Revision (2024 - Board exam papers)

1) If the sum of zeroes of the polynomial $p(x) = 2x^2 - k\sqrt{2}x + 1$ is $\sqrt{2}$, then value of k is ___

(a) $\sqrt{2}$ (b) 2 (c) $2\sqrt{2}$ (d) $\frac{1}{2}$

2) If the roots of equation $ax^2 + bx + c = 0$, $a \neq 0$ are real and equal, then which of the following relation is true?

(a) $a = \frac{b^2}{c}$ (b) $b^2 = ac$ (c) $ac = \frac{b^2}{4}$ (d) $c = \frac{b^2}{a}$

3) In an A.P., if first term $a = 7$, n^{th} term $a_n = 84$ and the sum of first n terms, $S_n = \frac{2093}{2}$, then $n =$

(a) 22 (b) 24 (c) 23 (d) 26

4) If two positive integers p and q can be expressed as $p = 18a^2b^4$ and $q = 20a^3b^2$; where a and b are prime numbers, then LCM (p, q) = ___

(a) $2a^2b^2$ (b) $180a^2b^2$ (c) $12a^2b^2$ (d) $180a^3b^4$

5) AD is a median of ΔABC with vertices A(5, −6), B(6, 4) and C(0, 0), length AD = ___

(a) $\sqrt{68}$ units (b) $2\sqrt{15}$ units (c) $\sqrt{101}$ units (d) 10 units

6) If $\sec\theta - \tan\theta = m$, then the value of $\sec\theta + \tan\theta =$ ___

(a) $1 - \frac{1}{m}$ (b) $m^2 - 1$ (c) $\frac{1}{m}$ (d) $-m$

7) For some data $x_1, x_2, \ldots, x_n$ with respective frequencies $f_1, f_2, \ldots f_n$, the value of $\sum_{i=1}^{n} f_i(x_i - \bar{x}) =$ ___

(a) $n\bar{x}$ (b) 1 (c) $\sum f_i$ (d) 0

8) The zeroes of a polynomial $x^2 + px + q$ are twice the zeroes of the polynomial $4x^2 - 5x - 6$. The value of p is ___

(a) $-\frac{5}{2}$ (b) $\frac{5}{2}$ (c) -5 (d) 10

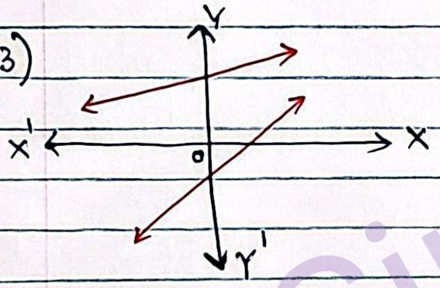
9) If the distance between the points $(3,-5)$ and $(x,-5)$ is 15 units, then the values of x are
(a) $12,-18$ (b) $-12,18$ (c) $18,5$ (d) $-9,-12$

10) If $\cos(\alpha+\beta)=0$, then value of $\cos\left(\frac{\alpha+\beta}{2}\right)=$ ____

(a) $1/\sqrt{2}$ (b) $1/2$ (c) 0 (d) $\sqrt{2}$

11) The middle most observation of every data arranged in order is called ____
(a) mode (b) median (c) mean (d) deviation

12) The centre of a circle is at $(2,0)$. If one end of a diameter is at $(6,0)$, then the other end is at
(a) $(0,0)$ (b) $(4,0)$ (c) $(-2,0)$ (d) $(-6,0)$

13) 

Graphs of two linear equations are shown. The pair of these linear equations is
(a) consistent with unique solution
(b) Consistent with infinitely many solutions
(c) inconsistent
(d) inconsistent but can be made consistent by extending these lines.

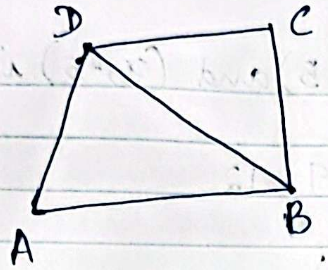
14) Assertion (A): If the graph of a polynomial touches x-axis at only one point, then the polynomial cannot be a quadratic polynomial.

Reason (R): A polynomial of degree n $(n>1)$ can have atmost n zeroes.
(a) (b) (c) (d)

15) Solve and verify your answer.
$7x-2y=5$; $8x+7y=15$

16) Evaluate : $2\sqrt{2}\cos 45 \sin 30^\circ + 2\sqrt{3}\cos 30^\circ$

17) If $A=60^\circ$ and $B=30^\circ$, verify that
$\sin(A+B)=\sin A\cos B+\cos A\sin B$

18) 

ABCD is a quadrilateral. Diagonal BD bisects $\angle B$ and $\angle D$, both.
Prove that (i) $\Delta ABD \sim \Delta CBD$
(ii) $AB = BC$

19) Prove that $5-2\sqrt{3}$ is an irrational no. It is given that $\sqrt{3}$ is an irrational no.

20) Show that the number $5\times11\times17+3\times11$ is a composite number.

Revision WS - 1 (Answers)

1) $a = 2,\ b = -k\sqrt{2},\ c = 1$

$$\alpha + \beta = -\frac{b}{a} = \sqrt{2}$$

$$\Rightarrow \frac{k\sqrt{2}}{2} = \sqrt{2}$$

$$\therefore k = 2 \text{ (b)}$$

2) $b^2 - 4ac = 0$

$$\Rightarrow b^2 = 4ac$$

$$\Rightarrow ac = \frac{b^2}{4} \text{ (c)}$$

3) $S_n = \frac{n}{2}[a + a_n]$

$$\frac{2093}{\cancel{2}1} = \frac{n}{\cancel{2}1}[7 + 84]$$

$$2093 = n \times 91$$

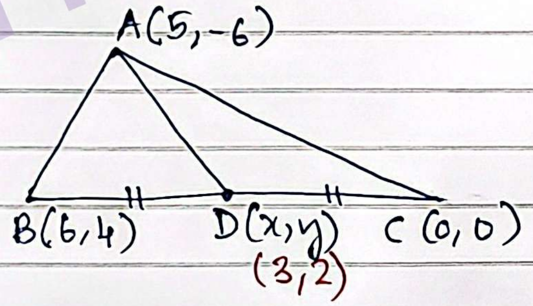
$$\therefore n = \frac{2093}{91} = 23 \text{ (c)}$$

4) $p = 18a^2b^4 = 2 \times 3^2 \times a^2 b^4$

$q = 20a^3b^2 = 2^2 \times 5 \times a^3 b^2$

$$LCM(p, q) = 2^2 \times 5 \times 3^2 \times a^3 \times b^4$$
$$= 180a^3b^4 \text{ (d)}$$

5)



$$D(x, y) = D\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$(x, y) = \left(\frac{6+0}{2}, \frac{4+0}{2}\right) = (3, 2)$$

$$AD = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(3-5)^2 + (2+6)^2} = \sqrt{4 + 64} = \sqrt{68} \text{ units (a)}$$

6) $\sec\theta - \tan\theta = m \rightarrow (1)$

$$\sec^2\theta - \tan^2\theta = 1$$

$$\Rightarrow (\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$$

$$\Rightarrow (\sec\theta + \tan\theta) \times m = 1$$

$$\therefore \sec\theta + \tan\theta = \frac{1}{m} \text{ (c)}$$

7) $\sum_{i=1}^{n} f_i(x_i - \bar{x}) = \sum_{i=1}^{n} f_i x_i - \sum_{i=1}^{n} \bar{x} f_i$

$= n\bar{x} - \bar{x}\sum_{i=1}^{n} f_i$

$= n\bar{x} - n\bar{x} = 0$ (d)

$\bar{x} = \frac{\sum f_i x_i}{n}$

or $\frac{\sum f_i x_i}{\sum f_i}$

8) $p(x) = 4x^2 - 5x - 6$

$= 4x^2 - 8x + 3x - 6$

$= 4x(x-2) + 3(x-2)$

$= (4x+3)(x-2)$

S: -5, P: -24 ⟨ -8, 3

$\therefore x = -\frac{3}{4}$ or 2

Let $\alpha = -\frac{3}{4}$ and $\beta = 2$ and zeroes of $f(x) = x^2 + px + q$ be 2α and 2β.

Sum of zeroes $= 2\alpha + 2\beta = -p$

$\Rightarrow 2(\alpha + \beta) = -p$

$\Rightarrow 2\left(-\frac{3}{4} + 2\right) = -p$

$\Rightarrow 2 \times \frac{5}{4} = -p$

$\therefore p = -\frac{5}{2}$ (a)

(Or) Let α and β be the zeroes of $p(x) = 4x^2 - 5x - 6$, then

$\alpha + \beta = \frac{-b}{a} = \frac{5}{4}$

$\alpha\beta = \frac{c}{a} = \frac{-6}{4} = -\frac{3}{2}$

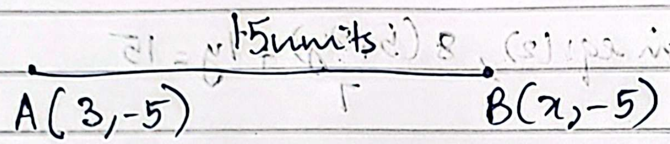
Let the zeroes of $f(x) = x^2 + px + q$ be 2α and 2β.

Then, sum of zeroes $= 2\alpha + 2\beta = -p$

$\Rightarrow 2(\alpha + \beta) = -p$

$\Rightarrow 2 \times \frac{5}{4} = -p$

$\therefore p = -\frac{5}{2}$

9) 

$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$\Rightarrow \sqrt{(x-3)^2+(-5+5)^2} = 15$

Squaring on both sides, $(x-3)^2+0 = (15)^2$

$\Rightarrow x^2+9-6x = 225$

$\Rightarrow x^2-6x-216=0$ S: -6 P: -216

$\Rightarrow (x+12)(x-18)=0$ $12, -18$

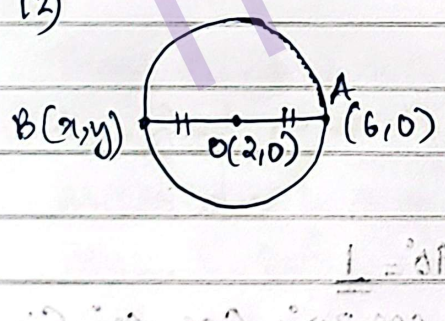
$\therefore x = -12, 18$ (b)

10) $\cos(\alpha+\beta)=0$

$\Rightarrow (\alpha+\beta) = 90^\circ$

$\therefore \cos\left(\frac{\alpha+\beta}{2}\right) = \cos\left(\frac{90^\circ}{2}\right) = \cos 45^\circ = \frac{1}{\sqrt{2}}$ (a)

11) median (b)

12) 

$O(x,y) = O\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$\Rightarrow (2,0) = \left(\frac{x+6}{2}, \frac{y+0}{2}\right)$

$\therefore \frac{x+6}{2} = 2$	$\frac{y+0}{2} = 0$
$\Rightarrow x+6=4$	$y=0$
$x=-2$	$\therefore$ The other end is at $(-2,0)$ (c)

13) Consistent with unique solution (a)

14) assertion is false but reason is true (d)

15) $7x - 2y = 5 \rightarrow (1)$

$8x + 7y = 15 \rightarrow (2)$

From eq: (1), $7x = 5 + 2y$

$x = \frac{5+2y}{7} \rightarrow (3)$

On Substituting eq: (3) in eq: (2), $8\frac{(5+2y)}{7} + 7y = 15$

$\Rightarrow 40 + 16y + 49y = 105$

$\Rightarrow 65y = 65$

$\boxed{y = 1}$

From eq: (3), $x = \frac{5+2}{7} = \frac{7}{7}$

$\boxed{x = 1}$

Verification :-

LHS, $7x - 2y = 7\times1 - 2\times1 = 7 - 2 = 5$, RHS

LHS, $8x + 7y = 8\times1 + 7\times1 = 8 + 7 = 15$, RHS

$\therefore$ LHS = RHS

Hence, verified

16) $2\sqrt{2}\cos 45^\circ \sin 30^\circ + 2\sqrt{3}\cos 30^\circ$

$= 2\sqrt{2} \times \frac{1}{\sqrt{2}} \times \frac{1}{2} + 2\sqrt{3} \times \frac{\sqrt{3}}{2}$

$= 1 + 3 = \underline{4}$

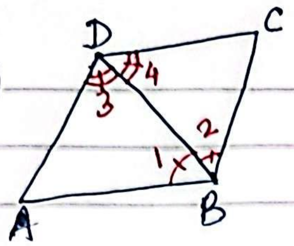
17) LHS, $\sin(A+B) = \sin(60^\circ + 30^\circ) = \sin 90^\circ = \underline{1}$

RHS, $\sin A \cos B + \cos A \sin B = \sin 60^\circ \cdot \cos 30^\circ + \cos 60^\circ \cdot \sin 30^\circ$

$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times \frac{1}{2}$

$= \frac{3}{4} + \frac{1}{4} = \frac{4}{4} = \underline{1}$

$\therefore$ LHS = RHS. Hence verified.

18) 

Given: in quadrilateral ABCD,
BD bisects $\angle B$
BD bisects $\angle D$

To prove:- (i) $\triangle ABD \sim \triangle CBD$
(ii) $AB = BC$

Proof:- In $\triangle ABD$ and $\triangle CBD$, $\angle 1 = \angle 2$ [$\because$ BD bisects $\angle B$]
$\angle 3 = \angle 4$ [$\because$ BD bisects $\angle D$]
$\therefore \triangle ABD \sim \triangle CBD$ (AA similarity)

Thus, $\frac{AB}{BC} = \frac{BD}{BD}$ (corresponding sides of similar $\triangle$s are proportional)

$\Rightarrow \frac{AB}{BC} = 1$

$\therefore \underline{\underline{AB = BC}}$. Hence Proved

19) Let us assume $5-2\sqrt{3}$ is a rational number

Then, $5-2\sqrt{3} = \frac{a}{b}$; where a and b are co-prime integers and $b \neq 0$

$\Rightarrow -2\sqrt{3} = \frac{a}{b} - 5$

$\Rightarrow -2\sqrt{3} = \frac{a-5b}{b}$

$\Rightarrow \sqrt{3} = \frac{5b-a}{2b}$

Since a and b are integers, $\frac{5b-a}{2b}$ is a rational number.

Thus, $\sqrt{3}$ is also a rational number. But this contradicts the fact that $\sqrt{3}$ is an irrational number. This contradiction arises due to our wrong assumption that $5-2\sqrt{3}$ is rational. Hence, $5-2\sqrt{3}$ is an irrational number.

20) $5 \times 11 \times 17 + 3 \times 11 = 11 \times (5 \times 17 + 3)$
$= 11 \times 88$
$= 11 \times 11 \times 2^3 = 11^2 \times 2^3$

Thus, the given number can be expressed as product of two factors other than 1. Hence, it is a composite number.