CBSE Board
Class VII Mathematics

Time: 2 ½ hours Total Marks: 80

General Instructions:

1. **All** questions are **compulsory**.
2. **Section A** comprises of **12** questions carrying 1 mark each.
3. **Section B** comprises of **12** questions carrying 2 marks each.
4. **Section C** comprises of **8** questions carrying 3 marks each.
5. **Section D** comprises of **5** questions carrying 4 marks each.

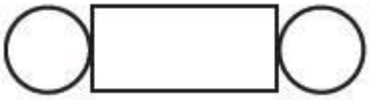
Section A
(Questions 1 to 12 carry 1 mark each)

1. 56% is equal to the decimal number
   A. 5.60
   B. 0.56
   C. 56.0
   D. 0.056

2. Which of the following rational numbers is in the standard form?
   A. $\frac{15}{-63}$
   B. $\frac{36}{25}$
   C. $\frac{-8}{30}$
   D. $\frac{24}{33}$

3. A triangle has _____ components.
   A. 3
   B. 4
   C. 5
   D. 6

4. Name the solid, whose net is shown below:



A. Cylinder
B. Cone
C. Sphere
D. Rectangle

5. Which of the following is an example of binomial?

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

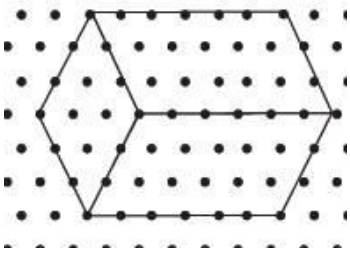
6. $\frac{16}{25}$ in exponential form is

A. $\frac{4^3}{5^2}$
B. $\frac{4^2}{5^3}$
C. $\frac{2^4}{5^2}$
D. $\frac{2^3}{5^2}$

7. English alphabet "Z" has rotational symmetry of order _____.

A. 2
B. 1
C. 4
D. 3

8. The length of following cuboid is:



A. 3 units
B. 2 units
C. 6 units
D. 4 units

9. $\frac{11^{10}}{11^{6}}$ =

A. 10^{16}

B. 10^{4}

C. 11^{16}

D. 11^{4}

10. Rhombus has a perimeter of 28 cm, then what will be the length of its side?

A. 7 cm

B. 4 cm

C. 16 cm

D. 14 cm

11. (128 ÷ 32) ÷ (-4) =

A. -1

B. 2

C. -3

D. -4

12. The first step that we will use to separate variables and constants in the linear equation 2x + 3 = 7 is

A. Transposing 3 to RHS

B. Transposing 7 to LHS

C. Diving both sides by 2

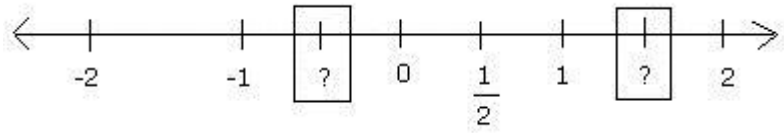
D. Multiplying both sides with 3

Section B

(Questions 13 to 24 carry 2 marks each)

13. Rahul has got 40 marks out of 50 in his math exam while Rohan has got 75 out of 100. Who scored more marks?

14. Find the missing values in the number line below:

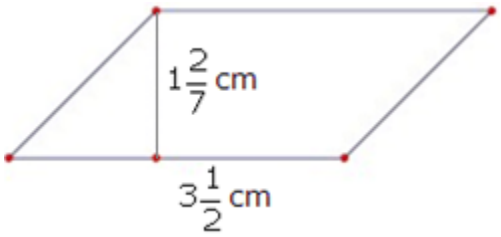


15. Is it possible to construct a triangle with the following given elements? Why or why not?

a) $\angle A = 120^{o}$, $\angle B = 90^{o}$ and AB = 8 cm.

b) $\angle P = 90^{o}$, $\angle Q = 90^{o}$ and PQ = 9 cm.

16. Find the area of the given parallelogram.



17. Add the following expressions:
6m - 7n - 5p, -4m - 9n + 6p, -4m - 9n + 6p

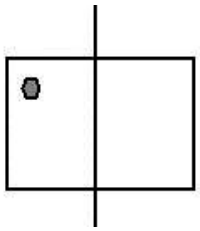
18. Write the following in expanded form:

(i) $\left(\frac{-7}{9}\right)^3$

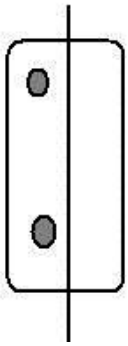
(ii) $\left(\frac{5}{8}\right)^6$

19. Given the line of symmetry, find the other hole(s) in the following figures.

i.



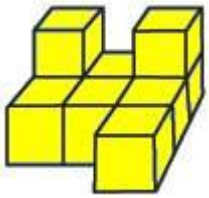
ii.



20. Draw a cuboid of dimensions 5 units x 3 units x 6 units on an isometric dot sheet.

21. Mass of earth is approximately 5,970,000,000,000,000,000,000,000 kg. Express this mass in standard form.

22. Count the number of cubes in the following solid.



23. In a cricket match, the runs scored by 11 players are as follows:
12, 23, 10, 77, 15, 78, 90, 54, 23, 10 and 1
Find the average score.

24. Find the value of the following expression using suitable property:
$725 \times (-35) + (-725) \times 65$

Section C

(Questions 25 to 32 carry 3 marks each)

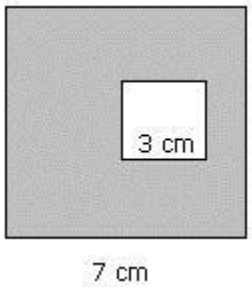
25. If $\frac{1}{2}$ of $\frac{-3}{4}$ of a number is 6, what is the number?

26. A shopkeeper sells one transistor for Rs. 840 at a gain of 20% and another for Rs. 960 at a loss of 4%. What is his total gain or loss percent?

27. Draw a right angled triangle in which hypotenuse is of length 5 cm and one side of length 3 cm. Also measure the length of third side.

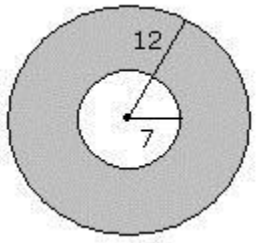
28. Explain ASA congruence condition with the help of a diagram.

29. A small square is located inside a bigger square as shown in the figure below. The length of one side of the small square is 3 cm and the length of one side of the big square is 7 cm. What is the area of the shaded region?



30. A sum of Rs. 12,500 amounts to Rs. 15,500 in 4 years at a rate of simple interest. What is the rate of interest?

31. In the figure given below, a circle is inscribed inside another circle. The radius of the outer circle is 12 cm and that of the inner circle is 7 cm. Find the area of the shaded portion between the circles.



32. Find the coefficient of x in each of the following options:

i. $(2 - z)x$

ii. $z^3y + 2x$

iii. $x^3y + 2xy + 1$

Section D

(Questions 33 to 37 carry 4 marks each)

33. Draw a triangle PQR, where PQ = 5.7 cm, $\angle P = 45^o$ and $\angle Q = 30^o$.

34. Multiply $(3a + 3b)$ by $(2a - 2b)$. Verify the result for a = 2 and b= (-2).

35. The perimeter of a square is same as that of the rectangle. Find the side of the square if the dimensions of the rectangle are 10 m × 8 m.

36. Simplify: $20x - [15x^3 + 5x^2 - \{8x^2 - (4 - 2x - x^3) - 5x^3\} - 2x]$.

37. A bag has 12 balls coloured yellow, blue, green and red. The number of balls of each colour is the same. A ball is drawn from the bag. Calculate the probability of drawing a yellow ball, a blue ball, a green ball and a red ball.

CBSE Board
Class VII Mathematics

Solution

Time: 2 ½ hours Total Marks: 80

Section A

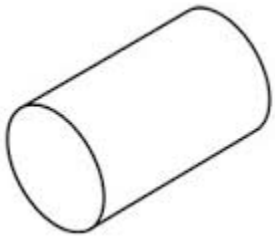
1. Correct answer: B

$$56\% = \frac{56}{100} = 0.56$$

2. Correct answer: B
For the option (B), 1 is the only common factor between numerator and denominator and the denominator is a positive integer, hence it is in the standard form.

3. Correct answer: D
6 components - three angles and three sides

4. Correct answer: A
Cylinder



5. Correct answer: B
-x + 1 is an example of binomial as it contains two terms.

6. Correct answer: C

$$\frac{16}{25} = \frac{2\times2\times2\times2}{5\times5} = \frac{2^4}{5^2}$$

7. Correct answer: A

Z N Z N Z
90^0 180^0 270^0 360^0

Hence, order of rotational symmetry is 2.

8. Correct answer: C
The length of given cuboid is 6 units.

9. Correct answer: D
$\frac{11^{10}}{11^{6}} = 11^{10-6} = 11^{4}$

10. Correct answer: A
Perimeter of rhombus = 28 cm
Thus, 4 x (side) = 28 cm
Side = $\frac{28}{4}$ = 7 cm

11. Correct answer: A
(128 ÷32) ÷ (-4) = 4 ÷ (-4) = -1

12. Correct answer: A
2x + 3 = 7
If we transpose 3 to RHS, then the term with variable will remain on one side and the constants will be on the other side.
So, the first step is to transpose 3 to RHS.
i.e. 2x = 7 – 3

Section B

13. Percentage of marks scored by Rahul = $\frac{40}{50} \times 100 = 80\%$

Percentage of marks scored by Rohan = $\frac{75}{100} \times 100 = 75\%$

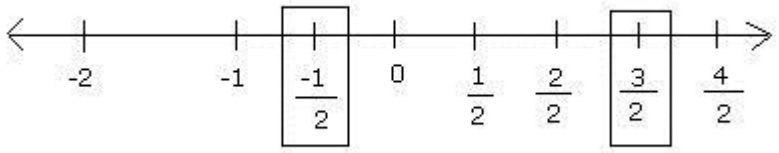
Hence, Rahul scored more marks than Rohan.

14. In the given number line, the rational number between 0 and -1 would be $\frac{-1}{2}$.

Rational number between 1 and 2 is $\frac{3}{2}$ as 1 can be written as $\frac{2}{2}$.

So, the next point would be $\frac{3}{2}$ and 2 can be written as $\frac{4}{2}$, which is the same.

Thus, the number line representing the missing values is as follows:



15.

(a) $\angle A = 120^o$, $\angle B = 90^o$ and AB = 8 cm

Since, $\angle A + \angle B = 120^o + 90^o = 210^o$

That is the sum of two angles is more than 180^o.

Hence, the triangle is not possible.

(b) $\angle P = 90^o$, $\angle Q = 90^o$ and PQ = 9 cm

Since, $\angle P + \angle Q = 90^o + 90^o = 180^o$

That is the sum of two angles is equal to 180^o.

And the measure of third angle is zero.

Hence, the triangle is not possible.

16.

Area of a parallelogram is given by

= base (b) x height (h)

$= (3\frac{1}{2} \text{ cm}) \times (1\frac{2}{7} \text{ cm})$

$= \frac{7}{2} \times \frac{9}{7} \text{ cm}^2$

$= \frac{9}{2} \text{ cm}^2$

$= 4.5 \text{ cm}^2$

Thus, the area of the parallelogram is 4.5 sq. cm.

17. Required sum:

(6m - 7n - 5p) + (-4m - 9n + 6p) + (-4m - 9n + 6p)

= 6m - 7n - 5p - 4m - 9n + 6p - 4m - 9n + 6p

= (6m - 4m - 4m) + (-7n - 9n - 9n) + (-5p + 6p + 6p)

= (6 - 4 - 4)m + (-7 - 9 - 9)n + (-5 + 6 + 6)p

= -2m - 25n + 7p

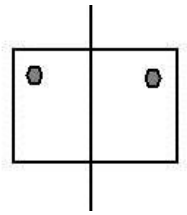
18.

(i) $\left(\frac{-7}{9}\right)^3 = \frac{-7}{9} \times \frac{-7}{9} \times \frac{-7}{9} = \frac{-7 \times -7 \times -7}{9 \times 9 \times 9}$

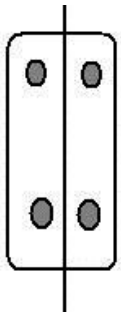
(ii) $\left(\frac{5}{8}\right)^6 = \frac{5}{8} \times \frac{5}{8} \times \frac{5}{8} \times \frac{5}{8} \times \frac{5}{8} \times \frac{5}{8} = \frac{5 \times 5 \times 5 \times 5 \times 5 \times 5}{8 \times 8 \times 8 \times 8 \times 8 \times 8}$

19. The other holes are as below:

i.

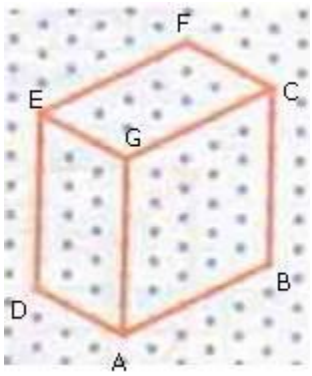


ii.



20.

1. 1. First take an isometric dot sheet.
2. Draw the line segment AB and AD of length 5 units and 3 units respectively.
3. For the height draw the line segment AG, BC and DE of 6 units each.
4. Join EG and GC.
5. Again draw EF and CF of 5 units and 3 units respectively.



21. Mass of earth = 5,970,000,000,000,000,000,000,000 kg
= 597 × 10000000000000000000000 kg
= 597 × 10^{22} kg
= 5.97 × 10^{24} kg

22. Number of cubes in first layer = 7
Number of cubes in second layer = 2
Hence, total number of cubes = 7 + 2 = 9

23. Average score = mean score

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Total number of observations}}$$

$$= \frac{12+23+10+77+15+78+90+54+23+10+1}{11}$$

$$= \frac{393}{11}$$

$$= 35.7$$

24. 725 × (-35) + (-725) × 65
= 725 × (-35) - 725 × 65
= 725 x (-35 - 65) [Using distributive property]
= 725 × (-100)
= -72500

Section C

25. Let the unknown number be n.

$\frac{1}{2}$ of $\frac{-3}{4}$ of n = 6

i.e. $\frac{1}{2} \times \frac{-3}{4} \times n = 6$

$\frac{-3}{8} \times n = 6$

$n = 6 \times \frac{8}{-3}$

$n = \frac{6 \times 8}{-3}$

$n = \frac{48}{-3}$

$n = -16$

Thus, the required number is -16.

26.

$$CP = \left(\frac{100}{100 + \text{gain}\%}\right) \times SP$$

Thus, CP of 1^{st} transistor

$= \left(\frac{100}{120} \times \text{Rs } 840\right) = \text{Rs } 700$

CP of 2^{nd} transistor

$= \left(\frac{100}{96} \times \text{Rs } 960\right) = \text{Rs } 1000$

So, total C.P. = Rs. (700 + 1000) = Rs. 1700.

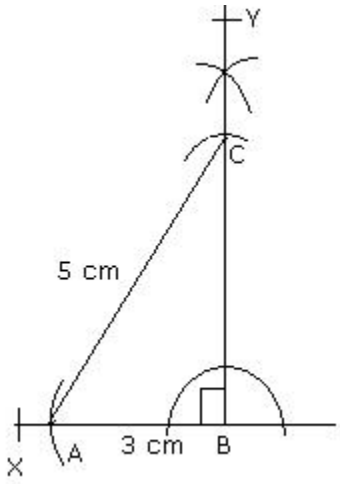
Total S.P. = Rs. (840 + 960) = Rs. 1800.

Gain = Rs (1800 - 1700) = Rs 100

$\therefore \text{Gain}\% = \left(\frac{100}{1700} \times 100\right)\% = 5\frac{15}{17}\%$

27. Steps of construction:

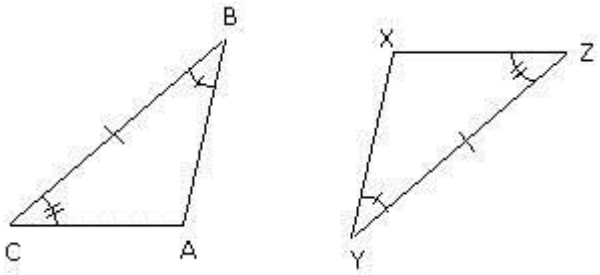
1. Draw a line BX and BY such that BY is perpendicular on BX.
2. Taking radius 3 cm and centre B cut the line BX at A.
3. Taking radius 5 cm and centre A cut the line BY at C.
4. Join AC.
5. ABC is the required triangle.
6. Measure of side BC i.e. third side is 4 cm.



28. ASA congruence criterion:

The Angle Side Angle (ASA) postulate states that if under correspondence, two angles and the included side of a triangle is equal to two corresponding angles and included side of another triangle, then the two triangles are congruent.

Consider the triangles ABC and XYZ as shown below.



Two angles and the included side are congruent.

$\angle ABC = \angle XYZ$ (equal angle)

BC = YZ (equal side)

$\angle ACB = \angle XZY$ (equal angle)

So, $\triangle ABC \cong \triangle XYZ$

Therefore, by the ASA congruence criterion, the triangles are congruent.

29. The area of the shaded region can be obtained by removing the area of the small square from the area of the big square.
Area of big square = 7 x 7 = 49 cm^2
Area of small square = 3 x 3 = 9 cm^2
Thus, area of the shaded region = 49 - 9 = 40 cm^2

30. Principal, P = Rs. 12500
Amount, A = Rs. 15500
Thus, S.I. = Rs. (A - P) = Rs. (15500 - 12500) = Rs. 3000.

$$\text{Rate} = \left(\frac{100 \times \text{Simple Interest}}{\text{Principal} \times \text{Time}}\right)\%$$

$$\text{Rate} = \left(\frac{100 \times 3000}{12500 \times 4}\right)\%$$

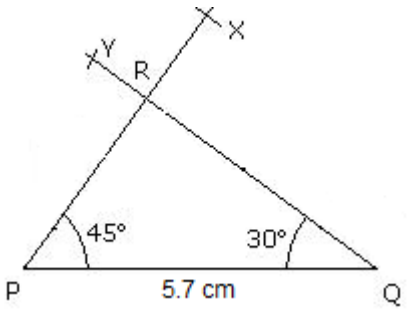
$$\text{Rate} = 6\%$$

31. Given, radius of the outer circle = 12 cm
So, area of the outer circle = $\pi r^2 = 3.14 \times 12^2 = 452.16\ cm^2$
Radius of the inner circle = 7 cm
Area of the inner circle = $\pi r^2 = \frac{22}{7} \times 7^2 = 154\ cm^2$
Thus, the required area of the shaded portion
= Area of the outer circle - Area of the inner circle
= 452.16 - 154
= 298.16 cm^2

32. Coefficient of x is:
(i) 2 – z
(ii) z^3
(iii) 2

Section D

33. Steps of construction:
1. Draw a line segment PQ = 5.7 cm.
2. Draw an angle of 45° at P and 30° at Q and let them intersect at R.
3. Thus, PQR is the required triangle.



34. Multiply (3a + 3b) by (2a – 2b). Verify the result for a = 2 and b= (-2)

(3a + 3b) by (2a – 2b)= $3a(2a – 2b) + 3b(2a – 2b)= 6a^2 – 6ab + 6ab – 6b^2 = 6(a^2 – b^2)$

For a = 2, b = - 2

[(3a + 3b)(2a – 2b)] = [(0)(8)] = 0

$\Rightarrow 6(a^2 – b^2) = 6(4 - 4) = 0$

35. Given, Perimeter of square = Perimeter of rectangle.

Length (l) of the rectangle = 10 m

Breadth (b) of the rectangle = 8 m

Perimeter of the rectangle = 2 × (l + b)= 2 × (10 + 8)= 2 × 18= 36 m

So, perimeter of the square = 36 m

Formula for perimeter of square:

Perimeter of square = 4 × s

36 = 4 × s [swap both sides]

4 × s = 36

$s = \frac{36}{4} = 9$ m

Thus, the side of the square is 9 m.

36. Consider:

$20x – [15x^3+5x^2 – \{8x^2 – (4 - 2x - x^3) - 5x^3\} - 2x]$

$= 20x – [15x^3+5x^2 – \{8x^2 – 4 + 2x + x^3 –5x^3\} – 2x]$

$= 20x – [15x^3+5x^2 – \{8x^2 – 4 + 2x –4x^3\} – 2x]$

$= 20x – [15x^3+5x^2 – 8x^2 + 4 – 2x + 4x^3 – 2x]$

$= 20x – [19x^3 – 3x^2 – 4x + 4]$

$= 20x – 19x^3 + 3x^2 + 4x – 4$

$= – 19x^3 + 3x^2 + 24x – 4$

37. Total number of balls = 12

It is also given that the bag contains an equal number of balls of each of the four colours: yellow, blue, green and red.

Therefore,

Number of yellow balls = Number of blue balls = Number of green balls = Number of red balls = 3

$$P(\text{yellow}) = \frac{\text{Number of yellow balls}}{\text{Total number of balls}} = \frac{3}{12} = \frac{1}{4}$$

$$P(\text{blue}) = \frac{\text{Number of blue balls}}{\text{Total number of balls}} = \frac{3}{12} = \frac{1}{4}$$

$$P(\text{green}) = \frac{\text{Number of green balls}}{\text{Total number of balls}} = \frac{3}{12} = \frac{1}{4}$$

$$P(\text{red}) = \frac{\text{Number of red balls}}{\text{Total number of balls}} = \frac{3}{12} = \frac{1}{4}$$