## ICSE
## Class VII Mathematics
## Sample Paper 2

**Time: 2hour 30mins**                                                     **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 [ ].

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## Section A (40 marks)

### Question 1

a) Three metallic cubes with edges 3 cm, 4 cm and 5 cm were melted and recast into a new cube. What will be the length of the edge of the new cube?    [3]

b) Draw a Venn-Diagram to represent A = {2, 4, 6, 8, 10} and B = {4, 8, 12, 16, 20}. Find A ∪ B and A ∩ B.                                                    [4]

c) Simplify: $\left(\dfrac{y}{6} + \dfrac{2y}{3}\right) \div \left(2y - \dfrac{3y-2}{2}\right)$                                                [3]
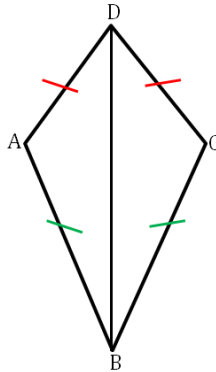
### Question 2

a) In the given figure, find m∠CGF and m∠DGF.                                [3]
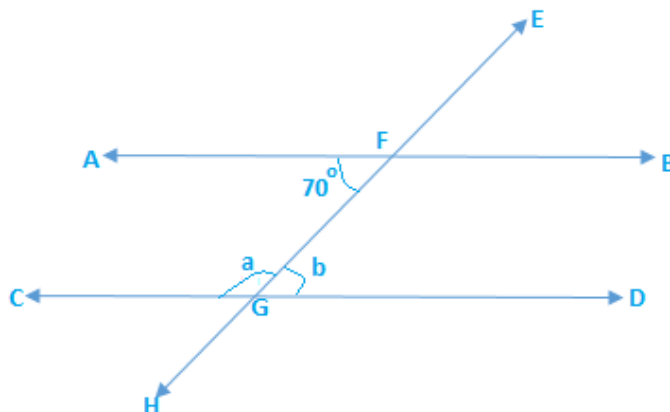
b) Represent the inequation on a number line: $3x + 14 \geq 8$ , $x \in I$ [3]

c) Solve for a: $a + b + 27 = 45$ [2]

d) Calculate the interest earned on a sum of Rs. 18,000, lent for 3 years at 6% per annum. [2]
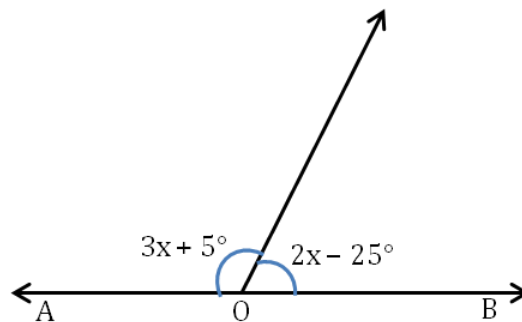
## Question 3

a) Convert as instructed:

i. 36 km/hr to m/sec      ii. 75 cm/sec to m/ sec [3]

b) Solve:    i. $\{5 + (5 \times 8) \div 2 - 3\} \div (-11)$

         ii. $\{63 \div (-15 + 8)\} - (-3 \times 7)$ [4]

c) In the figure, AD = DC and AB = BC. Prove that $\triangle ABD \cong \triangle CBD$. [3]



## Question 4

a) By selling a dress for Rs. 729, a shopkeeper experienced a loss of 10%. Find the cost price of the dress? [3]

b) Aryan has a rectangular garden whose length is double its width. The area of the garden is 450 square cm. What is the length of the garden? [2]

c) Find the value of x in the given figure if AOB is a straight line. [2]



d) Each interior angle of a polygon is 140°. Find the number of sides. [3]
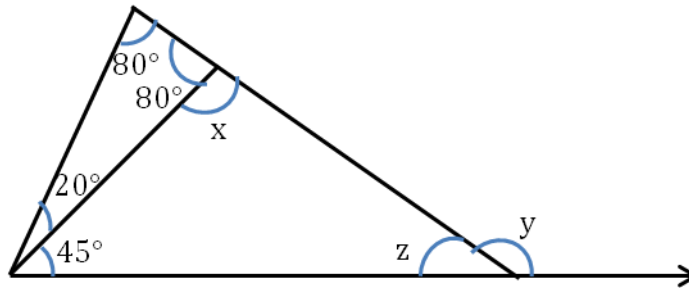
## Section B (40 marks)

**Question 5**

a) Subtract the sum of $(8a^3 + 4a + 5c^2)$ and $(4a^2 + 8b - 4c^2)$ from $(-2a^3 + 9a - 5c^2 + 8a^2 + 6)$ [3]

b) Solve: $\left(2^{-1} \times 3^{-1}\right)^2 \times \left(\dfrac{-3}{8}\right)^{-1}$ [2]
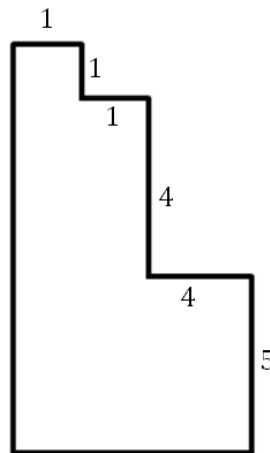
c) Simplify: $\dfrac{\dfrac{1}{3}\left(\dfrac{1}{2} + \dfrac{1}{5}\right)}{\dfrac{1}{5}\left(\dfrac{1}{2} + \dfrac{1}{3}\right)}$ [2]

d) Find x, y and z in the following triangle. [3]



**Question 6**

a) Find the perimeter of the following plot (all measures are in m). [3]



b) Divide 104 pens between 3 friends in the ratio $\dfrac{1}{2} : \dfrac{1}{3} : \dfrac{1}{4}$ [4]

c) Factorise: $49(2x + y)^2 - 64(x - 3y)^2$ [3]

**Question 7**

a) The average of 6 numbers is 36.5. If 5 of the six numbers are 25, 29, 33, 37 and 51, find the 6$^{th}$ number. [3]

b) Find x: 4x + 3 − x + 3 = 60 [2]

c) Divide 0.00945 by 0.315. [2]

d) Find the co-ordinates of the image of the following points under reflection in the origin: [3]

   i. A(2, −3)      ii. B(−3, −6)      iii. C(0, 9)


**Question 8**

a) Find the square and cube of: i. 15      and      ii. 1.5 [3]

b) In a poultry farm, 300 eggs are produced every day. If 100 birds produce an average of 75 eggs each day, how many birds are there in the poultry farm? Also find how many more birds should be bought if 375 eggs are needed every day. [4]

c) Construct ΔXYZ in which XZ = 5 cm, YZ = 3.6 cm and XY = 5.4 cm. [3]


**Question 9**

a) The temperatures of 10 days in a city are given below. Plot a line graph to represent the data. [4]

| Days | Temperature (in °C) |
|---|---|
| Day 1 | 41 |
| Day 2 | 40.5 |
| Day 3 | 42 |
| Day 4 | 39 |
| Day 5 | 40 |
| Day 6 | 43 |
| Day 7 | 44 |
| Day 8 | 41.5 |
| Day 9 | 38 |
| Day 10 | 40 |

b) The H.C.F. of two numbers is 18 and their L.C.M. is 108. One of the numbers is 54. Find the other number. [3]
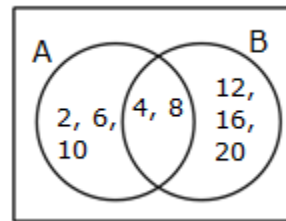
c) Multiply: 57 × 63 [3]

# Solution

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**Question 1**

a) Volume of the $1^{st}$ cube = 3 × 3 × 3 = 27 cm$^3$
   Volume of the $2^{nd}$ cube = 4 × 4 × 4 = 64 cm$^3$
   Volume of the $3^{rd}$ cube = 5 × 5 × 5 = 125 cm$^3$
   Total volume of the cubes = (27 + 64 + 125) cm$^3$ = 216 cm$^3$
   Thus, the volume of the new cube is 216 cm$^3$.
   Therefore, the edge of the new cube = $\sqrt[3]{216} = \sqrt[3]{6 \times 6 \times 6} = 6$ cm

b) A ∪ B = {2, 4, 6, 8, 10, 12, 16, 20}
   A ∩ B = {4, 8}



c) $\left( \dfrac{y}{6} + \dfrac{2y}{3} \right) \div \left( 2y - \dfrac{3y-2}{2} \right)$

$= \left( \dfrac{y + 4y}{6} \right) \div \left( \dfrac{4y - 3y + 2}{2} \right)$

$= \left( \dfrac{5y}{6} \right) \div \left( \dfrac{y+2}{2} \right)$

$= \dfrac{5y}{6} \times \dfrac{2}{y+2}$

$= \dfrac{5y}{3y+6}$

**Question 2**

a) In the given figure, AB and CD are parallel lines and EH is a transversal.
   Also given that m∠AFG = 70°
   Since alternate interior angles of a transversal through two parallel lines are equal, we have, m∠DGF = m∠AFG = 70°
   Therefore, b = 70°
   Since ∠CGF and ∠DGF lie on the straight line CD, they form a linear pair.
   Therefore, the sum of the angles ∠CGF and ∠DGF is 180°.
   ∴ m∠CGF + m∠DGF = 180°
   ∴ m∠CGF + 70° = 180°
   ∴ m∠CGF = 180° − 70°
   ∴ m∠CGF = 110°

b) $3x + 14 \geq 8$

$\therefore 3x \geq 8 - 14$

$\therefore 3x \geq -6$

$\therefore x \geq -2$
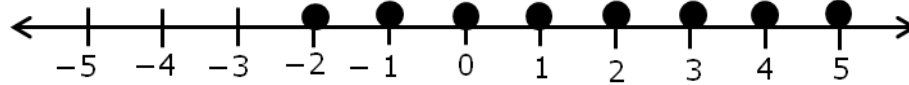


c) $a + b + 27 = 45$

$\therefore a + b = 45 - 27$

$\therefore a + b = 18$

$\therefore a = 18 - b$

d) Simple interest $= \dfrac{PTR}{100}$

$\text{S.I.} = \dfrac{18000 \times 3 \times 6}{100} = 3240$

Thus, interest earned is Rs. 3240

## Question 3

a)  i. 36 km/hr to m/sec

   1 km = 1000 m

   1 hour = 60 × 60 = 3600 sec

   $1 \text{ km/hr} = \dfrac{1000 \text{ m}}{3600 \text{ s}} = \dfrac{5}{18} \text{m/s}$

   36 km/hr = $\dfrac{5}{18} \times 36 = 10 \text{ m/s}$

   ii. 75 cm/sec to m/ sec

   100 cm = 1 m

   75 cm = 0.75 m

   So, 75 cm/sec = 0.75 m/sec

b)  i. {5 + (5 × 8) ÷ 2 − 3} ÷ (−11)

   = {5 + 40 ÷ 2 − 3} ÷ (−11)

   = {5 + 20 − 3} ÷ (−11)

   = 22 ÷ (−11)

   = −2

   ii. {63 ÷ (−15 + 8)} − (−3 × 7)

   = {63 ÷ (−7)} − (−21)

   = −9 + 21

   = 12

c) Given, AD = DC and AB = BC
   In ΔABD and ΔCBD,
   AD = DC      (given)
   AB = BC      (given)
   BD = BD      (common side)
   According to the SSS test for congruence, ΔABD ≅ ΔCBD

## Question 4

a) Selling price of the dress = Rs. 729
   Loss% = 10%
   Cost price = ?

$$CP = \left[ \frac{100}{100 - loss\%} \times SP \right]$$

$$= \left[ \frac{100}{100 - 10} \times 729 \right]$$

$$= \left[ \frac{100}{90} \times 729 \right]$$

$$= 810$$

   Thus, the cost price of a dress is Rs. 810

b) Let the width of the garden be w cm.
   Then, the length of the garden = 2w cm
   Area of a rectangle = length × breadth
   ∴ 450 = 2w × w
   ∴ 450 = 2w$^2$
   ∴ w$^2$ = 225
   ∴ w = $\sqrt{225}$ = 15
   ∴ 2w = 2 × 15 = 30 cm
   Thus, the length of the garden is 30 cm.

c) Given, AOB is a straight line.
   So, (3x + 5) + (2x − 25) = 180°  ….(linear pair)
   ∴ 3x + 5 + 2x − 25 = 180°
   ∴ 5x − 20 = 180°
   ∴ 5x = 180 + 20
   ∴ 5x = 200°
   ∴ x = 40°

d) Let the number of sides of the polygon be n.
   Given, each interior angle = 140°
   Sum of all interior angles = (n − 2) × 180°

   Hence, each interior angle of the polygon = $\dfrac{(n-2)}{n} \times 180°$

   $\therefore \dfrac{(n-2)}{n} \times 180° = 140°$

   $\therefore \dfrac{n-2}{n} = \dfrac{140}{180}$

   $\therefore \dfrac{n-2}{n} = \dfrac{7}{9}$

   $\therefore 9(n-2) = 7n$

   $\therefore 9n - 18 = 7n$

   $\therefore 9n - 7n = 18$

   $\therefore 2n = 18$

   $\therefore n = 9$

   Thus, the polygon has 9 sides.

## Section B (40 marks)

## Question 5

a) $(8a^3 + 4a + 5c^2) + (4a^2 + 8b - 4c^2)$
   $= 8a^3 + 4a + 5c^2 + 4a^2 + 8b - 4c^2$
   $= 8a^3 + 4a^2 + 5c^2 - 4c^2 + 8b + 4a$
   $= 8a^3 + 4a^2 + c^2 + 8b + 4a$
   Now, subtracting from $(-2a^3 + 9a - 5c^2 + 8a^2 + 6)$, we get,
   $(-2a^3 + 9a - 5c^2 + 8a^2 + 6) - (8a^3 + 4a^2 + c^2 + 8b + 4a)$
   $= -2a^3 + 9a - 5c^2 + 8a^2 + 6 - 8a^3 - 4a^2 - c^2 - 8b - 4a$
   $= -2a^3 - 8a^3 - 5c^2 - c^2 + 8a^2 - 4a^2 - 8b - 4a + 9a + 6$
   $= -10a^3 - 6c^2 + 4a^2 - 8b + 5a + 6$

b) $\left(2^{-1} \times 3^{-1}\right)^2 \times \left(\dfrac{-3}{8}\right)^{-1} = \left(\dfrac{1}{2} \times \dfrac{1}{3}\right)^2 \times \dfrac{-8}{3}$

   $= \left(\dfrac{1}{6}\right)^2 \times \dfrac{-8}{3}$

   $= \dfrac{1}{36} \times \dfrac{-8}{3}$

   $= \dfrac{-2}{27}$

c) 
$$\frac{\dfrac{1}{3}\left(\dfrac{1}{2}+\dfrac{1}{5}\right)}{\dfrac{1}{5}\left(\dfrac{1}{2}+\dfrac{1}{3}\right)}=\frac{\dfrac{1}{3}\left(\dfrac{5+2}{10}\right)}{\dfrac{1}{5}\left(\dfrac{3+2}{6}\right)}$$

$$=\frac{\dfrac{1}{3}\left(\dfrac{7}{10}\right)}{\dfrac{1}{5}\left(\dfrac{5}{6}\right)}$$

$$=\frac{\dfrac{7}{30}}{\dfrac{1}{6}}$$

$$=\frac{7}{30}\times\frac{6}{1}$$

$$=\frac{7}{5}$$

d)  x  = 180° − 80°      ....(linear pair)
∴ x = 100°

z = 180° − (x + 45°)    (angle sum property of a triangle)
∴ z = 180° − (100 + 45)
∴ z = 180 − 145
∴ z = 35°

y = x + 45°    (exterior angle property of a triangle)
∴ y = 100 + 45
∴ y = 145°

## Question 6

a)  The measurements of the missing sides:
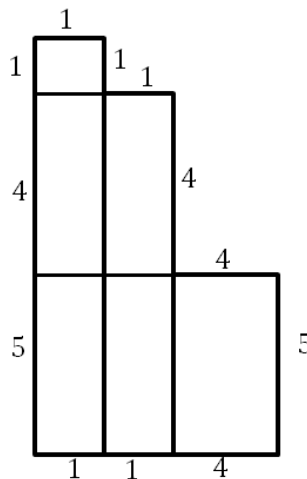


∴ Perimeter = (1 + 4 + 5 + 1 + 1 + 4 + 5 + 4 + 4 + 1 + 1 + 1) = 32 m

b) Given ratio = $\dfrac{1}{2} : \dfrac{1}{3} : \dfrac{1}{4}$

L.C.M. = 12

$\dfrac{1}{2} \times 12 = 6$

$\dfrac{1}{3} \times 12 = 4$

$\dfrac{1}{4} \times 12 = 3$

So, the ratio is 6 : 4 : 3

Total of the ratio = 6 + 4 + 3 = 13

∴ Number of pens for 1ˢᵗ friend = $\dfrac{6}{13} \times 104 = 48$

Number of pens for 2ⁿᵈ friend = $\dfrac{4}{13} \times 104 = 32$

Number of pens for 3ʳᵈ friend = $\dfrac{3}{13} \times 104 = 24$

Hence, the 3 friends get 48, 32 and 24 pens respectively.

c) $49(2x + y)^2 - 64(x - 3y)^2$

$= [7(2x + y)]^2 - [8(x - 3y)]^2$

Using identity $a^2 - b^2 = (a + b)(a - b)$

$= \{[7(2x + y)] + [8(x - 3y)]\}\{[7(2x + y)] - [8(x - 3y)]\}$

$= \{14x + 7y + 8x - 24y\}\{14x + 7y - 8x + 24y\}$

$= \{22x - 17y\}\{6x + 31y\}$

## Question 7

a) Total numbers = 6

Average of 6 numbers = 36.5

Now, average of 6 numbers $= \dfrac{\text{Sum of 6 numbers}}{\text{Total numbers}}$

∴ $36.5 = \dfrac{\text{Sum of 6 numbers}}{6}$

∴ Sum of the 6 numbers = 36.5 × 6 = 219

Sum of the 5 numbers = (25 + 29 + 33 + 37 + 51) = 175

∴ 6ᵗʰ number = Sum of 6 numbers – Sum of 5 numbers

= 219 – 175

= 44

∴ The 6ᵗʰ number is 44.

b) $4x + 3 - x + 3 = 60$

∴ $4x - x + 3 + 3 = 60$

∴ $3x + 6 = 60$

∴ $3x = 60 - 6 = 54$

∴ $x = 18$

c) $0.00945 \div 0.315$

$$0.00945 = \frac{945}{100000}$$

$$0.315 = \frac{315}{1000}$$

$$\therefore \frac{0.00945}{0.315} = \frac{945}{100000} \times \frac{1000}{315}$$

$$= \frac{3}{100}$$

$$= 0.03$$

d) i. A(2, −3)

   Reflection for A(2, −3) = (−2, 3)

  ii. B(−3, −6)

   Reflection for B(−3, −6) = (3, 6)

  iii. (0, 9)

   Reflection for C(0, 9) = (0, −9)

## Question 8

a) i. 15

   Square $= (15)^2 = 15 \times 15 = 225$

   Cube $= (15)^3 = 15 \times 15 \times 15 = 3375$

  ii. 1.5

   Square $= (1.5)^2 = 1.5 \times 1.5 = 2.25$

   Cube $= (1.5)^3 = 1.5 \times 1.5 \times 1.5 = 3.375$

b) Number of eggs produced each day = 300

  Number of eggs produced by 100 birds = 75

$$\therefore \text{Number of birds which will produce 300 eggs} = \frac{100 \times 300}{75} = 400$$

Hence, there are 400 birds in the poultry farm.

$$\text{Number of birds which will produce 375 eggs} = \frac{100 \times 375}{75} = 500$$

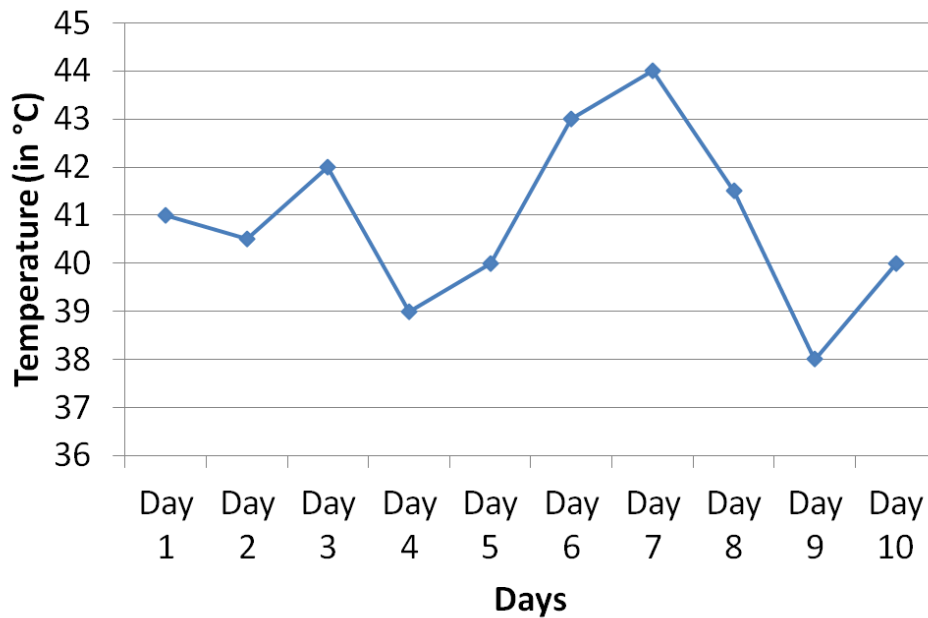$$\therefore \text{ Number of more birds required to produce 375 eggs} = 500 - 400 = 100$$

c) Steps of construction:

i. Draw XY = 5.4 cm

ii. With X as centre and 5 cm radius cut an arc.

iii. With Y as centre and radius = 3.6 cm cut the previous arc at point Z.

iv. Join YZ and XZ.

ΔXYZ is the required triangle.
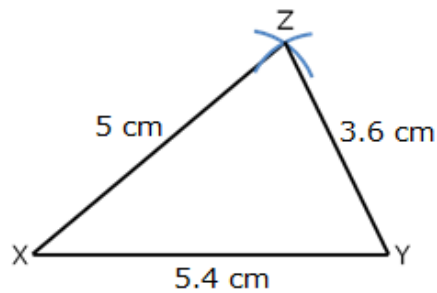


## Question 9

a) The line graph



b) Let the required number be x.

Given, H.C.F. = 18 and L.C.M. = 108

Given number = 54

We know, Product of two numbers = Product of their H.C.F. and L.C.M.

∴ 54 × x = 108 × 18

∴ x = $\dfrac{108 \times 18}{54}$

∴ x = 36

c) 57 × 63

57 = (60 − 3)

63 = (60 + 3)

We have, (60 − 3)(60 + 3)

Using identity, (a + b)(a − b) = $a^2 - b^2$

(60 + 3)(60 − 3) = $(60)^2 - (3)^2$

$$= 3600 - 9$$

$$= 3591$$