WITH GRAPH PAPER

केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली

सैकण्डरी स्कूल परीक्षा (कक्षा दसवीं)

परीक्षार्थी प्रवेश–पत्र के अनुसार भरें

विषय **Subject :** Mathematics

विषय कोड **Subject Code :** 041

परीक्षा का दिन एवं तिथि
Day & Date of the Examination : Thursday 7/03/2019

उत्तर देने का माध्यम
Medium of answering the paper : English

प्रश्न पत्र के ऊपर लिखे कोड को दर्शाएँ :
Write code No. as written on the top of the question paper :

Code Number	Set Number
30/1/3	① ② ● ④

अतिरिक्त उत्तर–पुस्तिका (ओं) की संख्या
No. of supplementary answer -book(s) used 01

बेंचमार्क विकलांग व्यक्ति हाँ / नहीं
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विकलांगता का कोड
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यदि दृष्टिहीन हैं तो उपयोग में लाए गये सोफ्टवेयर का नाम :
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Each letter be written in one box and one box be left blank between each part of the name. In case Candidate's Name exceeds 24 letters, write first 24 letters.

कार्यालय उपयोग के लिए
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1. Make sure that the answer-book contains 48 pages and are properly serialed in number (including title pages) as soon as you receive it.
2. DO NOT make any special sign or mark in or outside the answer-book, supplementary answer-book, graph-paper, map etc.
3. DO NOT write your roll no., name of your school or place of examination in any of your answers.
4. You must write the supplementary answer-book serial no. in the attendance sheet.
5. Write on each ruled line on both sides and do not waste pages by leaving a wider margin.
6. DO NOT tear out or fold the pages of the answer-book and do not leave any page blank unnecessarily. No supplementary anwer-book(s) should be asked for unless this answer - book / the previous supplementary answer-book is finished.
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8. Draw a line when a question (or a part thereof) is finished.
9. Securely tag your answer-book with supplementary answer-book(s), graph-paper, map etc. if used by you, but DO NOT write your Roll No. on the supplementary answer-book, graph-paper, map etc.
10. Use only blue-black or royal-blue ink/gel/ball point pen. Using of any other writing instrument/ink/pencil etc will be on your own risk and responsibility.
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    - (a) having in possession papers, books, notes or any other material or information relevant to the examination in the paper concerned;
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WITH GRAPH PAPER

केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली

Central Board of Secondary Education, Delhi

SECONDARY SCHOOL EXAMINATION (CLASS X)

सैकण्डरी स्कूल परीक्षा (कक्षा दसवीं)

Q. No.	01	02	03	04	05	06	07	08	09	10	TOTAL
MARKS	1	1	1	1	1	1	2	2	2	2	14
Q. No.	11	12	13	14	15	16	17	18	19	20	TOTAL
MARKS	2	2	3	3	3	3	3	3	3	3	28
Q. No.	21	22	23	24	25	26	27	28	29	30	TOTAL
MARKS	3	3	4	4	4	4	4	4	4	4	38
Q. No.	31	32	33	34	35	36	37	38	39	40	TOTAL
MARKS											

GRAND TOTAL	80
MARKS IN WORDS	Eighty Eighty

CBSE

प्रमाणित किया जाता है कि मैंने इस उत्तर पुस्तिका का मूल्यांकन उचित प्रश्नपत्र के सैट और अंकन योजना के अनुसार किया है। यह भी प्रमाणित किया जाता है कि उत्तर पुस्तिका के अन्दर कोई भी प्रश्न बिना मूल्यांकन के नहीं छूटा है।

80

Certified that I have evaluated this answer book according to the correct set of question paper and strictly as per the marking scheme. It is also certified

Section-'D'

Ans-23 $\sec\theta = x + \frac{1}{4x} = \frac{4x^2+1}{4x}$

4

By using. $\sec^2\theta - \tan^2\theta = 1$

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

$(a+b)^2 = a^2 + 2ab + b^2$

$$\frac{(4x^2)^2 + (1)^2 + 2 \times 4x^2 \times 1}{16x^2} - 1 = \tan^2\theta$$

$$\frac{16x^4 + 1 + 8x^2}{16x^2} - 1 = \tan^2\theta$$

$$\frac{16x^4 + 1 + 8x^2 - 16x^2}{16x^2} = \tan^2\theta$$

$$\frac{16x^4 + 1 - 8x^2}{16x^2} = \tan^2\theta$$

$$\tan^2\theta = \left(\frac{4x^2-1}{4x}\right)^2$$

On taking root both sides

$$\tan\theta = \pm\left(\frac{4x^2-1}{4x}\right)$$

When $\tan\theta = +\left(\frac{4x^2-1}{4x}\right)$,

$$\sec\theta + \tan\theta = \frac{4x^2+1}{4x} + \frac{4x^2-1}{4x}$$

$$= \frac{4x^2+\cancel{1}+4x^2-\cancel{1}}{4x}$$

$$= \frac{8x^2}{4x} = 2x$$

When $\tan\theta = -\left(\frac{4x^2-1}{4x}\right)$

$$\sec\theta + \tan\theta = \frac{4x^2+1}{4x} + \boxed{-\left(\frac{4x^2-1}{4x}\right)}$$

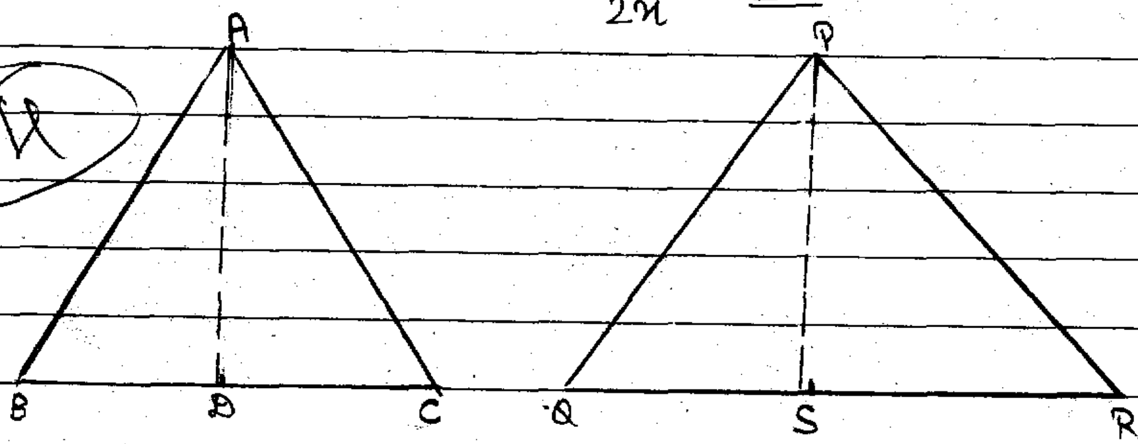
$$= \frac{4x^2+1}{4x} - \frac{4x^2-1}{4x}$$

$$= \frac{\cancel{4x^2}+1-\cancel{4x^2}+1}{4x}$$

$$= \frac{\cancel{2}}{2\cancel{4}x} = \frac{1}{2x}$$

$$\sec\theta + \tan\theta = 2x \text{ or } \frac{1}{2x}$$ Ans

Ans-24



Given :- $\Delta ABC \sim \Delta PQR$

To Prove :- $\dfrac{ar(\Delta ABC)}{ar(\Delta PQR)} = \dfrac{AB^2}{PQ^2} = \dfrac{BC^2}{QR^2} = \dfrac{AC^2}{PR^2}$

Construction :- In ΔABC, Draw $AD \perp BC$, In ΔPQR, Draw $PS \perp QR$

Proof :- Area of triangle $= \frac{1}{2} \times$ base $\times$ height

$$ar(\Delta ABC) = \frac{1}{2} \times AD \times BC \text{ ——— } (1)$$

$$ar(\Delta PQR) = \frac{1}{2} \times PS \times QR \text{ ——— } (2)$$

Divide (1) by (2)

$$\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{\cancel{\frac{1}{2}} \times AD \times BC}{\cancel{\frac{1}{2}} \times PS \times QR} = \frac{AD}{PS} \times \frac{BC}{QR} = \frac{AD}{PS} \times \frac{AB}{PQ} \quad \left[\Delta ABC \sim \Delta PQR, \ \frac{AB}{PQ} = \frac{BC}{QR} \right] \text{ ——— } (3)$$

In ΔABD and ΔPQS

$\angle ABD = \angle PQS$ [$\Delta ABC \sim \Delta PQR$]

$\angle ADB = \angle PSQ$ [each $90°$, ~~by~~]

$\Delta ABD \sim \Delta PQS$ (by AAA rule)

$\frac{AB}{PQ} = \frac{BD}{QS} = \frac{AD}{PS}$ (by CPST)

$\Rightarrow \frac{AB}{PQ} = \frac{AD}{PS}$ —— (4)

from (3) and (4)

$\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{AB^2}{PQ^2}$

similarly, $\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{BC^2}{QR^2} = \frac{AC^2}{PR^2}$

$$\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{AB^2}{PQ^2} = \frac{BC^2}{QR^2} = \frac{AC^2}{PR^2}$$

Hence Proved

Ans-25

4

Daily Expenditure (in ₹)	No. of Households (f)	class mark (x)	$d = x - a$	u	Σfu
100 - 150	4	$\boxed{125}$	0	0	0
150 - 200	5	175	50	1	5
200 - 250	12	225	100	2	24
250 - 300	2	275	150	3	6
300 - 350	2	325	200	4	+ 8
	25				43

$a = 125$

$$\text{class mark} = \frac{\text{lower limit} + \text{upper limit}}{2}$$

$h = 50$

$\frac{250}{2}$ 125

$\frac{650}{2}$ 325

150
200
$\frac{350}{2}$
175

$\frac{450}{2}$ 225

250
300
$\frac{550}{2}$
275

Step Deviation Method,

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

$$= 125 + \frac{43}{\cancel{25}} \times \cancel{50}\ 2$$

$$= 125 + 86$$

$$= ₹211$$

43
2
86

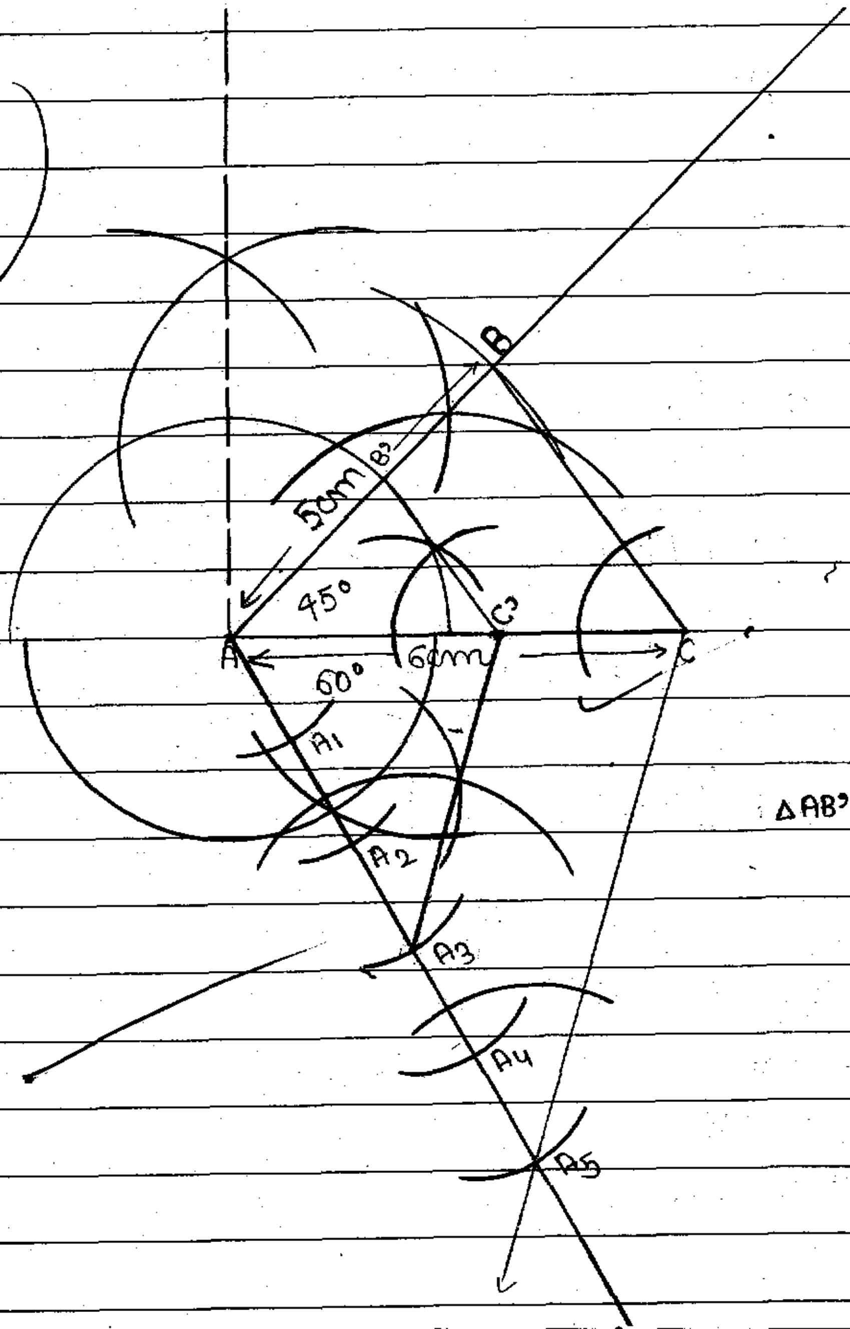
43
2
86

125
+86
211

Mean Daily expenditure on food is ₹211 Ans

Ans-26

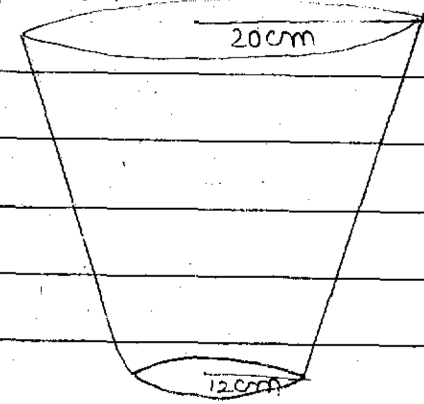
4



$\Delta AB'C' \sim \Delta ABC$

Ans-27 capacity of bucket = 12308·8 cm3

4



Radius of top (R) = 20cm

Radius of Bottom (r) = 12cm

let the height of bucket be h

Volume of frustum = $\frac{1}{3}\pi h\,[R^2 + r^2 + Rr]$

$12308 \cdot 8\,cm^3 = \frac{1}{3} \times 3 \cdot 14 \times h \,\left[(20)^2 + (12)^2 + 20 \times 12\right]$

$12308 \cdot 8\,cm^3 = \frac{1}{3} \times 3 \cdot 14 \times h \,[400 + 144 + 240]$

$12308 \cdot 8\,cm^3 = \frac{1}{3} \times 3 \cdot 14 \times h \times 784$

$\cancel{157}$ $\cancel{1099}$ $\cancel{61544}$ $\cancel{30772}$ $\cancel{15386}$ $\cancel{7693}$

$h = \dfrac{\cancel{12308 \cdot 8} \times 3 \times 100}{\cancel{3 \cdot 14} \times \cancel{784} \times 10}$

2 $\cancel{392}$ $\cancel{196}$ $\cancel{98}$ $\cancel{49}$ 7

400
+144
240
784

$h = \frac{3 \times \cancel{10}\,5}{2} = 15\,cm$

Height of bucket = 15 cm

$l^2 = (R-r)^2 + h^2$

$l^2 = (20-12)^2 + (15cm)^2$

$l^2 = (8cm)^2 + (15cm)^2$

$l^2 = 289\,cm^2$

$l = 17\,cm$

Slant height $(l) = 17\,cm$

Area of Metal sheet used in making it $= \pi(R+r)l + \pi r^2$

$= \pi(20+12)17 + \pi(12cm)^2$

$= \pi\,\boxed{32 \times 17 + 144}\ cm^2$

$= \pi[544+144]\,cm^2$

$= 3.14\,(688)\,cm^2$

$= 2160.32\,cm^2$

2
3
3

$3.14 \times 688 = 2512 + 25120 + 1884\,00 = 2160.32$

$544 + 144 = 688$

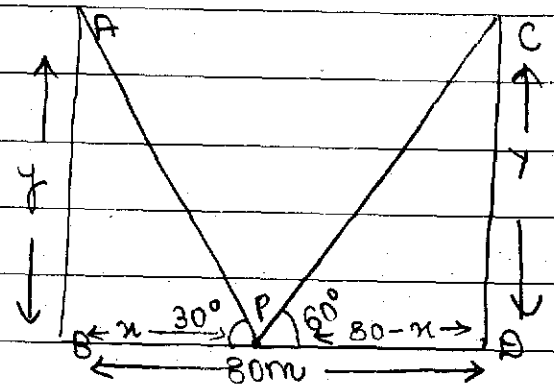
$20 + 12 = 32$

$32 \times 17 = 224 + 320 = 544$

Area of Metal Sheet used in making container is 2160.32 cm^2

Ans-28

4



AB and CD are two poles of equal height. Road BD is 80m wide. From Point P, the angle of elevation of top of Pole CD is 60° and the angle of elevation of top of pole AB is 30°

Let the height of ~~the~~ Two poles is y m
Let the Distance of point P from pole AB is x m and distance of pole CD from point P (80−x) m

In ΔABP, $\angle ABP = 90°$

$$\tan 30° = \frac{AB}{BP}$$

$$\tan 30^\circ = \frac{y}{x}$$

$$\frac{1}{\sqrt{3}} = \frac{y}{x}$$

$$x = y\sqrt{3} \quad \text{——— (1)}$$

In ΔCPD, $\angle CDP = 90^\circ$

$$\tan 60^\circ = \frac{CD}{PD}$$

$$\cancel{\sqrt{3} = \frac{y}{80-x}}$$

$$\sqrt{3}(80-x) = y$$

$$80\sqrt{3} - \sqrt{3}x = y$$

$$80\sqrt{3} - \sqrt{3}(y\sqrt{3}) = y \quad \boxed{\text{from (1)}, x = y\sqrt{3}}$$

$$80\sqrt{3} - 3y = y$$

$$80\sqrt{3} = 4y$$

$$\cancel{y = 20\sqrt{3}\,m}$$

$$\begin{array}{r} 3.14 \\ \times\ 6.88 \\ \hline 2512 \\ 2512\times \\ 1884\times\times \\ \hline 21.6032 \end{array}$$

put $y = 20\sqrt{3}$ m in eq ①

$x = y\sqrt{3}$

$x = 20\sqrt{3} \times \sqrt{3}$

$x = 60$ m

Height of Pole AB and CD is $20\sqrt{3}$ m

Distance of Point P from Pole AB $= x = 60$ m

Distance of Point P from Pole CD $= (80 - x)$ m $= (80-60) = 20$ m Ans

Ans-29 Let the speed of boat in still water $= x$ km/hr,
speed of stream $= y$ km/hr

4

Speed of boat downstream $= (x+y)$ km/hr
Speed of boat upstream $= (x-y)$ km/hr

Boat travels 30 km upstream and 44 km downstream in 10 hrs

$$\text{speed} = \frac{\text{Distance}}{\text{time}}$$

$$\frac{30}{x-y} + \frac{44}{x+y} = 10.$$

let $\frac{1}{x-y}$ be u and $\frac{1}{x+y}$ be v.

$30u + 44v = 10$ ——— (1)

Boat travels 40 km upstream and 55 km downstream in 13 hrs

$$\frac{40}{x-y} + \frac{55}{x+y} = 13$$

$40u + 55v = 13$ ——— (2)

Multiply eq ① by ④ and eq ② by 3

$120u + 176v = 40$ ——— ③

$120u + 165v = 39$ ——— ④

Solve eq ③ and ④

$$\begin{array}{r} \cancel{120u} + 176v = 40 \\ \cancel{120u} + 165v = 39 \\ - \quad\quad - \quad\quad - \\ \hline 11v = 1 \end{array}$$

$$v = \frac{1}{11}$$

Put $v = \frac{1}{11}$ in eq ①

$30u + 44v = 10$

$30u + \cancel{44}^{4} \times \frac{1}{\cancel{11}} = 10$

$30u = 6$

$u = \frac{1}{5}$

$\frac{1}{x-y} = u$

$\frac{1}{x-y} = \frac{1}{5}$

$x - y = 5$ —— (5)

$\frac{1}{x+y} = v$

$\frac{1}{x+y} = \frac{1}{11}$

$x + y = 11$ —— (6)

solve (5) and (6)

$$\begin{aligned} x + \cancel{y} &= 11 \\ x - \cancel{y} &= 5 \\ \hline 2x &= 16 \\ x &= 8 \end{aligned}$$

Put $x = 8$ in eq (6)

$$x + y = 11$$
$$8 + y = 11$$
$$y = 3$$

Speed of boat in still water $= x = 8$ km/hr

Speed of stream $= y = 3$ km/hr

Ans-30 Let the first term of AP be a and common difference be d

4

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

Sum of first four terms of AP $= 40$

$$S_4 = 40$$
$$\frac{\cancel{4}\,2}{\cancel{2}}\left[2a + (4-1)d\right] = 40$$

$2[2a+3d] = 40$

$2a+3d = 20$ ——— ①

Sum of first 14 terms of AP = 280

$S_{14} = 280$

$7\ \frac{\cancel{14}}{\cancel{2}}[2a+13d) = 280$

$2a+13d = 40$ ——— ②

solve eq ① and ②

$$\begin{array}{r} 2a + 13d = 40 \\ 2a + 3d = 20 \\ - \quad - \quad - \\ \hline 10d = 20 \\ \hline d = 2 \end{array}$$

$\frac{20 \times 2}{2}$

$\frac{10 \times 7 \times 4}{2}$

put $d=2$ in eq (1)

$$2a+3d=20$$
$$2a+3(2)=20$$
$$2a+6=20$$
$$2a=14$$
$$a=\frac{\cancel{2}\times 7}{\cancel{2}}$$
$$a=7$$

$$S_n=\frac{n}{2}\left[2a+(n-1)d\right]$$
$$=\frac{n}{2}\left[2(7)+(n-1)2\right]$$
$$=\frac{n}{2}\left[14+2n-2\right]$$
$$=\frac{n}{2}\left[2n+12\right]=n(n+6)$$
$$=n^2+6n$$

~~Sum of first n terms of AP is 280 Ans~~

Sum of first n terms of AP is $\boxed{n^2+6n}$ Ans.

Section-'C'

Ans-13 $P(x) = 3x^3+10x^2-9x-4$

3

One zero of polynomial is 1

$(x-1)$ is the factor of Polynomial $\boxed{3x^3+10x^2-9x-4}$

$$
\begin{array}{r|l}
 & 3x^2+13x+4 \\
x-1 & 3x^3+10x^2-9x-4 \\
 & \cancel{3x^3}-3x^2 \\
 & -\quad + \\
 & \cancel{13x^2}-9x \\
 & \cancel{13x^2}-13x \\
 & -\quad + \\
 & \cancel{4x-4} \\
 & \cancel{4x}-4 \\
 & -\quad +
\end{array}
$$

Quotient = $3x^2+13x+4$

$$q(x) = 3x^2+13x+4$$
$$= 3x^2+12x+x+4$$
$$= 3x(x+4)+1(x+4)$$
$$= (3x+1)(x+4)$$

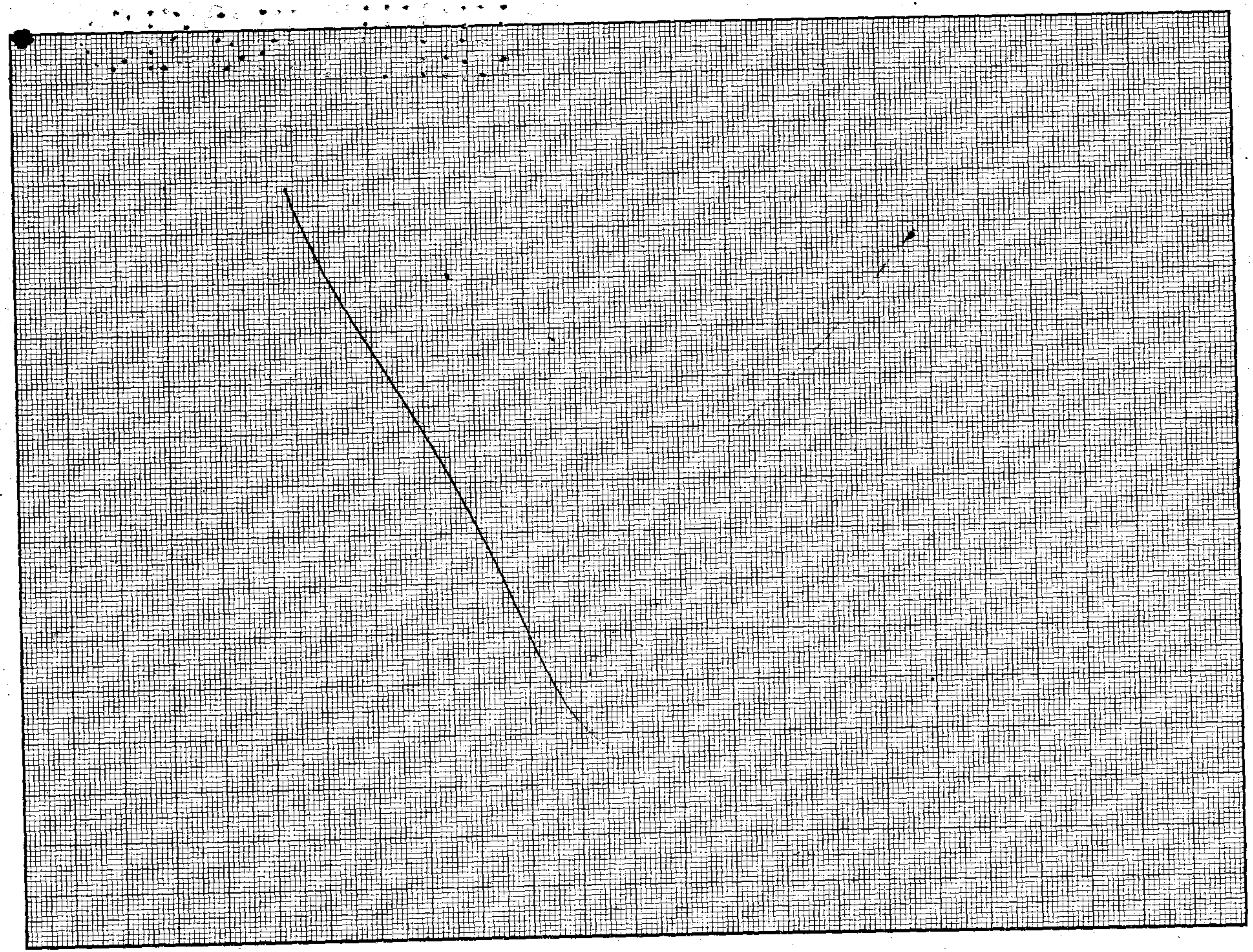
Zeroes of $q(x)$,

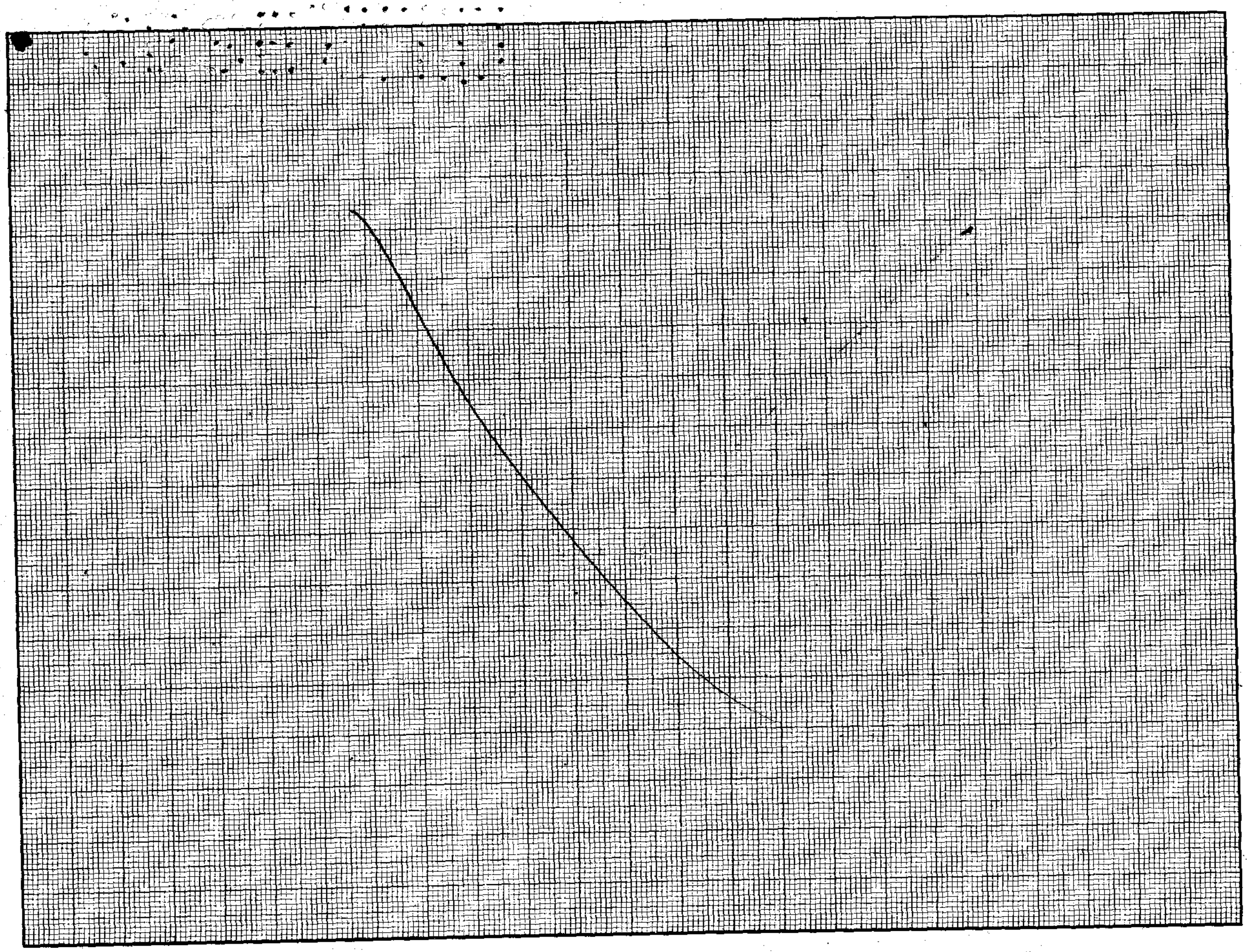
$3x+1=0$ or $x+4=0$

$3x=-1$ or $x=-4$

$x=\frac{-1}{3}$ or $x=-4$

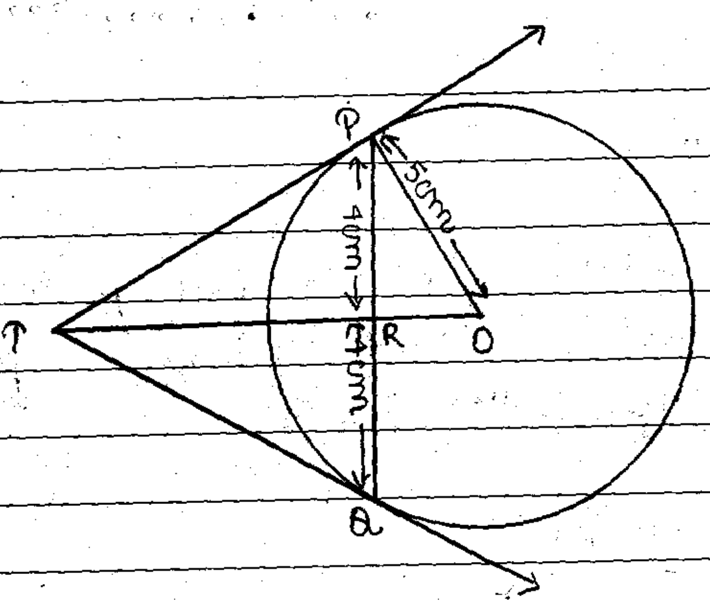
All the zeroes of the Polynomial are $\frac{-1}{3}$, -4 and 1 Ans





Ans-14

3



Given:- PQ is chord of length 8cm. Radius of circle = 5cm, from external point T, two tangents TP and TQ are drawn to the circle with centre O.

To find:- Length of TP

Proof/solution :- In ΔTRP and ΔTRQ

$TP = TQ$ [Length of Tangents drawn from external point to circle are equal.]

TR = TR (common)

∠PTR = ∠QTR [Tangents drawn from external point to circle are equally inclined to the line joining centre to that Point.]

ΔTRP ≅ ΔTRQ [by SAS Rule]

∠TRP = ∠TRQ (by CPCT)

PR = QR = 4cm (by CPCT)

PQ is a line and TR is Ray

∠TRP + ∠TRQ = 180° (linear Pair)

2∠TRP = 180° [∠TRP = ∠TRQ]

∠TRP = 90°

Similarly, ∠ORP + ∠TRP = 180° (linear Pair)

$\angle ORP + 90^\circ = 180^\circ$ $\boxed{\angle TRP = 90^\circ}$

$\angle ORP = 90^\circ$

In ΔOPR, $\angle ORP = 90^\circ$

$(OP)^2 = (OR)^2 + (PR)^2$ [by Pythagoras theorem]

$(5cm)^2 = (OR)^2 + (4cm)^2$

$\cancel{OR \neq 3cm}$

$25cm^2 - 16cm^2 = (OR)^2$

$(OR)^2 = 9cm^2$

$OR = 3cm$

In ΔTRP, $\angle TRP = 90^\circ$

$(TP)^2 = (PR)^2 + (TR)^2$ [by pythagoras theorem]

$(TP)^2 = (4cm)^2 + (TR)^2$

$(TP)^2 = 16cm^2 + TR^2 \longleftarrow (1)$

In ΔTPO,

$\angle OPT = 90°$ [Tangent at any point of circle is perpendicular to radius through point of contact.]

$(OT)^2 = (OP)^2 + (TP)^2$ [by pythagoreas theorem]

$(TR+3cm)^2 = (5cm)^2 + (TP)^2$

$(TR)^2 + 9 + 6TR = 25cm^2 + (TP)^2$ $\boxed{(a+b)^2 = a^2+2ab+b^2}$

$\cancel{(TR)^2} + 9 + 6 \cdot TR = 25cm^2 + 16cm^2 + \cancel{TR^2}$ [from eq ①]

$9 + 6TR = 41$

~~$6TR = 35$~~

~~$TR = \frac{35}{6}$~~

$6 \times TR = 41 - 9$

$TR = \frac{32}{6} cm = \frac{16}{3} cm$

25
16
+11
6
35

41
9
32

put $PR = \frac{16}{3}$ cm in eq ①

$(TP)^2 = 16\,cm^2 + \left(\frac{16}{3} cm\right)^2$

$(TP)^2 = 16\,cm^2 + \frac{256}{9} cm^2$

$(TP)^2 = \frac{144 + 256}{9} cm^2$

$(TP)^2 = \frac{400}{9} cm^2$

$TP = \frac{20}{3}$ cm

Length of Tangent $TP = \frac{20}{3}$ cm Ans

16 × 9 = 144, 144 + 256 = 400

$\frac{20 \times 20}{3 \times 3}$

Ans-15 (2) let us assume that $\frac{2+\sqrt{3}}{5}$ is an Rational Number.

$$\frac{2+\sqrt{3}}{5} = \frac{a}{b}$$ [a and b are co-prime Numbers]

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

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

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

$\Rightarrow$ $\sqrt{3}$ is Rational no. [a and b are integers, so, $\frac{5a-2b}{b}$ is rational]

This contradicts the fact that $\sqrt{3}$ is Irrational no. This contradiction has arisen due to our wrong Assumption.

Hence Our, Assumption is Wrong.

$\therefore$ $\frac{2+\sqrt{3}}{5}$ is and Irrational Number.

Hence proved

Ans-16 $(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$

L.H.S:- $(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2$

2

$= \sin^2\theta + \operatorname{cosec}^2\theta + 2\sin\theta\operatorname{cosec}\theta + \cos^2\theta + \sec^2\theta + 2\cos\theta\sec\theta$ $\boxed{(a+b)^2 = a^2 + 2ab + b^2}$

$= \sin^2\theta + \operatorname{cosec}^2\theta + 2\cancel{\sin\theta} \times \frac{1}{\cancel{\sin\theta}} + \cos^2\theta + \sec^2\theta + 2\cancel{\cos\theta} \times \frac{1}{\cancel{\cos\theta}}$

$= \sin^2\theta + \operatorname{cosec}^2\theta + 2 + \cos^2\theta + \sec^2\theta + 2$

$\sin^2\theta + \cos^2\theta = 1$
$\sec^2\theta - \tan^2\theta = 1$
$\operatorname{cosec}^2\theta - \cot^2\theta = 1$

$= (\sin^2\theta + \cos^2\theta) + 4 + \operatorname{cosec}^2\theta + \sec^2\theta$

$= 1 + 4 + (1 + \cot^2\theta) + (1 + \tan^2\theta)$

$= 5 + 1 + \cot^2\theta + 1 + \tan^2\theta$

$= 7 + \tan^2\theta + \cot^2\theta$

L.H.S = R.H.S = $7 + \tan^2\theta + \cot^2\theta$

Hence proved

Ans-17 3

let the Numerator be x and Denominator be y

Original fraction $= \frac{x}{y}$

ATQ,

when 2 is subtracted from Numerator fraction becomes $\frac{1}{3}$

$$\frac{x-2}{y} = \frac{1}{3}$$

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

$$3x-6 = y$$

$$3x-y = 6 \quad \text{——} \quad (1)$$

when 1 is subtracted from denominator fraction becomes $\frac{1}{2}$

$$\frac{x}{y-1} = \frac{1}{2}$$

$2x = y - 1$

$2x - y = -1$ —— (2)

solve eq (1) and (2)

$$\begin{array}{r} 3x - \cancel{y} = 6 \\ 2x - \cancel{y} = -1 \\ - \quad + \quad\quad + \\ \hline x = 7 \end{array}$$

Put $x = 7$ in eq (1)

$3(7) - y = 6$

$21 - y = 6$

$y = 15$

Original fraction $= \frac{7}{15}$ Ans

Ans-18 Any point on the y axis is of the form (0, y)

Let P(0, y) is equidistant from A(5, -2) and B(-3, 2)

3

Distance formulae = $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$AP = \sqrt{(0-5)^2+(y+2)^2}$

$= \sqrt{25+y^2+4+4y}$ $\quad [(a+b)^2 = a^2+2ab+b^2]$

$= \sqrt{y^2+4y+29}$

$BP = \sqrt{(3)^2+(y-2)^2}$

$= \sqrt{9+y^2+4-4y}$ $\quad [(a-b)^2 = a^2-2ab+b^2]$

$= \sqrt{y^2-4y+13}$

ATQ,

$$AP = BP$$

$$\sqrt{y^2+4y+29} = \sqrt{y^2-4y+13}$$

On squaring both sides

$$\cancel{y^2}+4y+29 = \cancel{y^2}-4y+13$$

$$8y = -16$$

$$y = -2$$

(0, -2) is equidistant from (5, -2) and (-3, 2)

$$\begin{array}{r} 29 \\ 13 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 29 \\ 13 \\ \hline 16 \end{array}$$

Ans-19

3

class	frequency	
0 - 10	8	
10 - 20	10	
20 - 30	10	f_0
30 - 40	16	f_1
40 - 50	12	f_2
50 - 60	6	
60 - 70	7	

10
12
22

$f_1 = 16$

$f_0 = 10$

$f_2 = 12$

32
22
10

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

$$= 30 + \frac{16 - 10}{2(16) - 10 - 12} \times 10$$

$= 30 + \frac{6}{\cancel{10}} \times \cancel{10}$

$= 36$

Mode of the following distribution is 36 Ans

Ans-20 Speed of water = 10 Km/hr

$= \overset{5}{\cancel{10}} \times 1000m \times \frac{1}{\cancel{2}}$ $\boxed{1 Km = 1000m}$

$= 5000 m/hr$

Width of canal = 6m

Depth of canal = 1·5 m

Volume = l x b x h

= 5000 x 6 x 1·5

Height of standing water = 8 cm $= \frac{8}{100}$ m.

Area irrigated in 30 minutes $= \dfrac{\cancel{5000}^{2500} \times \cancel{6}^{3} \times 1\cdot5}{\cancel{8}_{\cancel{2}\,4} \times 1\cancel{0}} \times \cancel{100}^{5}$ m

$= 2500 \times 15 \times 3 \times 5$ m

$= 7500 \times 75$ m^2

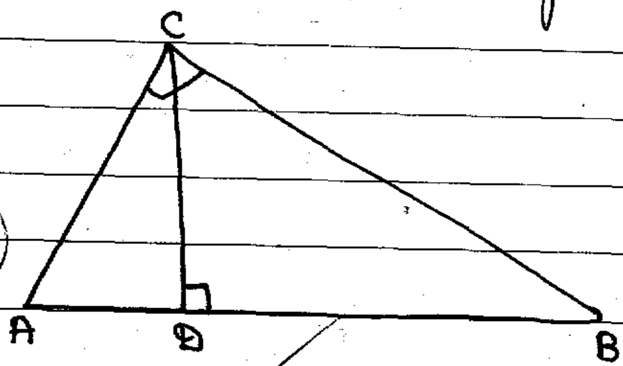
$= 562500$ m^2

Area it will irrigate in 30 minutes $= 562500$ m^2 Ans

	7500
×	75
	37500
	52500×
	562500

Ans-21

3



Given:- $\angle ACB = 90^\circ$, $CD \perp AB$

To Prove:- $CD^2 = BD \times AD$

Proof:- In $\triangle ADC$, $\angle ADC = 90^\circ$

$(AC)^2 = (CD)^2 + (AD)^2$ [by pythagouras theorem] —— ①

In ΔCDB, $\angle CDB = 90^\circ$

$(BC)^2 = (BD)^2 + (CD)^2$ [by pythagoreas theorem] —— ②

In ΔACB, $\angle ACB = 90^\circ$

$(AB)^2 = (AC)^2 + (BC)^2$ [by pythagoreas theorem] —— ③

Add eq ① and ②

$(AC)^2 + (BC)^2 = (CD)^2 + (CD)^2 + (AD)^2 + (BD)^2$

$(AB)^2 = 2(CD)^2 + (AD)^2 + (BD)^2$ [from eq ③]

$(AD+DB)^2 = 2(CD)^2 + (AD)^2 + (BD)^2$

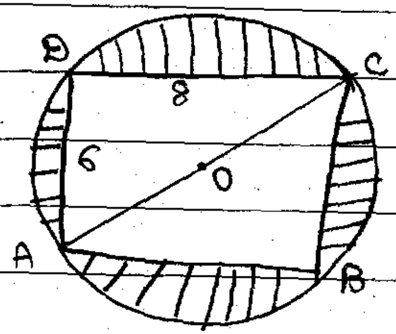
$\cancel{AD^2} + \cancel{DB^2} + 2AD\cdot DB = 2(CD)^2 + \cancel{(AD)^2} + \cancel{(BD)^2}$ $[(a+b)^2 = a^2 + 2ab + b^2]$

$\cancel{2}(CD)^2 = \cancel{2}AD\cdot DB$

$$CD^2 = BD \times AD$$

Hence proved

Ans-22



ABCD is a rectangle.

Area of Rectangle ABCD $= l \times b$

$= 8cm \times 6cm$

$= 48 cm^2$

In ΔADC,

$\angle ADC = 90^\circ$ [Adjacent sides of rectangle contain right angle (90°)]

$(AC)^2 = (AD)^2 + (CD)^2$ [by pythagoreas theorem]

$(AC)^2 = (6cm)^2 + (8cm)^2$

$(AC)^2 = 36cm^2 + 64cm^2$

$AC = 10cm$

AC is diameter of circle.

Radius of circle = 5cm

Area of circle whose centre is O $= \pi r^2$

$= 3.14 \times (5cm)^2$

$= 3.14 \times 25 cm^2$

$= 78.50 cm^2$

$$\begin{array}{r} 2 \\ 3.14 \\ \times 25 \\ \hline 1570 \\ 628\times \\ \hline 78.50 \\ -48 \\ \hline 30.50 \end{array}$$

Area of shaded region = Area of circle − Area of rectangle

$= 78.50 cm^2 - 48cm^2$

$= 30.50cm^2$

$$\begin{array}{r} 78.50 \\ 48 \\ 30.50 \end{array}$$

Area of shaded region = $30.50 cm^2$ Ans

Section - 'B'

Ans-7 AP: 14, 21, 28 98

let the first term of AP be a and common difference be d

$a_n = 98$

$a = 14$

$d = 7$

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

$98 = 14 + (n-1)7$

$84 = (n-1)7$

$n - 1 = \frac{84}{7}$ 12

$n = 13$

13 Numbers are divisible by 7 Ans.

Ans-8 Total outcomes- HHH, HTH, THH, TTT, HHT, HTT, THT, TTH = 8 | HH HT TH TT

2

Favourable outcomes- 6

$$\text{Probability} = \frac{\text{Favourable outcomes}}{\text{Total outcomes}}$$

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

Ans-9 let Point $(x, 0)$ divides the line segment in the ratio $k : 1$

2

$$A(1,-3) \xrightarrow{\quad k \quad} P(x,0) \xrightarrow{\quad 1 \quad} B(4,5)$$

$$(x_1, y_1) \xrightarrow{\quad m_1 \quad} P \xrightarrow{\quad m_2 \quad} (x_2, y_2)$$

using section formulae.

$$P(x, y) = \frac{x_1 m_2 + x_2 m_1}{m_1 + m_2}, \quad \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}$$

$$P(x,0) = \frac{4K+1}{K+1}, \frac{5K-3}{K+1}$$

On comparing,

$$0 = \frac{5K-3}{K+1}$$

$$5K-3=0$$

$$K = \frac{3}{5}$$

Ratio $- K:1 - \frac{3}{5}:1 = 3:5$

$$x = \frac{4K+1}{K+1}$$

$$= \frac{4\times\frac{3}{5}+1}{\frac{3}{5}+1} = \frac{\frac{12}{5}+1}{\frac{3}{5}+1},$$

$$= \frac{\frac{17}{5}}{\frac{8}{5}} = \frac{17}{\cancel{5}} \times \frac{\cancel{5}}{8} = \frac{17}{8}$$

Point (a) $(x,0) = \left(\frac{17}{8},0\right)$

Point $\left(\frac{17}{8},0\right)$ divides line segment in the ratio 3:5 Ans

Ans-10 Total Outcomes=6

$\Rightarrow$ Favourable outcomes = 3

| Probability of an Event = $\frac{\text{Favourable outcomes}}{\text{Total outcomes}}$ |

(i) $P(\text{prime no}) = \frac{3}{6} = \frac{1}{2}$

2

$\Rightarrow$ Favourable outcomes = 3, 4, 5 = 3

(ii) $P(\text{lies between 2 and 6}) = \frac{3}{6} = \frac{1}{2}$

3, 4, 5

Ans-11 Following pair of linear equation have infinitely many solution so they satisfy $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

2

$cx + 3y + (3-c) = 0$

$12x + cy - c = 0$

$$\boxed{\frac{c}{12} = \frac{3}{c}} = \frac{3-c}{-c}$$

$c^2 = 36$

$c = \pm 6$

Also, $\dfrac{3}{c} = \dfrac{3-c}{-c}$

$-3c = 3c - c^2$

$c^2 - 3c - 3c = 0$

$c^2 - 6c = 0$

$c(c-6) = 0$

$c = 0$ or 6

$c=6$ satisfy both the conditions.

Value of $c = 6$ for which the equations have infinitely many solutions.

Fictitious Roll No.
(To be entered by Board)

अपना अनुक्रमांक इस उत्तर-पुस्तिका पर न लिखें
Please do not write your Roll Number on this Answer-Book

अतिरिक्त उत्तर-पुस्तिका (ओं) की संख्या.......................
Supplementary Answer-Book(S) No. 01

Ans-12 let a be any odd +ve integer and $b=4$

By Euclid's divison lemma,

$a = bq + r, \; 0 \le r < b$

since, $r = 0, 1, 2, 3$

~~$r=0$,~~

$r=1$, $a = 4q+1$ (odd)

$r=2$, $a = 4q+2$ (even)

$r=3$, $a = 4q+3$ (odd)

Hence, every odd +ve integer is in the form of $4q+1$ and ~~4q+3~~ ans.

Section -'A'

Ans-1 $a = x^3y^2$

$b = xy^3$

1

$LCM(a,b) = x^3y^3$ Ans.

Ans-2 AP:- 12, 15 99

1

~~let a be any two~~ let ~~the~~ first term of AP
diffrence be d

$a_n = 99$

$a = 12$

$d = 3$

$99 - 12 = 87$

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

$99 = 12 + (n-1)3$

$87 = (n-1)3$

$n-1 = \frac{87}{3}$

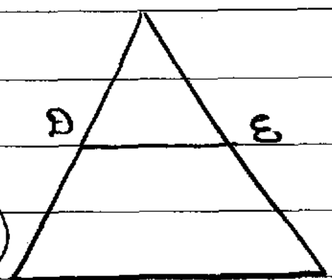
$n-1 = 29$

$n = 30$

30 numbers are divisible by 3.

Ans-3

1



Given :- $DE \parallel BC$, $AD = 1cm$ $BD = 2cm$

To find :- $\frac{ar(\triangle ABC)}{ar(\triangle ADE)}$

Solution :- In $\triangle ADE$ and $\triangle ABC$

$\angle DAE = \angle BAC$ (common)

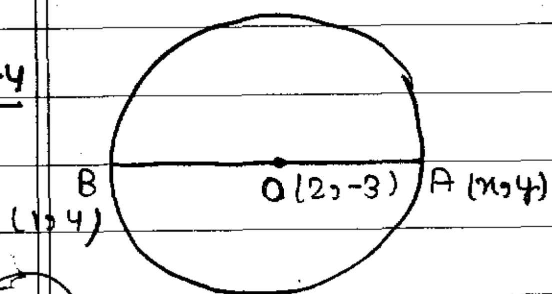
$\angle ADE = \angle ABC$ (corresponding Angles)

$\Delta ADE \sim \Delta ABC$ (by AA Rule)

~~ar(ΔAD~~ $\dfrac{ar(\Delta ABC)}{ar(\Delta ADE)} = \dfrac{AB^2}{AD^2}$ [Ratio of area of two similar triangle is equal to the square of the ratio of their corresponding side]

$= \left(\dfrac{3}{1}\right)^2 = 9:1$ Ans

Ans-4



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let co-ordinates of point A (x, y)

OA = OB (Radius)

∴ O is the mid-point of line AB

$O(2,-3) = \dfrac{1+x}{2}, \dfrac{y+4}{2}$

On comparing,

$\dfrac{x+1}{2} = 2$, $\dfrac{y+4}{2} = -3$

$x = 3$

$y+4 = -6$

$y = -10$

$A(3, -10)$ Ans

Ans-6 $\tan 2A = \cot(A - 24^\circ)$

1

$\cot(90^\circ - 2A) = \cot(A - 24^\circ)$ $\cot(90^\circ - \theta) = \tan\theta$

$\Rightarrow 90^\circ - 2A = A - 24^\circ$

$114^\circ = 3A$

$A = 38^\circ$ Ans

$\begin{array}{r} 90 \\ 24 \\ \hline 114 \end{array}$ $\frac{38^\circ}{3)\cancel{114}}$

Ans-5 let One root of equation be α and other be $\frac{1}{\alpha}$ because roots of equation are reciprocal of each other.

$[3x^2 - 10x + K = 0]$

1

Product of zeroes $= \frac{c}{a}$

$\cancel{\alpha} \times \frac{1}{\cancel{\alpha}} = \frac{K}{3}$

$K = 3$ Ans

Deepak
09365

80
80

Eighty

SS
09359

Eighty

Sunil Kumar
09363

Jyoti
09351

80

09355