Sample Paper 7

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

SOLUTIONS

1. **(b)**
2. **(c)**

(a) $x^2 + \frac{1}{x} = x^2 + x^{-1}$ is not a polynomial since the exponent of variable in 2nd term is negative

(b) $2x^2 - 3\sqrt{x} + 1 = 2x^2 - 3x^{\frac{1}{2}} + 1$ is not a polynomial, since the exponent of variable in 2nd term is a rational number.

(c) $x^3 - 3x + 1$ is a polynomial.

(d) $2x^{\frac{3}{2}} - 5x$ is also not a polynomial, since the exponents of variable in 1st term is a rational number

Hence, (a), (b) and (d) is not a polynomial.

3. **(a)** In ΔABC, we have DE || BC

$\therefore \quad \frac{AD}{DB} = \frac{AE}{EC}$ [By Thale's Theorem]

$\Rightarrow \quad \frac{x}{x-2} = \frac{x+2}{x-1}$

$\Rightarrow \quad x(x-1) = (x-2)(x+2)$

$\Rightarrow \quad x^2 - x = x^2 - 4 \Rightarrow x = 4$

4. **(b)** No. of sample space = 6 × 6 = 36

Sum total of 9 = (3, 6), (4, 5), (5, 4), (6, 3)

$\therefore \quad P = \frac{4}{36} = \frac{1}{9}$

5. **(d)**
6. **(c)**
7. **(d)** Given : 13 tan θ = 12 $\Rightarrow \tan\theta = \frac{12}{13}$

Now given expression is, $\frac{2\sin\theta.\cos\theta}{\cos^2\theta - \sin^2\theta}$

Dividing numerator and denominator by $\cos^2\theta$,

$$\frac{\frac{2\sin\theta\cos\theta}{\cos^2\theta}}{\frac{\cos^2\theta}{\cos^2\theta} - \frac{\sin^2\theta}{\cos^2\theta}} = \frac{2\tan\theta}{1-\tan^2\theta} = \frac{2\times\frac{12}{13}}{1-\left(\frac{12}{13}\right)^2}$$

$\left(\tan\theta = \frac{12}{13}\right)$

8. **(b)** $n(S) = [1, 2, 3, ..., 100] = 100$

$\because \quad x + \frac{1}{x} > 2$

$\therefore \quad x^2 + 1 > 2x$

$\Rightarrow \quad x^2 - 2x + 1 > 0$

$\Rightarrow \quad (x-1)^2 > 0$

$x = [2, 3, ... ,100]$

$n(E) = [2, 3, 4, ..., 100] = 99$

$P(E) = \frac{99}{100} = 0.99$

9. **(a)** Let the third side be x cm. Then, by Pythagoras theorem, we have

$p^2 = q^2 + x^2$

$\Rightarrow x^2 = p^2 - q^2 = (p-q)(p+q) = p+q \quad [\because p - q = 1]$

$\Rightarrow x = \sqrt{p+q} = \sqrt{2q+1} \quad [\because p - q = 1 \therefore p = q + 1]$

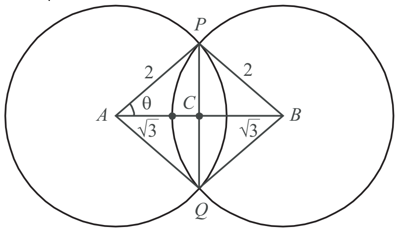
Hence, the length of the third side is $\sqrt{2q+1}$ cm.

10. **(c)** Given,

Two circle each of radius is 2 and difference between their centre is $2\sqrt{3}$

$AB = 2\sqrt{3} \Rightarrow AC = \frac{1}{2}AB$

$AC = \sqrt{3} = CB$



In ΔAPC, $\cos\theta = \frac{AC}{AP} = \frac{\sqrt{3}}{2}$ $(\angle C = 90°)$

$\Rightarrow \quad \theta = 30°$

We know,

Area of common region

= 2 (Area of sector – Area of ΔAPQ)

$= 2\left(\frac{60°}{360°}\times\pi(2)^2 - \frac{1}{2}\times(2)^2\times\sin 60°\right)$

$= 2\left(\frac{4\pi}{6} - \frac{4\sqrt{3}}{4}\right) = 2\left(\frac{2}{3}(3.14) - (1.73)\right)$

= 2 (2.09 – 1.73) = 2 (0.36) = 0.72.

$\therefore$ Area of region lie between 0.7 and 0.75.

11. **(a)**

12. **(b)** (a) is not true [By def.]

(b) holds [$\because$ degree of a zero polynomial is not defined]

(c) is not true [$\because$ degree of a constant polynomial is '0']

(d) is not true

[$\because$ a polynomial of degree n has at most n zeroes].

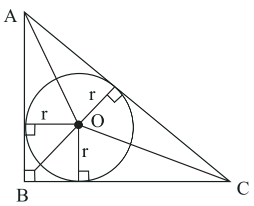
13. **(b)** $\frac{(2+2\sin\theta)\ (1-\sin\theta)}{(1+\cos\theta)\ (2-2\cos\theta)} = \frac{2(1+\sin\theta)\ (1-\sin\theta)}{(1+\cos\theta)\ (2)\ (1-\cos\theta)}$

$= \frac{2(1-\sin^2\theta)}{2(1-\cos^2\theta)} = \frac{2\cos^2\theta}{2\sin^2\theta} = \cot^2\theta = \left(\frac{15}{8}\right)^2 = \frac{225}{64}$

14. **(a)**

15. **(d)** All the statements given in option 'a', 'b' and 'c' are correct.

16. **(a)**



circumference of circle = $2\pi r$ ...(i)

Area of ΔABC = [ar(ΔAOB) + ar(ΔBOC) + ar(ΔAOC)]

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

$= \frac{1}{2}\ r\ [AB + BC + AC] = \frac{1}{2}\ r\times 7\pi$ ...(ii)

From (i) and (ii),

$\frac{\text{Circmference of circle}}{\text{Area of triangle}} = \frac{2\pi r}{\frac{1}{2}r\times 7\pi} = \frac{4}{7}$

17. **(a)** S and T trisect the side QR.

Let $QS = ST = TR = x$ units

Let $PQ = y$ units

In right ΔPQS, $PS^2 = PQ^2 + QS^2$

(By Pythagoras Theorem)

$= y^2 + x^2$ ...(i)

In right ΔPQT, $PT^2 = PQ^2 + QT^2$

(By Pythagoras Theorem)

$= y^2 + (2x)^2 = y^2 + 4x^2$ ...(ii)

In right ΔPQT, $PR^2 = PQ^2 + QR^2$

(By Pythagoras Theorem)

$= y^2 + (3x)^2 = y^2 + 9x^2$ ...(iii)

R.H.S. = $3PR^2 + 5PS^2$

$= 3(y^2 + 9x^2) + 5(y^2 + x^2)$ [From (i) and (iii)]

$= 3y^2 + 27x^2 + 5y^2 + 5x^2 = 8y^2 + 32x^2$

$= 8(y^2 + 4x^2) = 8PT^2$ = L.H.S. [From (ii)]

Thus $8PT^2 = 3PR^2 + 5PS^2$

18. **(a)** Unit digit in (7^{95}) = Unit digit in $[(7^4)^{23}\times 7^3]$

= Unit digit in 7^3 (as unit digit in $7^4 = 1$)

= Unit digit in 343

Unit digit in 3^{58} = Unit digit in $(3^4)^4\times 3^2$

[as unit digit $3^4 = 1$]

= Unit digit is 9

So, unit digit in $(7^{95} - 3^{58})$

= Unit digit in (343 – 9) = Unit digit in 334 = 4

Unit digit in $(7^{95} + 3^{58})$ = Unit digit in (343 + 9)

= Unit digit in 352 = 2

So, the product is 4 × 2 = 8

19. **(d)** In (a) power of x is –1 i.e. negative

$\therefore$ (a) is not true.

In (b) power of $x = \frac{1}{2}$, not an integer.

$\therefore$ (b) is not true

In (c) Here also power of x is not an integer

$\therefore$ (c) is not true

(d) holds [$\because$ all the powers of x are non-negative integers.]

20. **(d)** We have, $\sin 5\theta = \cos 4\theta$

$\Rightarrow \quad 5\theta + 4\theta = 90°$ [$\because \sin\alpha = \cos\beta$, than $\alpha + \beta = 90°$]

$\Rightarrow \quad 9\theta = 90° \Rightarrow \theta = 10°$

Now, $2\sin 3\theta - \sqrt{3}\tan 3\theta$

$= 2\sin 30° - \sqrt{3}\tan 30°$

$= 2\times\frac{1}{2} - \sqrt{3}\times\frac{1}{\sqrt{3}} = 1 - 1 = 0$

21. **(c)** **22.** **(d)**

23. **(c)** In ΔPAC and ΔQBC, We have

$\angle PAC = \angle QBC$ [Each = 90°]

$\angle PCA = \angle QCB$ [Common]

$\therefore \quad \Delta PAC \sim \Delta QBC$

$\therefore \quad \frac{x}{y} = \frac{AC}{BC}$ *i.e.* $\frac{y}{x} = \frac{BC}{AC}$ ...(i)

Similarly $\frac{z}{y} = \frac{AC}{AB}$ *i.e.* $\frac{y}{z} = \frac{AB}{AC}$ ...(ii)

Adding (i) and (ii), we get

$\frac{BC + AB}{AC} = \frac{y}{x} + \frac{y}{z} = y\left(\frac{1}{x} + \frac{1}{z}\right)$

$$\frac{AC}{AC} = y\left(\frac{1}{x}+\frac{1}{z}\right) \Rightarrow 1 = y\left(\frac{1}{x}+\frac{1}{z}\right)$$

$$\Rightarrow \frac{1}{y} = \frac{1}{x}+\frac{1}{z}$$

24. **(c)** On adding both the equations, we get $x = 3$, $y = 1$

25. **(b)** A(2 – 2), B(– 1, x), AB = 5
$\Rightarrow AB^2 = 25$
$\Rightarrow (-1-2)^2 + (x+2)^2 = 25$
$\Rightarrow 9 + x^2 + 4x + 4 = 25$
$\Rightarrow x^2 + 4x - 12 = 0$
$\Rightarrow x^2 + 6x - 2x - 12 = 0$
$\Rightarrow x(x+6) - 2(x+6) = 0$
$\Rightarrow (x-2)(x+6) = 0$
$\Rightarrow x = 2, -6$

26. **(b)** As 1 radian = 1 degree × $\frac{180°}{\pi}$

$\therefore \frac{2\pi}{3}$ radian $= \left(\frac{2\pi}{3}\times\frac{180°}{\pi}\right)$

$\therefore$ Time $= \frac{120}{6} = 20$ min.

27. **(d)** For solution to be infinite, $\frac{-c}{6} = \frac{-1}{2} = \frac{-2}{-3}$ must satisfy.
but $\frac{-1}{2} \neq \frac{2}{3}$, so, infinite solution don't exist, for given equations.

28. **(d)** All the statements given in option (a, b, c) are correct.

29. **(c)** Let the coordinate of other end be B(10, y) Given point is A(2, –3)
AB = 10 $\Rightarrow AB^2 = 100$
$\Rightarrow (10-2)^2 + (y+3)^2 = 100$
$\Rightarrow y^2 + 6y - 27 = 0$
$\Rightarrow (y+9)(y-3) = 0$
$\Rightarrow y = -9, 3$

30. **(b)** The probability of an event can never be negative.

31. **(a)** Given, $\sin A + \sin^2 A = 1$
$\Rightarrow \sin A = 1 - \sin^2 A = \cos^2 A$
Consider, $\cos^2 A + \cos^4 A = \sin A + (\sin A)^2 = 1$

32. **(a)**

33. **(d)** Area of the circle $= \pi\left(\frac{7}{\sqrt{\pi}}\right)^2 = \frac{\pi(49)}{\pi} = 49\text{ cm}^2$.

Now, consider $\frac{154}{\pi} = \frac{154\times 7}{22} = 49\text{ cm}^2$

34. **(b)** Coefficient of all the terms are positive. So, both roots will be negative.

35. **(b)** Let (x, y) be the point which will be collinear with the points (–3, 4) and (2, –5)
$\therefore x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) = 0$
$\Rightarrow x(4+5) - 3(-5-y) + 2(y-4) = 0$
$\Rightarrow 9x + 15 + 3y + 2y - 8 = 0$
$\Rightarrow 9x + 5y = -7$
By plotting the points given in the options we find that (7, –14) satisfies it.

36. **(c)** $\cos\theta = \sqrt{1-\sin^2\theta} = \sqrt{1-\frac{a^2}{b^2}} = \frac{\sqrt{b^2-a^2}}{b}$

37. **(c)**

38. **(b)** A die is thrown once therefore, total number of outcomes are {1, 2, 3, 4, 5, 6}
(a) P(odd number) = 3/6 = 1/2
(b) P(multiple of 3) = 2/6 = 1/3
(c) P(prime number) = 3/6 = 1/2
(d) P(greater than 5) = 1/6

39. **(a)** (By definition of similar triangles).

40. **(d)** Radius of the circle is 13/4

Distance between (0, 0) and $\left(-\frac{3}{4}, 1\right)$ is

$$\sqrt{\left(0+\frac{3}{4}\right)^2 + (0-1)^2} = \sqrt{\frac{9}{16}+1}$$

$$= \sqrt{\frac{25}{16}} = \frac{5}{4} < \frac{13}{4}$$

Distance between (0, 0) and $\left(2, \frac{7}{3}\right)$ is

$$\sqrt{(2-0)^2 + \left(\frac{7}{3}-0\right)^2} = \sqrt{4+\frac{49}{9}} = \sqrt{\frac{85}{9}}$$

$$= 3.073 < \frac{13}{4}$$

Distance between (0, 0) and $\left(3, \frac{-1}{2}\right)$ is,

$$\sqrt{(3-0)^2 + \left(\frac{-1}{2}-0\right)^2} = \sqrt{9+\frac{1}{4}}$$

$$= 3.041 < \frac{13}{4}$$

Distance between points (0, 0) and $\left(-6, \frac{5}{2}\right)$ is

$$\sqrt{(-6-0)^2 + \left(\frac{5}{2}-0\right)^2} = \sqrt{36+\frac{25}{4}} = \sqrt{\frac{169}{4}}$$

$$= \frac{13}{2} = 6.5 > \frac{13}{4}$$

41. **(c)** AB $= \sqrt{(2.4)^2 + (1.8)^2} = 3$m.

42. **(b)** CD = 3.6 – 2.4 = 1.2 m

43. **(a)** $\because \Delta ABC \sim \Delta AEF$

$\therefore \frac{AC}{AB} = \frac{AE}{AF}$

$\Rightarrow \frac{1.8}{3} = \frac{0.9}{AF} \Rightarrow AF = 1.5$ m

44. **(d)**

45. **(a)** Time $= \frac{D}{S} = \frac{300}{5} = 60$ sec = 1 min.

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

49. **(c)** **50.** **(a)**