BLOOM | **BMO** *Bloom Maths Olympiad*

GRADE **7**

Bloom Maths Olympiad
Sample Paper 1

Maximum Time : 60 Minutes

Maximum Marks : 60

INSTRUCTIONS

1. There are 50 Multiple Choice Questions in this paper divided into two sections :

   Section A   40 MCQs; 1 Mark each
   Section B   10 MCQs; 2 Marks each

2. Each question has Four Options out of which **ONLY ONE** is correct.

3. All questions are compulsory.

4. There is no negative marking.

5. No electronic device capable of storing and displaying visual information such as calculator and mobile is allowed during the course of the exam.

School Name	
Student's Name	

Section A (1 Mark Questions)

1. Arrange the following in descending order.

$-(-67)$	$+(207)$	$|-450|$	$-(300)$
P	Q	R	S

   (a) $QPRS$ **(b)** $PQRS$ (c) $RQPS$ (d) $QRSP$

2. Which of the following letters have not rotational symmetry?

   (a) Z   (b) S   (c) N   (d) C

3. If the product of two numbers is 0.01875 and one of the number is 15. Find the other number.

   (a) 125   (b) 0.125   (c) 0.00125   (d) 1.25

4. The product of $\left(\dfrac{3}{4}a + \dfrac{8}{5}\right)$ and $\left(6 - \dfrac{5}{9}a\right)$ is

   (a) $\dfrac{-5}{12}a^2 - \dfrac{65}{18}a + \dfrac{48}{5}$ (b) $\dfrac{-5}{12}a^2 + \dfrac{65}{18}a + \dfrac{48}{5}$ (c) $\dfrac{-5}{12}a^2 + \dfrac{65}{18}a - \dfrac{48}{5}$ (d) $\dfrac{-5}{12}a^2 - \dfrac{65}{18}a - \dfrac{48}{5}$

5. What is the value of $p(p^q - q^p)$, if $p = 3$ and $q = 1$?

   (a) 4   (b) 3   (c) 6   (d) 2

6. Match the column.

	Column A		Column B
A	$0.005 \div 0.0001$	(i)	3
B	$0.2 \div 0.002$	(ii)	50
C	$\dfrac{1}{2} \times \dfrac{1}{5}$	(iii)	100
D	$1\dfrac{1}{2} \div \dfrac{1}{2}$	(iv)	0.1

Codes

	A	B	C	D			A	B	C	D
(a)	(iii)	(ii)	(iv)	(i)		(b)	(ii)	(i)	(iii)	(iv)
(c)	(ii)	(iii)	(iv)	(i)		(d)	(iv)	(ii)	(i)	(iii)

7. Compare and write '<', '>' or '=', in the box □, if $a \, \Delta \, b = a + b$ and $a \, \blacksquare \, b = a \div b$

$$14 \, \Delta \, 7 \, \blacksquare \, 3 \, \square \, 22 \, \blacksquare \, 2 \, \Delta \, 61$$

   (a) $<$ (b) $=$ (c) $>$ (d) None of these

8. Aruna deposits ₹ 6500 in a firm, who pays an interest at the rate of 12% per annum. Calculate the interest she get from it annually.

   (a) ₹ 800   (b) ₹ 780   (c) ₹ 500   (d) ₹ 685

9. How many lines of symmetry an isosceles triangle have?

   (a) 3   (b) 1   (c) 2   (d) zero

2

10. What is the value of $\angle BCA$, if ΔDAC and ΔBCA are congruent to each other.
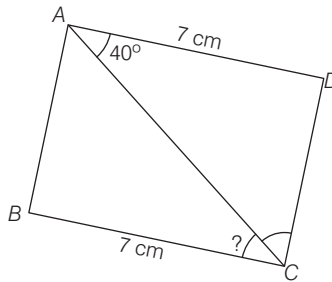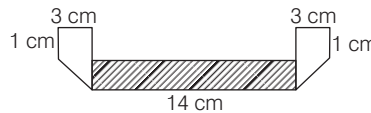

(a) 45°   (b) 30°   (c) 40°   (d) 100°

11. Car A travels 513 km in 3 h and Car B travels 716 km in 4h. The ratio of their speed is

(a) 1 : 3   (b) 170 : 189   (c) 171 : 179   (d) 71 : 86

12. A rectangular piece of paper was folded to form the shape shown below. What was the area of the piece of paper before it was folded.

(a) 50 cm^2 (b) 18 cm^2 (c) 66 cm^2 (d) 36 cm^2

13. What should be subtracted from $\left(\dfrac{3}{5} + \dfrac{5}{4}\right)$ to get 0.5?

(a) 1.43   (b) 2.35   (c) 1.50   (d) 1.35

14. The area of a circular field is 1386 m^2. Find the cost of fencing it at the rate of ₹3.5 per m.

(a) ₹600   (b) ₹460   (c) ₹462   (d) ₹642

15. The difference between SP and CP of an article is ₹120. If the profit is 10%, then what is the selling price?

(a) 1200   (b) 1320   (c) 1300   (d) 13200

16. The age of Mukesh is four times that of his cousin Suresh and the difference of their ages is 12 yr. Find the age of Suresh.

(a) 4   (b) 14   (c) 16   (d) 10

17. In the given figure ΔABC and ΔPQR, if $\angle A = 30°$ and $\angle P = 30°$ and $PQ = AB$ and $PR = AC$. Then by which property, the triangles ΔABC and ΔPQR are congruent?
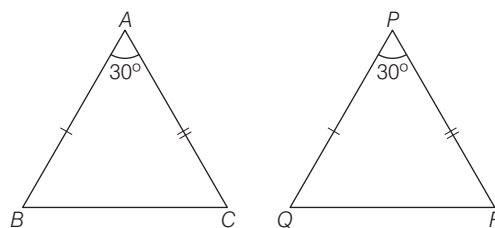
(a) ASA   (b) RHS   (c) SSS   (d) SAS

3

18. If 15% of *P* is equal to 18% of *Q,* then 10% of *P* is equal to what percent of *Q*?

(a) 12%   (b) 10%   (c) 16%   (d) 20%

19. What is the value of *y* for following equation $\frac{y}{3} + 2 = 5$?

(a) 10   (b) 13   (c) 9   (d) 6

20. Which of the following statement is correct?

Statement 1 : Two acute angles form a linear pair.

Statement 2 : Two obtuse angles can be supplementary.

(a) Both Statement-1 and Statemen-2 are true.

(b) Statement-1 is true but Statement-2 is false.

(c) Statement-1 is false but Statement-2 is true.

(d) Both Statements are false

21. Kunal bought 10 pens for ₹120 and sold them at a rate of 11 pens for ₹100. Then, find the approximately profit or loss percent.

(a) 30%   (b) 24%   (c) 16%   (d) 12%

22. How many letters have rotational symmetry of order more than 1?

B, Z, S, G, Q, A, H

(a) 1   (b) 2   (c) 4   (d) 0

23. A table bought for ₹120 and sold at gain of 5%. Find its selling price.

(a) 132   (b) 126   (c) 162   (d) 144

24. Sunita goes 42 km East from her house and reached to school. From school on the same road, she moves 100 km West. If the distance towards east is represented by positive integer then which integer will represent her final distance from her house?

(a) – 68   (b) – 58   (c) 58   (d) 68

25. The ages of Sonal and Sikha are in the ratio of 2 : 3. After 15 yr, their ages are in the ratio of 11 : 14. What will be the present age of Sikha?

(a) 42   (b) 27   (c) 18   (d) 9

26. The coefficient of *x* in $4x^2 + 73x + y$ is

(a) 24   (b) 4   (c) 1   (d) 73

27. Which of the following statement holds correct?

Statement I : If a and b are non-zero rational numbers and m and n are two positive integer, then $(a)^m \times (b)^n = (ab)^{2mn}$.

Statement II : Standard form of 14000000 is 1.4×10^7.

(a) Both Statement I and II are correct

(b) Only Statement I is correct

(c) Only Statement II is correct

(d) Both Statements are incorrect

4

28. What is the value of x for the following proportion?

$$4:9::52:x$$

(a) 113   (b) 173   (c) 137   (d) 117

29. State True/False for following statements

  I. An algebraic expression containing three terms is called a binomial.

  II. An algebraic expression that has fixed value is called constant.

  III. Factors of 3x are 3 and x.

  IV. 13xy and 7xy are like terms.

	I	II	III	IV			I	II	III	IV
(a)	T	T	F	F		(b)	T	F	F	F
(c)	F	T	T	T		(d)	F	F	F	T

30. Aparna and Kunal have invested in the ratio of $4:7$. If both of them invested a total amount of ₹4950, then find the investment of Aparna.

(a) ₹180   (b) ₹1800   (c) ₹18000   (d) ₹3500

31. The solution of the equation $ax + b + cx = 0$ is

(a) $\dfrac{-b}{a+c}$ (b) $\dfrac{a+c}{b}$ (c) $\dfrac{-a}{b+c}$ (d) $\dfrac{b}{a}$
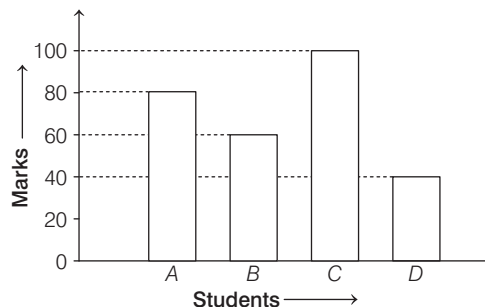
32. If $x = 3$, $y = 4$, then find the product of $x^{1/2}$ and $y^{1/3}$.

(a) $(12)^6$ (b) $(432)^{1/6}$ (c) $(432)^6$ (d) $(432)^{1/3}$

33. In what time, does a sum of money become five times at the simple interest rate of 10% per annum?

(a) 50 yr   (b) 40 yr   (c) 60 yr   (d) 30 yr

34. The graph given below represents the marks of some student in a class. Who scored minimum marks?

(a) A (b) B (c) C (d) D

35. What will be ratio of simple interest earned on certain amount at the rate of 16% per annum for 10 yr and that for 13 yr?

(a) 13 : 10   (b) 12 : 16   (c) 10 : 13   (d) 17 : 13

5

36. If 4 is subtracted from a number and the difference is multiplied by $\frac{1}{3}$, then result is 7.

What will be the number?

(a) 24　　　　　(b) 27　　　　　(c) 25　　　　　(d) 26

37. If a% of $a + b$% of $b = 2$% of ab. Then, choose the possible correct option.

(a) $a = b$　　　　　(b) $a > b$　　　　　(c) $b > a$　　　　　(d) None of these

38. Match the column for congruent triangles.

	Column A		Column B
A	If all three sides are equal	(i)	ASA rule
B	If two angles and their included sides are equal	(ii)	SSS rule
C	If hypotenuse and one side of right angled-triangle are equal	(iii)	SAS rule
D	If two sides and one angle are equal	(iv)	RHS rule

Codes

	A	B	C	D		A	B	C	D
(a)	(ii)	(i)	(iv)	(iii)	(b)	(i)	(ii)	(iii)	(iv)
(c)	(iv)	(i)	(iii)	(ii)	(d)	(ii)	(iv)	(i)	(iii)

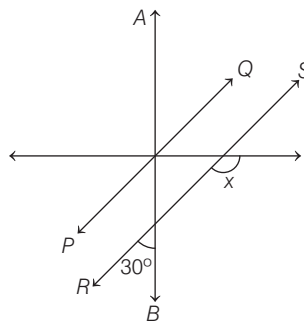**39.** Choose the correct sequence

(a) $\dfrac{2}{15} > \dfrac{1}{5} > \dfrac{-3}{-10} > 0 > \dfrac{-1}{15} > \dfrac{-2}{15}$

(b) $\dfrac{2}{15} > \dfrac{1}{5} > \dfrac{-3}{-10} > \dfrac{-1}{15} > \dfrac{-2}{15} > 0$

(c) $\dfrac{-2}{15} > \dfrac{-3}{-10} > \dfrac{-1}{15} > 0 > \dfrac{1}{5} > \dfrac{2}{15}$

(d) $\dfrac{-3}{-10} > \dfrac{1}{5} > \dfrac{2}{15} > 0 > \dfrac{-1}{15} > \dfrac{-2}{15}$

40. The ratio of length and breadth of a rectangular plot is $3 : 2$ and its perimeter is 120 m.

Then, what will be is its area in hectares?

(a) 0.4086 hectares　　　　　(b) 8604 hectares

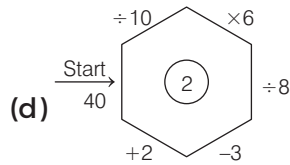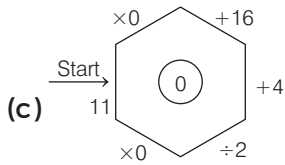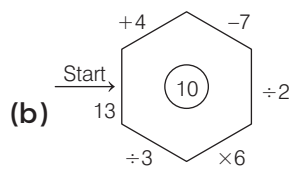(c) 0.0864 hectares　　　　　(d) 86.04 hectares
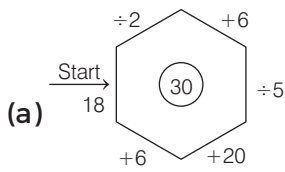
Section B (2 Marks Questions)

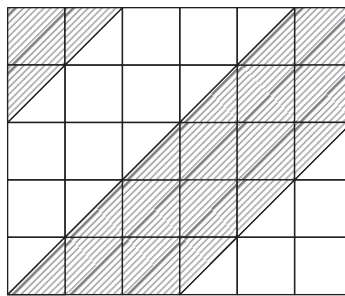**41.** Which of the following option is the correct value of x?

(a) 60°　　　　　(b) 100°　　　　　(c) 160°　　　　　(d) 120°

6

42. Pick the odd one out.

(a) Start 18 → (÷2) (+6) 30 (÷5) (+6) (+20)

(b) Start 13 → (+4) (−7) 10 (÷2) (÷3) (×6)

(c) Start 11 → (×0) (+16) 0 (+4) (×0) (÷2)

(d) Start 40 → (÷10) (×6) 2 (÷8) (+2) (−3)

43. What fraction of given figure is shaded?

(a) $\dfrac{1}{2}$ (b) $\dfrac{1}{5}$ (c) $\dfrac{1}{4}$ (d) $\dfrac{1}{3}$

44. The value of

$(-2)\times(-2)\times(-2)\times(-2)\times(-2)+(-2)\times(-2)\times(-2)\times(-2)\times(-2)+(-2)\times(-2)\times(-2)\times(-2)\times(-2)$ is

(a) $2\times(3^{16})$ (b) -2^5

(c) $3\times(-2)^5$ (d) All of these

45. What is the average weight of given data?

Weight of each (in kg)	25	73	64	27	43
Number of articles	4	2	5	8	6

(a) 24.8   (b) 25.2   (c) 25.8   (d) 41.6

46. Rashmi spent 15% of her montly salary on insurance policy, 10% of salary on internet bill, 25% of salary on rent and rest of expenses on food. If she spent ₹12000 on food. Find her monthly salary.

(a) ₹24000   (b) ₹72000

(c) ₹2400   (d) ₹3600

47. If the price of petrol increased by 12%. By how much percent should we reduce our consumption so that our expenditure does not increase?
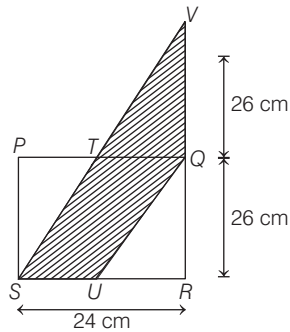
(a) 10.7%   (b) 12%

(c) 10%   (d) 11%

48. The difference between simple interest of two banks on ₹2000 for 4 yr is ₹1600. Find the difference in rate of interest.

(a) 2% (b) 1%

(c) 3% (d) 5%

49. Find the area of the shaded part of the given figure, if *T* and *U* are the mid-points of *PQ* and *SR* respectively.

(a) 468 cm^2 (b) 312 cm^2

(c) 156 cm^2 (d) 302 cm^2

50. Match the columns.

	Column A		Column B
A	$\left[\dfrac{3}{20}+\dfrac{1}{5}\right]\times\left[\dfrac{2}{3}+\dfrac{1}{7}\right]$	(i)	$\dfrac{13}{12}$
B	$\left[\dfrac{21}{7}\times\dfrac{1}{9}\right]\div\dfrac{4}{13}$	(ii)	$\dfrac{9}{70}$
C	$\dfrac{3}{7}\div\dfrac{10}{3}$	(iii)	$\dfrac{17}{60}$
D	$\left[\dfrac{7}{8}\times\dfrac{-5}{14}\right]+\dfrac{2}{16}$	(iv)	$\dfrac{-3}{16}$

Codes

	A	B	C	D			A	B	C	D
(a)	(i)	(iii)	(ii)	(iv)		(b)	(iii)	(i)	(ii)	(iv)
(c)	(iv)	(iii)	(ii)	(i)		(d)	(iii)	(ii)	(iv)	(i)

8

Solutions

1. (c) $P = -(-67) = 67$

$Q = 207$

$R = |-450| = 450 \quad \Rightarrow \quad S = -300$

The arrangement of numbers in descending order is

$450 > 207 > 67 > -300$

$\therefore \quad R > Q > P > S$

$\therefore$ **Correct arrangement is** $RQPS$.

2. (d) By option (a) When we rotate Z, we get the same shape Z, so it has a rotational symmetry.

By option (b) When we rotate S, we get the same shape S, so it has a rotational symmetry.

By option (c) When we rotate N, we get the same shape N, so it has a rotational symmetry.

By option (d) When we rotate C, we do not get the same shape C (i.e. we get the shape), so it is not a rotational symmetry.

3. (c) According to the question,

Product of two numbers = 0.01875 and one number = 15

$\therefore$ Other number $= \dfrac{\text{Product of two numbers}}{\text{One number}} = \dfrac{0.01875}{15} = \dfrac{1875}{15 \times 100000} = 0.00125$

4. (b) The product of $\left(\dfrac{3}{4}a + \dfrac{8}{5}\right)$ and $\left(6 - \dfrac{5}{9}a\right)$

$= \left(\dfrac{3}{4}a + \dfrac{8}{5}\right) \times \left(6 - \dfrac{5}{9}a\right)$

$= \dfrac{3}{4}a \times 6 - \dfrac{3}{4}a \times \dfrac{5}{9}a + \dfrac{8}{5} \times 6 - \dfrac{8}{5} \times \dfrac{5}{9}a$

$= \dfrac{9a}{2} - \dfrac{5a^2}{12} + \dfrac{48}{5} - \dfrac{8a}{9} = \dfrac{-5a^2}{12} + \dfrac{9a}{2} - \dfrac{8a}{9} + \dfrac{48}{5}$

$= \dfrac{-5a^2}{12} + \dfrac{81a - 16a}{18} + \dfrac{48}{5} = \dfrac{-5a^2}{12} + \dfrac{65a}{18} + \dfrac{48}{5}$

5. (c) We have, $p = 3$ and $q = 1$

$\therefore \quad p(p^q - q^p) = 3(3^1 - 1^3) = 3(3 - 1) = 3 \times 2 = 6$

6. (c) A $\quad 0.005 \div 0.0001 = \dfrac{0.0050}{0.0001} = \dfrac{50 \times 10000}{1 \times 10000} = \dfrac{50}{1} = 50$

B $\quad 0.2 \div 0.002 = \dfrac{0.200}{0.002} = \dfrac{200 \times 1000}{2 \times 1000} = \dfrac{200}{2} = 100$

C $\quad \dfrac{1}{2} \times \dfrac{1}{5} = \dfrac{1}{10} = 0.1$

9

D $1\dfrac{1}{2} \div \dfrac{1}{2} = \dfrac{3}{2} \div \dfrac{1}{2} = \dfrac{3}{2} \times 2 = 3$

$\therefore$ A $\rightarrow$ (ii); B $\rightarrow$ (iii); C $\rightarrow$ (iv); D $\rightarrow$ (i)

7. (a) According to the question,

Δ Means +

$\blacksquare$ means $\div$

Now, $14 \, \Delta \, 7 \, \blacksquare \, 3 = 14 + 7 \div 3 = 14 + \dfrac{7}{3} = \dfrac{42 + 7}{3} = \dfrac{49}{3}$

and $22 \, \blacksquare \, 2 \, \Delta \, 61 = 22 \div 2 + 61 = 11 + 61 = 72$

$\because \quad 72 > \dfrac{49}{3}$

$\therefore \quad 14 \, \Delta \, 7 \, \blacksquare \, 3 < 22 \, \blacksquare \, 2 \, \Delta \, 61$

8. (b) Given, principal amount, $P = ₹ \, 6500$.

Time period $= 1$ yr and Rate of interest $= 12\%$ p.a.

$\therefore$ Simple interest $= \dfrac{P \times R \times T}{100} = \dfrac{(6500 \times 12 \times 1)}{100} = 65 \times 12 = ₹ \, 780$

9. (b) An isosceles triangle has only 1 line of symmetry. The line of symmetry of isosceles triangle is also known as altitude of an isosceles triangle.

Line of Symmetry
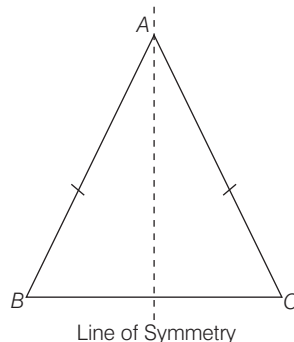
10. (c) Given $\triangle DAC \cong \triangle BCA$

$\therefore \qquad \angle DAC = \angle BCA = 40°$ [by CPCT (i.e. Corresponding parts of corgruent triangles)]
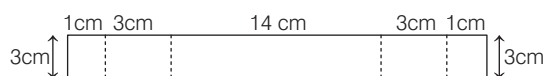
11. (c) According to the question,

Speed of Car $A = \dfrac{513}{3}$ km/h $= 171$ km/h $\qquad \left[\because \text{Speed} = \dfrac{\text{Distance}}{\text{Time}} \right]$

Speed of Car $B = \dfrac{716}{4}$ km/h $= 179$ km/h

$\therefore$ Required ratio $= \dfrac{\text{Speed of Car } A}{\text{Speed of Car } B} = \dfrac{171}{179} = 171 : 179$

12. (c) The shape of the figure before fold is shown below

10

Length of the paper $= 1 + 3 + 14 + 3 + 1 = 22$ cm

Breadth of the paper $= 3$ cm

Area of the paper before it was folded $= 22 \times 3 = 66$ cm^2

13. (d) Let x be subtracted.

According to the question,

$$\left(\frac{3}{5} + \frac{5}{4}\right) - x = 0.5 \qquad \Rightarrow \qquad \frac{12 + 25}{20} - x = 0.5$$

$$\frac{37}{20} - 0.5 = x \qquad \Rightarrow \qquad 1.85 - 0.5 = x$$

$\therefore \qquad\qquad\qquad\qquad x = 1.35$

14. (c) Let the radius of the circular field be r.

Area of the circular field $= \pi r^2$

According to the question, area $= 1386$ m^2

$\therefore \qquad\qquad\qquad\qquad \pi r^2 = 1386$ m^2

$$r^2 = \frac{1386}{\pi} = \frac{1386 \times 7}{22} \Rightarrow r^2 = 441$$

$\therefore \qquad\qquad\qquad\qquad r = 21$ m

$\therefore$ Circumference of the field $= 2\pi r = 2 \times \dfrac{22}{7} \times 21 = 2 \times 22 \times 3 = 132$ m

$\because$ Cost of fencing of 1 m $= ₹\,3.5$

$\therefore$ Cost of fencing of 132 m $= ₹\,(132 \times 3.5) = ₹\,462$

15. (b) Given, profit $= 10\%$

Difference between SP and CP $= 120$ (Profit) $\qquad\qquad\qquad\qquad$ [$\because$ Profit $=$ SP $-$ CP]

$$\text{Profit \%} = \frac{\text{SP} - \text{CP}}{\text{CP}} \times 100$$

$$10 = \frac{120}{\text{CP}} \times 100$$

$\therefore \qquad\qquad \text{CP} = \dfrac{120 \times 100}{10} = 1200$

$\qquad\qquad \text{SP} = \text{CP} + \text{Profit} = 1200 + 120$

$\therefore \qquad\qquad \text{SP} = ₹\,1320$

16. (a) Let age of Mukesh $= x$ and age of Suresh $= y$

According to the question,

$\qquad\qquad$ Age of Mukesh $= 4 \times$ age of Suresh

$\Rightarrow \qquad\qquad\qquad\qquad x = 4 \times y \qquad\qquad\qquad\qquad$ ...(i)

and $\qquad\qquad\qquad x - y = 12 \qquad\qquad\qquad\qquad$ ...(ii)

From Eqs. (i) and (ii), we get

11

$$4y - y = 12 \implies 3y = 12 \implies y = 4$$

∴ Age of Suresh = 4 yr

17. (d) As we know, if two sides and the included angle of one triangle are respectively equal to two sides and included angle of the other triangle. Then, the triangles are congruent by SAS congruency criterian.

18. (a) According to the question,

$$15\% \text{ of } P = 18\% \text{ of } Q$$

$$\frac{15}{100} \times P = \frac{18}{100} \times Q$$

$$P = \frac{18}{15} Q$$

$$P = \frac{6}{5} Q \qquad \qquad \text{...(i)}$$

Now, let $\qquad$ 10% of $P = x\%$ of Q $\qquad\qquad$ $[x \rightarrow \text{Let}]$

$$\frac{10}{100} \times P = \frac{x}{100} \times Q$$

$$\frac{10}{100} \times \frac{6}{5} Q = \frac{x}{100} \times Q \qquad\qquad \text{[from Eq.}$$

(i)]

$$x = \frac{10 \times 6}{5} = 2 \times 6 = 12\%$$

19. (c) According to the question,

$$\frac{y}{3} + 2 = 5 \qquad \implies \qquad \frac{y}{3} = 5 - 2$$

$$\implies \qquad \frac{y}{3} = \frac{3}{1} \implies \quad y = 3 \times 3 = 9$$

20. (d) Statement 1 : Two acute angles cannot form a linear pair

∴ Statement 1 is false.

Statement 2 : Two obtuse angles cannot be supplementary

∴ Statement 2 is also false.

∴ The correct option is (d).

21. (b) Given, CP of 10 pens = ₹ 120

$$\text{CP of 1 pen} = ₹ \frac{120}{10} = ₹ 12 \qquad \text{and} \quad \text{SP of 11 pens} = ₹ 100$$

$$\text{SP of 1 pen} = ₹ \frac{100}{11} = ₹ 9.09$$

Here, CP > SP

12

$$\therefore \ \text{Loss \%} = \frac{CP - SP}{CP} \times 100\% = \frac{12 - 9.09}{12} \times 100 = \frac{2.91 \times 100}{12} = 24.25 \approx 24\%$$

22. (b) B – One rotational symmetry

Z – One rotational symmetry

S – Two rotational symmetry

G – Zero rotational symmetry

Q – One rotational symmetry

A – One rotational symmetry

H – Two rotational symmetry

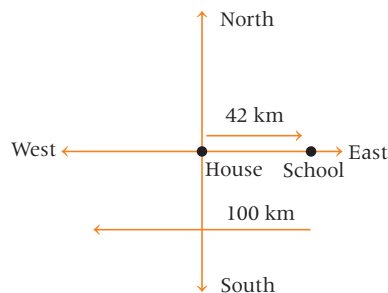Hence, two letters have more than 1 rotational symmetry.

23. (b) Given, CP = ₹120.

Gain = 5%

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

$$= \left(\frac{100 + 5}{100}\right) \times ₹120 = ₹\frac{105}{100} \times 120 = ₹\frac{12600}{100} = ₹126$$

24. (b) Let the direction in East be positive.

∴ Required final distance = 42 − 100 = − 58

25. (b) Let the present ages of Sonal and Sikha be $2x$ and $3x$ respectively.

After 15 yr, ages of Sonal and Sikha will be $(2x + 15)$ and $(3x + 15)$.

According to the question, $\dfrac{2x + 15}{3x + 15} = \dfrac{11}{14}$

$$14(2x + 15) = 11(3x + 15)$$

$$\Rightarrow \qquad 28x + 210 = 33x + 165$$

$$\Rightarrow \qquad 33x - 28x = 210 - 165$$

$$\therefore \qquad 5x = 45$$

$$\therefore \qquad x = \frac{45}{5} = 9$$

∴ Present age of Sikha $= 3x = 3 \times 9 = 27$ yr

26. (d) The coefficient of x in $4x^2 + 73x + y$ is 73.

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27. (c) $(a)^m \times (b)^n = a^m b^n \neq (ab)^{2mn}$.

So, Statement I is incorrect.

Statement II is correct.

So, option (c) is correct.

28. (d) According to the question,

$$4 : 9 :: 52 : x$$

$\Rightarrow \qquad \dfrac{4}{9} = \dfrac{52}{x}$

$\Rightarrow \qquad 4x = 52 \times 9$

$\therefore \qquad x = \dfrac{468}{4} = 117$

29. (c) I. False, an algebraic expression containing three terms is called a trinomial.

II. True, an algebraic expression that has fixed value is called constant.

III. True

IV. True

30. (b) Total investment $= ₹\, 4950$

Let Aparna's part of investment $= ₹\, 4x$

and Kunal's part of investment $= ₹\, 7x$

Then, $\qquad 4x + 7x = 4950$

$\Rightarrow \qquad 11x = 4950$

$\therefore \qquad x = \dfrac{4950}{11} = 450$

Hence, investment of Aparna $= 4x = 4 \times 450 = ₹\, 1800$

31. (a) $ax + b + cx = 0$

$\Rightarrow \quad x(a + c) = -b \qquad \Rightarrow \qquad x = \dfrac{-b}{a + c}$

32. (b) According to the question,

$$x = 3 \text{ and } y = 4$$

and we have to find $(3^{1/2}) \times (4^{1/3})$

LCM of 2 and 3 $= 6$, then,

$$(3^{\frac{1}{2}}) \times (4^{\frac{1}{3}}) = (3)^{\frac{3}{6}} \times (4)^{\frac{2}{6}} = (3^3)^{1/6} \times (4^2)^{1/6}$$

$$= (27)^{1/6} \times (16)^{1/6} = (432)^{1/6}$$

33. (b) Let P be the principal amount, then P becomes $5P$ in time T

$\therefore \qquad SI = (5P - P) = ₹\, 4P$

$\Rightarrow \qquad SI = \dfrac{P \times R \times T}{100}$

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$$\because \qquad 4P = \frac{P \times R \times T}{100}$$

$$\Rightarrow \qquad 4 = \frac{10 \times T}{100} \Rightarrow T = 40 \text{ yr}$$

34. (d) From the graph, marks of student $D = 40$

$\therefore$ Student D scored minimum marks.

35. (c) Let the principal be ₹P.

Then, first SI $= \dfrac{P \times 16 \times 10}{100} = ₹\dfrac{160P}{100}$

and second SI $= \dfrac{P \times 16 \times 13}{100} = ₹\dfrac{208P}{100}$

$\therefore$ Required ratio $= \dfrac{\text{First SI}}{\text{Second SI}} = ₹\dfrac{160P}{208P} = \dfrac{10}{13} = 10 : 13$

36. (c) Let the required number be x.

According to the question,

$$(x - 4)\frac{1}{3} = 7 \qquad \Rightarrow \qquad (x - 4) = 7 \times 3$$

$$\Rightarrow \qquad (x - 4) = 21 \quad \Rightarrow \qquad x = 21 + 4 = 25$$

37. (a) According to the question,

$$a\% \text{ of } a + b\% \text{ of } b = 2\% \text{ of } ab$$

i.e. $\qquad \dfrac{a}{100} \times a + \dfrac{b}{100} \times b = \dfrac{2}{100} \times ab$

$$\Rightarrow \qquad a^2 + b^2 = 2ab$$

If we consider $a = b$, then $a^2 + a^2 = 2a^2$

$$\Rightarrow \qquad 2a^2 = 2a^2, \text{ which is true.}$$

38. (a) A. If all three sides are equal of two or more triangles, then these triangles are congruent by SSS rule.

B. If two angles and their included sides are equal of two or more triangles, then these triangle are congruent by ASA rule.

C. If hypotenuse and one side of right angled triangle are equal of two or more triangle, then these triangles are congruent by RHS rule.

D. It two sides and one angle are equal of two or more triangles, then these triangles are congruent by SAS rule.

39. (d) Consider $\dfrac{-3}{-10}, \dfrac{1}{5}, \dfrac{2}{15}, 0, \dfrac{-1}{15}, \dfrac{-2}{15}$

Now LCM of $(10, 5, 15) = 30$

Converting them into equivalent fraction, we get

$$\dfrac{9}{30}, \dfrac{6}{30}, \dfrac{4}{30}, 0, \dfrac{-2}{30}, \dfrac{-4}{30}$$

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So, the correct sequence is

$$\frac{-3}{-10} > \frac{1}{5} > \frac{2}{15} > 0 > \frac{-1}{15} > \frac{-2}{15}.$$

40. (c) Let the length and breadth of rectangular plot be $3x$ and $2x$.

Then, perimeter of rectangular plot $= 2$ (length + breadth) $= 2(3x + 2x) = 10x$

According to the question, perimeter $= 120$ m.

$\therefore$ $\qquad\qquad\qquad\qquad\qquad 10x = 120$

$\therefore$ $\qquad\qquad\qquad\qquad\qquad\quad x = 12$

$\therefore$ Length $= 3 \times 12 = 36$ m

Breadth $= 2 \times 12 = 24$ m

$\therefore$ $\qquad$ Area $= 36 \times 24\,\text{m}^2 = 864\,\text{m}^2$

$\qquad\qquad = \dfrac{864}{10000}$ hectares $\qquad\qquad\qquad\qquad$ [1 hectares $= 10000\,\text{m}^2$.]

$\qquad\qquad = 0.0864$ hectares

41. (d) Draw a perpendicular line CD at point O.
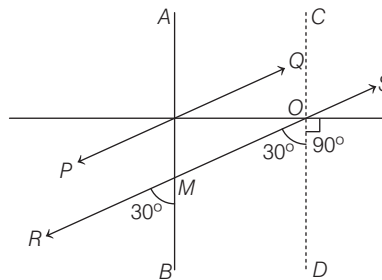
$\because$ $\qquad\qquad\qquad AB \parallel CD$

$\therefore$ $\qquad\qquad\qquad \angle RMB = \angle MOD$ $\qquad\qquad\qquad$ [corresponding angles]

$\Rightarrow$ $\qquad\qquad\qquad \angle MOD = 30°.$

From figure, $\angle SOD + \angle MOD$

$\therefore$ $\qquad\qquad\qquad x = 90° + 30° = 120°$

42. (a) Consider option (a); Starting from 18, we get

$\qquad\qquad\qquad 18 \div 2 = 9$

$\qquad\qquad\qquad 9 + 6 = 15$

$\qquad\qquad\qquad 15 \div 5 = 3$

$\qquad\qquad\qquad 3 + 20 = 23$

$\qquad\qquad\qquad 23 + 6 = 29 \neq 30$, which is incorrect.

Consider option (b); Starting from 13, we get

$\qquad\qquad\qquad 13 + 4 = 17$

$\qquad\qquad\qquad 17 - 7 = 10$

$\qquad\qquad\qquad 10 \div 2 = 5$

$\qquad\qquad\qquad 5 \times 6 = 30$

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$$30 \div 3 = 10, \text{ which is correct.}$$

Consider option (c); Starting from 12, we get

$$11 \times 0 = 0$$
$$0 + 16 = 16$$
$$16 + 4 = 20$$
$$20 \div 2 = 10$$
$$10 \times 0 = 0, \text{ which is correct.}$$

Consider option (d); Starting from 40, we get

$$40 \div 10 = 4$$
$$4 \times 6 = 24$$
$$24 \div 8 = 3$$
$$3 - 3 = 0$$
$$0 + 2 = 2, \text{ which is correct.}$$

43. (a) Total number of square parts $= 30$

Number of shaded parts $= 10 \times 1 + 10 \times \dfrac{1}{2} = 10 + 5 = 15$

$\therefore$ Shaded fraction $= \dfrac{15}{30}$

Its simplest form $= \dfrac{1}{2}$

44. (c) According to the question, $(-2)^5 + (-2)^5 + (-2)^5 = 3 \times (-2)^5$

$\therefore$ Option (c) is correct.

45. (d) Average weight of the given data $= \dfrac{25 \times 4 + 73 \times 2 + 64 \times 5 + 27 \times 8 + 43 \times 6}{4 + 2 + 5 + 8 + 6}$

$= \dfrac{100 + 146 + 320 + 216 + 258}{25} = \dfrac{1040}{25} = 41.6$

46. (a) Let the total monthly salary of Rashmi be ₹x.

Percentage of salary spent on food $= 100\% - (15 + 10 + 25)\%$

$= 100\% - 50\% = 50\%$

Also, given the amount of salary spent on food $=$ ₹12000

$\therefore$ 50% of total monthly salary $=$ ₹12000

$\Rightarrow \qquad \dfrac{50}{100} \times x =$ ₹12000

$\therefore \qquad x = \dfrac{₹12000 \times 100}{50} =$ ₹24000

47. (a) Let the price before increament be ₹ 100 and quantity of petrol be x L.

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∴ Total expenditure $= 100x$

Increased price of petrol $= 100 + 12\%$ of 100

$$= 100 + \frac{12}{100} \times 100 = 112$$

Again let new quantity of petrol be y L

∴ Total expenditure $= 112y$

According to the question, $100x = 112y$ $\Rightarrow$ $y = \dfrac{100x}{112}$

∴ Decrease in consumption $= \dfrac{x - \dfrac{100x}{112}}{x} \times 100$

$$= \frac{112 - 100}{112} \times 100$$

$$= \frac{12}{112} \times 100 = \frac{1200}{112} = 10.7\%$$

48. (a) We know that, $\mathrm{SI} = \dfrac{P \times R \times T}{100}$

∴ $\quad \dfrac{2000 \times 4 \times R_1}{100} - \dfrac{2000 \times 4 \times R_2}{100} = 160$

$\Rightarrow \quad \dfrac{8000}{100}(R_1 - R_2) = 160$

$\Rightarrow \quad (R_1 - R_2) = \dfrac{160 \times 100}{8000}$

∴ $\quad (R_1 - R_2) = 2\%$

49. (a) ∵ U is mid-point of SR

∴ Base of parallelogram, $SU = \dfrac{1}{2}SR = \dfrac{1}{2} \times 24\,\text{cm} = 12\,\text{cm}$

and height of the parallelogram $= 26\,\text{cm}$

∴ Area of parallelogram, $STQU = \text{Base} \times \text{Height} = (12 \times 26)\,\text{cm}^2 = 312\,\text{cm}^2$

and area of triangle $VQT = \dfrac{1}{2} \times \text{Base} \times \text{Height}$

$$= \frac{1}{2} \times QT \times VQ = \frac{1}{2} \times 12\,\text{cm} \times 26\,\text{cm} = 156\,\text{cm}^2$$

∴ Area of shaded part $= (312 + 156)\,\text{cm}^2 = 468\,\text{cm}^2$

Alternate solution

Clearly $TSUQ$ is forming a parallelogram and VTQ is forming a triangle

Area of shaded figure $=$ Area of parallelogram $TSUQ +$ Area of triangle VTQ

$$= \text{Base} \times \text{Height} + \frac{1}{2} \times \text{Base} \times \text{Height}$$

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$$= (24 - 12) \times 26 + \frac{1}{2} \times 12 \times 26$$

$$= 12 \times 26 + 6 \times 26 = 26 \times 18 = 468 \text{ cm}^2$$

50. (b) $A : \left[\dfrac{3}{20} + \dfrac{1}{5}\right] \times \left[\dfrac{2}{3} + \dfrac{1}{7}\right] = \dfrac{3+4}{20} \times \dfrac{14+3}{21} = \dfrac{7}{20} \times \dfrac{17}{21} = \dfrac{17}{60}$ [Match (iii)]

$B : \left[\dfrac{21}{7} \times \dfrac{1}{9}\right] \div \dfrac{4}{13} = \dfrac{1}{3} \times \dfrac{13}{4} = \dfrac{13}{12}$ [Match (i)]

$C : \dfrac{3}{7} \div \dfrac{10}{3} = \dfrac{3}{7} \times \dfrac{3}{10} = \dfrac{9}{70}$ [Match (ii)]

$D : \left[\dfrac{7}{8} \times -\dfrac{5}{14}\right] + \dfrac{2}{16} = \dfrac{-5}{16} + \dfrac{2}{16} = \dfrac{-3}{16}$ [Match (iv)]

So, option (b) is correct answer.