SSLC MODEL EXAMINATION FEBRUARY – 2024 . CLASS: X

MATHEMATICS

ANSWER KEY.

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GHS
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1)

a) $d = 10$

b) $x_{10} = f + 9d$

$= 1 + 9 \times 10$

$= 1 + 90$

$= \underline{91}$.

2) $\angle APB = \cancel{\frac{1}{2}} \cancel{\times} 180 - \angle AQB$

a) $= 180 - 110$

$= \underline{70^\circ}$.

b) $\angle AOB = 2 \times \angle APB$

$= 2 \times 70$

$= \underline{140^\circ}$

3) Ascending order is

$20, 20, 24, \boxed{32, x}, 40, 45, 48$

median $= \frac{32 + x}{2}$

$34 = \frac{32 + x}{2}$

$68 = 32 + x$

$\therefore x = 68 - 32$

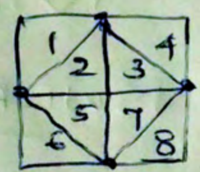
$= \underline{36}$.

4) probability of dot in the shaded part $\}$

$$= \frac{\text{area of shaded part}}{\text{Total area}}$$

$$= \frac{4}{8}$$

$$= \underline{\underline{\frac{1}{2}}}$$



5) Given $x_n = 3n - 2$

a) $x_1 = 3 \times 1 - 2$

$= 3 - 2$

$= \underline{\underline{1}}$.

b) $x_{50} = 3 \times 50 - 2$

$= 150 - 2$

$= \underline{\underline{148}}$

$S_{n} = \frac{n}{2}(x_1 + x_n)$

$S_{50} = \frac{50}{2}(1 + 148)$

$= 25 \times 149$

$= \underline{\underline{3725}}$

6) fig.

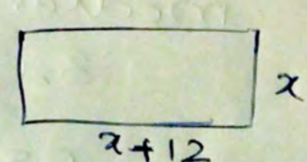
7) let one side $= x$

$\therefore$ longer side $= x + 12$

a) Area $= l \times b$

$x(x+12) = 864$

$x^2 + 12x = 864$



$x^2+12x-864=0$

Coeff of $x = 12$
half $= 6$
$(6)^2 = \underline{36}$

b) Consider $x^2+12x=864$

$$x^2+12x+36=864+36$$
$$(x+6)^2=900$$

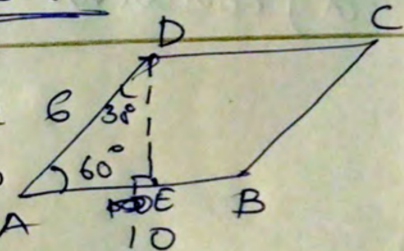
$\therefore x+6=\sqrt{900}$ $\therefore x+6=\pm 30$

$x+6=30$	$x+6=-30$
$x=30-6$	$x=-30-6$
$=\underline{24}$	$=\underline{-36}$

Being length of side $\therefore x=24$

$\therefore$ shorter side $= 24$ cm

longer side $= 24+12$
$= \underline{36 \text{ cm}}$



8) In ΔAED angles are $30°, 60°, 90°$ so opp. sides are in the ratio $1:\sqrt{3}:2$

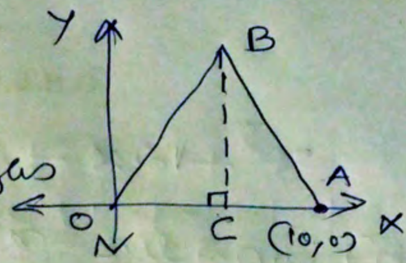
$\therefore AE = \frac{6}{2} = 3$ cm

$DE = 3\times\sqrt{3}$
$= \underline{3\sqrt{3} \text{ cm}}$

a) distance b/w ||el sides (AB & CD) $= \underline{3\sqrt{3} \text{ cm}}$

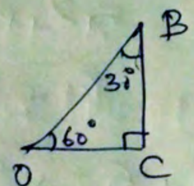
b) Area of ||gm $= bh$
$= 10\times 3\sqrt{3}$
$= \underline{30\sqrt{3} \text{ cm}^2}$

9)



a) one side = 10 units

b) In of Δ^{le} OCB, angles are 30°, 60°, 90°,



Since OB = 10

$\therefore$ OC = $\frac{10}{2}$

= 5

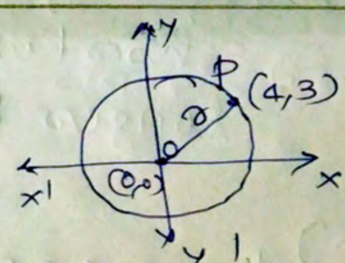
BC = $5\sqrt{3}$

Ht. of Δ^{le} = $5\sqrt{3}$

c) Coordinates of B are (OC, CB)

$(5, 5\sqrt{3})$

10)



a) radius = $\sqrt{4^2+3^2}$

= $\sqrt{16+9}$

= $\sqrt{25}$

= 5 units

b) Points of I.S of this circle with y-axis = (0, 5) & (0, -5)

11) Given $x_3 = 16$, $x_{21} = 124$.

a) $d = \frac{x_{21} - x_3}{21-3}$

$= \frac{124-16}{18}$

$= \frac{108}{18}$

$= 6$.

b) $x_1 = x_3 - 2d$
$= 16 - 2 \times 6$
$= 16 - 12$
$= \underline{\underline{4}}.$

c) $x_n = dn + (f - d)$
$= 6n + (4 - 6)$
$280 = 6n - 2$
$\therefore 6n = 280 + 2$
$6n = 282$
$\therefore n = \frac{282}{6}$
$= \underline{\underline{47}}$

OR
$n = \left(\frac{x_n - x_1}{d}\right) + 1$
$= \left(\frac{280 - 4}{6}\right) + 1$
$= \frac{276}{6} + 1$
$= 46 + 1$
$= \underline{\underline{47}}$

position of 280 in this seq: $= \underline{\underline{47}}.$

12) Box-1: $\boxed{1 \text{ to } 10}$ Box-2: $\boxed{1 \text{ to } 20}$

a) Total no. of ways $= 10 \times 20$
$= \underline{\underline{200}}$

b) Prob. of both no.s same $= P\{(1,1),(2,2), \cdots (10,10)\}$
$= \frac{10}{200}$
$= \underline{\underline{\frac{1}{20}}}.$

c) Prob. of an even no. & an odd no.
$= \frac{\text{Even} \times \text{odd} + \text{odd} \times \text{Even}}{\text{Total pairs}}$
$= \frac{5 \times 10 + 5 \times 10}{200} = \frac{50+50}{200} = \frac{100}{200}$
$= \underline{\underline{\frac{1}{2}}}.$

b) Given, $10 + x(x+7) = 304$

$\therefore 10 + x^2 + 7x = 304$

$\therefore x^2 + 7x + 10 - 304 = 0$

$x^2 + 7x - 294 = 0.$

$x^2 + 7x = 294$

$\therefore x^2 + 7x + \frac{49}{4} = 294 + \frac{49}{4}$

$\left(x + \frac{7}{2}\right)^2 = \frac{1176 + 49}{4}$

$\left(x + \frac{7}{2}\right)^2 = \frac{1225}{4}$

$\therefore x + \frac{7}{2} = \sqrt{\frac{1225}{4}}$

$x + \frac{7}{2} = \pm \frac{35}{2}$

$x + \frac{7}{2} = \frac{35}{2}$

$\therefore x = \frac{35}{2} - \frac{7}{2}$

$= \frac{35 - 7}{2}$

$= \frac{28}{2}$

$= \underline{14}$

$x + \frac{7}{2} = \frac{-35}{2}$

$x = \frac{-35}{2} - \frac{7}{2}$

$= \frac{-42}{2}$

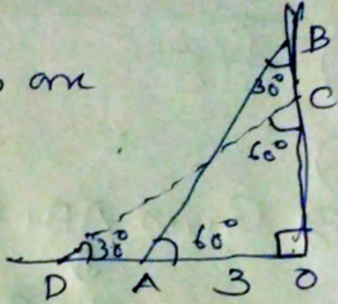
$= \underline{-21}.$

$\therefore$ No.s are $= \underline{14, 21}$ or $\underline{-21, -14}$

14)

a) In ΔAOB, angles are

$30°, 60°, 90°$



So $OA : OB : AB = 1 : \sqrt{3} : 2$

Here $\underline{OA = 3\,m}$ $\therefore OB = \underline{3\sqrt{3}\,m}$ $AB = 3 \times 2 = \underline{6\,m}$

$\therefore$ length of ladder $= \underline{6\,m}$

b) Consider of Δ^{le} OCD, angles are $30°, 60°, 90°$

Here $CD = AB = \underline{6\,m}$

$\therefore OC = \frac{6}{2} = \underline{3\,m}$

$\therefore$ Now the Ht. of ladder $= \underline{3\,m}$.

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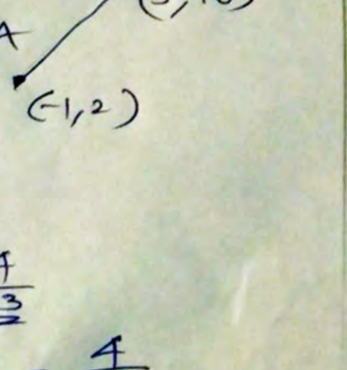
15) a) Given pts $(-1, 2)$ & $(5, 10)$

$$\text{distance} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$
$$= \sqrt{(5 - -1)^2 + (10 - 2)^2}$$
$$= \sqrt{(5+1)^2 + (8)^2}$$
$$= \sqrt{6^2 + 8^2}$$
$$= \sqrt{36 + 64}$$
$$= \sqrt{100}$$
$$= \underline{10 \text{ units}}$$



b)

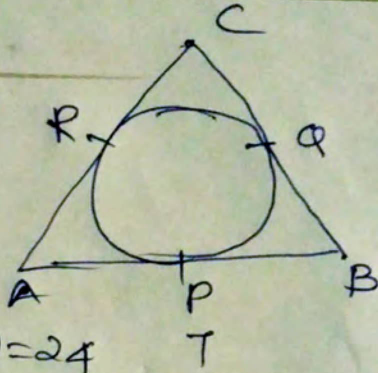
Slope of $AB = \frac{y_2 - y_1}{x_2 - x_1}$

$$= \frac{10 - 2}{5 - -1} = \frac{8}{6} = \underline{\frac{4}{3}}$$

Slope of $AP = \frac{18 - 2}{11 - -1} = \frac{16}{11+1} = \frac{16}{12} = \frac{4}{3}$

Since AP & AB have same slope.
So AB extended also passes through.
(11, 18)

16) fig.



17)
a) Given $AB + BC + AC = 24$

$(AP + PB) + (BQ + CQ) + (AR + RC) = 24$

$AP + BQ + BQ + CR + AP + CR = 24$

$2(AP + BQ + CR) = 24$

$\therefore AP + BQ + CR = \frac{24}{2}$

$AP + BQ + CR = \underline{\underline{12}}$.

b) we have $AP + BQ + CR = 12$

$AP + BP + CQ = 12$

$AB + CQ = 12$

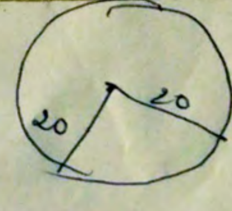
$7 + CQ = 12$

$\therefore CQ = 12 - 7$

$CQ = \underline{\underline{5}}$ cm

$\therefore QC = \underline{\underline{5}}$ cm

18) Given $R = 20$ cm,
rad. of cone $(r) = 12$ cm.



a) For cone $l = R$
$= 20cm$

we have $\frac{r}{R} = \frac{x}{360}$

$\frac{12}{20} = \frac{x}{360}$

$\therefore x = \frac{12}{20} \times 360$

$= 12 \times 18$

$= \underline{216^{\circ}}$

Central angle of the sector $= \underline{216^{\circ}}$

b) C.S.A. of cone $= \pi r l$

$= \pi \times 12 \times 20$

$= \underline{240\pi \, cm^2}$

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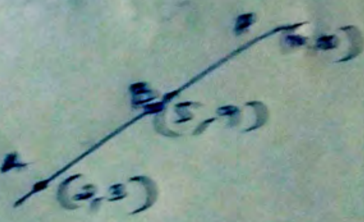
19) a) Slope $= \frac{y_2 - y_1}{x_2 - x_1}$ $\quad \overset{x_1 \; y_1}{(2, 3)} \quad \overset{x_2 \; y_2}{(5, 9)}$

$= \frac{9-3}{5-2}$

$= \frac{6}{3}$

$= \underline{\underline{2}}$



b) Let $P(x, y)$ be a pt. on the line

$\therefore$ Slope of AP = Slope of AB

$\frac{y-3}{x-2} = 2$

$\therefore y - 3 = 2(x-2)$

$y - 3 = 2x - 4$

$\therefore \underline{2x - y - 1 = 0}$

c) Consider the pt $(1,5)$

Put $x=1$ & $y=5$ in $2x-y-1$

$$2x-y-1 = 2\times1-5-1$$
$$= 2-5-1$$
$$= 2-6$$
$$= -4$$
$$\neq 0.$$

$\therefore (1,5)$ is not a pt. on this line

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20) Given $p(x) = 2x^2-7x+9$

a) $p(2) = 2(2)^2-7(2)+9$
$$= 2\times4-14+9$$
$$= 8-14+9$$
$$= 17-14$$
$$= \underline{\underline{3}}.$$

b) Consider $p(x)-p(2)=0$
$$2x^2-7x+9-3=0$$
$$2x^2-7x+6=0.$$
$$\therefore x = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$$
$$= \frac{7\pm\sqrt{(-7)^2-4\times2\times6}}{2\times2}$$
$$= \frac{7\pm\sqrt{1}}{4} = \frac{7\pm1}{4} = \frac{7+1}{4}, \frac{7-1}{4}$$
$$= \frac{8}{4}, \frac{6}{4} = \underline{2, \frac{3}{2}}$$

Solutions are $\underline{\underline{2, 3/2}}$

21) No. of Spheres $= \dfrac{\text{Vol. of Hemisphere}}{\text{Vol. of One sphere}}$

$$= \frac{\frac{2}{3}\pi R^3}{\frac{4}{3}\pi r^3}$$

Given
$R = 10$ cm
$r = 1$ cm

$$= \frac{R^3}{2r^3}$$

$$= \frac{10 \times 10 \times 10}{2 \times 1 \times 1 \times 1}$$

$$= \frac{1000}{2}$$

$$= \underline{\underline{500}}.$$

22) Given $x_1 = 5$, $d = 4$.

a) $x_n = dn + (f - d)$

$= 4n + (5 - 4)$

$= \underline{\underline{4n + 1}}.$

b) $S_n = \frac{d}{2} n^2 + \left(f - \frac{d}{2}\right) n$

$= 2n^2 + (5 - 2) n$

$= \underline{\underline{2n^2 + 3n}}$

c) $S_{20} = 2(20)^2 + 3(20)$

$= 2 \times 400 + 60$

$= 800 + 60$

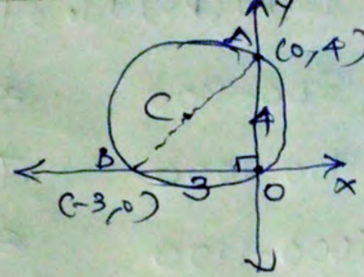
$= \underline{\underline{860}}$

23) a) diameter $= \sqrt{3^2+4^2}$

$= \sqrt{9+16}$

$= \sqrt{25}$

$= \underline{5}$.



(or by distance formula also we can find diameter)

b) Centre $= \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

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

$= \underline{\underline{(-3/2, 2)}}$

c) eq. of circle is $(x-a)^2+(y-b)^2=r^2$

$\left[x-\left(-3/2\right)\right]^2+(y-2)^2=\left(\frac{5}{2}\right)^2$

$\underline{\underline{(x+3/2)^2+(y-2)^2=\frac{25}{4}}}$

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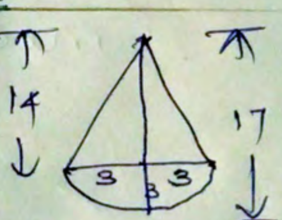
24) fig.



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25) a) Ht. of Cone $= 17-3$

$= \underline{\underline{14}}$ cm

b) Vol. of toy $= V_1+V_2$

$= \frac{2}{3}\pi r^3+\frac{1}{3}\pi r^2 h$.

$= \frac{2}{3}\pi\times 3^3+\frac{1}{3}\pi\times 3^2\times 14$

$= 18\pi+42\pi$

$= \underline{\underline{60\pi \text{ cm}^3}}$

05)

D.W (Rs)	No of workers	D.W	No of workers
800-900	5	upto 900	5
900-1000	7	" 1000	12
1000-1100	6	" 1100	18
1100-1200	10	" 1200	28 ← 23rd
1200-1300	15	" 1300	43
1300-1400	2	" 1400	45
TOTAL	45		

Here $d = \frac{1200-1100}{10}$

$= \frac{100}{10}$

$= \underline{\underline{10}}$.

a) $a_{19} = 1100 + \frac{d}{2}$

$= 1100 + \frac{10}{2}$

$= 1100 + 5$

$= \underline{\underline{1105}}$

b) median position $= \frac{45+1}{2}$

$= \underline{\underline{23}}$

$\therefore$ median $= a_{23}$

$= a_{19} + 4d$

$= 1105 + 4 \times 10$

$= 1105 + 40$

$= \underline{\underline{1145}}$.

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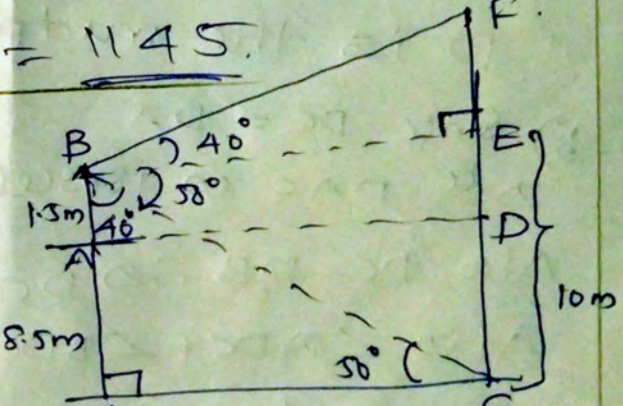
27) a)

b) In of $\triangle^{le}$ COB,



$\tan 40 = \frac{OC}{OB}$

$0.84 = \frac{OC}{10}$

$\therefore OC = \underline{\underline{8.4}}$

Distance b/w tower & building $= \underline{\underline{8.4}}$ m

In ~~A~~ · ΔBEF, $\tan 40 = \frac{EF}{BF}$

$$0.84 = \frac{EF}{8.4}$$

$$\therefore EF = 8.4 \times 0.84$$

$$= \underline{7.056 \, m}$$

$\therefore$ Ht. of tower $= CF$

$$= CE + EF$$

$$= 10 + 7.056$$

$$= 17.056$$

$$\simeq \underline{17.06 \, m}$$

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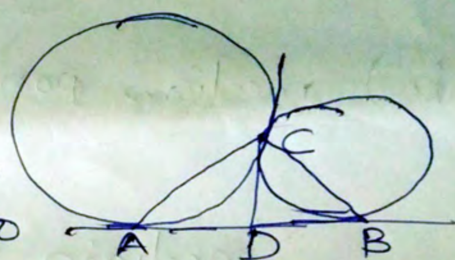
28)

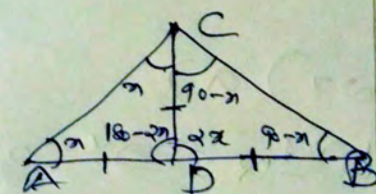


a) we have tangents drawn from an external point to the circle are equal.

$\therefore$ $DC = DA$ & $DC = DB$

$\therefore$ $DA = DB$

$\therefore$ D is the midpoint of AB



b) Since $DC = DA$

Δle DAC is Isosceles

Also $DC = DB$ $\therefore \Delta DCB$ is Isosceles

Also $\angle ADC + \angle BDC = 180^\circ$ (L.P)

$\therefore$ From fig. $\angle C = x + (90 - x)$

$$= 90^\circ$$

$\therefore$ $\angle ACB = \underline{90^\circ}$

29) a) $1+2+3+4+5+6+5+4+3+2+1=36$

b) $1+2+ \cdots + 14+15+14+13+ \cdots +1 = 15^2$

$= \underline{\underline{225}}$

c) middle no. = 20

d) $(3n-1)^2 = 2500$

$\therefore 3n-1 = \sqrt{2500}$

$3n-1 = 50$

$3n = 50+1$

$3n = 51$

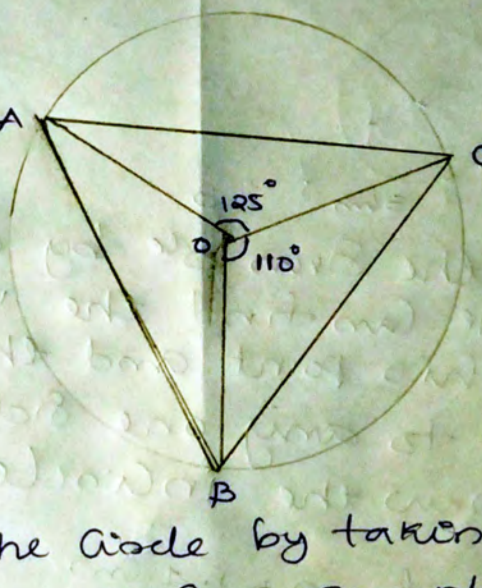
$n = \frac{51}{3}$

$= \underline{\underline{17}}$

$55 \times 2 = 110°$

$62\frac{1}{2} \times 2 = 125°$

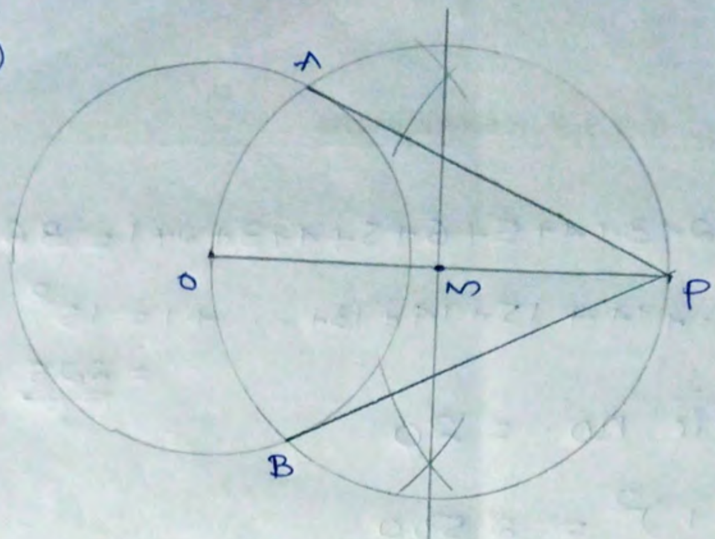
6)



First draw the circle by taking $110°$ & $125°$ at the centre we can complete this circum circle. Here $\angle A = \frac{110}{2} = 55°$ & $\angle B = \frac{125}{2}$

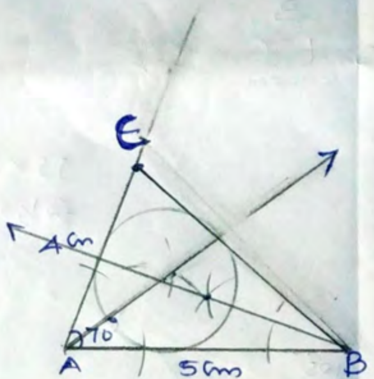
$= \underline{\underline{62\frac{1}{2}°}}$

16)



First draw the circle mark P at 7.5 cm from centre by drawing ⊥r bisector to OP we get 2 pts of intersection of circles (M is the centre of ... circle & MO = MP as radius). Here PA & PB are the tangents to the given circle from P.

24)



First draw the given △le by drawing angle bisectors we can find the incentre by taking centre at this point and the distance from this point to any one side as radius we can draw the incircle.

Incircle radius = 1.4 cm