36. Find the values of x and y if the median for the following data is 31.

Class Interval	Frequency
0-10	5
10-20	X
20-30	6
30-40	Y
40-50	6
50-60	5
Total	**40**

Answers

1. Three places of decimal.

2. $\alpha + \beta = 0 \Rightarrow p = 0$

3. $245 - 5 = 240$, $1029 - 5 = 1024$

HCF (240, 1024) = 16

OR

(*iii*) 4.07007000 ...

4. Parallel to *y*-axis and *x*-axis.

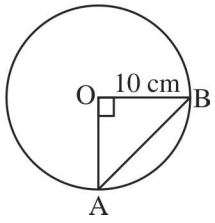
5. $1260 = 2 \times 2 \times 3 \times 3 \times 5 \times 7 = 2^2 \times 3^2 \times 5 \times 7$

6. Area of circle = 38.5 sq. cm.

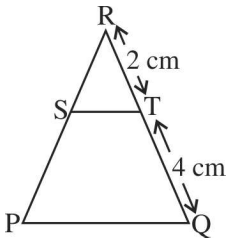
$\pi r^2 = 38.5 \Rightarrow r^2 = \frac{7}{2} \times \frac{7}{2} \Rightarrow r = \frac{7}{2}$ cm

OR

$r = 10$ m $\Rightarrow OB^2 + OA^2 = AB^2 \Rightarrow AB = 10\sqrt{2}$ cm



7. $\frac{\text{Ar}\Delta\text{I}}{\text{Ar}\Delta\text{II}} = \frac{(\text{Side I})^2}{(\text{Side II})^2} = \frac{3^2}{4^2} = 9:16$

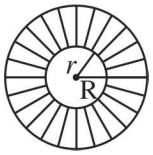


OR

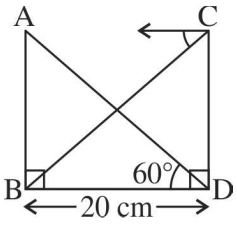
$\Delta PST \sim \Delta PQR$ (AA similarity rule)

$\frac{\text{ar}(\Delta PST)}{\text{ar}(\Delta PQR)} = \frac{PT^2}{TR^2} = 1:4$

8. Area = $\pi R^2 - \pi r^2 = \pi(R^2 - r^2)$



9. Angle of depression = 60°



10. Perimeter of sector = $2r + l$

$\Rightarrow \quad 68 = 28 + \frac{\pi r\theta}{180°} \quad \Rightarrow \quad \theta = \frac{40 \times 180°}{\pi \times 14}$

So area of sector = $\frac{\pi r^2 \theta}{360°}$ = 280 sq. cm

11. Mode + 2 Mean = 2 Median

$\Rightarrow$ 29 + 2 × 26 = 3 median

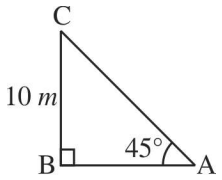
$\Rightarrow$ Median = $\frac{81}{3}$ = 27

12. r = 3 cm

13. (ii) Interesting lines or coincident lines.

14. (ii) –0.3 OR P(not E) = 1 – 0.60 = 0.40

15. $\tan 45° = \frac{BC}{AB} \Rightarrow AB = BC = 10$ m



16. $P(E) = \frac{6}{52} = \frac{3}{26}$

17. (i) (c) (x – 4), (*x* – 5)

(ii) (d) (4, 5)

(iii) (c) (4, 0)

(iv) (c) 2

(v) (a) $x^2 - 18x + 80$

18. (i) (b) (4, 3)

(ii) (a) AD = $\sqrt{10}$

(iii) (b) AB + BD = 2 + $\sqrt{10}$

(iv) (a) (1, 2)

(v) (d) B and D

19. (i) (b) $\frac{AD}{DB} = \frac{AE}{EC}$

(ii) (c) Thales Theorem

(iii) (d) 12.5 cm

(iv) (b) 2DE = BC

(v) (c) AA

20. (i) (c) 12 cm

(ii) (d) 13 cm

(iii) (d) 15.4 cm

(iv) (a) 29.16 cm

(v) (b) 4.605 kg

21. $PA = PB \Rightarrow PA^2 = PB^2$

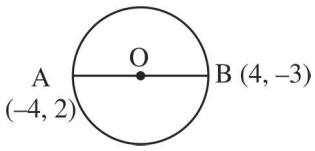
$(x-5)^2 + (y-1)^2 = (x+1)^2 + (y-5)^2$

$\Rightarrow -10x - 2y + 25 + 1 = 2x - 10y + 1 + 25$

$\Rightarrow 3x = 2y$

OR

Coordination of O $= \left(\frac{-4+4}{2}, \frac{2-3}{2}\right) = \left(0, -\frac{1}{2}\right)$



$$OA = \sqrt{(O+4)^2 + \left(-\frac{1}{2} - 2\right)^2} = \sqrt{16 + \frac{25}{4}}$$

$$\Rightarrow \quad OA = \frac{\sqrt{89}}{2} \text{ units}$$

22. BD = AC $\rightarrow$ I (Diagonals of a rectangle)

Here AP = PC $\rightarrow$ II and BP = PD $\rightarrow$ III

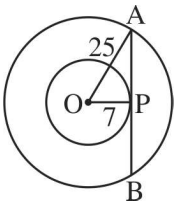
from I, II, III AP = PC = BP = DP

Hence $PA^2 + PC^2 = PB^2 + PD^2$

23. $\angle OPA = 90°$ (tangent)

AP = PB

So by pythagoras Theorem



$AP = \sqrt{OA^2 - OP^2} = 24$ cm

24. Construction of circle of radius 4 cm and centre O and construction of P such OP = 6cm. Construction of pair of tangents.

25. Dividing each term by cos θ

$$\frac{\tan\theta - 1}{\tan\theta + 1} = \frac{\sqrt{3}-1}{\sqrt{3}+1} = \frac{4 - 2\sqrt{3}}{2} = 2 - \sqrt{3}$$

OR

$LHS = x^2 + y^2 = (3\sin\theta + 4\cos\theta)^2 + (3\cos\theta - 4\sin\theta)^2$

$= 25 = RHS$

26. AP : – 12,18, ..., 96

$a = 12, d = 6, a_n = 96$

$a + (n - 1)d = 96$

$\Rightarrow 12 + (n - 1)6 = 96$

$\Rightarrow \quad n = 14 + 1 = 15$

27. Let $\frac{p}{q} = 2 - \sqrt{3}$, $q \neq 0$, HCF(p, q) =1

$\sqrt{3} = 2 - \frac{p}{q} \quad \Rightarrow \quad \underset{\text{irrational}}{\sqrt{3}} = \underset{\text{rational}}{\frac{2q - p}{q}}$

$\therefore$ Our assumption is false. $2 - \sqrt{3}$ is an irrational number.

28. Perimeter of $\Delta PAB = PA + PB + AB$

AS = AQ, BS = BR and PQ = PR (Length of tangents from external points)

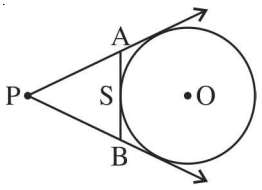
Perimetre $\Delta PAB = PA + PB + AB$

$= PA + PB + AQ + BR$

$= PQ + PR$

$= 2PQ$

$= 2 \times$ length of the tangent

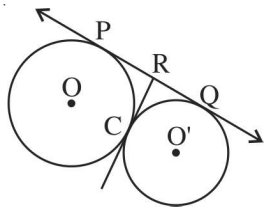


OR

RP = RC (I) RQ = RC (II) from

(Length of tangents from external point)

from I and II $\Rightarrow$ PR = RC = RQ $\Rightarrow$ RC bisects PQ



29. Finding $a_1 = 2, b_1 = -3, c_1 = 7$

$a_2 = (a + b), b_2 = -(a + b - 3), c_2 = 4a + b$

For infinite solutions

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \Rightarrow \frac{2}{a+b} = \frac{-3}{-(a+b-3)} = \frac{7}{4a+b}$

$\Rightarrow \quad 2(a + b - 3) = 3(a + b)$ and $2(4a + b) = 7(a + b)$

$\Rightarrow \quad a + b = 6 \qquad$ and $\qquad a = 5b$

$\therefore \quad a = 5$ and $b = 1$

30. Total -digit numbers = 90

(i) Numbers having both same digits = 9

$$P(E) = \frac{9}{90} = \frac{1}{10}$$

(ii) P(multiple of 10) = $\frac{9}{10} = \frac{1}{10}$

OR

Total outcomes = 36

(i) Favourable out comes = 9

$$P(E) = \frac{9}{36} = \frac{1}{4}$$

(ii) Favourable out comes = 3

$$P(E) = \frac{3}{36} = \frac{1}{12}$$

31. T.S.A. of Hemisphere = $3\pi r^2$

$\Rightarrow \quad 462 = 3 \times \frac{22}{7} \times r^2 \Rightarrow \quad r = 7$ cm

$\therefore \quad$ Volume of Hemisphere = $\frac{2}{3}\pi r^3 = \frac{2156}{3}$ cm^3

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

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

$$= \tan\theta + \sec\theta = \frac{1 + \sin\theta}{\cos\theta} = \text{RHS}$$

33. $I^2 + II \times III = 46$

Let the nos be x, x + 1, x + 2

then $x^2 + (x + 1)(x + 2) = 46$

$\Rightarrow \quad 2x^2 + 3x - 44 = 0$

$\Rightarrow \quad x = 4, -\frac{11}{2}$ (not possible)

$\therefore \quad x, x + 1, x + 2 = 4, 5, 6$

OR

Let the present age of Mona be = x yrs

then 3 years ago of Mona = (x – 3) yrs

and 5 years hence of Mona = (x + 5) yrs

Now $\frac{1}{x-3}+\frac{1}{x+5}=\frac{1}{3}$

$\Rightarrow \quad x^2 - 4x - 21 = 0$

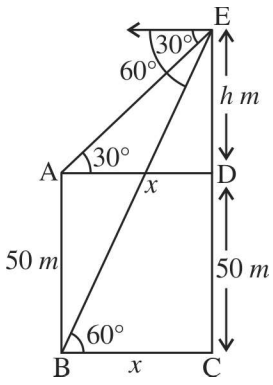
$\Rightarrow \quad x = 7$ or $x = -3$ (Not possible)

$\therefore$ Mona's present age = 7 years.

34. In ΔADE

$\frac{h}{x} = \tan 30° \Rightarrow \sqrt{3}\,h = x$

In ΔBCE, $\frac{h+50}{x} = \tan 60° \Rightarrow \frac{h+50}{\sqrt{3}} = x$



$\therefore \quad h = 25$

and Height of tower = 75 m

35. $a_{10} = 25$, $s_{20} = 610$, $S_{30} = ?$

$a + 9d = 25$ (I) and $\frac{20}{2}[2a + 19d] = 610$

$\Rightarrow \quad 2a + 19d = 61 \quad$ (II)

From (I) and (II) $d = 11$, $a = -74$

$\therefore \qquad S_{30} = \frac{30}{2}[2 \times (-74) + 29 \times 11] = 15 \times 171 = 2565$

36.

C.I.	Frequency	CF
0–10	5	5
10–20	x	5+x
20–30	6	11+x
30–40	y	11+x+y
40–50	6	17+x+y
50–60	5	22+x+y
	40	

$x + y = 18$ (I)

$\frac{N}{2} = 20$. So median lies in30–40 as median is 31 given.

$l = 30$

$f = y$

$cf = 11 + x$

$h = 10$

$$\text{Median} = 1 + \frac{\left(\frac{N}{2} - cf\right)}{f} \times h$$

$$31 = 30 + \left(\frac{20 - 11 - x}{y}\right) \times 10$$

$\Rightarrow \quad 10x + 5y = 90$ (II)

From I and II $x = 8$ and $y = 10$