1. We know $a \times b = \text{HCF }(a, b) \times \text{LCM }(a, b)$

   (where a,b are positive integer)

   $39 \times 91 = \text{HCF }(39{,}91) \times \text{LCM }(39{,}91)$

   $LC\text{M}(39{,}91) = \frac{39\times91}{13} = 3 \times 91 = 273$

2. $\overline{4.57}$

   The decimals are repeating and non – terminating

   (Option -b)

3. X – coordinate of any point lying on Y – axis is “0”

   Substituting x=0 in the given line $4x - 3y = 9$

   $4(0) - 3(y) = 9$

   $-3y = 9$

   $-3y = 9 \qquad \Rightarrow y = -3$

   Line $4x - 3y = 9$ intersect y – axis at $(0, -3)$

   (Option -a)

4. let R(x.0) be the point tying on x – axis and equidistant from points $P(5{,}0)$ and $Q\ (-1{,}0)$

   Equation $PR = RQ$

   $\sqrt{(x-5)^2 + (0-0)^2} = \sqrt{(x+1)^2 + (0-0)^2}$

   $(x-5)^2 = (x+1)^2$ (squaring on both sides)

   $x^2 - 10x + 25 = x^2 + 2x + 1$

   $-12x = -24$

   $x = 2$

   Required point is $(2{,}0)$

   (option - a)

5. Given $\triangle$ ABC and $\triangle$ PQR similar

Which implies $\angle A = \angle P, \angle B = \angle Q, \angle C = \angle R$

$\angle R = 69°$

$\therefore \angle Q = 180° - (\angle P + \angle R)$

$\angle Q = 180° - (31° + 69°) = 180° - (100°) = 80°$

(option - d)

6. Given $\cos\theta = \frac{\sqrt{8}}{2}$ $\Rightarrow \cos^2\theta = \frac{3}{4}$

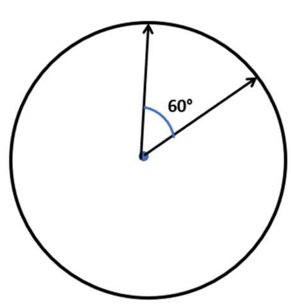
$\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cose}^2\theta + \sec^2\theta} = \frac{\frac{1}{\sin^2\theta} - \frac{1}{\cos^2\theta}}{\frac{1}{\sin^2\theta} + \frac{1}{\cos^2\theta}}$ (cos $\theta = \frac{1}{\sin\theta}$ and cos $\theta = \frac{1}{\text{se}}$)

$$\left(\frac{\frac{1}{1-\cos^2\theta} - \frac{1}{\cos^2\theta}}{\frac{1}{1-\cos^2\theta} + \frac{1}{\cos^2\theta}}\right) = \frac{\frac{1}{(1-\frac{3}{4})} - \frac{1}{(\frac{3}{4})}}{\frac{1}{\left(1-\frac{3}{4}\right)} + \frac{1}{\left(\frac{3}{4}\right)}}$$

$$\frac{\frac{1}{(1/4)} - \frac{1}{(3/4)}}{\frac{1}{(1/4)} + \frac{1}{(3/4)}} = \frac{4 - \frac{4}{3}}{4 + \frac{4}{3}} = \frac{\frac{12-4}{3}}{\frac{12+4}{3}} = \frac{8}{16} = \frac{1}{2}$$

(Option -c)

7.



In 10 min minute hand covers 60°

Are of sector $= \frac{\theta}{360} \times \pi r^2$ (θ is in degree)

$$\frac{60}{360}\times\frac{22}{7}\times7\times7=\frac{154}{6}=\frac{77}{3}$$

$$=25\frac{2}{3}cm^2$$

(Option -d)

8. When a coin is tossed the possible outcomes are

$\{HH, HT, TH, TT\}$
probability of two heads is ¼

9. product of two numbers $= 6336$ (given)
Given HCF is 12 so two numbers are 12x and 12y
Where x, y are coprimes
$(12x) \times (12y) = 6336$
$xy = 44$
possible coprimes are $(1,44)$ and $(4,11)$
$(2,22)$ is not considered as they are not coprimes

10. $y = 2$ and $y = -3$ are parallel lines
Two parallel lines have no common point. Hence no solution

11. From Basic proportionality theorem $\frac{CP}{PA} = \frac{CQ}{QB}$
$\frac{x+3}{3x+19} = \frac{x}{3x+4} \Rightarrow (x+3)(3x+2) = x(3x+19)$

$\Rightarrow 3x^2 + 4x + 4x + 12 = 3x^2 + 19x$
$\Rightarrow 13x + 12 = 19x$
$\Rightarrow 6x = 12 \Rightarrow x = 2$

12. Given $\sin\alpha = \frac{\sqrt{3}}{2} \Rightarrow \alpha = 60°$
Given $\tan\beta = \frac{1}{\sqrt{3}} \Rightarrow \beta = 30°$
$\cos(\alpha - \beta) = \cos(60 - 30) = \cos(30) = \frac{\sqrt{3}}{2}$

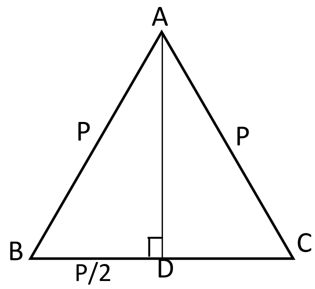
13. possible outcomes of a dice are $\{1,2,3,4,5,6\}$
4, 6 are composite
Probability of composite outcome is $= \frac{2}{6} = 1/5$

14. $250 = 2^{\circ} \times 5^3$ (highest power among 2 and 5 is 3)
decimal terminate after 3 decimal places

15. Given lines are $3x + 2y = 7$ and $4x + 8y - 11 = 0$

clearly $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ as $\frac{3}{4} \neq \frac{2}{8}$

16.



Let AD be the altitude

In equilateral Δ^{le} the altitude acts as perpendicular bisector of BC and applying Pythagoras theorem in ΔABD

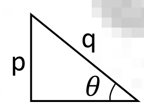
$$P^2 = \left(\frac{P}{2}\right)^2 + x^2$$

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

$$x^2 = \frac{3P^2}{4} \Rightarrow x = \frac{\sqrt{3}P}{2}$$

17. Given $sin\theta = \frac{p}{q}$, $tan\theta = ?$

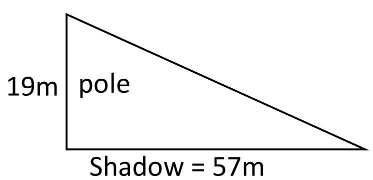
$sin\theta = \frac{opp}{hypotenus} \Rightarrow$

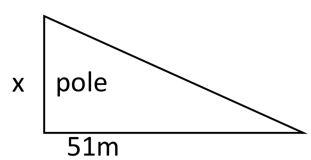


$tan\theta = \frac{opp}{adj}$ $(adjacentside = \sqrt{q^2 - p^2}$ $[\because by\ pythagoras\ theorem])$

$$\Rightarrow \frac{P}{\sqrt{q^2 - p^2}}$$

18.





2 triangles are similar

$$\Rightarrow \frac{51}{57} = \frac{x}{19} \Rightarrow x = 17m$$

19. $\sqrt{(1 - cos^2\theta)(1 + tan^2\theta)}$

From trigonometric identities

1-cos²θ=sin² θ

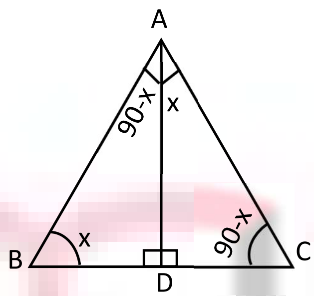
1+tan² θ =sec² θ

$\Rightarrow \sqrt{sin^2\theta . sec^2\theta}$

But $sec\theta = \frac{1}{cos\theta}$

$\Rightarrow \sqrt{\frac{sin^2\theta}{cos^2\theta}} = \frac{sin\theta}{cos\theta} = tan\theta$

20.



Given $\angle ABC + \angle ACB = 90°$ [complimentary]

$\Rightarrow \quad \angle BAC = 90°$ [Angle sum property of triangle]

Now comparing

$\Delta ABD \; and \; \Delta CAD$

$\angle BAD = \angle ACD$ [from figure]

$\angle ABD = \angle ACD$ [from figure]

$\angle ADB = \angle CDA$ [Right angle]

$\Rightarrow AAA \; similarity$

$\Delta ABD \sim \angle CAD$

$\Rightarrow \frac{BD}{AD} = \frac{AD}{CD}$ [By CPCT]

$\Rightarrow \quad BD.CD = AD^2$

21. Given one root is -3

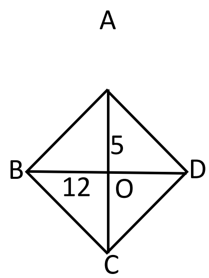
$(k-1)x^2 + kx + 1 = 0$ should be satisfied when x=-3

$\Rightarrow 9(k-1) - 3k + 1 = 0$

$9k - 9 - 3k + 1 = 0$

$k = \frac{8}{6} = \frac{4}{3}$

22.



We know the diagonals bisect perpendicularly in rhombus

$\Rightarrow AO = OC = 5$ $\qquad [\because AC = 10]$

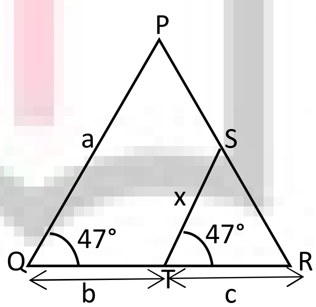
$\Rightarrow BO = OD = 12$ $\qquad [\because BD = 24]$

Now applying Pythagoras theorem in ΔAOD

$5^2 + 12^2 = AD^2 \quad \Rightarrow AD = \sqrt{169} = 13cm$

Perimeter = 13+13+13+13=52 cm

23.



ΔPQR is similar to ΔSTR

$\angle PQR = \angle STR \rightarrow Given$

$\angle PRQ = \angle SRQ \rightarrow Common\ angle$

By AA Similarity

$\Delta PQR \sim \Delta STR$

$\Rightarrow \frac{TR}{QR} = \frac{ST}{PQ}$

$\Rightarrow \frac{c}{b+c} = \frac{x}{a}$

$\Rightarrow x = \frac{ac}{b+c}$

24. $\frac{1}{\operatorname{cosec}\theta(1-\cot\theta)}+\frac{1}{\sec\theta(1-\tan\theta)}$

$\Rightarrow \frac{\sin\theta}{\left(1-\frac{\cos\theta}{\sin\theta}\right)}+\frac{\cos\theta}{\left(1-\frac{\sin\theta}{\cos\theta}\right)}$ $\left[\begin{array}{ll}\operatorname{cosec}\theta=\frac{1}{\sin\theta} & \tan\theta=\frac{\sin\theta}{\cos\theta}\\ \sec\theta=\frac{1}{\cos\theta} & \cos\theta=\frac{\cos\theta}{\sin\theta}\end{array}\right]$

$\Rightarrow \frac{\sin^2\theta}{(\sin\theta-\cos\theta)}+\frac{\cos^2\theta}{(\cos\theta-\sin\theta)}$

$\Rightarrow \frac{\sin^2\theta-\cos^2\theta}{\sin\theta-\cos\theta}\Rightarrow(\sin\theta+\cos\theta)$ $\boxed{\because a^2-b^2=(a+b)(a-b)}$

25. $(12)^n$ does not end with 0 because there is no ‘5’ in the units digit

26. Given a wire is bent in to circle of radius 56c m

$\Rightarrow$ Length of wire = $2\times\frac{22}{7}\times 56$

$=2\times 22\times 8$

When it is bent into square of side ‘r’

$4(\ell)=2\times 22\times 8$

$\Rightarrow \boxed{\ell=4\times 22\text{cm}}$ = 88 cm

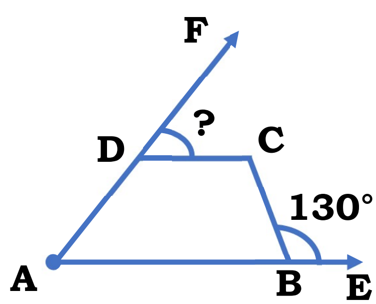
Area of square = $\ell^2=88^2=7744\text{cm}^2$

27. For a non leap year

365 days $\Rightarrow$ 52 weeks + 1 day this can be any day

$\Rightarrow$ Wednesday $\Rightarrow \boxed{\frac{1}{7}}$

28. A, B, C, D are concyclic $\Rightarrow$ Opposite angles are supplementary



If $\angle CBE = 130°$; $\boxed{\angle CBA = 50°}$ ($\because$ Linear pair)

And since A, B, C, D are concyclic

$\angle CDA + \angle CBA = 180°$

$\Rightarrow \angle CDA = 180° - 50° = 130°$

$\Rightarrow \angle CDF + \angle CDA = 180°$ [$\because$ Linear pair]

$\Rightarrow \angle CDF + 130° = 180°$

$\boxed{\angle CDF = 50°}$

29. x-coordinate of a point = 2 times its 'y' coordinate

$\Rightarrow \boxed{x = 2y}$ and $\Rightarrow \boxed{\text{point} = P(2y, y)}$

and it is equidistant from Q(2, -5) and R(-3, 6)

$\Rightarrow (2y-2)^2 + (y+5)^2 = (2y+3)^2 + (y-6)^2$

$\Rightarrow 4y^2 + 4 - 8y + y^2 + 10y + 25 = 4y^2 + 9 + 12y + y^2 + 36 - 12y$

$2y + 29 = 45$

$2y = 16$

$\boxed{y = 8} \Rightarrow \text{Point } \boxed{P = (16, 8)}$

30. Circle equation $(x-0)^2 + (y-0)^2 = 5^2$

$x^2 + y^2 = 25$

Given (x, 4) lies on circle

$\Rightarrow x^2 + 16 = 25$

$x^2 = 9$

$\boxed{x = \pm 3}$

31. $2\sin 2\theta = 1$

$\sin 2\theta = \frac{1}{2}$

We know that,

$\sin 30° = \frac{1}{2}$

$\therefore \sin 2\theta = \sin 30^\circ$

$\therefore 2\theta = 30^\circ \Rightarrow \theta = 15^\circ$

32. Prime factor of 385 $= 5 \times 77$

$= 5 \times 7 \times 11$

33. We have,

$2\pi r - r = 111$

$\therefore r(2\pi - 1) = 111$

$\therefore r = \dfrac{111}{2\pi - 1} = \dfrac{111}{\frac{44}{7} - 1} = \dfrac{777}{37} = 21$

We know that,

Area of circle = πr^2

$= \dfrac{22}{7} \times 21 \times 21 = 1386 \text{ cm}$

34. $S = \{M, A, N, G, O\}$

$n(s) = 5$

Let A be the event of selecting a vowel

$\therefore A = \{A, O\} \Rightarrow n(A) = 2$

$\therefore P(A) = \dfrac{2}{5}$

35. $17x - 19y = 53$ ....(1)

$19x - 17y = 55$ ....(2)

Subtracting equation (2) from equation (1)

$17x - 19y = 53$

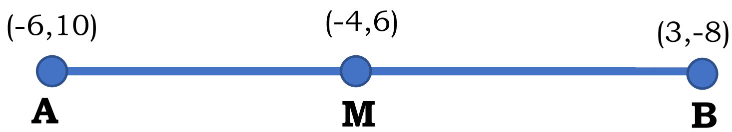
$19x - 17y = 55$

$-2x - 2y = -2$

$-2(x + y) = -2$

$x + y = 1$

36.



By section formula,

$$(-4, 6) = \left(\frac{m(3) + n(-6)}{m + n}, \frac{m(-8) + n(10)}{m + n} \right)$$

Let the ration be k : 1

$$\therefore -4 = \frac{3k - 6}{k + 1};$$

$$-4k - 4 = 3k - 6;$$

$$2 = 7k$$

$$k = \frac{2}{7}$$

$$6 = \frac{-8k + 10}{k + 1}$$

$$6k + 6 = -8k + 10$$

$$14k = 4$$

$$k = \frac{2}{7}$$

37. $\sin^2 \theta + \sin \theta = 1$ ...... (1)

We know that

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

$\therefore \sin^2 \theta = 1 - \cos^2 \theta$

Equation (1)

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

$-\cos^2 \theta = -\sin^2 \theta$

$\therefore \sin^2 \theta = \cos^2 \theta$

Squaring we get

$\sin^2 \theta = \cos^4 \theta$

$\therefore 1 - \cos^2 \theta = \cos^4 \theta$

$\therefore \cos^4 \theta + \cos^2 \theta = 1$

38. Non terminating and recurring

39. Let $C_i = 2\pi r_i$ & $C_f = 2\pi r_f$

Also, $2\pi r_f = 3(2\pi r_i)$

$r_f = 3r_i$

Now, $A_f = \pi r_f^2$

$= \pi(3r_i)^2$

$= 9\pi r_i^2$

40. Let the present age of Father be 'x' year & that of his son's be 'y' years

$\therefore$ we have

$x = 3y$ ......(1)

After 12 years, Father's age will be $(x+12)$ & son's age will be $(y+12)$

$\therefore$ We get

$x + 12 = 2(y+12)$

$x + 12 = 2y + 24$

$x - 2y = 12$

From (1) we get

$3y - 2y = 12$

$\therefore y = 12$

Using equation (1)

$x = 36$

$\therefore$ Sum of their present ages is

$36 + 12 = 48$

41. As it is looking like parabola is the figure.. If is parabola.

42. The curve ABC is touching x-axis at -3, -1

$\Rightarrow$ They are zeroes of the polynomial

43. Quadratic equation whose roots are α and β is $x^2 - (\alpha+\beta)x + \alpha\beta = 0$

44. The curve is touching x axis at 4 points $\Rightarrow$ Zeroes are 4

45. Distance between C & G $\Rightarrow$ C(-1, 0) , G = (5, 0)

$\Rightarrow \sqrt{(5-(-1))^2+(0-0)^2}=6$

46. By plotting coordination $\Rightarrow S=(-6,4)$

47. From Graph D = (-2, -4), H = (8, 2)

Midpoint = $\left(\frac{8-2}{2},\frac{2-4}{2}\right) \Rightarrow (3,-1)$

48. x-axis divides the points in the ratio $-y_1 : y_2$

$\Rightarrow -(4):-4 \Rightarrow 1:1$

49. Distance between P & G P(-6, -4), G = (8, 6)

$\Rightarrow \sqrt{14^2+10^2}=\sqrt{296}=2\sqrt{74}$

50. From graph is clear that

I (2, -2), J(2, -6), K(8, -6), L(8, -2)