Self-Assessment Model Paper-2 (2024-25)

X CLASS-MATHEMATICS-SOLUTIONS

1. The distance between origin and (6,8) is____

Sol: $\sqrt{x^2+y^2} = \sqrt{6^2+8^2} = \sqrt{36+64} = \sqrt{100} = 10\,units$

2. The sum of two numbers is 27 and product is 182. The numbers are: [B]

A) 12 and 13 B) 13 and 14 C) 12 and 15 D) 13 and 24

3 . The common difference of A.P x - y, x, x + y……. is.

$Sol: common\ difference = a_3 - a_2 = x + y - x = y$

4. If $a_n = \frac{n}{n+1}$ then $a_{2024} =$ [C]

A) $\frac{2021}{2022}$ B) $\frac{2022}{2023}$ C) $\frac{2024}{2025}$ D) $\frac{2023}{2024}$

5. The area of a rectangular plot is 528 m^2. The length of the plot (in metres). is one more than twice its breadth. Represent this situation in the form of quadratic equation.

Sol: Let breadth of rectangular plot $(b) = x\ m$

Length of rectangular plot $(l) = (2x+1)m$

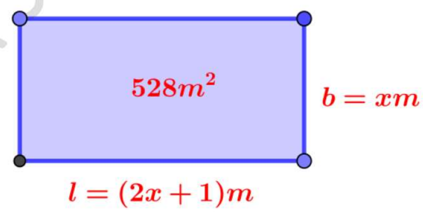
Given area of the rectangular plot $= 528\ m^2$

$l \times b = 528$

$(2x+1) \times x = 528$

$2x^2 + x - 528 = 0$

This is the required quadratic equation.



6. Find the coordinates of the point which divides the line segment joining the points (4,-3) and (8, 5) in the ratio 3 : 1 internally.

Sol: Given points $A\,(4,-3)$, $B\,(8,5)$ ratio $= 3 : 1$

(x_1, y_1) (x_2, y_2) $m_1 : m_2$

$$P(x,y) = \left(\frac{m_1x_2 + m_2x_1}{m_1+m_2}, \frac{m_1y_2 + m_2y_1}{m_1+m_2}\right)$$

$$= \left(\frac{3\times 8 + 1\times(4)}{3+1}, \frac{3\times(5) + 1\times(-3)}{3+1}\right)$$

$$= \left(\frac{24+4}{4}, \frac{15-3}{4}\right)$$

$$= \left(\frac{28}{4}, \frac{12}{4}\right) = (7,3)$$

The required point $= (7,3)$

7. Is the following situation possible? If so, determine their present ages. The sum of the ages of two friends is 20 years. Four years ago, the product of their ages in years was 48.

Sol: The sum of ages of two friends=20 years

	First friend	Second friend
Present age(in years)	x	$20-x$
Age four years ago	$x-4$	$20-x-4=16-x$

Four years ago, the product of their ages=48

$(x-4)(16-x)=48$

$16x-x^2-64+4x-48=0$

$-x^2+20x-112=0$

$x^2-20x+112=0$

$a=1, b=-20, c=112$

$b^2-4ac=(-20)^2-4\times1\times112=400-448=-48<0$

The roots are not real. So, the situation is not possible

8. a) If A and B are (-2,-2) and (2,-4), respectively, find the coordinates 3 of P such that AP $\frac{3}{7}$= AB and P lies on the line segment AB.

Sol: Given points $A(-2,-2)=(x_1,y_1)$, $B(2,-4)=(x_2,y_2)$

$\text{AP}=\frac{3}{7}\text{AB}$

$\Rightarrow\frac{\text{AP}}{\text{AB}}=\frac{3}{7}$

$\Longrightarrow\frac{\text{AP}}{\text{AB}-\text{AP}}=\frac{3}{7-3}$

$\Longrightarrow\frac{\text{AP}}{\text{PB}}=\frac{3}{4}$

∴ P divides AB in the ratio =3:4= $m_1:m_2$

$P(x,y)=\left(\frac{m_1x_2+m_2x_1}{m_1+m_2},\frac{m_1y_2+m_2y_1}{m_1+m_2}\right)$

$=\left(\frac{3\times2+4(-2)}{3+4},\frac{3\times(-4)+4\times(-2)}{3+4}\right)$

$=\left(\frac{6-8}{7},\frac{-12-8}{7}\right)$

$= \left(\frac{-2}{7}, \frac{-20}{7}\right)$

$The\ required\ point\ P = \left(\frac{-2}{7}, \frac{-20}{7}\right)$

b) . If the sum of the first n terms of an AP is 4n – n ², what is the first term? What is the sum of first two terms? What is the second term? Similarly, find the 3rd, the 10th and the nth terms

Sol: $S_n = 4n - n^2$

$S_1 = 4 \times 1 - 1^2 = 4 - 1 = 3$

$S_2 = 4 \times 2 - 2^2 = 8 - 4 = 4$

$S_3 = 4 \times 3 - 3^2 = 12 - 9 = 3$

$S_4 = 4 \times 4 - 4^2 = 16 - 16 = 0$

$a_1 = S_1 = 3$

$a_2 = S_2 - S_1 = 4 - 3 = 1$

$a_3 = S_3 - S_2 = 3 - 4 = -1$

$\therefore a = 3, d = a_2 - a_1 = 1 - 3 = -2$

$a_{10} = a + 9d$

$= 3 + 9 \times (-2)$

$= 3 - 18$

$= -15$

$a_n = a + (n-1)d$

$= 3 + (n-1) \times (-2)$

$= 3 - 2n + 2$

$= 5 - 2n$

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