Sample Paper 3

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

SOLUTIONS

1. **(b)** Here, $x - y = 3$ ...(i)

and $xy = 54$

$\therefore \quad (x+y)^2 = (x-y)^2 + 4xy$

$= (3)^2 + 4(54) = 225$

$\Rightarrow (x+y) = \sqrt{225} = \pm 15$ ...(ii)

Case I :

If $x + y = 15$ and $x - y = 3$

On adding the above two equations

$2x = 18 \Rightarrow x = 9$

$\therefore x + y = 15 \Rightarrow 9 + y = 15 \Rightarrow y = 6$

Case II

If $x + y = -15$ and $x - y = 3$

On adding the above two equations

$2x = -12$

$x = -6$

$\therefore \quad x + y = -15 \Rightarrow -6 + y = -15$

$\Rightarrow \quad y = -15 + 6 \Rightarrow y = -9$

2. **(b)** $\frac{16}{9} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2$

$\Rightarrow \frac{16}{9} = \left(\frac{AB}{18}\right)^2$ and $\frac{16}{9} = \left(\frac{12}{QR}\right)^2$

$\Rightarrow \frac{4}{3} = \frac{AB}{18}$ and $\frac{4}{3} = \frac{12}{QR}$

$\Rightarrow$ AB = 24 cm QR = 9 cm

3. **(b)** $\frac{1}{\sec\theta} = \cos\theta$ and maximum value of $\cos\theta$ is 1

$\Rightarrow$ Maximum value of $\frac{1}{\sec\theta}$ is 1

4. **(a)** $\alpha, \frac{1}{\alpha}$ are the roots of $k^2x^2 - 17x + (k+2)$

$\alpha \times \frac{1}{\alpha} = \frac{k+2}{k^2}$

$\Rightarrow k^2 = k + 2 \Rightarrow k^2 - k - 2 = 0$

$\Rightarrow k = 2$ and $k = -1$

But $k > 0 \therefore k = 2$

5. **(a)** Quadratic polynomial $p(x) = k(x+1)^2$

$p(-2) = k(-2+1)2 = 2$

$k = 2$

$p(x) = 2(x+1)^2$

$p(2) = 2(2+1)^2 = 2 \times 3 \times 3 = 18$

6. **(c)** P(raining on both day) = 0.2 × 0.3 = 0.06

(Because both independent event)

7. **(a)** Statement given in option (a) is false.

8. **(b)** $2\pi r_1 = 503$ and $2\pi r_2 = 437$

$\therefore \quad r_1 = \frac{503}{2\pi}$ and $r_2 = \frac{437}{2\pi}$

Area of ring = $\pi(r_1 + r_2)(r_1 - r_2)$

$= \pi\left(\frac{503+437}{2\pi}\right)\left(\frac{503-437}{2\pi}\right)$

$= \frac{940}{2}\left(\frac{66}{2\pi}\right) = 235\times\frac{66}{22}\times 7 = 235\times 21 = 4935$ sq. cm.

9. **(d)**

10. **(d)** L.C.M × H.C.F = First number × second number

Hence, required number = $\frac{36\times 2}{18} = 4$.

11. **(b)**

12. **(a)**

13. **(d)** Sum is 888 ⇒ unit's digit should add up to 8. This is possible only for option (d) as "3" + "5" = "8".

14. **(d)** Let the fraction be $\frac{x}{y}$

According to given conditions,

$\frac{x+1}{y+1} = 4$ ... (i)

and $\frac{x-1}{y-1} = 7$ ... (ii)

Solving (i) and (ii), we have $x = 15$, $y = 3$

i.e. numbers = 15

15. **(a)** Let the radii of the two circles be r_1 and r_2, then

$r_1 + r_2 = 15$ (given) ..... (i)

and $\pi r_1^2 + \pi r_2^2 = 153\pi$ (given)

⇒ $r_1^2 + r_2^2 = 153$ ..... (ii)

On solving, we get

$r_1 = 12$, $r_2 = 3$

Required ratio = 12 : 3 = 4 : 1

16. **(b)** $x^2 - (m+3)x + mx - m(m+3) = 0$

⇒ $x[x-(m+3)] + m[x-(m+3)] = 0$

⇒ $(x+m)[x-(m+3)] = 0$

∴ $x + m = 0$ | $x - (m+3) = 0$

$x = -m$ | $x = m + 3$

17. **(c)** We have, sum of zeroes

$= a + b = -\frac{(-4)}{2} = 2$

Product of zeroes = $ab = \frac{3}{2}$

$\therefore a^2b + ab^2 = ab(a+b) = \frac{3}{2}\times 2 = 3$

18. **(c)** Since, $DE \parallel BC$ ∴ ΔADE ~ ΔABC

$\therefore \frac{AD}{DB} = \frac{AE}{EC} \Rightarrow \frac{1.5}{3} = \frac{1}{EC} \Rightarrow EC = 2$ cm

19. **(c)** Let the ages of father and son be $7x$, $3x$

After 10 years,

∴ $(7x + 10) : (3x + 10) = 2 : 1$ or $x = 10$

∴ Age of the father is $7x$ i.e. 70 years.

20. **(b)** 24 out of the 90 two digit numbers are divisible by '3' and not by '5'.

The required probability is therefore, $\frac{24}{90} = \frac{4}{15}$.

21. **(d)** Let $x^2 = u$, $y^2 = v$

⇒ $2u + 3v = 35$ and $\frac{u}{2} + \frac{v}{3} = 5$

⇒ $2u + 3v = 35$ ...(i)

⇒ $3u + 2v = 30$ ...(ii)

Multiply (i) by 3 and (ii) by 2 and subtracting (ii) from (i), we have

$6u + 9v - 6u + 4v = 60$

⇒ $6u - 6u + 9v - 4v = 105 - 60$

⇒ $5v = 45 \Rightarrow v = 9$

substituting v = 9 in (1), we get $2u + 27 = 35$

⇒ $2u = 8 \Rightarrow u = 4 \Rightarrow x^2 = 4, y^2 = 9$

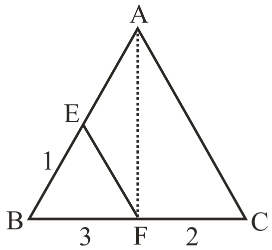
∴ $x = \pm 2, y = \pm 3$ is the required solution.

22. **(d)** Let Area of ΔBEF = x

∴ Area of ΔAFE = 3x

Let Area of ΔABF = 3y

∴ Area of ΔCAF = 2y



Area ΔABF = Area ΔBEF + Area ΔAEF

3y = x + 3x

3y = 4x

$\frac{3}{4} = \frac{x}{y}$

Area of ΔABC = Area of ΔABF + Area of ΔCAF

= 3y + 2y = 5y

$\frac{\text{Area }\Delta BEF}{\text{Area }\Delta ABC} = \frac{x}{5y} = \frac{1}{5}\times\frac{3}{4} = \frac{3}{20}$

23. **(b)** sin θ + 2 cos θ = 1 ⇒ (sin θ + 2 cos θ)2 = 1

⇒ $\sin^2\theta + 4\cos^2\theta + 4\sin\theta\cos\theta = 1$

⇒ $1 - \cos^2\theta + 4$

$(1 - \sin^2\theta + 4\sin\theta\cos\theta = 1$

$\Rightarrow$ $4\sin^2\theta + \cos^2\theta - 4\sin\theta\cos\theta = 4$
$\Rightarrow$ $(2\sin\theta - \cos\theta)^2 = 4$
$\Rightarrow$ $2\sin\theta - \cos\theta = 2$
[$\because$ $2\sin\theta - \cos\theta \neq -2$]

24. **(b)** $\alpha + \beta = 5$ ...(i)
$\alpha\beta = k$ ...(ii)
$\alpha - \beta = 1$ ...(iii)
Solving (i) and (iii), we get $\alpha = 3$ and $\beta = 2$.
Putting the value of α and β in (ii), we get

25. **(b)** $x + y = 1$ & $x^3 + y^3 + 3xy$
$= (x + y)^3 - 3xy(x + y) + 3xy = 1$

26. **(c)** We have, $p(x) = x^2 - 10x - 75 = x^2 - 15x + 5x - 75$

$= x(x - 15) + 5(x - 15) = (x - 15)(x + 5)$

$\therefore$ $p(x) = (x - 15)(x + 5)$

So, $p(x) = 0$ when $x = 15$ or $x = -5$. Therefore required zeroes are 15 and –5.

27. **(d)** Let $\operatorname{cosec} x - \cot x = \frac{1}{3}$

$$\Rightarrow \frac{1}{\sin x} - \frac{\cos x}{\sin x} = \frac{1}{3}$$

$$\Rightarrow \frac{1 - \cos x}{\sin x} = \frac{1}{3} \Rightarrow \frac{2\sin^2\frac{x}{2}}{2\sin\frac{x}{2}\cos\frac{x}{2}} = \frac{1}{3}$$

$$\Rightarrow \tan\frac{x}{2} = \frac{1}{3}$$

Consider

$$\tan x = \frac{2\tan\frac{x}{2}}{1 - \tan^2\frac{x}{2}} = \frac{\frac{2}{3}}{1 - \frac{1}{9}} = \frac{3}{4}$$

Thus $\sin x = \frac{3}{5}, \cos x = \frac{4}{5}$

$$\therefore \cos^2 x - \sin^2 x = \frac{16}{25} - \frac{9}{25} = \frac{7}{25}$$

28. **(b)** The point satisfy the line $4y = x + 1$

29. **(b)** Let salary of Y be $= A$ and of X is $= \frac{A}{2}$

$\therefore$ Total salary of X and $Y = \frac{3A}{2}$ ... (i)

Let X' and Y' be the new salary after increment, then we get

$$X' = \frac{3A}{4} \text{ and } Y' = \frac{5A}{4} \Rightarrow X' + Y' = 2A \text{ ... (ii)}$$

$$\therefore \text{Required percentage increase} = \frac{\left(\frac{2A - 3A}{2}\right) \times 100}{\frac{3A}{2}}$$

[from (i) & (ii) eqns.]

$$= \frac{1}{3} \times 100 \Rightarrow 33\frac{1}{3}\%$$

30. **(a)** Perimeter of sector = 25 cm

$$\Rightarrow 2r + \frac{\theta}{360°} \times 2\pi r = 25$$

$$\Rightarrow 2r + \frac{90°}{360°} \times 2 \times \frac{22}{7} \times r = 25$$

$$\Rightarrow 2r + \frac{11}{7} r = 25 \Rightarrow \frac{25}{7} r = 25 \Rightarrow r = 7$$

$$\text{Area of minor segment} = \left(\frac{\pi\theta}{360°} - \frac{\sin\theta}{2}\right) r^2$$

$$= \left(\frac{22}{7} \times \frac{90°}{360°} - \frac{\sin 90°}{2}\right)(7)^2$$

$$= \left(\frac{11}{14} - \frac{1}{2}\right) \times 49 = \frac{4}{14} \times 49 = 14 \text{ cm}^2.$$

31. **(d)** $\because \frac{\text{Perimeter of } \Delta ABC}{\text{Perimeter of } \Delta PQR} = \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$

32. **(a)** The number divisible by 15, 25 and 35 = L.C.M. (15, 25, 35) = 525

Since, the number is short by 10 for complete division by 15, 25 and 35.

Hence, the required least number = 525 – 10 = 515.

33. **(b)** [**Hint.** One digit prime numbers are 2, 3, 5, 7. Out of these numbers, only the number 2 is even.]

34. **(d)** Work ratio of $A : B = 100 : 160$ or $5 : 8$

$\therefore$ time ratio = 8 : 5 or 24 : 15

If A takes 24 days, B takes 15 days. Hence, B takes 30 days to do double the work.

35. **(d)** Out of n and $n + 2$, one is divisible by 2 and the other by 4, hence $n(n + 2)$ is divisible by 8. Also n, $n + 1$, $n + 2$ are three consecutive numbers, hence one of them is divisible by 3. Hence, $n(n + 1)(n + 2)$ must be divisible by 24. This will be true for any even number n.

36. **(d)** The L.C.M. of 16, 20 and 24 is 240. The least multiple of 240 that is a perfect square is 3600 and also we can easily eliminate choices (a) and (c) since they are not perfect number. Hence, the required least number which is also a perfect square is 3600 which is divisible by each of 16, 20 and 24.

37. **(a)** Since, $\Delta ABC \sim \Delta PQR$

$$\therefore \frac{\text{ar}(\Delta PQR)}{\text{ar}(\Delta ABC)} = \frac{PR^2}{AC^2} = \frac{QR^2}{BC^2} = \frac{9}{1} \left[\because \frac{QR}{BC} = \frac{3}{1}\right] = 9$$

38. **(b)** Area of rectangle = 28 × 23 = 644 cm^2

Radius of semi-circle = 28 ÷ 2 = 14 cm

Radius of quadrant = 23 – 16 = 7 cm

Area of unshaded region

$$= \left(\frac{1}{2} \times \frac{22}{7} \times 14 \times 14\right) + \left(2 \times \frac{1}{4} \times \frac{22}{7} \times 7 \times 7\right) = 385 \text{ cm}^2$$

$\therefore$ Shaded area = (644 – 385) = 259 cm^2

39. **(d)** $\frac{1}{5} = \frac{2}{k} \neq \frac{-3}{7}$ $\left[\because \text{For inconsistent } \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}\right]$

$\Rightarrow \quad k = 10$

40. **(a)** Required probability $= \frac{4}{6} = \frac{2}{3}$.

41. **(c)** For getting least number of books, taking LCM of 64, 72

$$\begin{array}{r|l} 8 & 64, 72 \\ \hline & 8,\ 9 \end{array}$$

$\Rightarrow$ 8 × 8 × 9 = 576

42. **(d)**

43. **(a)** 72 is expressed as prime
$72 = 2 \times 2 \times 2 \times 3 \times 3 = 2^3 \times 3^2$

44. **(b)** 5 × 13 × 17 × 19 + 19
$\Rightarrow$ 19 × (5 × 13 × 17 + 1)
so given no. is a composite number.

45. **(b)**

46. **(d)** parabola

47. **(a)** 2

48. **(b)** –1, 3

49. **(c)** $x^2 - 2x - 3$

50. **(d)** 0