Sample Paper 9

ANSWERKEY

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

SOLUTIONS

1. **(b)** Principal of similarity of figures.

2. **(b)** Let the quadratic polynomial be
   $ax^2 + bx + c$, and its zeroes be a and b.

   We have $\alpha + \beta = -3 = \dfrac{-b}{a}$ and $\alpha\beta = 2 = \dfrac{c}{a}$

3. **(b)** Area of rectangle = 28 cm × 23 cm = 644 cm^2
   Radius of semicircle = 28 cm ÷ 2 = 14 cm
   Radius of quadrant = 23 cm – 16 cm = 7 cm
   Area of unshaded region

   $= \left(\dfrac{1}{2} \times \dfrac{22}{7} \times 14\text{cm} \times 14\text{cm} \right)$

   $\qquad\qquad + \left(2 \times \dfrac{1}{4} \times \dfrac{22}{7} \times 7\text{cm} \times 7\text{cm} \right)$

   = 385 cm^2
   Shaded area = 644 cm^2 – 385 cm^2
   = 259 cm^2
   If a = 1, then b = 3 and c = 2.
   So, one quadratic polynomial which fits the given conditions is $x^2 + 3x + 2$.

4. **(b)** Let the lady has x coins of 25 p and y coins of 50 p.
   Then, according to problem
   x + y = 40 ....(i)
   25 x + 50 y = 1250 ....(ii)
   Solving for x & y we get
   x = 30 (25 p coins) & y = 10 (50 p coins)

5. **(d)** Let A(a, a), B(–a, –a) and $\left(-\sqrt{3}a, \sqrt{3}a\right)$ be the given points. Then, we have

   $AB = \sqrt{\left(-a-a\right)^2 + \left(-a-a\right)^2}$

   $= \sqrt{4a^2 + 4a^2} = 2\sqrt{2}a$

   $BC = \sqrt{\left(-\sqrt{3}a + a\right)^2 + \left(\sqrt{3}a + 1\right)^2}$

   $\Rightarrow \quad BC = \sqrt{a^2\left(1 - \sqrt{3}\right)^2 + a^2\left(\sqrt{3} + 1\right)^2}$

   $\Rightarrow \quad BC = a\sqrt{\left(1 - \sqrt{3}\right)^2 + \left(1 + \sqrt{3}\right)^2}$

   $\Rightarrow \quad BC = a\sqrt{1 + 3 - 2\sqrt{3} + 1 + 3 + 2\sqrt{3}}$

   $\Rightarrow \quad BC = a\sqrt{8} = 2\sqrt{2}a$

   and $\quad AC = \sqrt{\left(-\sqrt{3}a - a\right)^2 + \left(\sqrt{3}a - a\right)^2}$

   $\Rightarrow \quad AC = \sqrt{a^2\left(\sqrt{3} + 1\right)^2 + a^2\left(\sqrt{3} - 1\right)^2}$

   $\Rightarrow \quad AC = a\sqrt{\left(\sqrt{3} + 1\right)^2 + \left(\sqrt{3} - 1\right)^2}$
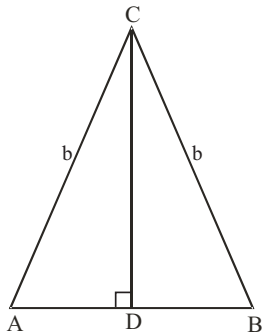
   $\Rightarrow \quad AC = a\sqrt{3 + 1 + 2\sqrt{3} + 3 + 1 - 2\sqrt{3}}$

   $\qquad = a\sqrt{8} = 2\sqrt{2}a$

   Clearly, we have AB = BC = AC
   Hence, the triangle ABC formed by the given points is an equilateral triangle.

6. **(a)** one

7. **(b)** $\dfrac{1}{\sec\theta} = \cos\theta$ and maximum value of cos θ is 1

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

8. **(c)** Let ABC be an isosceles triangle, where base AB = a and equal sides AC = BC = b. Let CD be the perpendicular on AB.

So, $AD = DB = \dfrac{1}{2}AB = \dfrac{a}{2}$

Altitude, CD = height of the
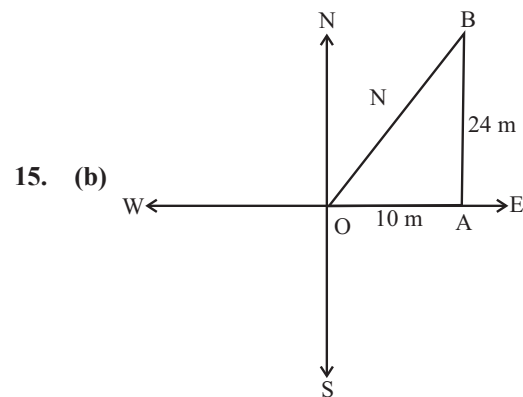ΔABC is given by

$h = \sqrt{AC^2 - AD^2}$

$\Rightarrow h = \dfrac{1}{2}\sqrt{4b^2 - a^2}$

Area of the $\Delta ABC = \dfrac{1}{2}$ base $\times$ altitude

$= \dfrac{1}{2} \times a \times \dfrac{1}{2}\sqrt{4b^2 - a^2} = \dfrac{a}{4}\sqrt{4b^2 - a^2}$.

9. **(c)** We have, $p(x) = x^2 - 10x - 75$
$= x^2 - 15x + 5x - 75$
$= x(x - 15) + 5(x - 15) = (x - 15)(x + 5)$
$\therefore \quad p(x) = (x - 15)(x + 5)$
So, $p(x) = 0$ when $x = 15$ or $x = -5$. Therefore required zeroes are 15 and -5.

10. **(b)** $A(-4, 0)$, $B(4, 0)$, $C(0, 3)$

$AB = \sqrt{(4+4)^2 + (0-0)^2} = \sqrt{(8)^2} = 8$

$BC = \sqrt{(0-4)^2 + (3-0)^2}$
$= \sqrt{16 + 9} = \sqrt{25} = 5$

$CA = \sqrt{(-4-0)^2 + (0-3)^2} = \sqrt{16+9} = \sqrt{25} = 5$

$BC = CA \Rightarrow DABC$ is isosceles.

11. **(a)** The circle is divided into 18 equal sectors

Central angle in each sector $= \dfrac{360°}{18} = 20°$

Area of each sector $= \dfrac{\theta}{360°} \times \pi r^2$

$= \dfrac{20°}{360°} \times 3.14 \times 4 \times 4 = 2.79$

Area of shaded portion $= 9 \times 2.79 = 25.12$

12. **(a)** Product

13. **(b)** $n(S) = 6 \times 6 = 36$, $E = \{(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)\}$
$n(E) = 6$

$P(E) = \dfrac{n(E)}{n(S)} = \dfrac{6}{36} = \dfrac{1}{6}$

14. **(b)** $AB = \sqrt{(9-9)^2 + (6-0)^2} = 6$

$BC = \sqrt{(-9-9)^2 + (6-6)^2} = 18$

$CD = \sqrt{(-9+9)^2 + (0-6)^2} = 6$

$DA = \sqrt{(9+9)^2 + (0-0)^2} = 18$

$AC = \sqrt{(-9-9)^2 + (6-0)^2} = \sqrt{324+36}$
$= \sqrt{360} = 6\sqrt{10}$

$BC = \sqrt{(-9-9)^2 + (0-6)^2} = \sqrt{324+36}$
$= \sqrt{360} = 6\sqrt{10}$

15. **(b)**

Let the initial position of the man be at O and his final position be B, since the man goes to 10 m due east and then 24 m due north.
Therefore ΔAOB is a right angled triangle at angle A.
$\therefore \Delta AOB$
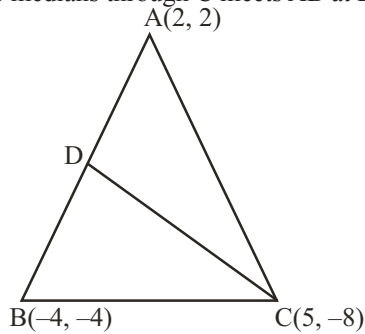$OB^2 = OA^2 + AB^2 = (10)^2 + (24)^2$
$= 100 + 576$
$OB = \sqrt{676}$

$\boxed{OB = 26m}$

Hence, the man is at a distance of 26 m from the starting point.

16. **(b)** Let length and breadth be x cm and y cm respectively.
According to problem,
$2(x + y) = 40$ .... (i)
and $\dfrac{y}{x} = \dfrac{2}{3}$ .... (ii)
on solving, x = 12, y = 8
$\therefore$ Length = 12 cm and breadth = 8cm.

17. **(c)** $\tan A = \dfrac{3}{4} = \dfrac{P}{b}$

$h = \sqrt{P^2 + b^2} = \sqrt{9+16}$

$\sin A = \dfrac{P}{h} = \dfrac{3}{5}$

18. **(c)** $\dfrac{3}{5} = 0.6$ where as other numbers have non-terminating decimals.

19. **(c)** Let the medians through C meets AB at D.

Coordinates of D are

$$\left(\frac{-4+2}{2}, \frac{-4+2}{2}\right) = (-1,-1)$$

Length of CD = $\sqrt{36+49} = \sqrt{85}$.

$$= \sqrt{(5+1)^2 + (-8+1)^2}$$

20. **(a)** Let the number of blue balls = x

∴ Total number of balls = 5 + x

P (blue ball) = $\dfrac{x}{5+x}$

P (red ball) = $\dfrac{5}{5+x}$

Given that P (blue) = 2 • P (red)

$$\frac{x}{5+x} = 2 \times \frac{5}{5+x}$$

$$\frac{x}{5+x} = \frac{10}{5+x}$$

21. **(c)** Total number of outcomes are {HH, HT, TH, TT}. The outcomes favourable to the event 'atmost one head' are HT, TH and TT.

$$\therefore \ P(E) = \frac{n(E)}{n(s)} = \frac{3}{4}$$

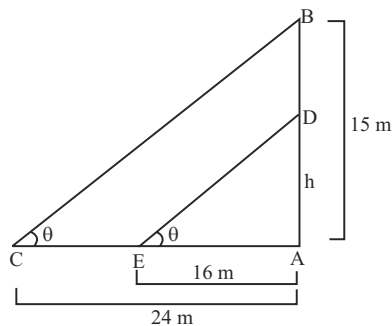**22.** **(c)** $\dfrac{a_1}{a_2} \ne \dfrac{b_1}{b_2} \Rightarrow \dfrac{3}{2m-5} \ne \dfrac{-2}{7}$

or $-4m + 10 \ne 21$

or $-4m \ne 11$

or $m \ne -\dfrac{11}{4}$

23. **(d)** Let *h* metres be the height of the telephone pole. Since time is the same in both the cases.
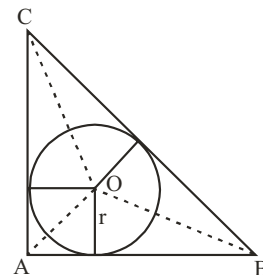

∴ ∠BCA = ∠DEA = q

Clearly, ΔABC and ΔADE are similar

∴ $\dfrac{AC}{AE} = \dfrac{AB}{AD}$

$\Rightarrow \dfrac{24}{16} = \dfrac{15}{h} \Rightarrow h = \dfrac{15 \times 16}{24} = \dfrac{240}{24} = 10$

Hence, height of the telephone pole = 10 cm.

24. **(a)** Polynomial $p(x)$ has four real zeros.

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

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

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

⇒ $4 \sin^2 θ + \cos^2 θ - 4 \sin θ \cos θ = 4$

⇒ $(2 \sin θ - \cos θ)^2 = 4$

⇒ $2 \sin θ - \cos θ = 2$

[∵ 2 sin θ – cos θ ≠ –2]

26. **(b)** The system of simultaneous equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, have exactly one (unique) solution if $\dfrac{a_1}{a_2} \ne \dfrac{b_1}{b_2}$.

27. **(d)** The L.C.M. of 16, 20 and 24 is 240.

The least multiple of 240 but it is not a perfect square. Similarly 2400 is also ruled out because it is also not a perfect square. 1600 is divided by 16 and 20 but not by 24. Therefore 3600 is least number which is a perfect square and divisible by 16, 20, 24.

28. **(b)** The centre of the circle is the midpoint of the diameter.

So coordinates of centre = midpoint of AB

$$= \left(\frac{-2+4}{2}, \frac{3-5}{2}\right) = \left(\frac{2}{2}, \frac{-2}{2}\right) = (1, -1)$$

29. **(b)** Since, the graph of y = f(x) is a parabola, therefore f(x) is quadratic.

30. **(d)** $1 + \sin^2 θ = 3 \sin θ \cos θ$

[∵ $1 = \cos^2 θ + \sin^2 θ$]

⇒ $\cos^2 θ + 2 \sin^2 θ = 3 \sin θ \cos θ$

⇒ $\cos^2 θ - 3 \sin θ \cos θ + 2 \sin^2 θ = 0$

⇒ $\cos θ - \sin q) (\cos θ - 2 \sin θ) = 0$

⇒ $\cos θ - \sin θ = 0$ or $\cos θ - 2 \sin θ = 0$

⇒ $\sin θ = \cos θ$ or $2 \sin θ = \cos θ$

⇒ $\dfrac{\sin θ}{\cos θ} = 1$ or $2 \dfrac{\sin θ}{\cos θ} = 1$

⇒ $\tan θ = 1$ or $2 \tan θ = 1$

Thus, $\tan θ = 1$ or $\tan θ = \dfrac{1}{2}$.

31. **(d)** By Pythagoras theorem in ΔBAC, we have

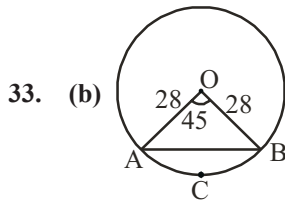$BC^2 = AB^2 + AC^2 = 6^2 + 8^2 = 100 \Rightarrow BC = 10$ CM

Now,

Area of $\triangle ABC$ = Area of $\triangle OAB$ + Area of

$\triangle OBC$ + Area of $\triangle OCA$

$\Rightarrow \dfrac{1}{2}AB \times AC = \dfrac{1}{2}AB \times r + \dfrac{1}{2}BC \times r + \dfrac{1}{2}CA \times r$

$\Rightarrow \dfrac{1}{2} \times 6 \times 8 = \dfrac{1}{2}(6 \times r) + (10 \times r) + \dfrac{1}{2}(8 \times r)$

$\Rightarrow 48 = 24\,r \Rightarrow r = 2$ cm

32. (c) $(-1)^n + (-1)^{4n} = 0$ will be possible, when n is any odd natural number i.e.,

33. (b)

Area of sector OACB

$= \dfrac{45}{360} \times \dfrac{22}{7} \times 28 \times 28 = 308$ cm^{27}

Area $(\triangle AOB) = \dfrac{1}{2}(28)(28)\sin 45°$

$= 14 \times 28 \times = 277.19$

Area (minor segment) $= 308 - 277.19$

$= 30.81$

34. (b) Let the required ratio be K : 1

$\therefore$ The co–ordinates of the required point on the y–axis is

$x = \dfrac{K(-4) + 3(1)}{K + 1}$; $y = \dfrac{K(2) + 5(1)}{K + 1}$

Since, it lies on y – axis

$\therefore$ Its x–cordinates = 0

$\therefore \dfrac{-4K + 3}{K + 1} = 0 \Rightarrow -4K + 3 = 0$

$\Rightarrow K = \dfrac{3}{4}$

$\Rightarrow$ Required ratio $= \dfrac{3}{4} : 1$

$\therefore$ ratio = 3 : 4

35. (b) Consistent system

36. (a) $\dfrac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1}$

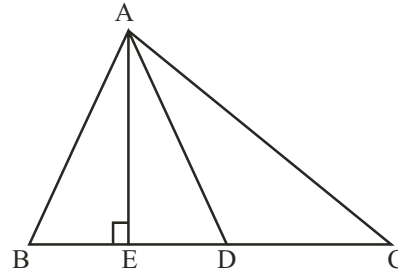$= \dfrac{(\tan\theta + \sec\theta) - (\sec^2\theta - \tan^2\theta)}{\tan\theta - \sec\theta + 1}$

$= \dfrac{(\tan\theta + \sec\theta)[1 - (\sec\theta - \tan\theta)]}{\tan\theta - \sec\theta + 1}$

$= \dfrac{(\tan\theta + \sec\theta)(1 - \sec\theta + \tan\theta)}{(1 + \tan\theta - \sec\theta)}$

$= \tan\theta + \sec\theta$

$= \dfrac{1 + \sin\theta}{\cos\theta}$

37. (b) –2, 1, 3

38. (b)

In $\triangle AEB$, $\angle AEB = 90°$

$\therefore \quad AB^2 = AE^2 + BE^2$ ....(i)

In $\triangle AED$, $\angle AED = 90°$

$\therefore \quad AD^2 = AE^2 + DE^2$

$\Rightarrow \quad AE^2 = (AD^2 - DE^2)$

$\therefore \quad AB^2 = (AD^2 - DE^2) + BE^2$

$= (AD^2 - DE^2) + (BD - DE^2)$

$= (AD^2 - DE^2) + \left(\dfrac{1}{2}BC - DE\right)^2$

$= AD^2 + \dfrac{1}{4}BC^2 - BC \times DE$

39. (a) The numbers common to given numbers are 2^2, 5 and 7^2.

$\therefore$ H.C.F. $= 2^2 \times 5 \times 7^2 = 980$.

40. (a) Perimeter of sector = 25 cm

$2r + \dfrac{\theta}{360} \times 2r = 25$

$\Rightarrow 2r + \dfrac{90}{360} \times 2 \times \dfrac{25}{7} \times r = 25$

$\Rightarrow \dfrac{11}{7}\,2r + r = 25 \Rightarrow \dfrac{22}{7}r = 25 \Rightarrow r = 7$

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

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

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

41.	**(b)**	**42.**	**(a)**	**43.**	**(c)**	
44.	**(a)**	**45.**	**(b)**	**46.**	**(d)**	
47.	**(c)**	**48.**	**(d)**	**49.**	**(a)**	
50.	**(b)**					