

ICSE
Class VII Mathematics
Sample Paper 1

Time: 2hour 30 mins

Total Marks: 80

General instructions:

1. Answers to this paper must be written on the paper provided separately.
2. You will not be allowed to write during the first **15 minutes**.
3. This time is to be spent in reading the question paper.
4. The time given at the head of this paper is the time allowed for writing the answers.
5. Attempt **all** questions from **Section A**. Solve any **four** questions from **Section B**.
6. **All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer.**
7. **Omission of essential working will result in loss of marks.**
8. The intended marks for questions or parts of questions are given in brackets [].

Section A (40 marks)

Question 1

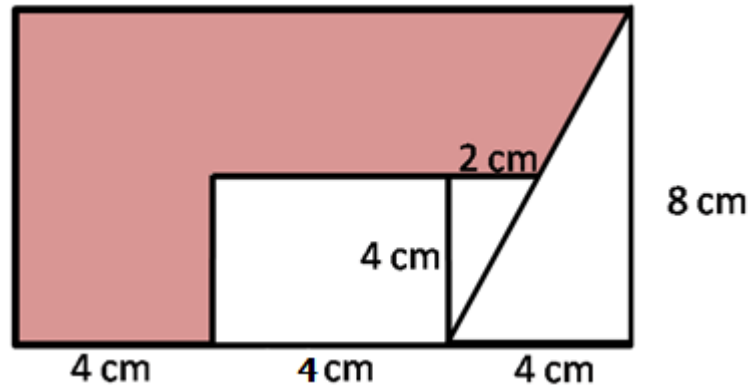
- a) If the marks of Rohit, Ajay and Vipul are in ratio of 4 : 5 : 6, and Ajay got 75 marks, then find the marks of Rohit and Vipul? [2]
- b) A train 270 m long is running at 40.5 km/hr. How much time will it take to cross the tree? [3]
- c) Express the following as a rational number:
$$\left[\left(\frac{2}{3}\right)^2\right]^3 \times \left(\frac{1}{3}\right)^{-2} \times 3^{-1} \times \frac{1}{6}$$
 [3]
- d) State whether True or False: [2]
 - i. If an object looks exactly the same after a rotation, then it has a rotational symmetry.
 - ii. If a transversal cuts a pair of parallel lines, then the alternate angles formed are congruent.

Question 2

- a) The given data shows the marks obtained by 20 students of a class in a Math test.
31, 9, 8, 20, 8, 7, 30, 31, 24, 20, 13, 13, 28, 26, 19, 27, 13, 12, 25, 21
Represent the data in a frequency distribution table and find the mean. [4]
- b) Add : i) $4x^2 + 3x + y$ and $5x - 3y$

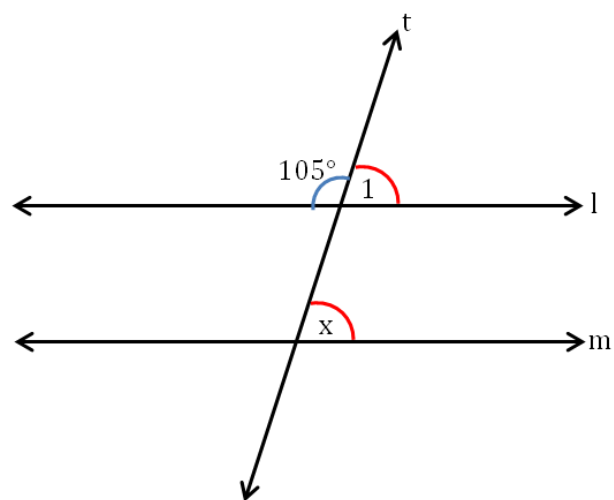
ii) $9a^2 + 4b - 4c$ and $-5a^2 - 5b$ [3]

c) Find the area of the shaded region? [3]



Question 3

- a) $\frac{5}{6}$ of the cake was eaten by 5 friends. The next day 3 other friends ate $\frac{1}{2}$ of what was left. How much of the cake is left? [3]
- b) Sanket's monthly expenditure is Rs. 15000. He spends 25% on house rent, 40% on food and groceries, 5% each on travelling and entertainment and the rest on education. Calculate the amount he spends on each. [4]
- c) In the given figure, $l \parallel m$ find x . [3]



Question 4

- a) The population of a town increases by 6% annually. If the present population is 17490, what was it a year ago? [4]

b) Simplify: $\left(\frac{a^3}{b^4}\right)^2 \times \left(\frac{b^2}{a^3}\right)^3$ [3]

c) The angles of a triangle are in the ratio 2 : 3 : 5. Find the angles. [3]

Section B (40 marks)

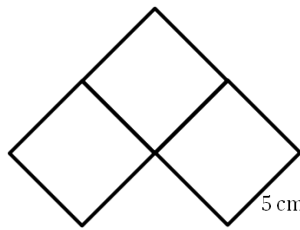
Question 5

a) Write the following sets in the roster method. [2]

i. M is a set of first 5 multiples of 3.

ii. V is a set of the vowels in 'DISJOINT'.

b) The figure below is made of 3 squares with sides 5 cm. What is the perimeter of the figure? [2]



c) The score of 8 members of a team is 360 and that of 7 members of another team is 322. Which team scored better? [3]

d) The cost of 1 L milk is Rs. 22.50. What is the cost of 40.3 L of milk? [3]

Question 6

a) Solve: i) $(-48) \times 24 \times (-10) + 100$

ii) $(-56) + 27 - 45 - 17 + 19$ [4]

b) If $5x - \frac{3}{4} = 2x - \frac{2}{3}$, then find the value of x. [3]

c) Simplify: $\frac{m}{5} - \frac{m-2}{3} + m$ [3]

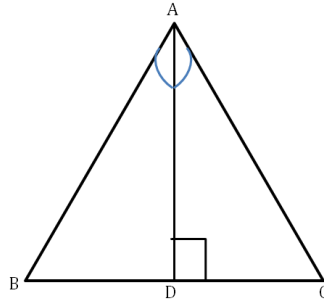
Question 7

a) Find x: $x + z - 15 = 65$ [2]

b) What is the square root of i) 1.44 and ii) 289 [3]

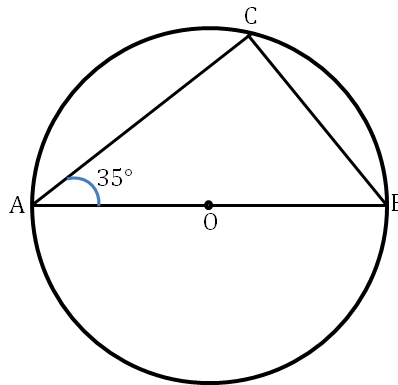
c) Solve the in equation: $-14 - 5x \geq 3x + 2$, $x \in \text{integers}$ [2]

d) In the figure, AD bisects $\angle A$ and $AD \perp BC$. Show that $\triangle ADB \cong \triangle ADC$. [3]



Question 8

- a) A person weighing 60 kg on the Earth weighs 9.9 kg on the Moon and 141.8 kg on Jupiter. How much will another person weighing 75 kg weigh on the Moon and on Jupiter? [4]
- b) What is the sum of the interior angles of a polygon with:
 - i) 12 sides and ii) 25 sides [3]
- c) In the given figure, O is the centre of the circle and $m\angle CAB = 35^\circ$. Calculate the measure of $\angle ABC$. [3]



Question 9

- a) Find the supplementary and complementary angle for an angle measuring 39° . [3]
- b) The ratio of the ages of two brothers is 3 : 2. If the elder brother's age is 21 years, how old is the younger brother? Find the ratio of their ages after 7 years. [4]
- c) Write the co-ordinates for the following points when reflected on the y-axis
 - i) A(3, 6) ii) B(-4, 8) iii) C(4, -7) [3]

Solution

Section A (40 marks)

Question 1

- a) Let the marks of Rohit, Ajay and Vipul be $4x$, $5x$ and $6x$ respectively.

Given that Ajay's marks = 75

$$\Rightarrow 5x = 75$$

$$\Rightarrow x = \frac{75}{5} = 15 \text{ marks}$$

$$\therefore \text{Marks of Rohit} = 4x = 4 \times 15 = 60 \text{ marks}$$

$$\text{Marks of Vipul} = 6x = 6 \times 15 = 90 \text{ marks.}$$

- b) Length of train = $270 \text{ m} = \frac{270}{1000} \text{ km} = 0.27 \text{ km}$

Speed of train = 40.5 km/hr

$$\begin{aligned} \text{Time taken to cross the tree} &= \frac{\text{Distance}}{\text{Speed}} = \frac{0.27}{40.5} \\ &= \frac{27}{4050} \\ &= \frac{1}{150} \text{ hr} \\ &= \frac{1}{150} \times 3600 \text{ sec} \\ &= 24 \text{ sec} \end{aligned}$$

Thus, a train will take 24 seconds to cross the tree.

$$\begin{aligned} \text{c) } &\left[\left(\frac{2}{3} \right)^2 \right]^3 \times \left(\frac{1}{3} \right)^{-2} \times 3^{-1} \times \frac{1}{6} \\ &= \left(\frac{2}{3} \right)^{2 \times 3} \times 3^2 \times 3^{-1} \times \frac{1}{6} \\ &= \left(\frac{2}{3} \right)^6 \times 3^{2-1} \times \frac{1}{6} \\ &= \frac{64}{729} \times \frac{1}{2} \\ &= \frac{32}{729} \end{aligned}$$

d) State whether True or False:

i. If an object looks exactly the same after a rotation, then it has a rotational symmetry.

-True

ii. If a transversal cuts a pair of parallel lines, then the alternate angles formed are congruent. -True

Question 2

a) Data: 7, 8, 8, 9, 12, 13, 13, 13, 19, 20, 20, 21, 24, 25, 26, 27, 28, 30, 31, 31

Frequency distribution table:

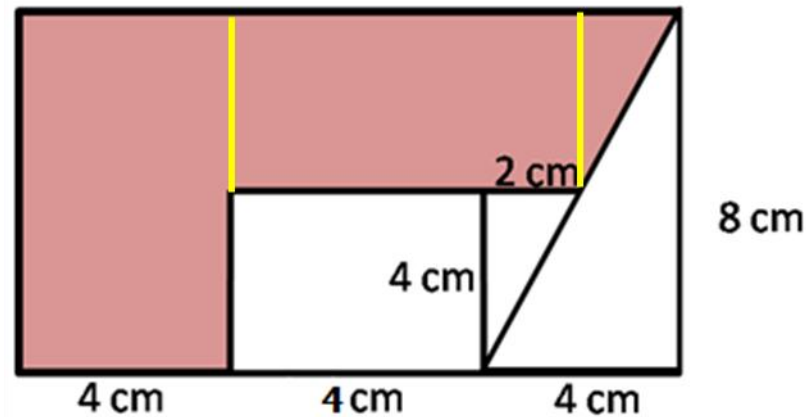
Marks scored	Tally marks	Frequency
7		1
8		2
9		1
12		1
13		3
19		1
20		2
21		1
24		1
25		1
26		1
27		1
28		1
30		1
31		2
Total = 300		Total = 20

$$\text{Mean marks} = \frac{300}{20} = 15$$

b) i) $4x^2 + 3x + y$ and $5x - 3y$
 $= (4x^2 + 3x + y) + (5x - 3y)$
 $= 4x^2 + 3x + y + 5x - 3y$
 $= 4x^2 + 3x + 5x + y - 3y$
 $= 4x^2 + 8x - 2y$

ii) $9a^2 + 4b - 4c$ and $-5a^2 - 5b$
 $= (9a^2 + 4b - 4c) + (-5a^2 - 5b)$
 $= 9a^2 + 4b - 4c - 5a^2 - 5b$
 $= 9a^2 - 5a^2 + 4b - 5b - 4c$
 $= 4a^2 - b - 4c$

- c) The given figure is a rectangle with sides 12 cm (4 cm + 4 cm + 4 cm) and 8 cm respectively.
The shaded region can be divided into 2 smaller rectangles and 1 right triangle.



The area of 1st rectangle = $4 \times 8 = 32 \text{ cm}^2$

The area of 2nd rectangle = $4 \times 6 = 24 \text{ cm}^2$

The area of the triangle = $\frac{1}{2} \times 2 \times 4 = 4 \text{ cm}^2$

Total area of the shaded region = $(32 + 24 + 4) \text{ cm}^2 = 60 \text{ cm}^2$

Question 3

a) Cake left on day 1 = $1 - \frac{5}{6} = \frac{6-5}{6} = \frac{1}{6}$

Cake left after day 2 = $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$

Hence, $\frac{1}{12}$ of the cake is remaining.

b) Total monthly expenditure = Rs. 15000

Amount spent on rent = $\frac{25}{100} \times 15000 = \text{Rs.} 3750$

Amount spent on food and groceries = $\frac{40}{100} \times 15000 = \text{Rs.} 6000$

Amount spent on travelling = $\frac{5}{100} \times 15000 = \text{Rs.} 750$

Amount spent on entertainment = $\frac{5}{100} \times 15000 = \text{Rs.} 750$

Now, amount spent on education = $15000 - (3750 + 6000 + 750 + 750)$
 $= 15000 - 11250$
 $= \text{Rs.} 3750$

- c) $m\angle 1 + 105^\circ = 180^\circ$ (linear pair)
 $\therefore m\angle 1 = 180 - 105 = 75^\circ$
 And, $x = m\angle 1 = 75^\circ$ (corresponding angles)

Question 4

- a) Let the population of the town a year ago be x .
 Then, its present population = 106% of x which is given as 17,490

$$\frac{106}{100} \times x = 17490$$

$$\therefore \frac{53x}{50} = 17490$$

$$\Rightarrow x = \frac{17490 \times 50}{53} = 16500$$

Hence, the population of the town a year ago was 16500.

$$\begin{aligned} & \left(\frac{a^3}{b^4} \right)^2 \times \left(\frac{b^2}{a^3} \right)^3 \\ &= \frac{(a^3)^2}{(b^4)^2} \times \frac{(b^2)^3}{(a^3)^3} \end{aligned}$$

$$\begin{aligned} \text{b) } &= \frac{a^6}{b^8} \times \frac{b^6}{a^9} \\ &= \frac{a^6}{a^9} \times \frac{b^6}{b^8} \\ &= a^{6-9} \times b^{6-8} \\ &= a^{-3} b^{-2} \end{aligned}$$

- c) Let the angles be $2x$, $3x$ and $5x$.
 $\therefore 2x + 3x + 5x = 180^\circ$ (sum of angles of a triangle = 180°)
 $\therefore 10x = 180^\circ$
 $\therefore x = \frac{180}{10} = 18^\circ$

Thus, we have

$$2x = 2 \times 18 = 36^\circ$$

$$3x = 3 \times 18 = 54^\circ$$

$$5x = 5 \times 18 = 90^\circ$$

Hence, the angles are 36° , 54° and 90° .

Section B (40 marks)

Question 5

- a) i. $M = \{3, 6, 9, 12, 15\}$
ii. $V = \{I, O\}$

b) Perimeter = $(5 + 5 + 5 + 5 + 5 + 5 + 5 + 5)$ cm = 40 cm

c) Total score of 1st team = 360
Total members of 1st team = 8
 $\therefore$ Average score of 1st team = $\frac{360}{8} = 45$

Total score of 2nd team = 322
Total members of 2nd team = 7
 $\therefore$ Average score of 2nd team = $\frac{322}{7} = 46$

Since the average score of the 2nd team is more than the average score of the 1st team, the 1st team scored better.

d) Cost of 1 L milk = Rs. 22.50
 $\therefore$ Cost of 40.3 L of milk = $40.3 \times 22.50 = 906.75$
Thus, the cost of 40.3 L of milk is Rs.906.75.

Question 6

a) i) $(-48) \times 24 \times (-10) + 100$
 $= -1152 \times (-10) + 100$
 $= 11520 + 100$
 $= 11620$

ii) $(-56) + 27 - 45 - 17 + 19$
 $= -29 - 45 - 17 + 19$
 $= -74 - 17 + 19$
 $= -91 + 19$
 $= -72$

b) $5x - \frac{3}{4} = 2x - \frac{2}{3}$

$$\therefore 5x - 2x = \frac{3}{4} - \frac{2}{3}$$

$$\therefore 3x = \frac{9-8}{12}$$

$$\therefore 3x = \frac{1}{12}$$

$$\therefore x = \frac{1}{12} \div 3$$

$$\therefore x = \frac{1}{12} \times \frac{1}{3}$$

$$\therefore x = \frac{1}{36}$$

$$\begin{aligned} & \frac{m}{5} - \frac{m-2}{3} + m \\ \text{c) } &= \frac{m \times 3}{5 \times 3} - \frac{(m-2) \times 5}{3 \times 5} + \frac{m \times 15}{1 \times 15} \\ &= \frac{3m - 5m + 10 + 15m}{15} \\ &= \frac{13m + 10}{15} \end{aligned}$$

Question 7

$$\text{a) } x + z - 15 = 65$$

$$\therefore x + z = 65 + 15$$

$$\therefore x + z = 80$$

$$\therefore x = 80 - z$$

$$\text{b) i) } \sqrt{1.44} = \frac{\sqrt{144}}{\sqrt{100}} = \frac{\sqrt{144}}{10} = \frac{12}{10} = 1.2$$

$$\text{ii) } \sqrt{289} = \sqrt{17 \times 17} = 17$$

$$\text{c) } -14 - 5x \geq 3x + 2$$

$$-14 - 2 \geq 3x + 5x$$

$$-16 \geq 8x$$

$$\frac{-16}{8} = -2 \geq x$$

$$x \leq -2$$

$$x = \{-2, -3, -4, \dots\}$$

$$\text{d) Given, AD bisects } \angle A \text{ and } AD \perp BC$$

In $\triangle ADB$ and $\triangle ADC$,

$AD = AD$ (common side)
 $\angle BAD = \angle CAD$ (bisected angles)
 $\angle ADB = \angle ADC$ (90° as $AD \perp BC$)
 Thus, by ASA test for congruence, $\triangle ADB \cong \triangle ADC$.

Question 8

- a) Weight of a person on Earth = 60 kg
 Weight of a person on the Moon = 9.9 kg
 Weight of a person on Jupiter = 141.8 kg
 If, weight of a person on Earth = 75 kg
 Then, weight of a person on the Moon = $\frac{75 \times 9.9}{60} = 12.375 \approx 12.4$
 And weight of a person on Jupiter = $\frac{75 \times 141.8}{60} = 177.25 \approx 177.3$
- b) Sum of interior angles of a polygon = $(n - 2) \times 180^\circ$
 i) Sum of angles of a polygon with 12 sides
 $= (12 - 2) \times 180^\circ$
 $= 10 \times 180^\circ$
 $= 1800^\circ$
 ii) Sum of angles of a polygon with 25 sides
 $= (25 - 2) \times 180^\circ$
 $= 23 \times 180$
 $= 4140^\circ$
- c) O is the centre of the circle. AB passes through O, hence AB is the diameter.
 $\therefore m\angle BCA = 90^\circ$ (angle in a semi-circle)
 In $\triangle ABC$,
 $m\angle ABC + m\angle BCA + m\angle CAB = 180^\circ$
 $\therefore m\angle ABC + 90^\circ + 35^\circ = 180^\circ$
 $\therefore m\angle ABC + 125^\circ = 180^\circ$
 $\therefore m\angle ABC = 180^\circ - 125^\circ$
 $\therefore m\angle ABC = 55^\circ$

Question 9

- a) Complementary angle for angle measuring $39^\circ = (90 - 39)^\circ = 51^\circ$
 Supplementary angle for angle measuring $39^\circ = (180 - 39)^\circ = 141^\circ$
- b) Ratio of the ages of the two brothers = 3 : 2
 Elder brother's age = 21 years
 Let the younger brother's age be x years.

Then, we have

$$3 : 2 :: 21 : x$$

$$\therefore 3x = 2 \times 21$$

$$\therefore 3x = 42$$

$$\therefore x = 42 \div 3$$

$$\therefore x = 14$$

Hence, the younger brother is 14 years old.

Elder brother's age after 7 years = $21 + 7 = 28$ years and

Younger brother's age = $14 + 7 = 21$ years

Thus, ratio after 7 years = $28 : 21 = 4 : 3$

c) The co-ordinates reflected on the y-axis will be

i) $A(3, 6) \equiv (-3, 6)$

ii) $B(-4, 8) = (4, 8)$

iii) $C(4, -7) = (-4, -7)$