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	(a)	47	(c)	48	(b)	49	(b)	50	(a)

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 $\alpha+\beta=-3=\frac{-b}{a}$ and $\alpha\beta=2=\frac{c}{a}$

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

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

   = 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

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

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

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

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

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

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

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

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

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

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

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

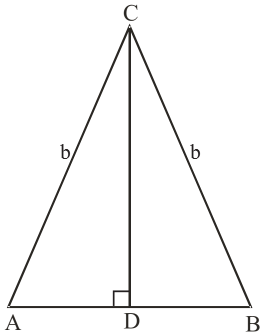
   $$=a\sqrt{8}=2\sqrt{2}a$$

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

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

   $\Rightarrow$ Maximum value of $\frac{1}{\sec\theta}$ 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, $AD = DB = \frac{1}{2}AB = \frac{a}{2}$

Altitude, CD = height of the ΔABC is given by

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

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

Area of the $\Delta ABC = \frac{1}{2}$ base × altitude

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

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 ⇒ DABC is isosceles.

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

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

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

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

Area of shaded portion = 9 × 2.79 = 25.12

12. **(a)** Product

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

n(E) = 6

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

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

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

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

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

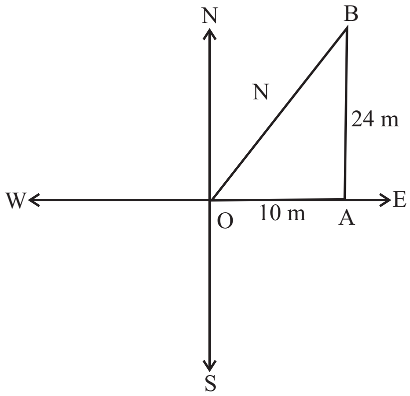
$AC = \sqrt{(-9-9)^2 + (6-0)^2} = \sqrt{324+36}$

$= \sqrt{360} = 6\sqrt{10}$

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

$= \sqrt{360} = 6\sqrt{10}$

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.

∴ ΔAOB

$OB^2 = OA^2 + AB^2 = (10)^2 + (24)^2$

$= 100 + 576$

$OB = \sqrt{676}$

$\boxed{OB = 26m}$

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 $\frac{y}{x} = \frac{2}{3}$ .... (ii)

on solving, x = 12, y = 8

∴ Length = 12 cm and breadth = 8cm.

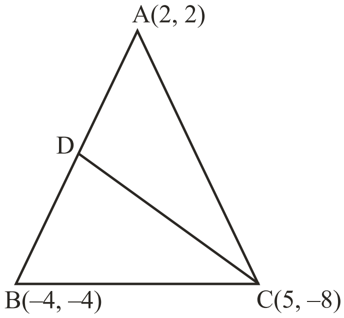
17. **(c)** $\tan A = \frac{3}{4} = \frac{P}{b}$

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

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

18. **(c)** $\frac{3}{5} = 0.6$ 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) = $\frac{x}{5+x}$

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

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.

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

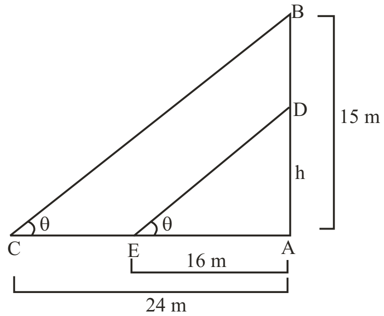
22. **(c)** $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{3}{2m-5} \neq \frac{-2}{7}$

or $-4m + 10 \neq 21$

or $-4m \neq 11$

or $m \neq -\frac{11}{4}$

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

∴ $\frac{AC}{AE} = \frac{AB}{AD}$

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

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

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

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

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

⇒ $(2\sin\theta - \cos\theta)^2 = 4$

⇒ $2\sin\theta - \cos\theta = 2$

[∵ 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 $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$.

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)** $1 + \sin^2\theta = 3\sin\theta\cos\theta$

[∵ $1 = \cos^2\theta + \sin^2\theta$]

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

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

⇒ (cos θ – sin q) (cos θ – 2 sin θ) = 0

⇒ cos θ – sin θ = 0 or cos θ – 2 sin θ = 0

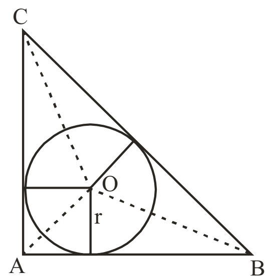
⇒ sin θ = cos θ or 2 sin θ = cos θ

⇒ $\frac{\sin\theta}{\cos\theta} = 1$ or $2\frac{\sin\theta}{\cos\theta} = 1$

⇒ tan θ = 1 or 2 tan θ = 1

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

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



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

Now,

Area of ΔABC = Area of ΔOAB + Area of ΔOBC + Area of ΔOCA

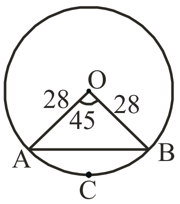
$\Rightarrow \frac{1}{2} AB \times AC = \frac{1}{2} AB \times r + \frac{1}{2} BC \times r + \frac{1}{2} CA \times r$

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

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

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

Area $(\Delta AOB) = \frac{1}{2}(28)(28) \sin 45°$

$= 14 \times 28 \times = 277.19$

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

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

Since, it lies on y – axis

$\therefore$ Its x–cordinates = 0

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

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

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

$\therefore$ ratio = 3 : 4

35. **(b)** Consistent system

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

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

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

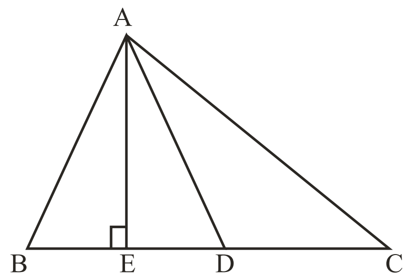
$= \frac{(\tan\theta + \sec\theta)(1 - \sec\theta + \tan\theta)}{(1 + \tan\theta - \sec\theta)}$

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

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

37. **(b)** –2, 1, 3

38. **(b)**



In ΔAEB, $\angle AEB = 90°$

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

In ΔAED, $\angle AED = 90°$

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

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

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

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

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

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

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

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

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

$\Rightarrow \frac{11}{7}\; 2r + \; r = 25 \Rightarrow \frac{22}{7} r = 25 \Rightarrow r = 7$

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

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

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

41. **(b)** **42.** **(a)** **43.** **(c)**

44. **(a)** **45.** **(b)**

46. **(a)** As three faces are marked with number '2', so number of favourable cases = 3.

$\therefore$ Required probability, $P(2) = \frac{3}{6} = \frac{1}{2}$

47. **(c)** No. of favourable cases = No. of events of getting the number 1 + no. of events of getting the number 3 = 2 + 1 = 3

$\therefore$ Required probability, P(1 or 3) $= \frac{3}{6} = \frac{1}{2}$

48. **(b)** Only 1 face is marked with 3, so there are 5 faces which are not marked with 3.

$\therefore$ Required probability, P (not 3) $= \frac{5}{6}$

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