



UNIFIED COUNCIL

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Unified International
Mathematics Olympiad

UNIFIED INTERNATIONAL MATHEMATICS OLYMPIAD (UPDATED)

CLASS - 7

Question Paper Code : UM9246

KEY

1	2	3	4	5	6	7	8	9	10
C	B	D	Delete	A	B	C	B	A	B
11	12	13	14	15	16	17	18	19	20
A	D	C	C	A	C	D	B	B	B
21	22	23	24	25	26	27	28	29	30
A	D	Delete	C	D	A	B	D	A	C
31	32	33	34	35	36	37	38	39	40
B,C	A,B,C,D	A,B,C,D	A,C,D	C,D	C	D	C	A	A
41	42	43	44	45	46	47	48	49	50
A	C	C	C	C	D	B	B	D	A

EXPLANATIONS

MATHEMATICS - 1

1: (C) $\frac{m}{4} = 5$ means one fourth of m is 5

2: (B) Unshaded area and shaded areas are equal

\therefore Area of shaded region = 27 cm²

$$\begin{aligned} 3: (D) \quad \text{LHS} &= 7 - [13 - \{-2 + 6(6 \times -5)\}] \\ &= 7 - [13 - \{-2 + 6(-30)\}] \\ &= 7 - [13 - \{-2 - 180\}] \\ &= 7 - [13 - \{-182\}] \\ &= 7 - 195 \\ &= -188 \end{aligned}$$

4: (Delete)

$$\begin{aligned}
 5: \quad (A) \quad \text{LHS} &= \left[-\frac{25}{8} + \frac{7}{6} - \frac{25}{12} \right] \times \frac{-3}{2} \\
 &= \left[\frac{-75+28-50}{24} \right] \times \frac{-3}{2} \\
 &= \frac{-97}{24} \times \frac{-3}{2} \\
 &= \frac{97}{16}
 \end{aligned}$$

$$\begin{aligned}
 6: \quad (B) \quad \text{AM} &= \frac{\text{sum of observations}}{\text{Number of observations}} \\
 &= \frac{1+2+3+4+5+6+7+8+9+10+11}{11} \\
 &= \frac{66}{11} = 6
 \end{aligned}$$

$$\begin{aligned}
 7: \quad (C) \quad &\text{Let } a^2 + 2ab + b^2 \text{ be less than } a^2 - 2ab + b^2 \text{ by } k \\
 K &= (a^2 - 2ab + b^2) - (a^2 + 2ab + b^2) \\
 &= a^2 - 2ab + b^2 - a^2 - 2ab - b^2 \\
 &= -4ab
 \end{aligned}$$

$$\begin{aligned}
 8: \quad (B) \quad \text{LHS} &= \left(\frac{2}{3}x + \frac{3}{2}y - \frac{4}{3}z \right) - \left(\frac{3}{2}x - \frac{5}{4}y - \frac{7}{2}z \right) \\
 &= \frac{2x}{3} + \frac{3y}{2} - \frac{4z}{3} - \frac{3x}{2} + \frac{5y}{4} + \frac{7z}{2} \\
 &= \left(\frac{2x}{3} - \frac{3x}{2} \right) + \left(\frac{3y}{2} + \frac{5y}{4} \right) + \left(\frac{7z}{2} - \frac{4z}{3} \right) \\
 &= \left(\frac{4x-9x}{6} \right) + \left(\frac{6y+5y}{4} \right) + \left(\frac{21z-8z}{6} \right) \\
 &= \left(\frac{-5x}{6} + \frac{11y}{4} + \frac{13z}{6} \right)
 \end{aligned}$$

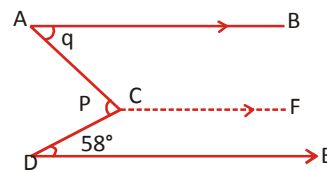
$$\begin{aligned}
 9: \quad (A) \quad \text{LHS} &= \left(\frac{-1}{4} + \frac{1}{6} \right) \div \left(\frac{-1}{3} + \frac{1}{2} \right) \\
 &= \left(\frac{-3+2}{12} \right) \div \left(\frac{-2+3}{6} \right)
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{-1}{12} \div \frac{1}{6} \\
 &= \frac{-1}{12} \times 6 \\
 &= \frac{-1}{2}
 \end{aligned}$$

$$10: \quad (B) \quad \frac{a^m}{a^n} = \frac{1}{a^{n-m}} \text{ if } n - m > 0 \text{ i.e., } m < n$$

$$\begin{aligned}
 11: \quad (A) \quad &[(-2)^{-2}]^{-3} = (-2)^{-2 \cdot -3} \\
 &= (-2)^6 = 64
 \end{aligned}$$

$$\begin{aligned}
 12: \quad (D) \quad &\frac{3}{4} = 0.75, \frac{8}{9} = 0.88, \frac{2}{3} = 0.66, \frac{4}{5} = 0.8 \\
 &\therefore \frac{8}{9} - \frac{2}{3} = \frac{8-6}{9} = \frac{2}{9}
 \end{aligned}$$



13: (C)

Const: $CF \parallel AB$

$$\begin{aligned}
 \therefore 58^\circ + \angle DCF &= 180^\circ \\
 \angle DCF &= 180^\circ - 58^\circ = 122^\circ \\
 \therefore \angle FCQ &= 260^\circ - 122^\circ = 138^\circ \\
 \text{But } q + 138^\circ &= 180^\circ \\
 q &= 180^\circ - 138^\circ = 42^\circ
 \end{aligned}$$

$$\begin{aligned}
 14: \quad (C) \quad &\frac{\frac{-2a^2b^2}{5} + \frac{3}{5}ab^3}{\frac{-3}{5}ab^2} = \frac{\left(\frac{-2}{5}\right)a^2b^2 + \left(\frac{3}{5}\right)ab^3}{\frac{-3}{5}ab^2} \\
 &= \left(\frac{-2}{5} \times \frac{-5a^2b^2}{3ab^2} \right) + \left(\frac{3}{5} \times \frac{-5ab^3}{3ab^2} \right) \\
 &= \left(\frac{2}{3}a - b \right)
 \end{aligned}$$

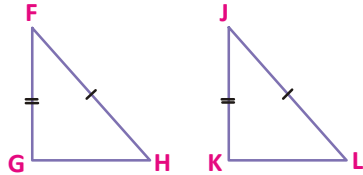
15: (A) Given $A = 2P \Rightarrow SI = A - P = 2P - P = P$

But simple interest = $\frac{PTR}{100}$

$$P = \frac{P \times 8 \times R}{100}$$

$$\therefore R = \frac{100P}{P \times 8} = 12\frac{1}{2}\%$$

16: (C)



Given $FH = JL$ (Hyp)

$FG = JK$ (Side)

Hypotenuse opposite vertex are right angles

$$\therefore \angle G = \angle K = 90^\circ$$

17: (D) Let number of original children be x

Given $(x - 2)9 = 144$

$$9x - 18 = 144$$

$$9x = 144 + 18$$

$$9x = 162$$

Original children $(x) = \frac{162}{9} = 18$

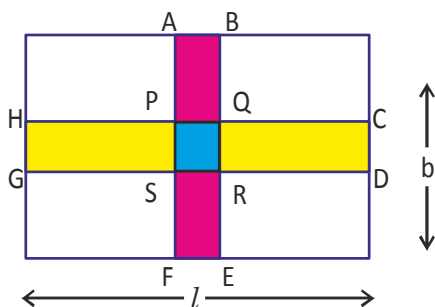
18: (B) Given $P = ₹8,000$ Rate of interest 10%.

$$SI = \frac{PTR}{100}$$

$$= \frac{₹ 8000 \times 2 \times 10}{100}$$

$$= ₹ 1600$$

19: (B)



Area of rectangle ABEF = bw

Area of rectangle GHCD = lw

Total Area of paths = $lw + bw - w^2$

$$= w(l + b - w)$$

20: (B) LHS = $1 - 2 + 3 - 4 + 5 - 6 + \dots - 48 + 49 - 50 + 51$

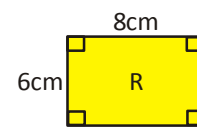
$$= (1 - 2) + (3 - 4) + (5 - 6) + \dots + (47 - 48) + (49 - 50) + 51$$

$$= -1 + (-1) + (-1) + \dots + (-1) + 51$$

$$= -25 + 51 \left[\because \frac{50}{2} = 25 \right]$$

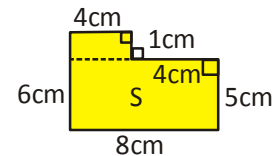
$$= 26$$

21: (A)



Area of R = $8 \times 6\text{cm}^2 = 48\text{cm}^2$

Perimeter of R $2(l + b) = 2(8\text{cm} + 6\text{cm}) = 28\text{cm}$



Perimeter of S = $6\text{cm} + 8\text{cm} + 5\text{cm} + 4\text{cm} + 1\text{cm} + 4\text{cm}$

$$= 28\text{cm}$$

Area of S = $5 \times 8\text{cm}^2 + 1 \times 4\text{cm}^2$

$$= 40\text{cm}^2 + 4\text{cm}^2$$

$$= 44\text{cm}^2$$

22: (D) Given $RQ = PS \Rightarrow \angle P = \angle Q$

Given $PR = SQ \Rightarrow \angle Q = \angle P$

Given $PQ = PQ \Rightarrow \angle R = \angle S$

$$\therefore \Delta PQR \cong \Delta QPS$$

23: (Delete)

24: (C) In a triangle difference of any two sides is always less than third side. But option 'C' is given $x - y > z$ is incorrect

25: (D) Number of tiles requires = $\frac{44 \text{ m} \times 52 \text{ m}}{8 \text{ cm} \times 8 \text{ cm}}$

$$= \frac{\cancel{4400}^{550} \times \cancel{5200}^{650} \text{ cm}^2}{\cancel{18} \text{ cm} \times \cancel{18} \text{ cm}^2}$$

$$= 357500$$

26: (A) $= \frac{19^{97}(19+342)}{19^{98}}$

$$= \frac{361}{19^{98-97}}$$

$$= \frac{361}{19} = 19$$

27: (B) Let 'x' to be added to $\frac{-7}{10}$ to get $\frac{-87}{80}$

$$\therefore \frac{-7}{10} + x = \frac{-87}{80}$$

$$x = \frac{-87}{80} + \frac{7}{10}$$

$$= \frac{-87+56}{80} = \frac{-31}{80}$$

28: (D) $a = 150^\circ$ [\therefore Alter native angle]

$b = 125^\circ$ [\therefore Alter native angle]

But $b + c = 180^\circ$

$$125^\circ + C = 180^\circ \Rightarrow C = 180^\circ - 125^\circ = 55^\circ$$

$$\therefore a - b + c = 150^\circ - 125^\circ + 55^\circ = 80^\circ$$

29: (A) Given $\angle BCA = 180^\circ - 135^\circ = 45^\circ$

Given, In $\triangle ABC$, $BC = BA \Rightarrow \angle BAC = \angle BCA = 45^\circ$

In $\triangle ABC$, $45^\circ + 45^\circ + x = 180^\circ$

$$x = 180^\circ - 90^\circ = 90^\circ$$

30: (C) Given $2[P + 4 + 3P - 2]\text{cm} = 60\text{cm}$

$$(4P + 2) = \frac{60\text{cm}}{2}$$

$$(4P + 2) \text{ cm} = 30\text{cm}$$

$$4P = 30\text{cm} - 2\text{cm}$$

$$P = \frac{28 \text{ cm}}{4} = 7 \text{ cm}$$

$$\therefore (P + 4) \text{ cm} = 7 \text{ cm} + 4 \text{ cm} = 11 \text{ cm}$$

$$(3P - 2) \text{ cm} = 3 \times 7 \text{ cm} - 2 \text{ cm} = 21 \text{ cm} - 2 \text{ cm} = 19 \text{ cm}$$

$$\text{Area} = (P + 4)(3P - 2) = 11\text{cm} \times 19 \text{ cm} = 209 \text{ cm}^2$$

MATHEMATICS - 2

31: (B,C)

Given $PQ = PR \Rightarrow (4x + 1)\text{cm} = (2x + 7)\text{cm}$

$$\Rightarrow 4x - 2x = 7 - 1$$

$$2x = 6$$

$$x = \frac{6}{2} = 3$$

$$\therefore PQ = (4x + 1)\text{cm} = (4 \times 3 + 1)\text{cm} = 13\text{cm}$$

$$\therefore PR = PQ = 13\text{cm}$$

$$QR = (3x + 2) \text{ cm} = (3 \times 3 + 2) \text{ cm} = 11\text{cm}$$

32: (A,B,C,D)

$$2^{12} = 2^{3 \times 4} = (2^3)^4 = 8^4$$

$$2^{12} = 2^{2 \times 6} = (2^2)^6 = 4^6$$

$$2^{12} = 2^{4 \times 3} = (2^4)^3 = 16^3$$

33: (A,B,C,D)

$$10 \text{ cm} \times 10 \text{ cm} = 20 \text{ cm} \times 5 \text{ cm} = 12.5 \text{ cm} \times 8 \text{ cm} = 4 \text{ cm} \times 25 \text{ cm} = 100 \text{ cm}^2$$

34: (A,C,D)

$$-12 \times -21 \times -5 = -1260,$$

$$-6 \times -5 \times -21 = -630$$

$$-21 \times 3 \times 20 = -1260,$$

$$-5 \times 42 \times 6 = -1260$$

35: (C, D)

Let present age of Asmitha be x years

Present age of Smitha is $2x$ years

Given $(2x + 4) = 4(x - 6)$

$$2x + 4 = 4x - 24$$

$$4 + 24 = 4x - 2x$$

$$2x = 28$$

$$\text{Asmitha's age present } (x) = \frac{28}{2} = 14 \text{ years}$$

$$\text{Smitha present age} = 2x = 2 \times 14 \text{ years}$$

$$= 28 \text{ years}$$

REASONING

36: (C) The number of colours on the palette is decreasing from left to right.

Hence there should be 3 colours in the 4th palette instead of 2.

37: (D) Every time the dot moves 2, 4, 6 steps in clockwise direction.

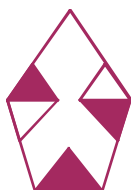
38: (C)

	A	B	C	D
English	✓	✓	✓	X
Hindi	X	X	✓	X
Maths	✓	X	X	✓

39: (A) Cube comprises square on all of its surface. In the same way square comprises line on all of its sides.



40: (A)



41: (A)

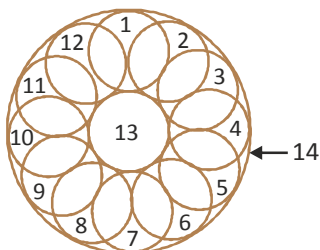
42: (C) On using the signs in option C, the equation becomes.

$$5 \times 4 - 16 \div 8 = 18$$

$$(5 \times 4) - (16 \div 8) \quad \dots \text{Applying BODMAS}$$

$$20 - 2 = 18$$

43: (C) There are 14 circles in the given figure.



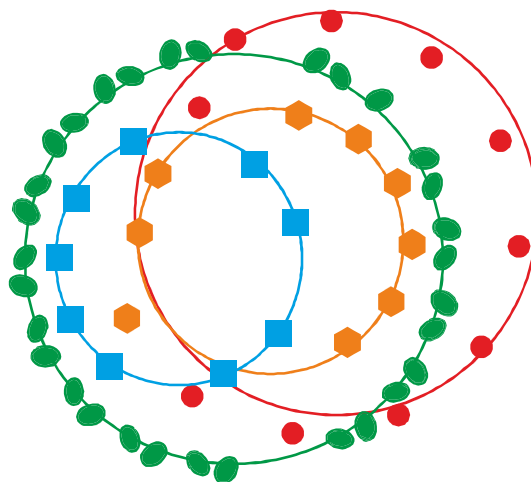
44: (C) The first letter in each group of letters is in reverse alphabetical order, and skips four letters each time. The second letter in each group of letters is in alphabetical order, and skips one letter each time. So we need to look for the letter five spaces before F and the letter two spaces after N. Only AP works

45: (C) Given coded word

Code:	Z	B	Y	X	M	N	Q	B
KEY	s	t	r	a	i	g	h	t

CRITICAL THINKING

46: (D) (iii) and (iv) symbols can't form a circle.



47: (B) 4th

1	2	3	4
Blue	Red	Green	Yellow

The red ball is neither the first nor the last ball.

Suppose the red ball is the third ball:

___, ___, _R_, ___

The yellow ball is neither next to the red ball nor next to the blue ball.

This means that the yellow ball is the first ball, and the blue ball is the last ball:

Y, ___, _R_, _B_

So the green ball is the second ball, which is a contradiction.

Thus the red ball must be the second ball:

___, _R_, ___, ___

The yellow ball is neither next to the red ball nor next to the blue ball.

This means that the yellow ball is the last ball, and the blue ball is the first ball:

B, _R_, ___, ___

So the green ball is the third ball.

∴ the order of the balls in the box is blue, red, green and yellow.

Q + S



48: (B)

49: (D) Both (A) and (B) are unlike situations.

50: (A) Plants → Cotton → Yarn → Cloth → Shirt

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The End
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