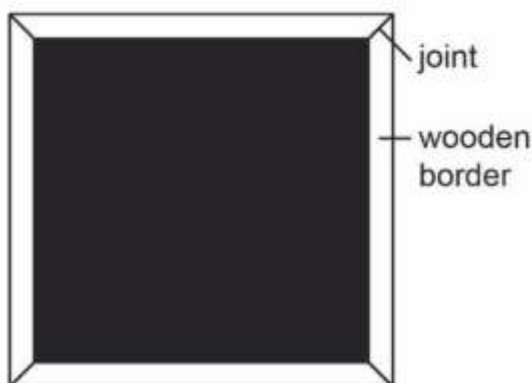
SAS21M08N0905

- 5 The expression representing the breadth of the painting is a binomial expression. Do you agree? Give reasons.

SAS21M08N0906

- 6 What is the area of the painting (excluding the border)?

The border of the painting has been made in such a way that the joints of the border are as shown in the diagram below.

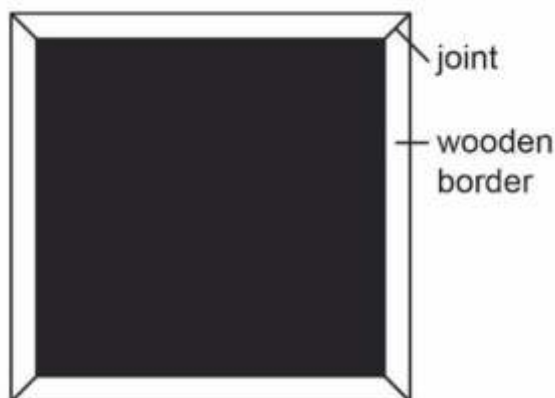


SAS21M08N0907

- 7 Shyam used a 5 cm wide piece of wood to make the border.
What is the length of the wood required by Shyam to make the border?

- A. $2l - 2$
- B. $2l - 22$
- C. $8l - 8$
- D. $8l - 88$

This is how Piyush made the border of the painting.



SAS21M08N0908

- 8 How many centimetres of wood did Piyush use?

SAS21M08N0909

- 9 Hemlata says, 'the length of the diagonal of the painting along with the border is $2\left(\sqrt{\frac{l^2}{2} - l + 1}\right)$.' Is Hemlata correct? Justify your answer.

SAS21M08N0910

- 10 Simplify the following algebraic expression.

$$(4g + h)(4h + g) - 2gh$$

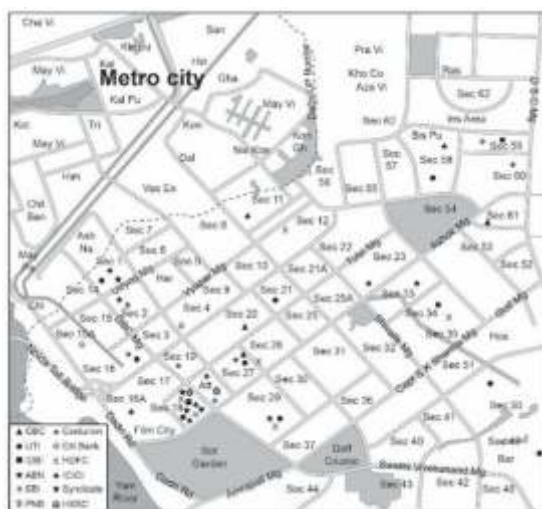
Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 10

Visualising Solid Shape

This map shows the location of the ATM machines in a metro city. The residential areas are divided into sectors marked as 'sec', followed by the sector number. Old residential areas have been marked by three letters.



SAS21M08S1001

- 1 Subramaniam's bank card is accepted by some ATM machines and not by others. In which sector is he more likely to find an ATM which accepts his card?

- A. Sector 1
- B. Sector 18
- C. Sector 26
- D. Sector 54

SAS21M08S1002

- 2 Name the sectors surrounding the golf course.

SAS21M08S1003

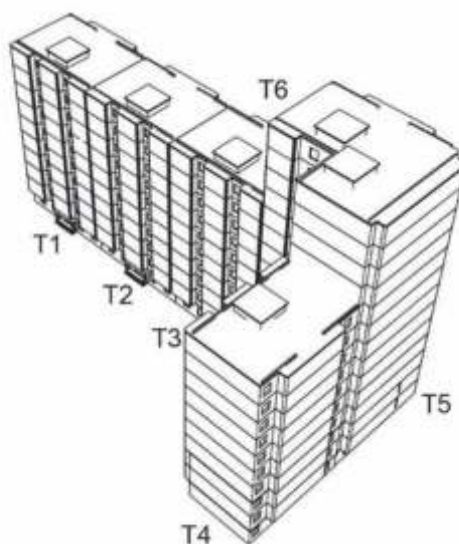
- 3 Suchi lives in Sector 31. Her bank card works on all ATM machines. Where can she go to use the nearest ATM?

- A. Sector 25A
- B. Sector 29
- C. Sector 32
- D. Sector 40

SAS21M08S1004

- 4 Ranbir is driving from the southwest corner of Sector 35 to the film city. Suggest a path guiding him to the south of the film city.

The picture below shows a wire diagram of a multi-storey apartment building. There are 6 blocks in the building. The blocks have either 9 floors or 13 floors other than a ground floor. The clubhouse, the playrooms and the gym are on the ground floor. In each block, there is one apartment on each floor. The size of the apartments vary in different blocks.



SAS21M08S1005

- 5 How many apartments are there in the building?

SAS21M08S1006

- 6 The height of the ground level of the building is 4.65 m. Other floors are of the height 3.7 m. What is the height of the tallest block?

SAS21M08S1007

- 7 The builder claims that all the apartments of the building have three open sides. Do you agree with the builder's statement? Justify your answer.

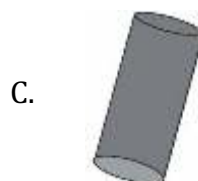
SAS21M08S1008

- 8 Which of the following is not a polyhedron?



SAS21M08S1009

- 9 To which of the given solids is Euler's formula applicable?



SAS21M08S1010

- 10 Is it possible to create a polyhedron with 8 faces, 12 vertices and 18 edges? Justify your answer.

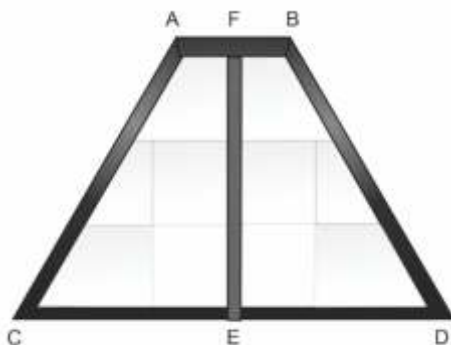
Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 11

Mensuration

The picture of a window is given below.



The length of side AB is 40 cm, side CE is 70 cm and side FE is 90 cm. AB is parallel to CE and E is the midpoint of CD.

SAS21M08S1101

1 What shape does the window ABCD resembles?

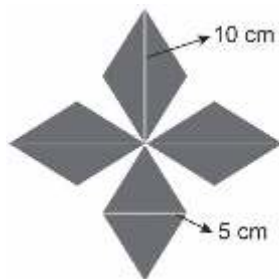
- A. Square
- B. Triangle
- C. Rectangle
- D. Trapezium

SAS21M08S1102

2 Find the area of the window ABCD?

- A. 270 cm^2
- B. $5,950 \text{ cm}^2$
- C. $8,100 \text{ cm}^2$
- D. $16,200 \text{ cm}^2$

A wall decoration is in the shape given below.



Decoration is made of four congruent mirrors. The sides of a mirror are of the same length.

SAS21M08S1103

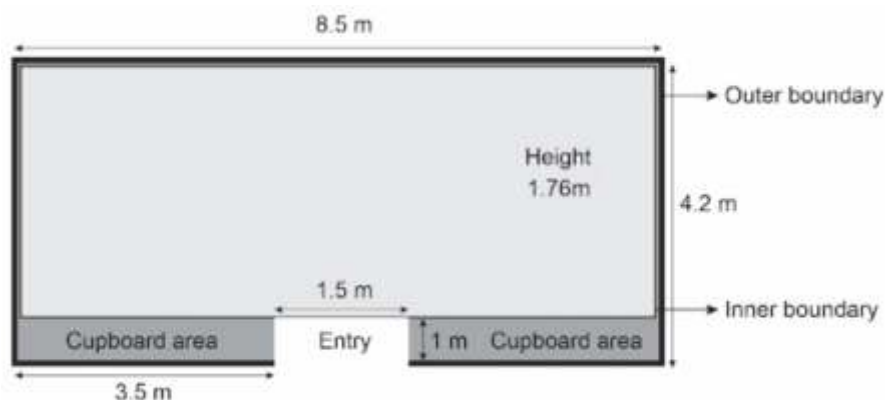
3 What is the area occupied by the decoration on the wall?

- A. 25 cm^2
- B. 30 cm^2
- C. 100 cm^2
- D. 200 cm^2

SAS21M08S1104

4 Rohan pasted four more mirrors congruent to the earlier ones.
What is the area of the new wall decoration?

The figure below shows a blueprint of a shower room of a club.



The walls of the shower room (inner boundary) is 0.1 m thick. The wall of outer boundary is 0.2 m thick.

SAS21M08S1105

- 5 The inside wall and the floor of the shower room are covered with tiles. What area of the shower room is covered with tiles?

- A. 20.54 m^2
- B. 37.52 m^2
- C. 58.06 m^2
- D. 65.20 m^2

SAS21M08S1106

- 6 Which of the following calculations shows the inside volume (in m^3) of the shower room?

- A. $7.9 \times 2.6 \times 1.76$
- B. $7.9 \times 3.1 \times 1.76$
- C. $8.2 \times 3.1 \times 1.76$
- D. $8.5 \times 4.2 \times 1.76$

SAS21M08S1107

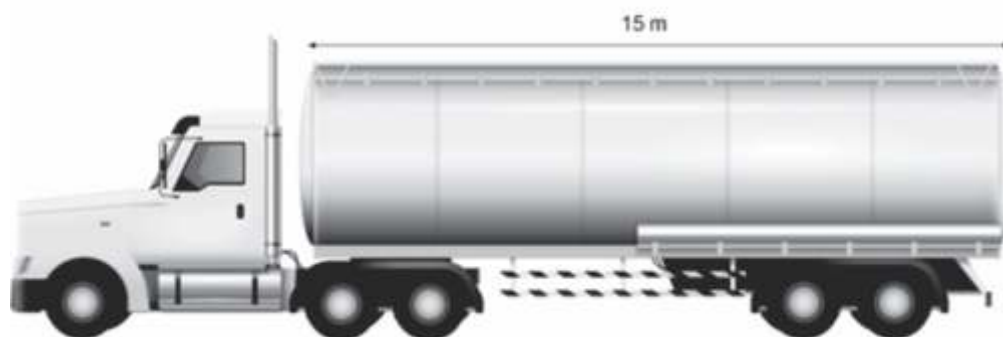
- 7 An area is marked for cupboards. How many cupboards with dimensions $1.5 \times 0.6 \times 1.76$ (length x breadth x height) can be built in the area?

SAS21M08S1108

- 8 One litre of paint is required to paint 12 square m. Approximately, how many litres of paint are required to paint the outer boundary of the shower room?

- A. 4
- B. 5
- C. 60
- D. 89

Oil is transported through a special kind of truck with a cylindrical tank.



The radius of the cylindrical tank of one such tank is 1.4 m.

SAS21M08S1109

- 9 What is the total surface area of the tank?

SAS21M08S1110

- 10 The quantity of oil carried in the truck is measured in litres. The measurement in meters can be converted into litres by using the conversion 1 cubic meter = 1000 litres. What can be the maximum oil (in litres) stored in the tank? (Use $\pi = \frac{22}{7}$)

- A. 92.4
- B. 132
- C. 1000
- D. 92,400

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 12

Exponents and Power

The distance between planets varies depending on their position on their orbital path around Sun. The table given below shows the average distance between two planets.

Planets	Average distance between them
Venus to Earth	40,000,000 km
Earth to Mars	225,000,000 km

SAS21M08N1201

- 1 Which of the following options correctly represents the distance (in km) between Venus and Earth in exponential form?

- A. 40×10^{-6}
- B. 4×10^6
- C. 40×10^7
- D. 4.0×10^7

SAS21M08N1202

- 2 How much further is Mars from Earth than Venus?

- A. 1.8510^6
- B. 1.9510^6
- C. 1.7510^8
- D. 1.8510^8

SAS21M08N1203

- 3 Divya finds the ratio of the distance between the Venus to the Earth and the distance between the Earth to Mars. Which of the following **cannot** be the ratio?

A. 40:225
B. 4:22.5
C. 0.4:2.25
D. 0.4:22.5

SAS21M08N1204

- 4 The distance of planet Neptune from the Sun is 449500000000000 km. Which of the following can be another way of representing the distance (in km) between the Neptune and the Sun?

A. 4.4×10^{14}
B. 4.4×10^{15}
C. 44×10^{15}
D. 4.4×10^{17}

SAS21M08N1205

- 5 The mass of earth is 5.97×10^{24} kg, whereas Jupiter has a mass of 1.8986×10^{27} kg. About how many times massive is Jupiter than Earth?

A. 3
B. 31
C. 300
D. 318

SAS21M08N1206

- 6 Rajat created an informative message. He forwards the message to 5 people. Each of the five people forward the message to next 5 people and the chain goes on. Rajat did not forward the message. How many people have it?

A. 0
B. 1
C. 5
D. 10

SAS21M08N1207

- 7 The message is forwarded 5 times. Which of the following calculation can be used to find number of times message is forwarded?

- A. $5^0 + 5^1 + 5^2 + 5^3 + 5^4$
- B. $5^1 + 5^1 + 5^1 + 5^1 + 5^1$
- C. $5^0 + 5^5 + 5^{10} + 5^{15} + 5^{20}$
- D. $5^5 + 5^{10} + 5^{15} + 5^{20} + 5^{25}$

SAS21M08N1208

- 8 Which of the following represents the product of 1.08×10^{12} and 4.0×10^7 ?

- A. $4 \times 1.08 \times 10^{12}$
- B. $0.4 \times 1.08 \times 10^{19}$
- C. $4 \times 1.0878 \times 10^{19}$
- D. $0.4 \times 1.0878 \times 10^{84}$

SAS21M08N1209

- 9 Evaluate.

$$\frac{1}{5} \div \frac{3}{5} = \frac{1}{5} \times \frac{5}{3} = \frac{1}{3}$$

SAS21M08N1210

- 10 Which of the following shows the relation between mm and km?

- A. $1 \text{ mm} = 10^{-6} \text{ km}$
- B. $1 \text{ mm} = 10^{-5} \text{ km}$
- C. $1 \text{ mm} = 10^5 \text{ km}$
- D. $1 \text{ mm} = 10^6 \text{ km}$

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 13

Direct and Inverse Proportion

Deepak and his family went on a road trip by car. They visited four cities. City 1 was 500 km from their home. The petrol tank in their car has a capacity of 35 litres. The car runs 20 km on one litre.

	City 1	City 2	City 3	City 4
Distance travelled by the car	500	1000	1500	2000

From city 4, they travelled 500 km to reach home.

SAS21M08C1301

1 How many litres of petrol did they use to complete the road trip?

- A. 100
- B. 125
- C. 200
- D. 2500

SAS21M08C1302

2 The family travelled 500 km in a day. What is the smallest number of days in which the road trip can be completed?

SAS21M08C1303

- 3 The car travelled at a uniform speed of 75 km/hr between city 3 and 4. How much distance did it travel in 20 minutes?

SAS21M08C1304

- 4 The family started their journey from city 3 at 10 am. By what time will they reach half the distance to City 4?

- A. 12 noon
- B. 1 pm
- C. 1:30 pm
- D. 3 pm

SAS21M08C1305

- 5 Deepak claims that the speed of the car and the time taken by it to cover the distance between the two cities, 3 and 4, is inversely proportional. Is Deepak correct? Why do you think so?

A hotel has 320 rooms and 32 cleaners to maintain them. With full capacity of staff, it took 2 hours to clean all the rooms.

SAS21M08C1306

- 6 On Monday 20% of the cleaners were not available. Will the cleaning of all rooms takes more than 2 hours? How can you say so?

SAS21M08C1307

- 7 Ishan says, “The number cleaners available in the hotel is directly proportional to the time taken by them to clean the rooms.”
Mira says, “The number of cleaners available in the hotel is inversely proportional to the time taken by them to clean the rooms.”
Who is correct? Give reason.
-
-

SAS21M08C1308

- 8 Equal number of rooms are allocated for each staff member for cleaning. How many rooms each cleaner had to maintain?
-
-

SAS21M08C1309

- 9 The hotel administration hired 8 more cleaners. What is the change in number of rooms maintained by each cleaner?
- A. The total number of room increases by 2.
B. The total number of room decreases by 2.
C. The total number of room increases by 3.
D. The total number of room decreases by 3.

SAS21M08C1310

- 10 How many rooms has to be cleaned in an hour by each cleaner after the increase in the number of staff?
- A. 1
B. 4
C. 8
D. 10

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 14

Factorisation

SAS21M08N1401

1 Which of the following is true for all the factors of 75?

- A. They are odd numbers.
- B. They are divisible by 3.
- C. They are divisible by 5.
- D. They are prime numbers.

SAS21M08N1402

2 Which of the following is **not** a factor of $18p^2q^2$?

- A. 3
- B. p^2
- C. pq
- D. q^3

SAS21M08N1403

3 Factorise the following and find its irreducible form.
 $15x^2y + 6x^4y^2 - 9xy$

SAS21M08N1404

4 Rajat factorises the given algebraic expression. $a^4 - r^4$, Which of the following would be his next step?

- A. $a^4 - r^4 - 2a^2r^2$
- B. $(a+r)(a-r)$
- C. $(a^2)^2 - (r^2)^2$
- D. $a^2 - r^2$

SAS21M08N1405

- 5 Satpal solved an algebraic equation as shown below.

Algebraic equation: $(s+4)^2=36+s^2$

Step 1: $s^2+16+8s=36+s^2$

Step 2: $8s = 52$

Step 3: $s = 528 = 132$

Did Satpal solve the equation correctly? Explain your answer.

SAS21M08N1406

- 6 “When a monomial is divided by a monomial, the quotient is a monomial.”

Siya disagrees with the statement as x^2 divided by x^2 , is 1. Is Siya correct? Justify your answer.

SAS21M08N1407

- 7 When $5(6t^2+12t)$ is divided by a polynomial gives $30t$ as the quotient. What would be the divisor of the polynomial?

- A. t
- B. $30t$
- C. t^2
- D. $t+2$

SAS21M08N1408

- 8 Salma and Abid factorise the algebraic expression $p^4 + 9p^2 + 18$.

Salma:

$$\begin{aligned} p^4 + 9p^2 + 18 &= p^4 + 6p^2 + 3p^2 + 18 \\ &= p^2(p^2 + 6) + 3(p^2 + 6) \\ &= (p^2 + 3)(p^2 + 6) \end{aligned}$$

Abid:

$$\begin{aligned} p^4 + 9p^2 + 18 &= p^4 + 6p + 3p + 18 \\ &= p(p^3 + 6) + 3(p + 6) \\ &= (p^3 + 6)(p + 6)(p + 3) \end{aligned}$$

Who is correct? Give a reason to justify your answer.

SAS21M08N1409

9 $2x + 5$ is divided by 5, What is the quotient?

- A. $2x + 1$
- B. $\frac{5}{2}x + 5$
- C. $\frac{2}{5}x + 1$
- D. $2x + 5$

SAS21M08N1410

10 Which of the following divides $25(x^2y + y^2x)$ completely?

- A. x^2y
- B. $5xy$
- C. $5x^2y$
- D. $5y^2x$

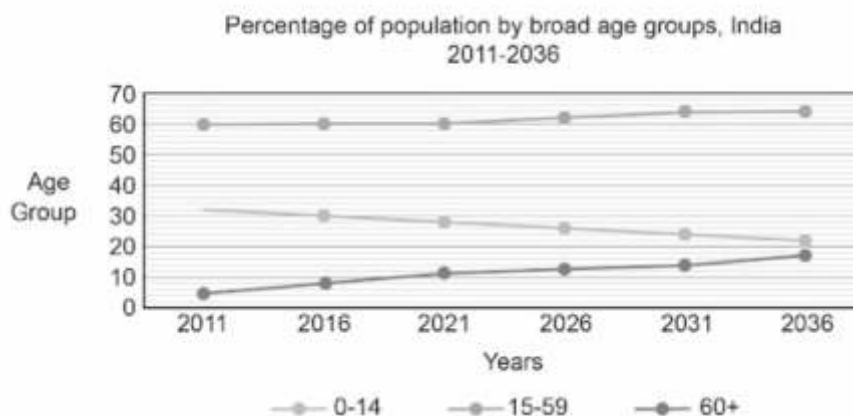
Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 15

Introduction to Graph

Population projection is a scientific attempt to predict what a population will be in the future. The prediction is based on past and current population, fertility rate, mortality rate and migration. Based on population projection for 2011 - 2036, changes in the age structure of the Indian population are shown in the graph below.



The population of the country is categorised into three broad age groups, 0-14 years, 15-59 years and 60+ years.

SAS21M08D1501

1 What percentage of the projected population will be in the age-group 15-59 in the year 2031?

- A. 24
- B. 60
- C. 64
- D. 70

SAS21M08D1502

2 What is the percent change in the projected population of the age group 60+ from 2021 to 2036?

- A. 2
- B. 6
- C. 14
- D. 26

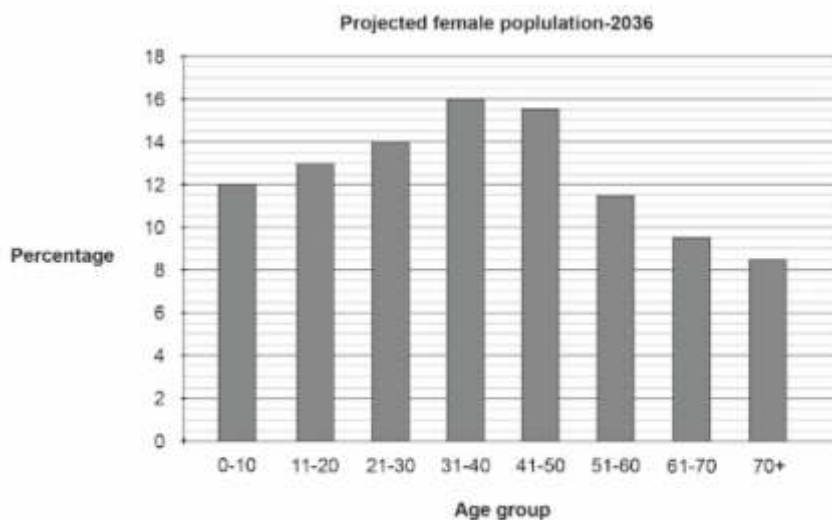
SAS21M08D1503

- 3 The total population of the country in the year 2021 is 1300 million. How many people (in millions) are in the age group 0-14 years?

SAS21M08D1504

- 4 Which of the following is not true for the graph shown above?
- Most of the population is in the age group 15-59 years across all the years.
 - The projected population of age group 0-14 years increased in the year 2036 compared to the year 2011.
 - The change in the population of the age group 60+ is less than 10 percent from 2011 to 2036.
 - The change in the population is the highest for the age group 0-14 years from 2021 to 2036.

The graph below shows the projected female population percentage of the country in the year 2036.



The total female population projected in the year 2036 is 775 million.

SAS21M08D1505

- 5 According to the projection, what percent of the female population will belong to the age group 11-40?
- 13.2
 - 15.8
 - 43.2
 - 55.3

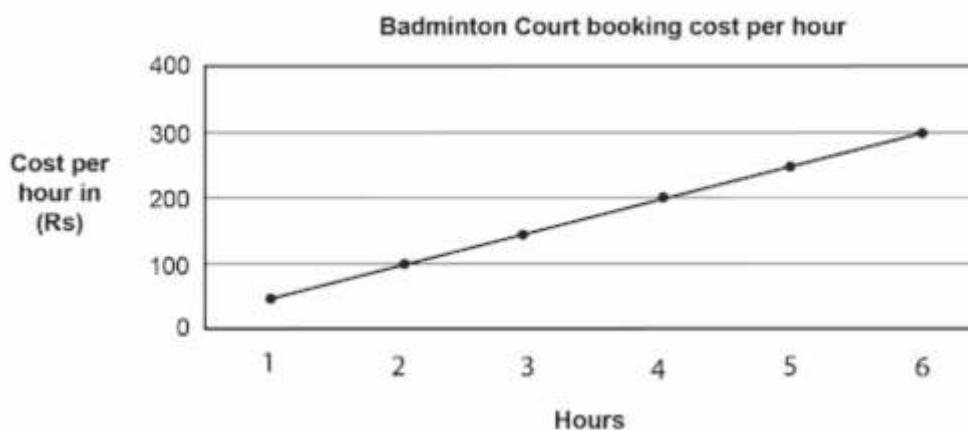
SAS21M08D1506

- 6 How many females (in millions) are in the age group 41-50?

SAS21M08S1507

- 7 If the total projected population for the year 2036 is 1518 million, what percentage of the total projected population would be female?

A badminton academy charges fees on a per-hour basis for their badminton court. They also issue monthly booking passes costing Rs 1500. The pass allows a user to play for 2 hours, 5 times a week. Any extra time is charged on an hourly basis. The graph shows the per hour cost of booking a badminton court.



The total female population projected in the year 2036 is 775 million.

SAS21M08S1508

- 8 Paul and his friends booked the badminton court for 7 hours. How much did the booking cost?

- A. Rs 50
- B. Rs 300
- C. Rs 350
- D. Rs 350

SAS21M08S1509

- 9 Rohan plays for 2 hours, 4 times a week. He pays on an hourly basis. Would using a monthly pass be more economical for Rohan?

SAS21M08S1510

- 10 Pritam wants to be a badminton professional. He decided to practice at least 40 hours a month at the academy. What is the minimum amount Pritam would be paying to the academy?

Curriculum Aligned Competency Based Test Items

Mathematics

Class 8 – Chapter 16

Playing with Numbers

SAS21M08N1601

- 1 A housing society has 16 towers, named A, B, C and so on. Each tower has a different number of flats. There are 720 fans installed in the tower A flats. Each flat has 9 fans. How many flats are there in tower A?

A. 9
B. 80
C. 90
D. 729

SAS21M08N1602

- 2 A shopping complex in the housing society has shops of the same size. Each shop has 10 lights inside the shop and two outside the shop. There are 360 lights fitted in them. How many shops are there?

A. 12
B. 30
C. 36
D. 360

SAS21M08N1603

- 3 Tower J has some flats with 3 bedrooms and some with 2 bedrooms. Three-fourth of the flats have 3 bedrooms and the rest have 2 bedrooms. The total number of bedrooms is 385. How many two-bedroom flats are there in tower J?

A. 30
B. 35
C. 105
D. 140

SAS21M08N1604

- 4 Priya plays a number game and follows the below steps.
Step 1: Choose a two-digit number between 20 and 100.
Step 2: Add digits together.
Step 3: Subtract the sum from the original number.

Which of the following statement is true of the resultant number in step 3?

- A. It is a multiple of 2.
- B. It is a multiple of 5.
- C. It is a multiple of 7.
- D. It is a multiple of 9.

SAS21M08N1605

- 5 Priya has two sets of three number cards 1, -3, 9 and -27. Which of the following is the smallest number she can make by adding the numbers on cards?

- A. -30
- B. -34
- C. -60
- D. -80

SAS21M08N1606

- 6 The general form of number 98 is $10 \times 9 + 8$. Which of the following is the general form of number 1072?

- A. $1+0+7+2$
- B. $1000+10 \times 7+2$
- C. $1000+100 \times 7+10 \times 2$
- D. $1000+100+10 \times 7+2$

SAS21M08N1607

- 7 Rajesh works in the courier collection centre. He received ten boxes, with a total weight of 75 kg at his centre. 15 kg, 13 kg, 11 kg, 10 kg, 9 kg, 8 kg, 4 kg, 2 kg, 2 kg, 1 kg
He wants to pack them into 3 crates. Each crate can carry a maximum of 25 kg.

How can Rajesh pack the boxes into the crates?

Kanika practised her math by solving the below questions

$$4\frac{1}{2} - 3$$

$$5\frac{1}{3} - 4$$

$$6\frac{1}{4} - 5$$

$$7\frac{1}{5} - 6$$

Manaya had done the same questions but she divides the two numbers instead of subtraction. Still, Kanika and Manaya both get the same answer.

SAS21M08N1108

8 Why do both get the same answer?

SAS21M08N1609

9 A three-digit number can be written as $100x + 10y + z$. A new number is formed by interchanging x and z . What is the difference between the two numbers?

- A. y
- B. $99(x - z)$
- C. $x - y - z$
- D. $99x - y - z$

SAS21M08N1610

10 A two-digit number has different digits at the ones and tens place. The number is multiplied by 6. The product is a three-digit number. Each digit of the product is one's digit of the original number. What is the original number?

- A. 16
- B. 32
- C. 66
- D. 74