MATHEMATICS SAMPLE PAPER

ANSWER AND SOLUTIONS

PART-A

SECTION-I

1. $\frac{51}{1500} = \frac{17}{500} \Rightarrow \frac{17}{5^3 \times 2^2} = \frac{17}{2^n \times 5^m}$

$\therefore$ m = 3, n = 2

Hence m + n = 5

2. f(x) = ax + b

$\Rightarrow ax + b = 0 \Rightarrow x = -\frac{b}{a}$

OR

$\frac{c}{a} = 4$

$\therefore \frac{-6}{a} = 4$

$\Rightarrow a = -\frac{3}{2}$

3. $b^2 - 4ac = 0$

$k^2 - 4(k)(2) = 0$

$k^2 - 8k = 0$

$k(k - 8) = 0$

k = 0 Not possible

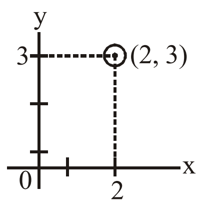
k = 8

4. a = –3

d = 4 – (–3) = 7

$a_{21} = a + 20d = -3 + 20(7) = -3 + 140 = 137$

5. Distance from x-axis is 3 units



6. PT = PR = PQ = 3.8 cm

(Tangents from external point)

$\therefore$ QR = 3.8 + 3.8 = 7.6 cm

7. $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\frac{3}{2} = \frac{2k}{5} \Rightarrow k = \frac{15}{4}$

8. a = –5

$d = -\frac{5}{2} + 5 = \frac{5}{2}$

$a_{25} = a + 24d \Rightarrow -5 + 24 \times \frac{5}{2}$

$\Rightarrow -5 + 60 = 55$

9. Volume of big cube = n × volume of small cube

$(4)^3 = n \times (2)^3$

$\frac{64}{8} = n$

$\Rightarrow n = 8$

OR

$4\pi r^2 = 616$

$4 \times \frac{22}{7} \times r^2 = 616$

$\Rightarrow r^2 = \frac{616 \times 7}{4 \times 22}$

$\Rightarrow r^2 = 49$ or r = 7 cm

10. $S_n = \frac{n}{2}(a + a_n)$

$730 = \frac{n}{2}(8 + 65)$

$\Rightarrow 730 = \frac{n}{2} \times 73$

$\therefore$ n = 20

OR

$\sqrt{2}\,;\ 2\sqrt{2};\ 3\sqrt{2}$ ......

$a_{10} = a + 9d$

$= \sqrt{2} + 9\sqrt{2}$

$= 10\sqrt{2} = \sqrt{200}$

11. OP = $\sqrt{(x-0)^2+(y-0)^2} = \sqrt{x^2+y^2}$ units

12. Let P(x, –1) and Q(3, 2) be the given points. Then,

PQ = 5

$\Rightarrow \sqrt{(x-3)^2+(-1-2)^2} = 5$

$\Rightarrow (x-3)^2 + 9 = 5^2$

$\Rightarrow x^2 - 6x + 18 = 25$

$\Rightarrow x^2 - 6x - 7 = 0$

$\Rightarrow (x-7)(x+1) = 0$

$\Rightarrow x = 7$ or, $x = -1$

13. Putting $x = \frac{7}{3}$ in $3x^2 - 13x - k = 0$

$$3\left(\frac{7}{3}\right)^2 - 13\left(\frac{7}{3}\right) - k = 0$$

$$\frac{49}{3} - \frac{91}{3} - k = 0$$

$$k = -\frac{42}{3} = -14$$

14. Let α, β be the zero of the polyhomial $f(x) = x^2 - 8x + k$. Then,

$\alpha + \beta = -\left(\frac{-8}{1}\right) = 8$ and $\alpha\beta = \frac{k}{1} = k$

It is given that

$\alpha^2 + \beta^2 = 40$

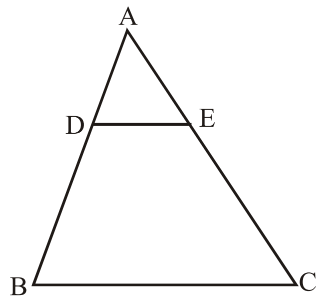
$\Rightarrow (\alpha+\beta)^2 - 2\alpha\beta = 40$

$\Rightarrow 8^2 - 2k = 40$

$\Rightarrow 2k = 64 - 40$ [∴ $\alpha + \beta$ and $\alpha\beta = k$]

$\Rightarrow 2k = 24 \Rightarrow k = 12$

15. We have,



AB = 5.6 cm, AD = 1.4 cm, AC = 7.2 cm and AE = 1.8 cm.

∴ BD = AB – AD = (5.6 – 1.4) cm = 4.2 cm

and, EC = AC – AE = (7.2 – 1.8) cm = 5.4 cm

Now, $\frac{AD}{DB} = \frac{1.4}{4.2} = \frac{1}{3}$ and $\frac{AE}{EC} = \frac{1.8}{5.4} = \frac{1}{3}$

$$\Rightarrow \frac{AD}{DB} = \frac{AE}{EC}$$

Thus, DE divides sides AB and AC of ΔABC in the same ratio, Therefore, by the converse of Basic Proportionality Theorem, we have

DE ∥ BC

OR

Since, ΔADB ~ ΔADC

$$\frac{BD}{DC} = \frac{AB}{AC}$$

$$\frac{P}{2} = \frac{18}{P}$$

$P^2 = 36$

$P = 6$

16. Clearly, the given sequence is an A.P. with first term a (= 4) and common difference d (= 5)

Let 124 be the nth term of the given sequence. Then,

$a_n = 124$

$\Rightarrow a + (n-1)d = 124 \Rightarrow 4 + (n-1) \times 5 = 124$

$\Rightarrow 5n = 125 \Rightarrow n = 25$

Hence, 25th term of the given sequence is 124.

OR

$a_1 = 3$, $a_3 = 7$

$s_3 = \frac{3}{2}(3 + 7) = 15$

SECTION-II

17. $P(E) = \frac{\text{Number of favourable outcomes}}{\text{Total outcomes}}$

(a) Favourable $\rightarrow$ 2 cards

Total $\rightarrow$ 52 cards

$P(E) = \frac{2}{52} = \frac{1}{26}$ option (iii)

(b) Favourable $\rightarrow$ 12 cards

Total $\rightarrow$ 52 cards

$P(E) = \frac{12}{52} = \frac{3}{13}$ option (iii)

(c) Favourable $\rightarrow$ 26 cards

Total $\rightarrow$ 52 cards

$P(E) = \frac{26}{52} = \frac{1}{2}$ option (i)

(d) Favourable $\rightarrow$ 13 cards

Total $\rightarrow$ 52 cards

Proability $= \frac{13}{52} = \frac{1}{4}$ option (iii)

(e) Favourable $\rightarrow$ 8 cards

Total $\rightarrow$ 52 cards

Proability $= \frac{8}{52} = \frac{2}{13}$ option (iv)

18. (a) Curved surface area

$= 4 \times 2\pi rh$

$= 4 \times 2 \times \frac{22}{7} \times 2 \times 14$

$= 704\ m^2$ option (iii)

(b) Volume $= \pi r^2 h$

$= \frac{22}{7} \times 2 \times 2 \times 14$

$= 176\ m^3$ option (i)

(c) $\frac{\text{Surface Area of Big Dome}}{4 \times \text{Surface Area of Smaller Dome}}$

$= \frac{2\pi R^2}{4 \times 2\pi r^2}$

$= \frac{21 \times 21}{4 \times 7 \times 7}$

$= \frac{9}{4}$ option (iv)

(d) $2\pi r^2 + 2\pi rh$ option (iii)

(e) Volume $= \frac{2}{3}\pi r^3 + \pi r^2 h$

$= \frac{2}{3} \times \frac{22}{7} \times 21 \times 21 \times 21 + \frac{22}{7} \times 21 \times 21 \times 3$

$= 19404 + 4158 = 23562 m^3$ option (ii)

19. (a) $a_n = a + (n - 1)d$

$= 41 + (16 - 1)(-2)$

$= 41 - 30 = 11$ option (ii)

(b) $a_8 - a_{13} = a + 7d - (a + 12d)$

$= -5d$

$= -5(-2) = 10$ option (i)

(c) $a_{11} = 41 + (11 - 1) \times (-2)$

$= 41 - 20 = 21$ option (iii)

(d) Number of decks $= \frac{\text{Total cards}}{\text{Cards in a deck}}$

$= \frac{832}{52} = 16$ option (iv)

(e) $a_n = a + (n - 1)d$

$a = 11$

$n = 4$

$d = 2$

$a_n = 11 + 3(2) = 17$ option (iii)

20. (a) In ΔABD $\tan 30° = \frac{300}{BD}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{300}{BD}$

$\Rightarrow BD = 300\sqrt{3}\ m$

option (iii)

(b) In ΔABC $\tan 60° = \frac{300}{BC}$

$\Rightarrow \sqrt{3} = \frac{300}{BC}$

$\Rightarrow BC = \frac{300}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 100\sqrt{3}\ m$ option (i)

(c) Distance between two ships

$300\sqrt{3} - 100\sqrt{3} = 200\sqrt{3}\ m$ option (iii)

(d) In $\Delta ABD \sin 30° = \frac{AB}{AD}$

$\frac{1}{2} = \frac{300}{AD}$

$\Rightarrow AD = 600$ m option (iv)

(e) For $100\sqrt{3}$ m time taken 10 min

For $300\sqrt{3}$ m time taken

$\frac{10}{100\sqrt{3}} \times 300\sqrt{3} = 30$ min option (ii)

PART-B

SECTION-III

21. In 60 minutes $\rightarrow 360°$

$\therefore$ In 5 minutes $\rightarrow \frac{360}{60} \times 5$

$= 30°$

Area $= \frac{\pi r^2 \theta}{360} = \frac{22}{7} \times \frac{14 \times 14 \times 30}{360}$

$= \frac{154}{3} = 51\frac{1}{3}$ cm^2

22. Out of 600 electric bulbs one bulb can be chosen in 600 ways.

$\therefore$ Total number of elementary events = 600

There are 588 (= 600 – 12) non-defective bulbs out of which one bulb can be chosen in 588 ways.

$\therefore$ Favourable number of elementary events = 588

Hence, P(Getting a non-defective bulb)

$= \frac{588}{600} = \frac{49}{50} = 0.98$

23. Let us assume, to the contrary, that $3 + 2\sqrt{5}$ is rational. That is, we can find coprime integers a and b (b ≠ 0) such that $3 + 2\sqrt{5} = \frac{a}{b}$, b ≠ 0,

a, b ∈ I

Therefore, $\frac{a}{b} - 3 = 2\sqrt{5}$

$\Rightarrow \frac{a-3b}{b} = 2\sqrt{5}$

$\Rightarrow \frac{a-3b}{2b} = \sqrt{5} \Rightarrow \frac{a}{2b} - \frac{3}{2} = \sqrt{5}$

Since a and b are integers, we get $\frac{a}{2b} - \frac{3}{2}$ is rational, and so $\frac{a-3b}{2b} = \sqrt{5}$ is rational.

But this contradicts the fact that $\sqrt{5}$ is irrational. This contradiction has arisen because of our incorrect assumption that $3 + 2\sqrt{5}$ is rational.

So, we conclude that $3 + 2\sqrt{5}$ is irrational.

OR

$\ell = 850$

b = 625

h = 475

longest rod = HCF (850, 625, 475)

$= 5^2 = 25$ cm

24. Yes,

Here, $\frac{a_1}{a_2} = \frac{2a}{4a} = \frac{1}{2}, \frac{b_1}{b_2} = \frac{b}{2b} = \frac{1}{2}, \frac{c_1}{c_2} = \frac{-a}{-2a} = \frac{1}{2}$

$\because \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\therefore$ The given system of equations is consistent.

25. We have, the total number of possible outcomes associated with the random experiment of throwing a die is 6 (i.e. 1, 2, 3, 4, 5, 6).

(i) Let E denotes the event of getting a prime number.

So, favourable number of outcomes = 3(i.e., 2, 3, 5)

$\therefore P(E) = \frac{3}{6} = \frac{1}{2}$

(ii) Let E be the event of getting a number lying between 2 and 6.

$\therefore$ Favourable number of elementary events (outcomes) = 3 (i.e., 3, 4, 5)

$\therefore P(E) = \frac{3}{6} = \frac{1}{2}$

26. $S_5 + S_7 = 167$

$\frac{5}{2}(2a + 4d) + \frac{7}{2}(2a + 6d) = 167$

$\Rightarrow 24a + 62d = 334$

or $12a + 31d = 167$ ....(i)

$S_{10} = 235$

$\Rightarrow 5(2a + 9d) = 235$

or $2a + 9d = 47$ ....(ii)

Solving (i) and (ii), wet get

a = 1, d = 5

Here A.P. = 1, 6, 11, ...

OR

Here, a = 27, d = –3, $S_n = 0$

$\therefore \frac{n}{2}[54 + (n - 1)(-3)] = 0$

$\Rightarrow n = 19$

SECTION-IV

27. LHS $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}}$

$= \sqrt{\frac{1+\sin\theta}{1-\sin\theta}\times\frac{1+\sin\theta}{1+\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}\times\frac{1-\sin\theta}{1-\sin\theta}}$

$= \sqrt{\frac{(1+\sin\theta)^2}{1-\sin^2\theta}} + \sqrt{\frac{(1-\sin\theta)^2}{1-\sin^2\theta}}$

$= \sqrt{\frac{(1+\sin\theta)^2}{\cos^2\theta}} + \sqrt{\frac{(1-\sin\theta)^2}{\cos^2\theta}}$

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

$= \frac{2}{\cos\theta} = 2\sec\theta = \text{RHS}$

Hence proved

OR

We have,

$\text{LHS} = \frac{\cos^2\theta}{1-\tan\theta} + \frac{\sin^3\theta}{\sin\theta - \cos\theta}$

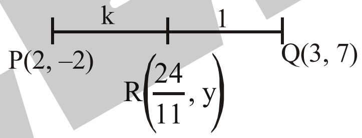
$\Rightarrow \text{LHS} = \frac{\cos^3\theta}{\cos\theta - \sin\theta} - \frac{\sin^3\theta}{\cos\theta - \sin\theta}$

$\Rightarrow \text{LHS} = \frac{\cos^3\theta - \sin^3\theta}{\cos\theta - \sin\theta}$

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

$\Rightarrow \text{LHS} = 1 + \sin\theta\cos\theta = \text{RHS}$

28.



Let R divides PQ in ratio k : 1

By section formula co-ordinates of 'R' are

$\frac{m_1x_2 + m_2x_1}{m_1 + m_2} ; \frac{m_1y_2 + m_2y_1}{m_1 + m_2}$

$\left(\frac{3k+2}{k+1} ; \frac{7k-2}{k+1}\right)$

$\frac{3k+2}{k+1} = \frac{24}{11}$

$33k + 22 = 24k + 24$

$9k = 2$

$k = \frac{2}{9}$ Ratio $\rightarrow$ 2 : 9

$y = \frac{7k-2}{k+1} \Rightarrow \frac{7\times\frac{2}{9} - 2}{\frac{2}{9} + 1}$

$y = \frac{-4}{11}$

29. We have, $2x + 3y = 7$ ..... (i)

$(a - b)x + (a + b)y = 3a + b - 2$ ..... (ii)

Here, $a_1 = 2$, $b_1 = 3$, $c_1 = 7$

and $a_2 = a - b$, $b_2 = a + b$, $c_2 = 3a + b - 2$

For infinite number solutions, we have

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

Now, $\frac{2}{a-b} = \frac{3}{a+b}$

$\Rightarrow 2a + 2b = 3a - 3b$

$\Rightarrow 2a - 3a = -3b - 2b$

$\Rightarrow -a = -5b$

$\therefore a = 5b$ ...... (iii)

Again, we have

$\frac{3}{a+b} = \frac{7}{3a+b-2} \Rightarrow 9a + 3b - 6 = 7a + 7b$

$\Rightarrow 9a - 7a + 3b - 7b - 6 = 0$

$\Rightarrow 2a - 4b - 6 = 0 \Rightarrow 2a - 4b = 6$

$\Rightarrow a - 2b = 3$ ...... (iv)

Putting $a = 5b$ in equation (iv), we get

$5b - 2b = 3$ or $3b = 3$ i.e., $b = \frac{3}{3} = 1$

Putting the value of b in equation (iii), we get $a = 5(1) = 5$

Hence, the given system of equations will have an infinite number of solutions for $a = 5$ and $b = 1$.

OR

Given equations

$\frac{2}{x} + \frac{3}{y} = 13$ .....(1)

$\frac{5}{x} - \frac{4}{y} = -2$ .....(2)

Let $\frac{1}{x} = u$, $\frac{1}{y} = v$

From (1) and (2)

$2u + 3v = 13$ ......(3)

$5u - 4v = -2$ ......(4)

Multiplying equation (3) from 5 and equation (4) by 2 and subtract them

$10u + 15v = 65$

$10u - 8v = -4$

$-\quad + \quad +$

$23v = 69$

$v = 3$

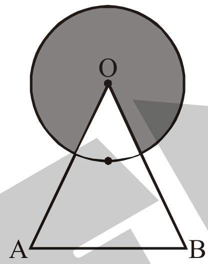
From (3) $2u + 3.3 = 13$

$2u = 4$

$u = 2$

Thus, $x = \frac{1}{2}$, $y = \frac{1}{3}$

30.



$\angle AOB = 60°$

Area of shaded region = Area of major sector

$= \frac{300}{360} \times \frac{22}{7} \times (6)^2 = 94.29 \text{ cm}^2$

31. Let $\sqrt{2}$ be rational

i.e $\sqrt{2} = \frac{p}{q}$ (q ≠ 0, p and q are co-prime)

Squaring $2 = \frac{p^2}{q^2}$

$\therefore q^2 = \frac{p^2}{2}$ .....(1)

If 2 divides p^2 ; then 2 divides p i.e.

2 is factor of p

Let $p = 2k$ ....(2)

Putting value of p from (2) in (1)

$q^2 = \frac{4k^2}{2}$

$k^2 = \frac{q^2}{2}$

If 2 divides q^2 then 2 divides q i.e. 2 is factor of q.

$\Rightarrow$ 2 is common factor of p and q

Which is contrary to our assumption

Hence $\sqrt{2}$ is irrational.

32. We observe that the class 12 – 15 has maximum frequency. Therefore, this is the modal class.

We have,

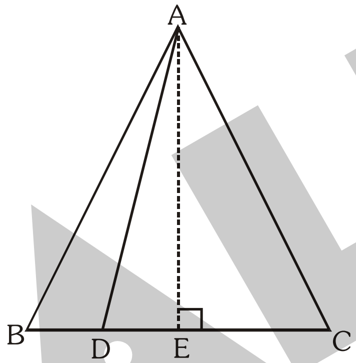
$\ell = 12$, h = 3, f = 23, $f_1 = 10$ and $f_2 = 21$

$$\therefore \text{Mode} = \ell + \frac{f - f_1}{2f - f_1 - f_2} \times h$$

$$\Rightarrow \text{Mode} = 12 + \frac{23-10}{46-10-21} \times 3$$

$$\Rightarrow \text{Mode} = 12 + \frac{13}{15} \times 3 = 12 + \frac{13}{5} = 14.6$$

33. Draw AE $\perp$ BC



In Δ AEB and ΔAEC, we have

AB = AC	
AE = AE	[Common]
$\angle B = \angle C$	[$\because$ AB = AC]
$\angle AEB = \angle AEC$	[Each 90°]
$\therefore$ $\Delta AEB \cong \Delta AEC$	[by AAS congruence]
$\Rightarrow$ BE = CE	[by cpct]

Since ΔAED and ΔABE are right triangles right angled at E. Therefore,

$AD^2 = AE^2 + DE^2$ and $AB^2 = AE^2 + BE^2$

$\Rightarrow$ $AB^2 - AD^2 = BE^2 - DE^2$

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

$\Rightarrow$ $AB^2 - AD^2 = (CE + DE)(BE - DE)$

$\Rightarrow$ $AB^2 - AD^2 = CD \cdot BD$

$\Rightarrow$ $AB^2 - AD^2 = BD \cdot CD$

Hence proved

SECTION-V

34. $$\text{LHS} = \frac{\tan A}{1 - \frac{1}{\tan A}} + \frac{1}{\tan A(1 - \tan A)}$$

$$= \frac{\tan^2 A}{\tan A - 1} - \frac{1}{\tan A(\tan A - 1)}$$

$$= \frac{\tan^3 A - 1}{\tan A(\tan A - 1)}$$

using $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$$\frac{(\tan A - 1)(\tan A + 1 + \tan^2 A)}{\tan A(\tan A - 1)}$$

$$\frac{\tan A + 1 + \tan^2 A}{\tan A}$$

$$= \frac{1}{\tan A} + \frac{\tan^2 A}{\tan A} + \frac{\tan A}{\tan A}$$

= cotA + tanA + 1

Hence proved

Now $1 + \frac{\sin A}{\cos A} + \frac{\cos A}{\sin A}$

$$= 1 + \frac{\sin^2 A + \cos^2 A}{\cos A \sin A}$$

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

= 1 + secA cosecA

Hence proved

OR

$m^2 - n^2 = (\tan\theta + \sin\theta)^2 - (\tan\theta - \sin\theta)^2$

$= \tan^2\theta + \sin^2\theta + 2\tan\theta\sin\theta - \tan^2\theta$

$- \sin^2\theta + 2\tan\theta\sin\theta$

$m^2 - n^2 = 4\tan\theta\sin\theta$

$\therefore (m^2 - n^2)^2 = 16\tan^2\theta\sin^2\theta$ ......(1)

Now, $16mn = 16(\tan\theta + \sin\theta)(\tan\theta - \sin\theta)$

$= 16[\tan^2\theta - \sin^2\theta]$

$$= 16\left[\frac{\sin^2\theta}{\cos^2\theta} - \sin^2\theta\right]$$

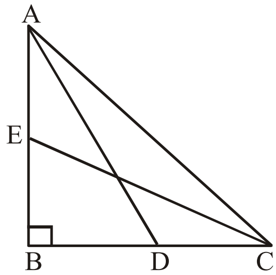
$$= 16\sin^2\theta\left[\frac{1}{\cos^2\theta} - 1\right]$$

$= 16\sin^2\theta[\sec^2\theta - 1]$

$16mn = 16\sin^2\theta\tan^2\theta$ ....(2)

$\therefore (m^2 - n^2)^2 = 16\,mn$

35. In ΔABD ; $\angle B = 90°$



$\therefore AD^2 = AB^2 + BD^2$

$$AD^2 = AB^2 + \left(\frac{BC}{2}\right)^2$$

$$AD^2 = AB^2 + \frac{BC^2}{4} \quad .....(1)$$

In ΔBEC

$CE^2 = BC^2 + BE^2$

$$CE^2 = BC^2 + \left(\frac{AB}{2}\right)^2$$

$$CE^2 = BC^2 + \frac{AB^2}{4} \quad ......(2)$$

equation (1) and (2)

$$AD^2 + CE^2 = AB^2 + \frac{BC^2}{4} + BC^2 + \frac{AB^2}{4}$$

$$AD^2 + CE^2 = \frac{5}{4}(AB^2 + BC^2)$$

$$AD^2 + CE^2 = \frac{5}{4}AC^2 \quad [AC^2 = AB^2 + BC^2]$$

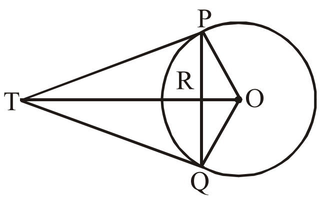
$$\left(\frac{3\sqrt{5}}{2}\right)^2 + CE^2 = \frac{5}{4} \times 25$$

$$CE^2 = \frac{125}{4} - \frac{45}{4}$$

$CE^2 = 20$

$CE = \sqrt{20} = 2\sqrt{5}$ cm

36.



Given PQ = 16 cm

Radius = 10 cm

To find : TP

Solution : Join OP and OQ

In ΔOTP and ΔOTQ

OP = OQ (Radius)

TP = TQ (Tangents from external point)

OT = OT (common)

$\therefore \Delta OPT \cong \Delta OQT$ (SSS)

$\angle POT = \angle QOT$ (cpct) ....(i)

In ΔOPR and ΔOQR

OP = OQ

$\angle POR = \angle QOP$ (from (i))

OR = RO

$\Delta OPR \cong \Delta OQR$ (SAS)

So, $PR = RQ = \frac{1}{2} \times 16 = 8$ cm .....(ii)

$\angle ORP = \angle ORQ = 90°$ .....(iii)

(By cpct)

In ΔOPR

$OR^2 = OP^2 - PR^2$

$OR^2 = 100 - 64$

OR = 6

In ΔTRP $TR^2 = TP^2 - 64$ .....(iv)

In ΔTOP

$OT^2 = TP^2 + (10)^2$

$(TR + OR)^2 = TP^2 + 100$

$(TR + 6)^2 = TP^2 + 100$

$TR^2 + 12TR + 36 = TP^2 + 100$

$TP^2 - 64 + 12TR + 36 = TP^2 + 100$

(using (iv))

12TR = 128

$TR = \frac{32}{3}$ cm

from (iv) $\left(\frac{32}{3}\right)^2 = TP^2 - 64$

$$TP^2 = \frac{1024}{9} + 64$$

$$TP^2 = \frac{1024 + 576}{9} = \frac{1600}{9}$$

$TP = \frac{40}{3}$ cm