Sample Paper 6

ANSWERKEY																			
1	(a)	2	(a)	3	(a)	4	(d)	5	(a)	6	(b)	7	(b)	8	(a)	9	(b)	10	(c)
11	(a)	12	(a)	13	(a)	14	(c)	15	(d)	16	(b)	17	(d)	18	(c)	19	(a)	20	(a)
21	(a)	22	(b)	23	(b)	24	(b)	25	(b)	26	(d)	27	(a)	28	(a)	29	(d)	30	(b)
31	(b)	32	(c)	33	(d)	34	(d)	35	(b)	36	(b)	37	(c)	38	(a)	39	(d)	40	(a)
41	(c)	42	(a)	43	(a)	44	(a)	45	(b)	46	(a)	47	(b)	48	(c)	49	(b)	50	(a)

SOLUTIONS

1. **(a)** $P(x)$ is a polynomial of degree 3.

and $P(n) = \frac{1}{n} \Rightarrow n\,P(n) - 1 = 0$

$n(P(n))$ is a polynomial of degree 4

$\therefore\ n\,P(n) - 1 = k(n-1)(n-2)(n-3)(n-4)$

For $n = 0; -1 = 24\,k \Rightarrow k = \frac{-1}{24}$

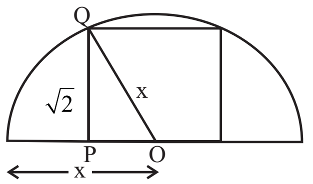
For $n = 5;\ 5 \times P(5) - 1 = \frac{-1}{24}\,(4)(3)(2)(1)$

$\Rightarrow 5 \cdot P(5) - 1 = -1 \Rightarrow P(5) = 0$

2. **(a)** Area of square = 2 cm^2

Side of square = $\sqrt{2}$ cm

OP = $\frac{\sqrt{2}}{2}$ cm, OQ = x cm

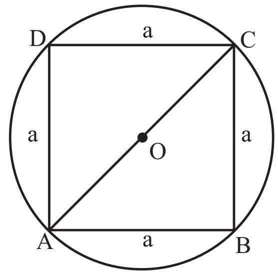


$\Rightarrow x^2 = \left(\sqrt{2}\right)^2 + \left(\frac{\sqrt{2}}{2}\right)^2$

$\Rightarrow x^2 = 2 + \frac{2}{4}$

$\Rightarrow x^2 = \frac{5}{2} \Rightarrow x = \sqrt{\frac{5}{2}}$ cm.

AC = $2\sqrt{\frac{5}{2}}$ cm (AC = Diameter)



$\left\{\frac{1}{2} \times d_1 \times d_2\right\}$

Area of square = $\frac{1}{2} \times AC \times BD$

Area of square = $\frac{1}{2} \times d_1 \times d_2$

$= \frac{1}{2} \times 2\sqrt{\frac{5}{2}} \times 2\sqrt{\frac{5}{2}} = 5\ cm^2$

3. **(a)**

4. **(d)** Let x & y be the unit and tenth digits respectively of a two digit number. Then,

$x + y = 9$ ($\because$ Given) ... (i)

and according to given condition,

$10x + y = 10\,y + x + 27$

$\Rightarrow 9x - 9y = 27$

$\Rightarrow x - y = 3$ ... (ii)

On adding (i) & (ii)

$2x = 12 \Rightarrow x = 6$

Hence, from equation (i),

$6 + y = 9 \Rightarrow y = 3$

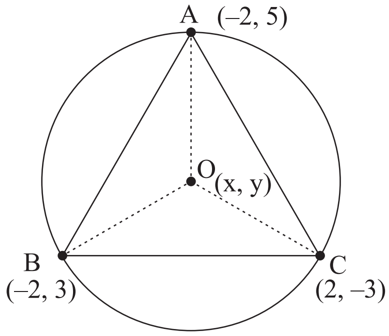
So number will be 10 × 3 + 6 = 36

5. **(a)** The largest number of four digits is 9999. Least number divisible by 12, 15, 18, 27 is 540.

On dividing 9999 by 540, we get 279 as remainder.

Required number = (9999 – 279) = 9720.

6. **(b)**



Let O(x, y) is the centre of the given circle.

Join OA, OB & OC.

$\because$ OA = OB = OC

$\therefore$ $OA^2 = OB^2$

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

$\Rightarrow x^2 + 4 + 4x + y^2 + 25 - 10y = x^2 + 4 + 4x + y^2 + 9 + 6x$

$\Rightarrow 16y = 16 \Rightarrow y = 1$

Again: $OB^2 = OC^2$

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

$\Rightarrow x^2 + 4 + 4x + (y + 3)^2 = x^2 + 4 - 4x + (y + 3)^2$

$\Rightarrow 8x = 0 \Rightarrow x = 0$

$\therefore$ centre of the circle is (0, 1).

7. **(b)** $\sin 45° + \cos 45° = \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \frac{2}{\sqrt{2}} = \sqrt{2}$

8. **(a)**

9. **(b)** Since, H.C.F. of co-prime number is 1.

$\therefore$ Product of two co-prime numbers is equal to their L.C.M. So, L.C.M. = 117

10. **(c)** $(x - 6)^2 + (y + 6)^2 = (x - 3)^2 + (y + 7)^2$ ...(i)

Also, $(x - 3)^2 + (y - 3)^2 = (x - 3)^2 + (y + 7)^2$

$y^2 - 6y + 9 = y^2 + 14y + 49$

$-20y = 40 \Rightarrow y = -2$

Putting $y = -2$ in equation (i), we have

$(x - 6)^2 + (4)^2 = (x - 3)^2 + (5)^2$

$x^2 - 12x + 36 + 16 = x^2 - 6x + 9 + 25$

$-6x = -18 \Rightarrow x = 3$

11. **(a)** Since a, b are co-prime

$\Rightarrow$ g. c.d of a, b = 1 $\Rightarrow$ g. c. d. of $a^2, b^2 = 1$

$\Rightarrow$ a^2, b^2 are co-prime.

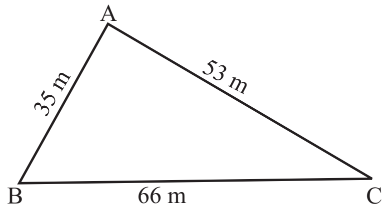
(b) does not hold. (c) does not hold, (d) does not hold

$\because$ If a = 2, b = 3, then $a^2 = 4$, $b^2 = 9$

$\therefore$ a^2 is even, b^2 is odd.

12. **(a)**

13. **(a)**



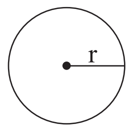
Here, a = 66 m, b = 53 m & c = 35 m

$s = \frac{a+b+c}{2} = \frac{66+53+35}{2} = 77\text{m}$

Area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$

So, area of $\Delta = \sqrt{77(11)(24)(42)} = 924$

$\pi r^2 = 2(924)$



$\Rightarrow r^2 = \frac{2 \times 924 + 7}{22} \Rightarrow r^2 = 588$

$\Rightarrow r = 14\sqrt{3}$ m

14. **(c)** $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} = \frac{5}{3}$

15. **(d)** $\frac{\tan 30°}{\cot 60°} = \frac{\frac{1}{\sqrt{3}}}{\frac{1}{\sqrt{3}}} = 1$

16. **(b)**

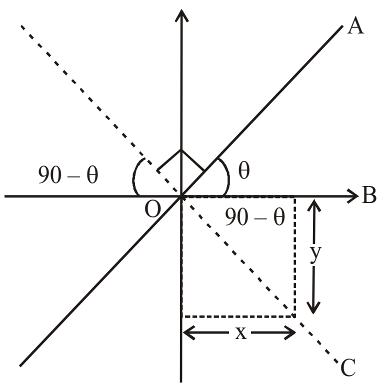
17. **(d)**

18. **(c)** Total number of cards = 25

Prime number are 3, 5, 7, 11, 13, 17, 19, 23,

$\therefore$ Probability of prime number card = $\frac{8}{25}$

19. **(a)**



$\angle AOB = \theta$

$\because$ CO $\perp$ OA

$\therefore$ $\angle BOC = (90° - \theta)$

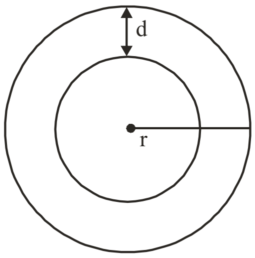
$\sin\theta = \frac{3}{5}$; $\cos\theta = \frac{4}{5}$ $\left[\because \cos\theta = \sqrt{1-\sin^2\theta}\right]$

$\sin\theta = x = \frac{3}{5}$

$\cos\theta = y = \frac{4}{5}$

$\therefore$ point on fourth quadrant is $\left(\frac{3}{5}, -\frac{4}{5}\right)$

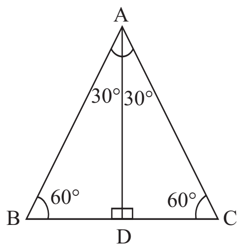
20. **(a)** Required area $= \pi\left[(r+d)^2 - r^2\right]$



$= \pi[r^2 + d^2 + 2rd - r^2]$

$= \pi[d^2 + 2rd] = \pi d[d + 2r]$

21. **(a)** We know that height of an equilateral triangle $\frac{\sqrt{3}}{2}a$, where a is the side of equilateral triangle



$\therefore AD^2 = \frac{3}{4}a^2 = \frac{3}{4}BC^2$

22. **(b)** Let speed of boat in still water be x km/hr and speed of stream be y km/hr

$\frac{30}{x+y} = 3 \Rightarrow x + y = 10$ …(i)

$\frac{30}{x-y} = 5 \Rightarrow x - y = 6$ …(ii)

From solving equations (i) and (ii)

$x + y = 10$

$-x - y = 6$

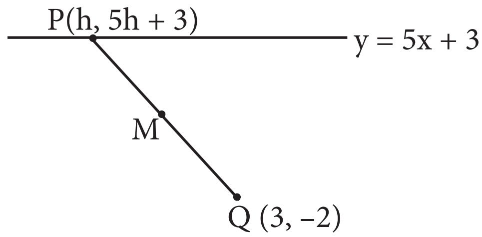
$\;\;+ \;\;\; -$

$2y = 4$ $\quad y = 2$ km/hr. and

$x = 8$ km/hr

23. **(b)** Probability $= \frac{\text{No. of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{5}$

24. **(b)** Let coordinate of point p be $(h, 5h + 3)$



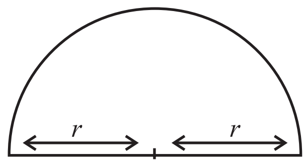
Since, M is the mid-point of PQ, therefore by mid-point formula, we have $M = \left(\frac{h+3}{2}, \frac{5h+3-2}{2}\right)$.

Clearly by observing the options, we can say that M must lie on the line

$y = 5x - 7$

25. **(b)** Perimeter $= \frac{2\pi r}{2} + 2r$

$= \pi r + 2r$



$\Rightarrow (\pi + 2)\, r = 36$

$\Rightarrow \left(\frac{36}{7}\right) - r = 36$

$\Rightarrow r = 7$ cm

Hence, diameter $= 7 \times 2 = 14$ cm.

26. **(d)** $f(x) = (x-1)^2 + (x-2)^2 + (x-3)^2 + (x-4)^2$

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

$f(x)$ is minimum at $x = \frac{5}{2} = 2.5$

27. **(a)** Let one woman can paint a large mural in W hours and one girl can paint it in G hours

According to question,

$\frac{8}{W} + \frac{12}{G} = \frac{1}{10} \Rightarrow \frac{2}{W} + \frac{3}{G} = \frac{1}{40}$ ...(i)

Also, $\frac{6}{W} + \frac{8}{G} = \frac{1}{14} \Rightarrow \frac{3}{W} + \frac{4}{G} = \frac{1}{28}$ ...(ii)

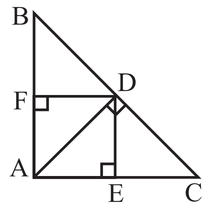
On solving equation (i) and (ii), we get

$W = 140$ and $G = 280$

Now, $\frac{7}{140} + \frac{14}{280} = \frac{1}{\text{Time taken}} = \frac{1}{t}$(say)

$\Rightarrow \frac{1}{t} = \frac{1}{20} + \frac{1}{20} \Rightarrow t = 10$ hours

28. **(a)** Here, *BAC* is a right angle triangle



$AB = 15$ & $BC = 25$

$\therefore AC = \sqrt{BC^2 - AB^2} = 20$

Area of $\Delta ABC = \frac{1}{2} BC.AD$

$= \frac{1}{2} AB.AC$

$\Rightarrow BC.AD = AB.AC$

$\Rightarrow 25(AD) = 15(20) \quad \Rightarrow \quad AD = 12$

$\because$ *AEDF* is rectangle then, $AD = EF = 12$

29. **(d)** As $(a, 0)$, $(0, b)$ and $(1, 1)$ are collinear

$\therefore \quad a(b-1) + 0(1-0) + 1(0-b) = 0$

$ab - a - b = 0$

$ab = a + b$

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

30. **(b)** $(\sin 30° + \cos 30°) - (\sin 60° + \cos 60°)$

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

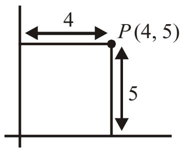
31. **(b)** Since, 2 is the zero of $x^2 + 3x + k$,

$\therefore \quad (2)^2 + 3(2) + k = 0 \quad \Rightarrow \quad k + 10 = 0 \Rightarrow k = -10$

32. **(c)** Possible products are 1, 4, 9, 16, 2, 8, 18, 32, 3, 12, 27, 48, 4, 16, 36, 64

So, required probability of getting the product of the two numbers so obtained is $\frac{6}{16} = \frac{3}{8}$

33. **(d)**



34. **(d)** $\frac{1+\tan^2 A}{1+\cot^2 A} = \frac{(\sec^2 A - \tan^2 A) + \tan^2 A}{(\text{cosec}^2 A - \cot^2 A) + \cot^2 A}$

$= \frac{\sec^2 A}{\text{cosec}^2 A} = \frac{\sin^2 A}{\cos^2 A} = \left(\frac{\sin A}{\cos A}\right)^2 = \tan^2 A.$

35. **(b)** (I) Statement I is false. Consistent Linear equations may have unique or infinite solutions.

(II) Statement or is also false

$\because \quad 13^2 + 14^2 = 365$

36. **(b)** Let *r* be the radius of circle, then area $= \pi r^2$

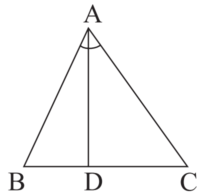
When *r* is diminished by 10%

then, area $= \pi\left(r - \frac{r}{10}\right) = \pi r \left(\frac{81}{100}\right)$

Thus, area is diminished by $\left(1 - \frac{81}{100}\right)\% = 19\%$

37. **(c)** $\because \angle BAC = \angle ADC$ (given)

$\angle C = \angle C$ (common)



$\therefore \Delta ABC \sim \Delta DAC$ (by AA similarity criterion)

$\Rightarrow \frac{BC}{AC} = \frac{AC}{DC} \Rightarrow BC \times DC = AC^2$

$\Rightarrow BC \times DC = (21)^2$ = area of rectangle with sides *BC* & *DC*

Now, Area of equilateral triangle = area of rectangle

$\Rightarrow \frac{\sqrt{3}}{4}(\text{side})^2 = (21)^2 \Rightarrow \text{Side} = 14 \times 3^{3/4}$

38. **(a)** Since -3 is the zero of $(k-1)x^2 + kx + 1$,

$\therefore \quad (k-1)(-3)^2 + k(-3) + 1 = 0$

$\Rightarrow \quad 9k - 9 - 3k + 1 = 0 \Rightarrow 6k - 8 = 0 \Rightarrow k = \frac{4}{3}$

39. **(d)** $(\sec A + \tan A)(1 - \sin A)$

$= \left(\frac{1}{\cos A} + \frac{\sin A}{\cos A}\right) \times (1 - \sin A)$

$= \frac{(1+\sin A)(1-\sin A)}{\cos A}$

$= \frac{1-\sin^2 A}{\cos A} = \frac{\cos^2 A}{\cos A} \quad (\because \cos^2 A = 1 - \sin^2 A)$

$= \cos A.$

40. **(a)** $x = \frac{1}{10} \Rightarrow a = 10$ and $y = \frac{1}{5} \Rightarrow b = 5$

41. **(c)** (0, 0)

42. **(a)** (4, 6)

43. **(a)** (6, 5)

44. **(a)** (16, 0)

45. **(b)** (–12, 6)

46. **(a)** **47.** **(b)** **48.** **(c)**

49. **(b)** **50.** **(a)**