



Half yearly Examination - 2018
X-Standard - Maths - Answer Key

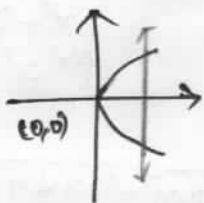
Section - I

1	not clear	9	b
2	a	10	b
3	b	11	c
4	a	12	c
5	c	13	b
6	d	14	c
7	b	15	b
8	c		

Section - II

16. If a set X is finite, then we define the cardinality of X to be the number of elements in X . cardinality of a set X is denoted by $n(X)$.

17.



The give graph does not represent a function as a vertical line cuts the graph at two points

18.

$$b_{1b} = 256$$

$$b_{13} = 195$$

19.

$$x = \frac{117}{37}, y = \frac{-7}{37}$$

Solution $(\frac{117}{37}, \frac{-7}{37})$

20. Sum of the roots = 6

Product of the roots = 2

Required equation $x^2 - 6x + 2 = 0$

21. The Transpose of a matrix A is obtained by interchanging rows and columns of the matrix A . It is denoted by A^T .

$$22. \begin{pmatrix} 3 & -2 \\ 5 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ 2 & 7 \end{pmatrix} = \begin{pmatrix} 8 & -11 \\ 22 & 12 \end{pmatrix}$$

$$23. \text{Area} = \frac{1}{2} \{ (x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3) \}$$

$$= 3 \text{ sq. units.}$$

$$24. PA \times PB = PC \times PD$$

$$8 \times 2 = 4 \times x$$

$$x = 4 \text{ cm}$$

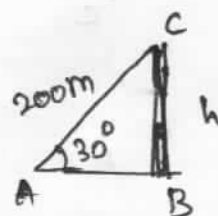
$$PD = 4 \text{ cm}$$

25. In $\triangle CAB$

$$\sin 30^\circ = \frac{h}{200}$$

$$h = 100 \text{ m}$$

The distance of the kite from the ground level is 100m



$$26. \sec^2 \theta + \operatorname{cosec}^2 \theta = \frac{1}{\cos^2 \theta} + \frac{1}{\sin^2 \theta}$$

$$= \frac{\sin^2 \theta + \cos^2 \theta}{\cos^2 \theta \sin^2 \theta}$$

$$= \frac{1}{\cos^2 \theta \sin^2 \theta}$$

$$= \sec^2 \theta \operatorname{cosec}^2 \theta$$

$$27. \text{Volume of Hollow sphere} = \frac{4}{3} \pi (R^3 - r^3)$$

$$= \frac{9152}{3} \text{ cm}^3$$

$$28. \text{S.D} = \sqrt{\frac{n^2 - 1}{12}}$$

$$n = 13, \text{ S.D} = 3.7$$



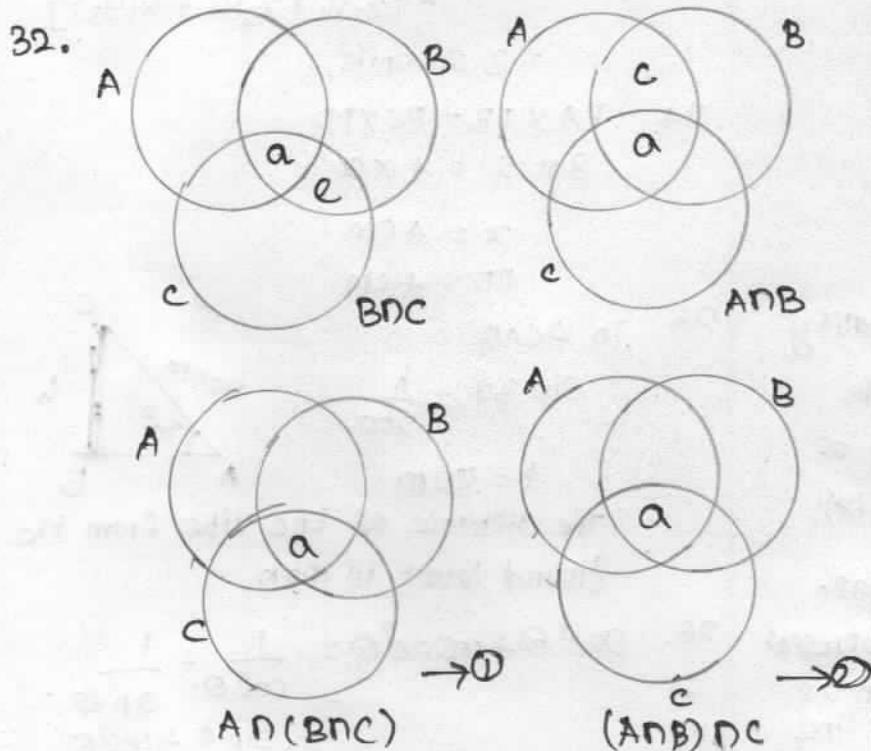
29. $n(S) = 100, S = \{1, 2, \dots, 100\}$
 $n(A) = 10, A = \{10, 20, 30, 40, 50, 60, 70, 80, 90, 100\}$
 $P(A) = \frac{1}{10}$

30. a) $m = 1, y\text{-intercept } c = \frac{2}{5}$
 Required equation $5x - 5y + 2 = 0$
 b) $r = 7\text{ cm}, h = 20\text{ cm}$
 $CSA = 2\pi rh = 880\text{ sq. cm}$

Section-III

31. $f(3) = 7, f(-1) = 3, f(6) = 9, f(1) = 3$

$$\frac{f(3) + f(-1)}{2f(6) - f(1)} = \frac{7 + 3}{2(9) - 3} = \frac{10}{15} = \frac{2}{3}$$



From ①, ② it is verified that
 $A \cap (B \cap C) = (A \cap B) \cap C$

33. $16^2 + 17^2 + 18^2 + \dots + 25^2 = (1^2 + 2^2 + \dots + 25^2) - (1^2 + 2^2 + 3^2 + \dots + 15^2)$
 $\sum_{n=16}^{25} n^2 = \frac{25 \times 26 \times 51}{6} - \frac{15 \times 16 \times 31}{6}$
 $= 5525 - 1240$
 $= 4285$

34. The principal is ₹500
 Interest 1 year = 50
 Principal 2nd year = $500(1 + \frac{10}{100})$
 Interest 2nd year = $500(1 + \frac{10}{100})(\frac{10}{100})$
 \vdots
 Principal for n^{th} year
 $= 500(1 + \frac{10}{100})^{n-1}$
 Amount at end of $(n-1)^{\text{th}}$ year } = Principal for the n^{th} year

\therefore The amount at end of 10th year = ₹ $500(\frac{11}{10})^{10}$

35. $a = 3p^2, b = -2pq, c = q^2$
 $\Delta = b^2 - 4ac$
 $= -8p^2q^2 < 0$

\therefore The roots are not real

36. $P(x) = x^4 - 4x^3 + 10x^2 - 12x + 9$
 $x^2 - 2x + 3$
 $x^2 \begin{array}{r} x^4 - 4x^3 + 10x^2 - 12x + 9 \\ \underline{-x^4} \\ 2x^2 - 2x \\ \underline{-2x^2 + 4x} \\ 4x + 9 \\ \underline{-4x + 12} \\ 21 \end{array}$

$$\sqrt{x^4 - 4x^3 + 10x^2 - 12x + 9} = 1x^2 - 2x + 3$$

37. $f(x) = 3x(x^3 + 2x^2 - 4x - 8)$
 $g(x) = 2x(2x^3 + 7x^2 + 4x - 4)$

$$\begin{array}{r} 2x^3 + 2x^2 - 4x - 8 \\ \underline{2x^3 + 7x^2 + 4x - 4} \\ 3x^2 + 12x + 12 \\ \underline{3x^2 + 12x + 12} \\ 0 \end{array}$$

Remainder = 0

$$\begin{array}{r}
 x^2 + 4x + 4 \quad | \quad x-2 \\
 \underline{x^3 + 2x^2 - 4x - 8} \\
 x^3 + 4x^2 + 4x \\
 \underline{-2x^2 - 8x - 8} \\
 -2x^2 - 8x - 8 \\
 \underline{-2x^2 - 8x - 8} \\
 0 \text{ - remainder.}
 \end{array}$$

GCD (A(x), g(x)) = x(x^2 + 4x + 4)

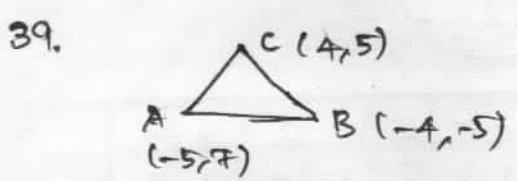
38. $2x + 3y = \begin{pmatrix} 2 & 3 \\ 1 & 0 \end{pmatrix} \rightarrow \textcircled{1}$

$3x + 2y = \begin{pmatrix} 2 & -2 \\ -1 & 5 \end{pmatrix} \rightarrow \textcircled{2}$

Solve $\textcircled{1}, \textcircled{2}$

$$x = \begin{pmatrix} 2/5 & -12/5 \\ -11/5 & 15/5 \end{pmatrix}$$

$$y = \begin{pmatrix} 2/5 & 13/5 \\ 14/5 & -2 \end{pmatrix}$$



Slope of AB = -12
Slope of BC = 5/4
Slope of AC = 9/2

40. a - x intercept
b - y intercept

Given $a + b = 5$
 $b = 5 - a$

Eqn. of straight line in the intercept form

$$\frac{x}{a} + \frac{y}{b} = 1$$

$$\frac{x}{a} + \frac{y}{5-a} = 1$$

$$(5-a)x + ay = a(5-a) \rightarrow \textcircled{1}$$

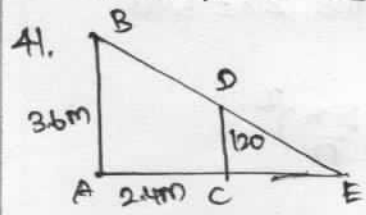
(1) Pass through (6, -2)

$$a^2 - 13a + 30 = 0$$

$$(a-3)(a-10) = 0$$

$$a = 3 \text{ or } a = 10$$

when $a = 3$, $2x + 3y = 6$
when $a = 10$, $x - 2y - 10 = 0$



AB = 3.6 m, CD = 1.2 m,
CE = the length of the shadow of the girl
walking speed of the girl = 0.6 m/sec

$$\triangle ECD \sim \triangle EAB$$

$$\frac{EC}{EA} = \frac{CD}{AB}$$

$$\frac{EC}{2.4 + EC} = \frac{1.2}{3.6} = \frac{1}{3}$$

$$3EC = 2.4 + EC$$

$$EC = 1.2 \text{ m}$$

42. R - radius of the spherical solid material
 r_1, r_2, r_3 - radii of the three solid sphere

$$R = 18, r_1 = 2, r_2 = 12$$

Volume of 3 spheres = Volume of the solid sphere.

$$\frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3 = \frac{4}{3}\pi R^3$$

$$2^3 + 12^3 + r_3^3 = 18^3$$

$$r_3^3 = 16^3$$

$$r_3 = 16$$

43. r = internal radius = 12 cm

R = external radius = 18 cm

height of hollow cylinder = h = 14 cm

$$CSA = 2\pi h (R+r)$$

$$= 2640 \text{ sq. cm}$$

$$TSA = 2\pi (R+r)(R-r+h)$$

$$= \frac{26400}{7}$$

$$= 3771 \frac{3}{7} \text{ sq. cm}$$



44. Mean of 30 items $\bar{x} = 18$

Sum of 30 items $\sum x = 540$

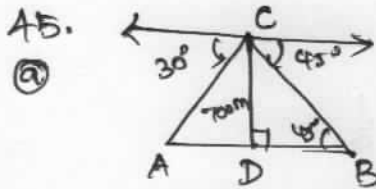
S.D, $\sigma = 8$

$$\sigma^2 = \frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2$$

$$\frac{\sum x^2}{30} - 18^2 = 64$$

$$\sum x^2 - 9720 = 2700$$

$$\sum x^2 = 9990$$



$CD = 700\text{m}$, $\angle CAD = 30^\circ$

$\angle CBD = 45^\circ$, In $\triangle CDB$

$$\tan 45^\circ = \frac{CD}{DB}$$

$$BD = CD = 700\text{m}$$

In $\triangle CAD$,

$$\tan 30^\circ = \frac{CD}{AD}$$

$$AD = 700\sqrt{3}\text{m}$$

width of the river,

$$AB = AD + DB$$

$$AB = 700\sqrt{3} + 700$$

$$= 1912.4\text{m}$$

45.

(a)

A be the event of getting award for design

B be the event of getting award for efficient use of fuel

$$P(A) = 0.25, P(B) = 0.35,$$

$$P(A \cap B) = 0.15$$

$$(i) P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.45$$

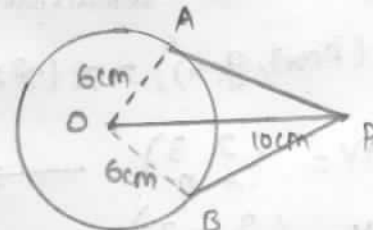
$$(ii) P(A \cap B) + P(\bar{A} \cap B)$$

$$= [P(A) - P(A \cap B)] + [P(B) - P(A \cap B)]$$

$$= 0.30$$

Section - IV

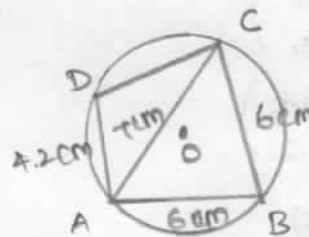
Ab. a)



Verification $PA = \sqrt{OP^2 - OA^2}$
 $= \sqrt{10^2 - 6^2} = \sqrt{100 - 36}$
 $= \sqrt{64} = 8\text{cm}$

Ab.

(b)



47.

(a)

x	-3	-2	-1	0	1	2	3	4
x ²	9	4	1	0	1	4	9	16
-2x	6	4	2	0	-2	-4	-6	-8
-3	-3	-3	-3	-3	-3	-3	-3	-3
y	12	5	0	-3	-4	-3	0	5

coordinates $(-3, 12), (-2, 5), (-1, 0), (0, -3), (1, -4), (2, -3), (3, 0), (4, 5)$

Solution set is $\{-1, 3\}$

47.

(b)

Direct variation, $K = \frac{y}{x}$

$$K = \frac{2}{1} = \frac{6}{3} = \frac{10}{5} = \frac{14}{7} = \frac{16}{8} = 2$$

$$y = 2x$$

(i) when $x = 1, y = 2$

(ii) when $y = 12, x = 6$

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