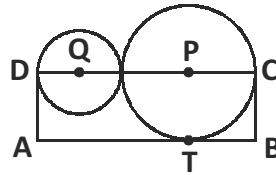


# UIMO SAMPLE QUESTIONS

## CLASS - 10

### MATHEMATICS - 1

01. Two circles with centres P and Q are as shown in the figure. The area of rectangle ABCD is 15 sq. cm.



Find the area of  $\Delta QPT$ .

- (A)  $\frac{12}{7} \text{ cm}^2$       (B)  $3.75 \text{ cm}^2$       (C)  $2.84 \text{ cm}^2$       (D)  $\frac{16}{5} \text{ cm}^2$
02. If the ratio of mean and median of a certain data is 2 : 3, what is the ratio of its mode and mean ?  
 (A) 3 : 2      (B) 5 : 2      (C) 3 : 5      (D) 2 : 3
03. Find the quadratic polynomial one of whose zeros is  $\frac{\sqrt{3}}{4}$  and the product of zeros is  $-\frac{1}{2}$ .  
 (A)  $4\sqrt{3}x^2 + 5x + 2\sqrt{3}$       (B)  $4\sqrt{3}x^2 + 5x - 2\sqrt{3}$   
 (C)  $4\sqrt{3} - 5x + 2\sqrt{3}$       (D)  $2x^2 + \frac{5}{4\sqrt{3}}x - \frac{1}{2}$
04. In an arithmetic progression, if  $\frac{T_5}{T_2} = 5$  and  $T_4 - T_3 = -5$ , find the sum of its first five terms.  
 (A)  $28\frac{2}{5}$       (B)  $-43\frac{3}{4}$       (C)  $\frac{35}{2}$       (D)  $17\frac{2}{3}$
05. Roshan walked 48 m due north and turned left. He again walked to a distance so that he is 60 m from his starting point. How far did he walk after turning left ?  
 (A) 36 m      (B) 39 m      (C) 54 m      (D) 46 m

### MATHEMATICS - 2

01. If  $\alpha, \beta$  are roots of  $ax^2 + bx + c = 0$ , find one root of the equation  $ax^2 - bx(x - 1) + c(x - 1)^2 = 0$ .  
 (A)  $\left(\frac{\alpha}{1-\alpha}\right)$       (B)  $\left(\frac{1-\beta}{\beta}\right)$       (C)  $\left(\frac{\alpha}{1+\alpha}\right)$       (D)  $\left(\frac{\beta}{1+\beta}\right)$
02. If  $x^2 + px + q = 0$  and  $x^2 + qx + p = 0$  have a common root, which of following is/are true ?  
 (A)  $p = q$       (B)  $1 + p + q = 0$       (C)  $p + q = 0$       (D)  $p - q = 0$

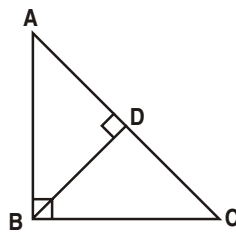
03. Which of the following have the same value ?

- (A)  $\sin^2\theta + \cos^2\theta$  (B)  $\sin^2\theta \operatorname{cosec}^2\theta$   
 (C)  $\operatorname{cosec}^2\theta - \cot^2\theta$  (D)  $\sec^2\theta - \tan^2\theta$

04. Which of the following statements are not true ?

- (A) Ratio of heights of two objects is equal to ratio of the length of their corresponding shadows at the same time.  
 (B) Two similar triangles of equal areas are not congruent.  
 (C)  $\triangle ABC$  with sides 5, 12 and 13 is an obtuse angled triangle.  
 (D) Similar figures are always congruent.

05. In the given figure,  $\triangle ABC$  is right angled at B. If  $BD \perp AC$  then which of the following is/are true ?



- (A)  $\triangle ABC \sim \triangle ADB$  (B)  $\triangle ABC \sim \triangle BDC$   
 (C)  $\triangle ADB \sim \triangle BDC$  (D)  $\triangle ABC \sim \triangle DBC$

REASONING

01. Ram is the brother of Shyam, and Mahesh is the father of Ram, Jagat is the brother of Priya and Priya is the daughter of Shyam. Who is the uncle of Jagat ?

- (A) Shyam (B) Mahesh  
 (C) Ram (D) Both Ram and Shyam

02. The positions of how many alphabets will remain unchanged if each of the alphabets in the word WALKING is arranged in alphabetical order from left to right ?

- (A) Zero (B) One  
 (C) Two (D) Four

03. Identify the missing word in the following.

(BLOAT, COAT) (CLING, DING) (SHOUT, ?)

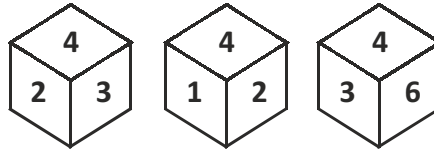
- (A) TUOT (B) HUTS  
 (C) SHOT (D) TOUT

04. Identify the second pair which has same relationship as in the first pair.

5 : 126 :: ?

- (A) 8 : 127 (B) 6 : 218  
 (C) 3 : 28 (D) 2 : 10

05. A die is thrown three times and its three different positions are noted as follows.



What number occur at the opposite face of number 4 ?

- (A) 1                      (B) 4                      (C) 5                      (D) 2

**CRITICAL THINKING**

01. Following operations, in the given order have been performed on the figure shown in the box.

- (i) Rotate 180°            (ii) Flip horizontal            (iii) Rotate 180°            (iv) Flip vertical

Identify the resultant figure.



- (A)            (B)            (C)            (D)

02. Veena is as old as Meghana will be in five years. The difference between Jansi's age and Meghana's age is twice the difference between Ilsa's age and Meghan's age. Jansi is 29. How old is Veena ?

- (A) 4                      (B) 10                      (C) 19                      (D) 24

03. 1988 rescue packages were distributed to seven regions affected by natural disasters as shown below.

P	Q	R	S	T	U	V
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
..	..	..	..	..	..	..

Which region received the 1986th rescue package ?

- (A) Region R            (B) Region Q            (C) Region T            (D) Region U

04. In a class of 90, where girls are twice that of boys, shridar ranked fourteenth from the top, if there are 10 girls ahead of Shridar, How many boys are after him in rank ?

- (A) 23                      (B) 26                      (C) 25                      (D) 22

05. A and B are children of D. Who is the father of A ? To answer this question which of the statements (1) and (2) is necessary ?

Statement (1) : C is the brother of A and the son of E.

Statement (2) : F is the mother of B.

- (A) Only (1)                      (B) Only (2)  
 (C) Either (1) or (2)                      (D) (1) and (2) both

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## KEY & SOLUTION

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### MATHEMATICS - 1

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01. (B)  $l = 2r + 2R$  &  $b = R$

Given  $l \times b = 15 \text{ cm}^2$

$2(R + r)(R) = 15 \text{ cm}^2$

$(R + r)(R) = \frac{15}{2} \text{ cm}^2 = 7.5 \text{ cm}^2$

Area of  $\Delta QPT = \frac{1}{2} \times QP \times PT = \frac{1}{2} (R + r)(R) = \frac{1}{2} \times 7.5 \text{ cm}^2$   
 $= 3.75 \text{ cm}^2$

02. (B) The given ratio of mean and median =  $2 : 3 = 2x : 3x$

But mode = 3 median – 2 mean

$= 9x - 4x = 5x$

The ratio of mode and mean =  $5x : 2x = 5 : 2$

03. (B) Given  $\alpha = \frac{\sqrt{3}}{4}$  &  $\alpha\beta = \frac{-1}{2}$

$\frac{\sqrt{3}}{4} \times \beta = \frac{-1}{2}$

$\beta = \frac{-2}{\sqrt{3}}$

$\therefore \alpha + \beta = \frac{\sqrt{3}}{4} - \frac{2}{\sqrt{3}} = \frac{3 - 8}{4\sqrt{3}} = \frac{-5}{4\sqrt{3}}$

$\alpha\beta = \frac{-1}{2}$

Required quadratic equation is  $x^2 - x(\alpha + \beta) + \alpha\beta = 0$

$x^2 - x\left(\frac{-5}{4\sqrt{3}}\right) + \left(\frac{-1}{2}\right) = 0$

$\frac{4\sqrt{3}x^2 + 5x - 2\sqrt{3}}{4\sqrt{3}} = 0$

$4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$

04. (B) Given in an AP  $\frac{T_5}{T_2} = 5$

$$\Rightarrow \frac{a+4d}{a+d} = 5$$

$$a + 4d = 5a + 5d$$

$$4a = -d$$

Given  $T_4 - T_3 = -5$

$$a + 3d - a - 2d = -5$$

$$d = -5$$

But  $4a = -d$

$$4a = -(-5)$$

$$a = \frac{5}{4}$$

$$S_5 = \frac{5}{2}[2a + 4d]$$

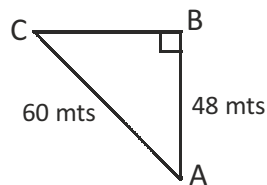
$$= \frac{5}{2} \left[ 2 \left( \frac{5}{4} \right) + 4(-5) \right]$$

$$= \frac{5}{2} \left[ \frac{5}{2} - 20 \right]$$

$$= \frac{-175}{4}$$

$$S_5 = -43 \frac{3}{4}$$

05. (A) Given  $AB = 48$  m and  $AC = 60$  m and  $\angle B = 90^\circ$



$$\therefore AC^2 = AB^2 + BC^2$$

$$(60\text{m})^2 = (48\text{m})^2 + BC^2$$

$$3600 \text{ m}^2 = 2304 \text{ m}^2 + BC^2$$

$$3600 \text{ m}^2 - 2304 \text{ m}^2 = BC^2$$

$$BC = \sqrt{1296\text{m}^2}$$

$$BC = 36 \text{ m}$$

## MATHEMATICS - 2

01. (C,D) Given  $\alpha + \beta = -\frac{b}{a}$

$$\alpha\beta = \frac{c}{a}$$

given equation is  $ax^2 - bx^2 + bx + cx^2 - 2cx + c = 0$

$$\text{Sum of roots} = \frac{-(b-2c)}{a-b+c}$$

$$= \frac{-b+2c}{a-b+c} = \frac{\frac{-b}{a} + 2\frac{c}{a}}{1 - \frac{b}{a} + \frac{c}{a}}$$

$$\Rightarrow \frac{\alpha + \beta + 2\alpha\beta}{1 + \alpha + \beta + 2\beta} = \frac{\alpha}{1 + \alpha} + \frac{\beta}{1 + \beta}$$

$$\text{Product of roots} = \frac{c}{a-b+c}$$

$$= \frac{\frac{c}{a}}{1 - \frac{b}{a} + \frac{c}{a}}$$

$$\Rightarrow \frac{\alpha\beta}{1 + \alpha + \beta + \alpha\beta} = \frac{\alpha\beta}{(1 - \alpha)(1 + \beta)}$$

$$= \left( \frac{\alpha}{1 + \alpha} \right) \left( \frac{\beta}{1 + \beta} \right)$$

02. (A,B,D) Let ' $\alpha$ ' be the common root of both equation

$$\alpha^2 + p\alpha + q = 0 \quad \dots\dots\dots (1)$$

$$\alpha^2 + q^2 + p = 0 \quad \dots\dots\dots (2)$$

$$\alpha^2 + p\alpha + q = \alpha^2 + q\alpha + p = 0$$

$$p\alpha - q\alpha + q - p = 0$$

$$\alpha(p - q) - 1(p - q) = 0$$

$$(p - q)(\alpha - 1) = 0$$

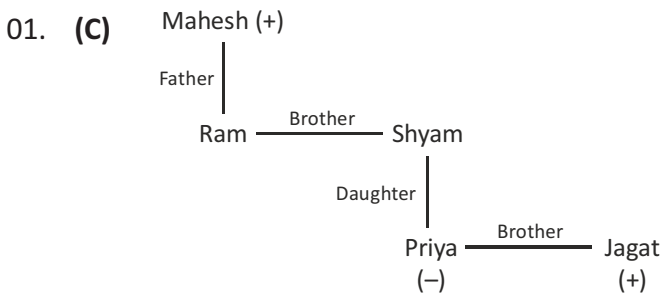
$$p - q = 0 \text{ (or) } \alpha - 1 = 0$$

$$p = q \text{ (or) } \alpha = 1$$

$$\text{If } \alpha = 1 \text{ then } 1 + p + q = 0 \quad \dots\dots\dots (1)$$

03. **(A,B,C,D)** (A)  $\sin^2\theta + \cos^2\theta = 1$
- (B)  $\sin^2\theta \operatorname{cosec}^2\theta = \sin^2\theta \times \frac{1}{\operatorname{cosec}^2\theta} = 1$
- (C)  $\operatorname{cosec}^2\theta - \cot^2\theta = 1$
- (D)  $\sec^2\theta - \tan^2\theta = 1$
04. **(B,C,D)** (B) Two similar triangles of equal area are congruent
- (C)  $\triangle ABC$  with sides 5 units, 12 units and 13 units is a right angled triangle [ $\because 13^2 = 12^2 + 5^2$ ]
- (D) Similar figures need not be congruent.
05. **(A,B,C)**  $\triangle ABC \sim \triangle ADB$  [ $\because$  A.A similarity]  
 $\triangle ABC \sim \triangle BDC$  [ $\because$  A.A similarity]  
 $\triangle ADB \sim \triangle BDC$  [ $\because$  Transitive property]

REASONING



Ram is the uncle of Jagat



Two letters are unchanged

03. **(D)** BLOAT – COAT  
 'BL' removed and 'C' added  
 Similarly CLING – DING  
 SHOUT – TOUT

04. **(C)**  $5 : 125 :: ?$   
 $5^3 + 1 \Rightarrow 125 + 1 \Rightarrow 126$   
 Similarly  $3^3 + 1 \Rightarrow 27 + 1 \Rightarrow 28$

05. **(C)** Adjacent faces of 4 are 2, 3, 1, 6  
 $\therefore$  4 opposite number is 5.

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 CRITICAL THINKING
 

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01. **(A)** (i) If we rotate the pattern 18 degree, we will get the pattern as shown in option A.  
 (ii) If we flip horizontally, then the pattern will look like B.  
 (iii) If we rotate the pattern in ii by 180 degrees, we will get a pattern as shown in D.  
 (iv) If we flip the pattern in iii, we get pattern shown in A.
02. **(D)** You should have eliminated choice a immediately. Veena can't be four years old if Meghan is going to be Ilsa's age in five years. The best way to eliminate other answer choices is to try plugging them into the information given in the problem. For instance, for choice b, if Ilsa is 10, then Meghan must be 5. The difference in their ages is 5. The difference between Jansi's age, 29, and Meghan's age, 5, is 24. Is 24 two times 5? No. Then choice b is wrong. You could eliminate choice c in the same way and be left with choice D.
03. **(C)**  $\frac{1988}{7} \Rightarrow 284 \text{ R } 0, 1988 = V, 1987 = u, 1986 = T$
04. **(B)** Explanation – No of boys = x; No of girls = 2x;  
 $x + 2x = 90 \Rightarrow 3x = 90$   
 $x \text{ (Boys)} = 30 ; 2x \text{ (Girls)} = 60$   
 Number of student behind Shridar =  $90 - 14 = 76$   
 No of girls behind Shridar =  $60 - 10 = 50$   
 No of boys behind Shridar =  $76 - 50 = 26$
05. **(B)** A and B are children of D.  
 From (1), C is the brother B and son of E.  
 Since, the sex of D and E are not known. Hence (1) is not sufficient to answer the question.  
 From (2). F is the mother of B. Hence, F is also the mother of A. Hence D is the father of A.  
 Thus, (2) is sufficient to answer the question.