CBSE CLASS-10
MATH (BASIC)
2026 EXAM SET-2

SECTION-A

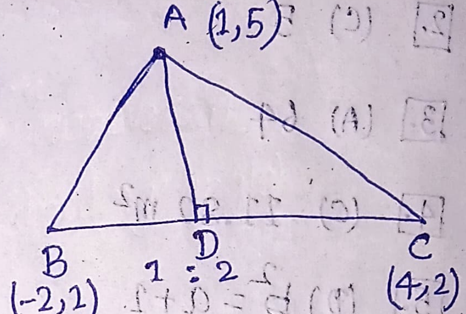
1. (A) $314\sqrt{2}\ cm^2$
2. (C) 5
3. (A) 64
4. (C) $11.82\ m^2$
5. (D) $b^2 = a+1$
6. (C) cosec A
7. (A) 2:5
8. (B) $10\sqrt{3}$ m
9. (C) 3.5 cm
10. (D) $\frac{AC}{BC} = \frac{PR}{QR}$
11. (C) 0.3
12. (D) $\frac{82}{80}$
13. (C) $\frac{10}{0.2}$
14. (B) $\frac{49}{12}$
15. (C) $a(x^2+5x-24)$
16. (B) -5
17. (C) 45°
18. (A) $\frac{5}{12}$

19. (A)

20. (C)

SECTION-B

21. In this ΔABC, $A=(1,5)$, $B=(-2,1)$ and $C=(4,2)$



D is a point of BC which divide in 1:2 ratio, then

$$D = \left(\frac{1(4)+2(-2)}{1+2}, \frac{1(2)+2(1)}{1+2}\right)$$

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

Length of $AD = \sqrt{(1-0)^2 + \left(5-\frac{4}{3}\right)^2}$

$$= \sqrt{1+\frac{121}{9}} = \frac{\sqrt{130}}{3}$$

22. (a) $$\frac{\sin^3 60^\circ - \tan 30^\circ}{\cos^2 45^\circ}$$

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

$$= \left(\frac{3\sqrt{3}}{8} - \frac{1}{3\sqrt{3}}\right) \times 2$$

$$= \frac{27-8}{24\sqrt{3}} \times 2 = \frac{\cancel{38}\ 19}{12\sqrt{3}}$$

22 (b) Given $\tan(A+2B) = \sqrt{3}$

$\Rightarrow A + 2B = 60^\circ$ ——— (i)

and $\sin(2A+B) = \frac{1}{\sqrt{2}}$

$\Rightarrow 2A + B = 45^\circ$ ——— (ii)

where $A, B, A+2B$ and $2A+B$ are acute angles.

Eq^n (i) $\times 1$: $A + 2B = 60^\circ$

Eq^n (ii) $\times -2$: $-4A - 2B = -90^\circ$

$-3A = -30^\circ$

$\Rightarrow \boxed{A = 30^\circ}$

From (i) $A + 2B = 60^\circ$

$\Rightarrow 2B = 60^\circ - 30^\circ$

$= 50^\circ$

$\Rightarrow \boxed{B = 25^\circ}$

23. A bag contains 25 balls.

Let no. of green balls $= x$.

one ball is drawn at random.

Given $P(\text{getting a green ball}) = \frac{3}{5}$

$\Rightarrow \frac{\text{no. of favourable events}}{\text{Total no. of outcomes}} = \frac{3}{5}$

$\Rightarrow \frac{x}{25} = \frac{3}{5}$

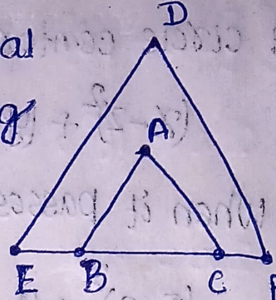
$\Rightarrow \boxed{x = 15}$

Hence, number of green balls are 15.

24. Given

ED ∥ AB and EC is a transversal

then $\angle DEB = \angle ABC$ (corresponding angle)



Again DF ∥ AC and BF is a transversal

then $\angle ACB = \angle DFC$ (corresponding angle)

In $\triangle ABC$ and $\triangle DEF$

$\angle B = \angle E$

and $\angle C = \angle E$

Hence by AA similarity criterion

$\triangle ABC \sim \triangle DEF$

Again $\frac{BC}{EF} = \frac{AB}{DE} \Rightarrow DE = \frac{AB \times EF}{BC} = \frac{7 \times 20}{10} = 14$ cm.

25. Given $\sqrt{3}$ is irrational.

Suppose that $14 - 2\sqrt{3}$ is rational

then $14 - 2\sqrt{3} = \frac{p}{q}$; where HCF(p, q) = 1

$\Rightarrow 2\sqrt{3} = 14 - \frac{p}{q}$

$\Rightarrow \sqrt{3} = 7 - \frac{p}{2q}$

but $\sqrt{3}$ is irrational and $7 - \frac{p}{2q}$ is rational

Which is a contradiction.

Hence $14 - 2\sqrt{3}$ is irrational.

26. (a) A circle centered at (2,1) is,

$$(x-2)^2+(y-1)^2=r^2 \quad \text{(i)}$$

When it passes through A(5,6)

$$(5-2)^2+(6-1)^2=r^2$$

$$\Rightarrow r^2=9+25$$

$$\Rightarrow \boxed{r^2=34}$$

When it passes through to B(-3,K)

$$(-3-2)^2+(K-1)^2=34$$

$$\Rightarrow (K-1)^2=34-25$$

$$\Rightarrow (K-1)=\pm 3$$

$$\Rightarrow \boxed{K=4} \text{ or } \boxed{K=-2}$$

(b) P divide the line segment $\overline{AB}$ in the ratio 3:2 ratio. Then by section formula ; A=(-1,7), B=(4,-3)

$$P=\left(\frac{3(4)+2(-1)}{3+2}, \frac{3(-3)+2(7)}{3+2}\right)=\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$$

$$=(2,1)$$

By distance formula $(\overline{AB})=\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$

$$=\sqrt{(-1-4)^2+(7-(-3))^2}$$

$$=\sqrt{25+100}$$

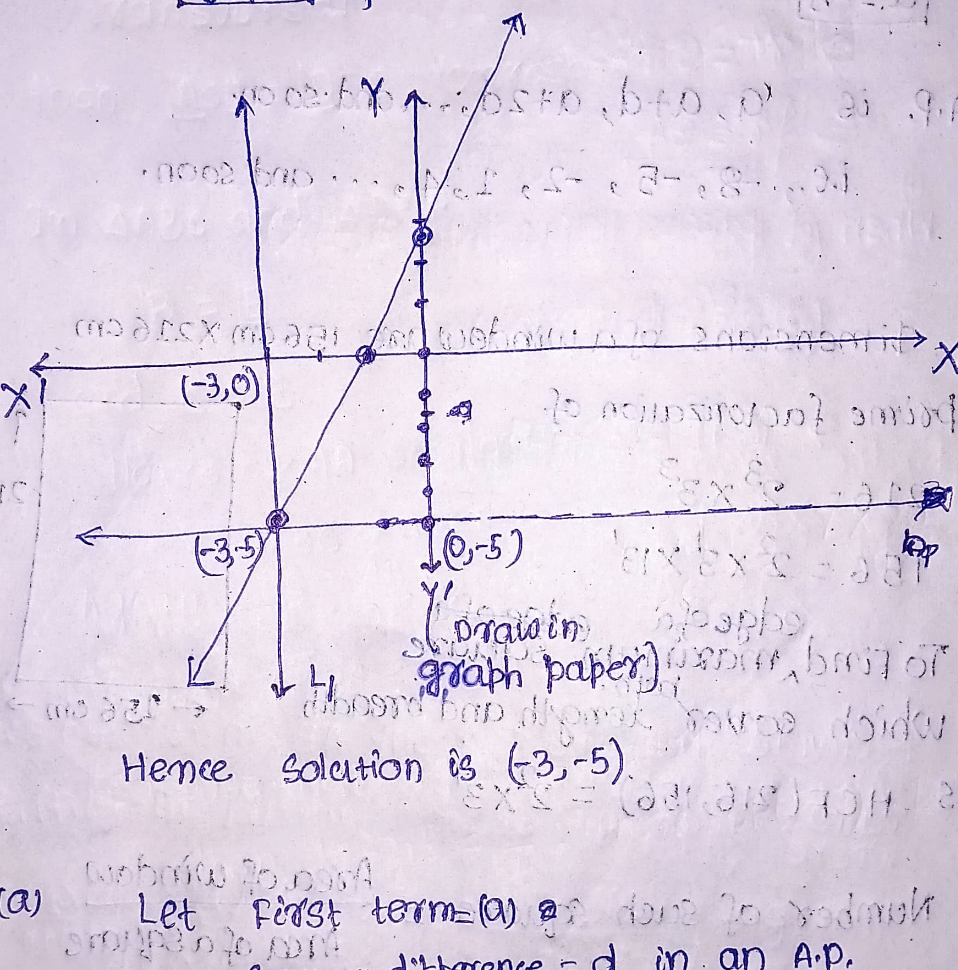
$$=5\sqrt{5} \text{ units}$$

27. Consider system of linear equations

$L_1: x = -3$

$L_2: 5x - 2y = -5$

x	0	-1
y	5/2	0



Hence solution is $(-3, -5)$.

28. (a) Let first term $= (a)$
common difference $= d$ in an A.P.

nth term $(a_n) = a + (n-1)d$

Sum of 1st n terms $(S_n) = \frac{n}{2}[2a + (n-1)d]$

ATQ, $a_{15} = a_8 + 21$

$\Rightarrow (a + 14d) - (a + 7d) = 21$

$\Rightarrow 7d = 21$

$\Rightarrow \boxed{d = 3}$

Again $S_{10} = 55$

$\Rightarrow \frac{10}{2}[2a+9d] = 55$

$\Rightarrow 2a+9(3) = 11$

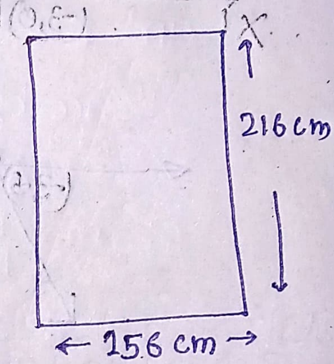
$\Rightarrow 2a = -16$

$\Rightarrow \boxed{a=-8}$

$\therefore$ A.P. is $a, a+d, a+2d, \ldots$ and so on.

i.e., $-8, -5, -2, 1, 4, \ldots$ and soon.

29. Dimensions of a window are $156\,cm \times 216\,cm$



prime factorization of

$216 = 2^3 \times 3^3$

$156 = 2^2 \times 3^1 \times 13^1$

To Find maximum edge of a square which cover both length and breadth

is $HCF(216, 156) = 2^2 \times 3^1$

$$\text{Number of such square} = \frac{\text{Area of window}}{\text{Area of a square}}$$

$$= \frac{156 \times 216}{(2^2 \times 3)^2}$$

$$= \frac{2^2 \times 3 \times 13 \times 2^3 \times 3^3}{2^4 \times 3^2}$$

$$= 2 \times 3^2 \times 13$$

$$= 234$$

30.

$$\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta}$$

$$= \frac{\tan\theta}{1-\frac{1}{\tan\theta}} + \frac{\frac{1}{\tan\theta}}{1-\tan\theta}$$

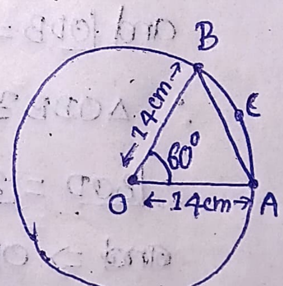
$$= \frac{-\tan^2\theta}{1-\tan\theta} + \frac{1}{\tan\theta(1-\tan\theta)}$$

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

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

$$= \cot\theta + 1 + \tan\theta$$

31. AB is a chord of a circle where radius (r) = 14cm making angle 60° with the centre.



$$Ar(\text{AOB sector}) = \frac{\theta}{360^\circ} \times \pi r^2$$

$$= \frac{60^\circ}{360^\circ} \times \frac{22}{7} \times 14 \times 14$$

$$= \frac{1}{6} \times 22 \times 2 \times 14$$

$$= \frac{1}{3} \times 308$$

$$\simeq 102.67 \text{ cm}^2$$

Perimeter of $\widehat{ACB} = \frac{\theta}{360^\circ} \times 2\pi r$

$= \frac{60^\circ}{360^\circ} \times 2 \times \frac{22}{7} \times 14$

$= \frac{1}{6} \times 2 \times 22 \times 2$

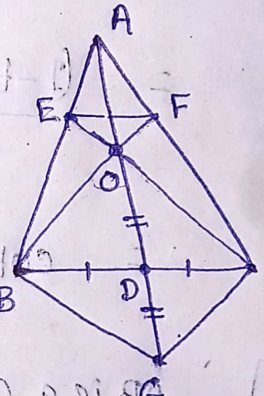
$= \frac{1}{3} \times 44$

≈ 14.67 cm

SECTION-D

32. In the given figure, given

$BD = CD$ and $OD = GD$



(i) In $\triangle ODB$ and $\triangle CDG$

$BD = CD$

$OD = GD$

and $\angle ODB = \angle CDG$ (opposite angle)

$\therefore \triangle ODB \cong \triangle CDG$

$\therefore \angle BOD = \angle DGC$ and $OB = CG$

~~and~~ $\Rightarrow OB \parallel CG$ —— (i)

Similarly $\triangle BDG \cong$ ~~and~~ $\triangle CDO$

$\therefore \angle DBG = \angle OCD$ and $BG = OC$

$\Rightarrow BG \parallel OC$ —— (ii)

From (i) and (ii) OBGC quadrilateral

two opposite pair and parallel and same.

so OCGB is a quadrilateral,

or

Simply as diagonals are bisect each other.

(ii) ~~In~~ $\triangle ABG$ $EO \parallel BG$ (as given $OC \parallel BG$)

By thales th^m

$$\frac{AE}{BE} = \frac{AO}{BO} \text{ ——(i)}$$

and In $\triangle ACG$, $FO \parallel CG$ (as given $BO \parallel CG$)

By thales th^m

$$\frac{AF}{CF} = \frac{AO}{OG} \text{ ——(ii)}$$

From (i) and (ii)

$$\frac{AE}{EB} = \frac{AF}{FC}$$

$\Rightarrow EF \parallel BC$. (By Converse of thales th^m)

(iii) As from (ii) $EF \parallel BC$

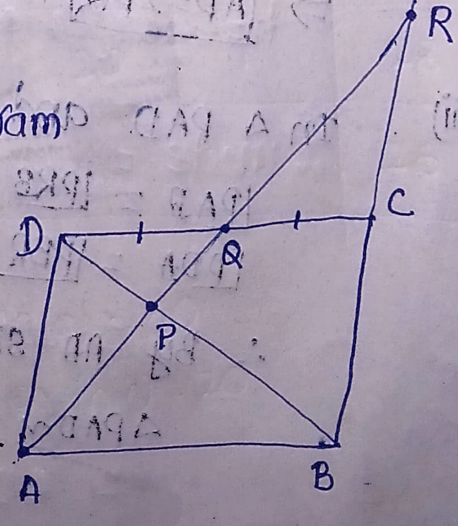
In $\triangle AEF$ and $\triangle ABC$

$\angle AEF = \angle ABC$

and $\angle AFE = \angle ACB$ (corresponding angle)

Hence by AA similarity criterion

$\triangle AEF \sim \triangle ABC$.



32. (b) Given ABCD is a parallelogram and Q is a mid-point of CD.

In $\triangle AQD$ and $\triangle RQC$

$\angle QAD = \angle QRC$ (AS $AD \parallel BR$)

$\angle QDA = \angle QCR$

(~~corresponding~~ alternate angle)

$\therefore$ By AA similarity criterion

$\triangle PAD \sim \triangle QRC$

$\Rightarrow \frac{QA}{QR} = \frac{AD}{CR} = \frac{QD}{QC}$

$\Rightarrow \frac{QA}{QR} = \frac{AD}{CR} = 1$ (As $QD = QC$, Q is a mid-point of DC)

$\Rightarrow \boxed{QA = QR}$ and $\boxed{AD = CR}$ —— (i)

(ii) In $\triangle PAB$ and $\triangle PQD$

$\angle PAB = \angle PQD$ (as $AB \parallel QD$ ~~corresponding~~ angle)

and $\angle PBA = \angle PDQ$ alternate

$\therefore$ By AA similarity criterion

$\triangle PAB \sim \triangle PQD$

$\Rightarrow \frac{AP}{PQ} = \frac{PB}{PD} = \frac{AB}{DQ}$

$= \frac{2DQ}{DQ}$ (As $AB = CD = 2DQ$)

$\Rightarrow \frac{AP}{PQ} = 2$

$\Rightarrow \boxed{AP = 2PQ}$

(iii) In $\triangle PAD$ and $\triangle PRB$

$\angle PAD = \angle PRB$ (As $AD \parallel BR$)

$\angle PDA = \angle PBR$ ~~correspond~~ (Alternate angle)

$\therefore$ By AA similarity criterion

$\triangle PAD \sim \triangle PRB$

From (i) AD = CR

and AD = BC (as ABCD is a parallelogram)

So CR = BC.

and $\frac{AD}{BR} = \frac{PD}{PB} = \frac{AP}{RP}$

$\Rightarrow \frac{AP}{RP} = \frac{AD}{BR}$

$= \frac{AD}{BC+CR}$

$= \frac{AD}{2BC}$

$\Rightarrow \frac{AP}{RP} = \frac{1}{2}$ (as AD = BC)

$\Rightarrow \boxed{PR = 2AP}$

33. (a) Given mean $(\bar{x}) = 53$ of the following distribution

Class	f	x	x−a	$u = \frac{x-a}{h}$	uf
0-20	12	10	−40	−2	−24
20-40	15	30	−20	−1	−15
40-60	p	50	0	0	0
60-80	28	70	20	1	28
80-100	13	90	40	2	26

Let assume mean (a) = 50

Interval length (h) = 20

$\therefore \Sigma uf = -24 - 15 + 0 + 28 + 26 = 15$

$\Sigma f = 12 + 15 + p + 28 + 13 = 68 + p$

by step-deviation method

$$\text{mean} = a + \frac{\Sigma fu}{\Sigma f} \times h$$

$$\Rightarrow 53 = 50 + \frac{15}{68+p} \times 20$$

$$\Rightarrow \frac{300}{68+p} = 3$$

$$\Rightarrow 3\cancel{0}0 = 204 + 3p$$

$$\Rightarrow 3p = 96$$

$$\Rightarrow \boxed{p = 32}$$

We have ~~for~~ highest frequency $(f_1) = 32$

$\therefore$ modal class : 40 − 60

l = lower limit of the modal class = 40

f_0 = preceeding frequency of the modal class = 15

f_2 = Succeeding frequency of the modal class = 28

h = length of the modal class = 20

$$\therefore \text{mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$= 40 + \frac{32 - 15}{2(32) - 15 - 28} \times 20$$

$$= 40 + \frac{17}{21} \times 20$$

$$= 40 + \frac{340}{21}$$

$$\approx 40 + 16.19$$

$$\Rightarrow \boxed{\text{mode} = 56.19}$$

(b). Given distribution table (Discrete frequency)

mid-Value (x)	frequency (f)	Cumulative frequency
115	12	12
125	15	27
135	20	47
145	16	63
155	10	73
165	16	89
175	11	100

$$\text{median} = \frac{\left(\frac{n}{2}\right)^{th} + \left(\frac{n}{2}+1\right)^{th} \text{ observation}}{2}$$

$$= \frac{\left(\frac{100}{2}\right)^{th} + \left(\frac{100}{2}+1\right)^{th} \text{ obsen}}{2}$$

$$= \frac{50^{th} + 51^{th} \text{ observation}}{2}$$

$$= \frac{145+145}{2} = \frac{290}{2}$$

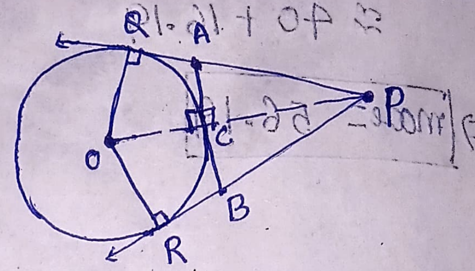
$$\boxed{\text{median} = 145}$$

34. PQ and PR are two tangent.

radius (r) = 5 cm.

AB is another tangen at C.

OP = 13 cm



Since $OQ \perp PQ$

$OR \perp PR$

$OC \perp AB$

(As line joining centre to the tangent point is $\perp r$ to the tangent)

$\therefore \triangle OPQ$ RAT, $OQ^2 + PQ^2 = OP^2$

$\Rightarrow PQ^2 = 13^2 - 5^2 = 12^2$

$\Rightarrow \boxed{PQ = 12}$ cm

In RAT $\triangle OPQ$, $\cos \angle OPQ = \frac{PQ}{OP}$ — (i)

and since $\angle ACP = 90^\circ$

RAT $\triangle ACP$, $\cos \angle CPA = \frac{CP}{AP}$ — (ii)

Since $OP = OC + CP$

$\Rightarrow CP = 13 - 5$

$\Rightarrow \boxed{CP = 8 \text{ cm}}$

Since Eq^n (i) and (ii) are same

$\frac{PQ}{OP} = \frac{CP}{AP}$

$\Rightarrow \frac{12}{13} = \frac{8}{AP}$

$\Rightarrow AP = \frac{8 \times 13}{12}$ $\Rightarrow \boxed{AP = \frac{26}{3} \text{ cm}}$

now RAT $\triangle CPA$, $AC^2 = AP^2 - RP^2$

$= \left(\frac{26}{3}\right)^2 - 8^2$

$= \frac{676 - \cancel{596}\,576}{9}$

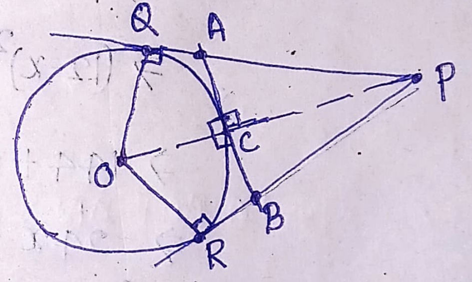
$= \cancel{\frac{484}{9}} = \frac{100}{9}$

$\Rightarrow$ $\cancel{\boxed{AC = \frac{22}{3}}}$ $\boxed{AC = \frac{10}{3}}$

Hence $\boxed{AB = 2AC = \frac{20}{3}\ cm}$

Method-II

Given ~~AQ~~ PQ and PR are tangent from P at Q and R.
AB is another tangent at C.



$OQ \perp PQ$
$OR \perp PR$
and $OC \perp AB$ (as line segment joining centre to the tangent point is $\perp$r to the tangent)

$OP = 13$ cm and radius $= 5$ cm

In RAT $\triangle OQP$, $PQ^2 = OP^2 - OQ^2 = 13^2 - 5^2$

$= 169 - 25$

$\Rightarrow \boxed{PQ = 12\ cm}$

$AQ = AC$ and $BC = BR$ and $PQ = PR$
(As length of tangent from an external point to the circle is same)

Let $AQ = x\ cm$

Then $AP = (12-x)\ cm$

$AQ = x\ cm$

$PC = OP - OC$

$= 13 - 5$

$\Rightarrow PC = 8\ cm$

$\angle ACO + \angle ACP = 90°$

$\therefore$ In RAT $\triangle ACP$, $\angle ACP = 90°$

By pythoras theorem

$AP^2 = AC^2 + CP^2$

$\Rightarrow (12-x)^2 = x^2 + 8^2$

$\Rightarrow 144 + x^2 - 24x = x^2 + 64$

$\Rightarrow 24x = 80$

$\Rightarrow \boxed{x = \frac{10}{3}\ cm}$

$\therefore \boxed{AQ = \frac{10}{3}\ cm}$

So, $AB = 2AC \Rightarrow \boxed{AB = \frac{20}{3}\ cm}$

$AP = 12 - x$

$= 12 - \frac{10}{3}$

$\Rightarrow \boxed{AP = \frac{26}{3}\ cm}$

35. Let two water tapes are B (with big diameter) and A (with small diameter).

Together A and B ~~full~~ filled the tank in $8\frac{8}{9}$ hours.

~~ATQ~~, Suppose tap A fill a tank in x hours and tap B fill the same tank in y hours

in 1 hour A fill $\frac{1}{x}$ part of the tank

and in 1 hour B fill $\frac{1}{y}$ part of the tank

then in 1 hour together they fill $\frac{1}{x}+\frac{1}{y}$ part of the tank.

Time take to fill the tank $= \frac{xy}{x+y}$ hours

$$\Rightarrow 8\frac{8}{9} = \frac{xy}{x+y} \qquad \text{——— (i)}$$

tape B take 4 hours less then A.

i.e. $y = x-4$

From (i) $\frac{80}{9} = \frac{x(x-4)}{x+x-4}$

$$\Rightarrow 160x - 320 = 9x^2 - 36x$$

$$\Rightarrow 9x^2 - 196x + 320 = 0$$

$$\Rightarrow 9x^2 - 180x - 16x + 320 = 0$$

$$\Rightarrow 9x(x-20) - 16(x-20) = 0$$

$$\Rightarrow (x-20)(9x-16) = 0$$

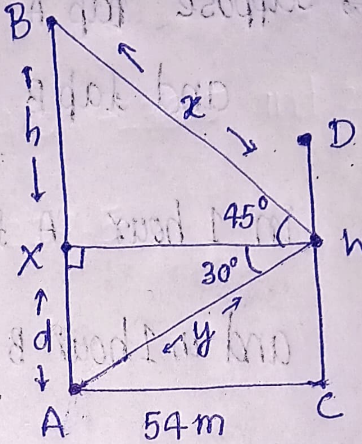
$$\Rightarrow \boxed{x = 20} \text{ or } x = \frac{16}{9} \text{ (impossible)}$$

Hence only possible value of $\boxed{x = 20}$

∴ time taken by A is 20 hours and B is 16 hours.

SECTION E

36. Given AB = elevated water tank
CD = multistory building



AC = distance between AB and CD
= 54 m

From a window W

$\angle XWB$ = angle of elevation = $45°$

$\angle XWA$ = angle of depression = $30°$

(i) ~~XW = AC = 54 m~~

~~In a RAT, ΔAXW, $\cos 30° = \frac{XW}{AW}$~~

~~$\Rightarrow AW = \frac{54}{\sqrt{3}/2}$~~

~~$\Rightarrow y =$~~ $\Rightarrow \boxed{y = \frac{108}{\sqrt{3}} m}$

(i) In RAT ΔAXW, $\sin 30° = \frac{AX}{AW}$

$\Rightarrow \frac{1}{2} = \frac{d}{y} \Rightarrow \boxed{y = 2d}$

(ii) In RAT ΔBXW, $\tan 45° = \frac{BX}{XW}$

$\Rightarrow 1 = \frac{h}{AC}$

$\Rightarrow \boxed{h = 54 m.}$

(iii) (a) In $\triangle AWX$ $\tan 30^\circ = \dfrac{AX}{XW}$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{d}{54}$$

$$\Rightarrow \boxed{d = 18\sqrt{3}\ m}$$

$\therefore$ height of the water tank $= h + d$

$= (54 + 18\sqrt{3})\ m$

(b) In $\triangle BXW$, $\cos 45^\circ = \dfrac{XW}{BW}$

$$\Rightarrow BW = \frac{AC}{1/\sqrt{2}}$$

$$\Rightarrow \boxed{x = 54\sqrt{2}\ m}$$

Height of the window $= d = 18\sqrt{3}\ m$

37 (i)
(ii) Co-ordinates $A = (0, P(0)) = (0, 136)$.
Span of the Arch = PQ

$= 228.5 - (-238.5)$

$= 467 \text{ m}$

(iii) (a) Zeroes of the polynomial are -238.5 and 228.5.

Sum of zeroes $= -238.5 + 228.5$

$= -10$

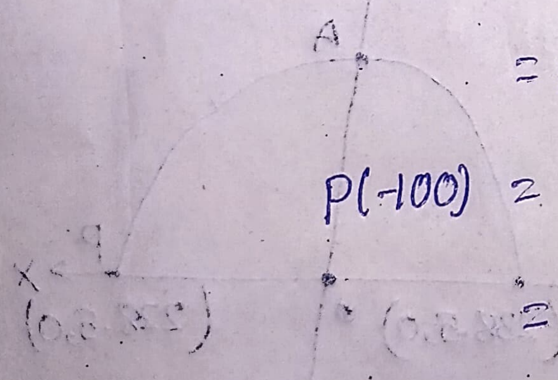
$-\frac{b}{a} = \frac{-(-0.025)}{-0.0025} = -10$

Hence sum of zeroes $= -\frac{b}{a}$

(b) $P(100) = -0.0025(100)^2 - 0.025(100) + 136$

$= -25 - 2.5 + 136$

$= 108.5$



$P(-100) = -0.0025(-100)^2 - 0.025(-100) + 136$

$= -0.25 + 2.5 + 136$

$= 138.25$

They are not same.

38 Dimensions of the cuboid shape wall mounted lamp are 24 cm × 12 cm × 17 cm.

Diameter of a spherical bulb = 7cm

(i) Surface area of the bulb $= 4\pi r^2$

$= 4 \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2$

$= 154 \text{ cm}^2$

(ii) minimum of (24, 12, 17) = 12 cm

After left 1cm space from each side, maximum diameter of the bulb = 12 cm − 2 × 1cm = 10 cm

(iii) (a) If there is a fold of 2cm on top and bottom edges then height (h) = 17 + 2 + 2 = 21 cm

length (l) = 24 cm and breadth (b) = 12 cm

Surface area $= 2(l \times h + b \times h)$

$= 2(24 \times 21 + 12 \times 21)$

$= 2(504 + 252)$

$= 1512 \text{ cm}^2$

(b) available space inside lamp

= Volume of the cuboid − volume of the sphere

$= 17 \times 24 \times 12 - \frac{4}{3}\pi r^3$

$= 4896 - 4312$

$= 584$ sq.cm.