उत्तराखण्ड विद्यालयी शिक्षा परिषद्, रामनगर (नैनीताल)	हाईस्कूल परीक्षा (उत्तराखण्ड)	'अ' 10 पन्ने

B1+B2

Answer - 1

(क) (ii) 240

(ख) (iii) atmost three zeroes

(ग) (iii) 6

(घ) (i) 49

(ङ) (iv) 10

(च) (iv) 2.1 cm

(छ) (i) Two diameters of a circle

(ज) (iii) 231 cm^2

(झ) (ii) 1

(ग) (ii) 2

Answer - 2

(क) (i) Both A and R are correct and R is the correct exp. of A.

(ख) (i) Both A and R are correct and R is the correct exp. of A.

Answer - 3

If zeros of a quadratic polynomial are equal then,

$$\boxed{D = 0}$$

$a = 3 \qquad b = -K \qquad c = 12$

$$D = (b)^2 - 4ac$$

$$0 = (-K)^2 - 4(3)(12)$$

$$0 = K^2 - 12 \times 12$$

$$0 = k^2 - 144$$

$$144 = k^2$$

$$\sqrt{12^2} = k$$

$$\boxed{12 = k}$$

The value of k is 12.

Answer -4

radius = 7 cm

Volume of hemisphere $= \frac{2}{3}\pi r^3$

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

$$= \frac{44 \times 49}{3}$$

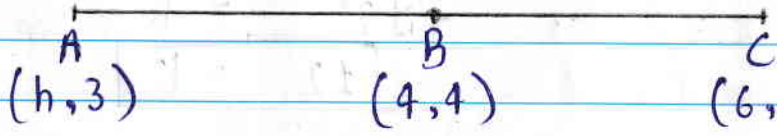
$$= \boxed{\frac{2156}{3} \text{ cm}^3}$$

$$= 718.666\ldots \text{ cm}^3$$

$$= 718.7 \text{ cm}^3 \text{ (approx)}$$

The Volume of hemisphere is $\frac{2156}{3}$ cm^3

Answer - 5



Let points be A(h,3), B(4,4) and C(6,5). And $m_1 : m_2 = 1 : 1$

Coordinates of Mid point (B) $= \frac{m_1x_2 + m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}$

$$(4,4) = \frac{(1)(6)+(1)(h)}{1+1}, \frac{1(5)+1(3)}{1+1}$$

$$4 = \frac{6+h}{2}$$

$$8 = 6+h$$

$$8-6 = h$$

$$2 = h$$

$$\boxed{h = 2}$$

Therefore, the value of h is 2.

Answer - 6

Given :- AB = 8cm , PE = 3cm

To find :- AE = ?

Solution :- AB = AC [tangents drawn from an ex. point to a circle are equal in length]

$\therefore$ AC = 8cm

PE = CE [tangents drawn from an ex. point to a circle are equal in length]

$\therefore$ CE = 3cm

So, AE = AC - CE

= 8 - 3

= 5 cm

So, the length of AE is 5 cm.

Answer - 7

Let the zeroes be α and β.

$\alpha = 2 + \sqrt{5}$ (Given)

$\beta = ?$

$$\alpha + \beta = 4$$
$$\beta = 4 - (2+\sqrt{5})$$
$$\beta = 4 - 2 - \sqrt{5}$$
$$\beta = 2 - \sqrt{5}$$

Sum of zeroes $= 4$

Product of zeroes $= (2+\sqrt{5}) \times (2-\sqrt{5})$
$$= (2)^2 - (\sqrt{5})^2$$
$$= 4 - 5$$
$$= -1$$

Required polynomial $= K\left(x^2 - (S.O.Z)x + (P\right.$
$$= K\left(x^2 - (4)x + (-1)\right)$$
$$= K\left(x^2 - 4x - 1\right)$$

The quadratic polynomial formed is

$$\boxed{x^2 - 4x - 1}$$

Answer - 8

AP :- 8, 10, 12 ---- 60^{th}

$a = 8 \qquad d = 2$

$a_{60} = a + 59d$

$a_{60} = 8 + 118$

$a_{60} = 126$

Reverse AP :- 126, 124, 122 ---- 8.

$a = 126 \qquad d = -2$

$S_{20} = ?$

$$S_{20} = \frac{20}{2}\left[2 \times 126 + 19(-2)\right]$$

$$= 10\left(252 + (-38)\right]$$

$$= 10\left(252 - 38\right)$$

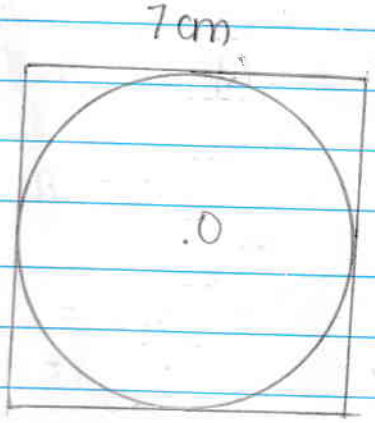
$$= 10 \times 214$$

$$= 2140$$

Hence, the sum of last 20 terms is 2140.

Answer - 9

A circle having diameter 7cm will have maximum area that can be inscribed in a square of 7 cm.



diameter = 7 cm

radius = $\frac{7}{2}$ cm

Area of circle = πr^2

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

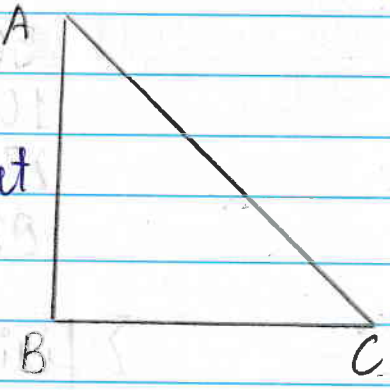
$= \boxed{\frac{77}{2}}$ cm²

∴ Area of circle will be $\frac{77}{2}$ cm²

or 38.5 cm²

Answer - 10

$\sin A + \cos A = \sqrt{2}$



Squaring both sides, we get

$(\sin A + \cos A)^2 = (\sqrt{2})^2$

$\sin^2 A + \cos^2 A + 2 \sin A \cos A = 2$

$1 + 2 \sin A \cos A = 2 \quad (\because \sin^2 A + \cos^2 A = 1)$

$2 \sin A \cos A = 2 - 1$

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

$\therefore \boxed{\sin A \cos A = \frac{1}{2}}$

Answer - 11

Class Interval	Frequency (f_i)	Class mark (x_i)
100 - 150	4	125
150 - 200	6	175
200 - 250	12	225
250 - 300	3	275
	$\sum f_i = 25$	

$f_i x_i$

500
1050
2700
825

$\Sigma f_i x_i = 5075$

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$= \frac{5075}{25}$$

$$= \boxed{203}$$

The mean daily expenditures on food is ₹ 203.

Answer - 12

Outcomes when two coins are tossed = 4

HH , TT , HT , TH

Total favourable outcomes = 3

Total outcomes = 4

P(one head) = $\frac{\text{Favourable out.}}{\text{total outcome}}$

= $\boxed{\frac{3}{4}}$

Answer - 13

For infinitly many solutions

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

$a_1 = k \quad a_2 = 12$
$b_1 = 3 \quad b_2 = k$
$c_1 = k-3 \quad c_2 = k$

$$\frac{k}{12} \times \frac{3}{k} \times \frac{k-3}{k}$$

$K^2 = 36$
$K = \sqrt{36}$
$K = 6$

$3K = K^2 - 3K$
$6K = K^2$
$6 = K$

The value of K is 6.

Answer - 14

Irrational Number - Those numbers that have non-recurring, non-terminating decimal expansion.

Example - $\sqrt{3}$, π

Prove $5+3\sqrt{2}$ is an Irrational.

Let us assume that $5-3\sqrt{2}$ is a rational no.,

so, $5-3\sqrt{2} = p/q$ [where $q \neq 0$, p and q are integers]

$-3\sqrt{2} = p/q - 5$

$3\sqrt{2} = 5 - p/q$

$\sqrt{2} = \frac{5q-p}{3q}$ [p and q are integers so $\frac{5q-p}{3q}$ is also an integer]

$\frac{5q-p}{3q}$ is a rational numbers

so, $\sqrt{2}$ is also rational

But we know that $\sqrt{2}$ is irrational

This is a contradiction and it has arisen due to our wrong assumption. That $5-3\sqrt{2}$ is rationale.

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

Answer - 15

$x - y = 8$

$3x - 3y = 16$

$\longrightarrow \quad x = 8 + y$

Put $y = 0$ then $x = 8$

$x = 8 + 0$

$x = 8$

Put $y = 1$ then $x = 9$

$x = 8 + 1$

$x = 9$

Put $y = 2$ then $x = 10$

$x = 8 + 2$

$x = 10$

x	8	9	10
y	0	1	2

$\longrightarrow$ $3x - 3y = 16$

$$x = \frac{16 + 3y}{3}$$

Put $y = 1$ then $x = \frac{19}{3}$

$$x = \frac{16 + 3}{3}$$

$$x = \frac{19}{3}$$

Put $y = 0$ then $x = \frac{16}{3}$

$$x = \frac{16 + 0}{3}$$

$$x = \frac{16}{3}$$

Put $y = 2$ then $x = \frac{22}{3}$

$$x = \frac{16 + 6}{3}$$

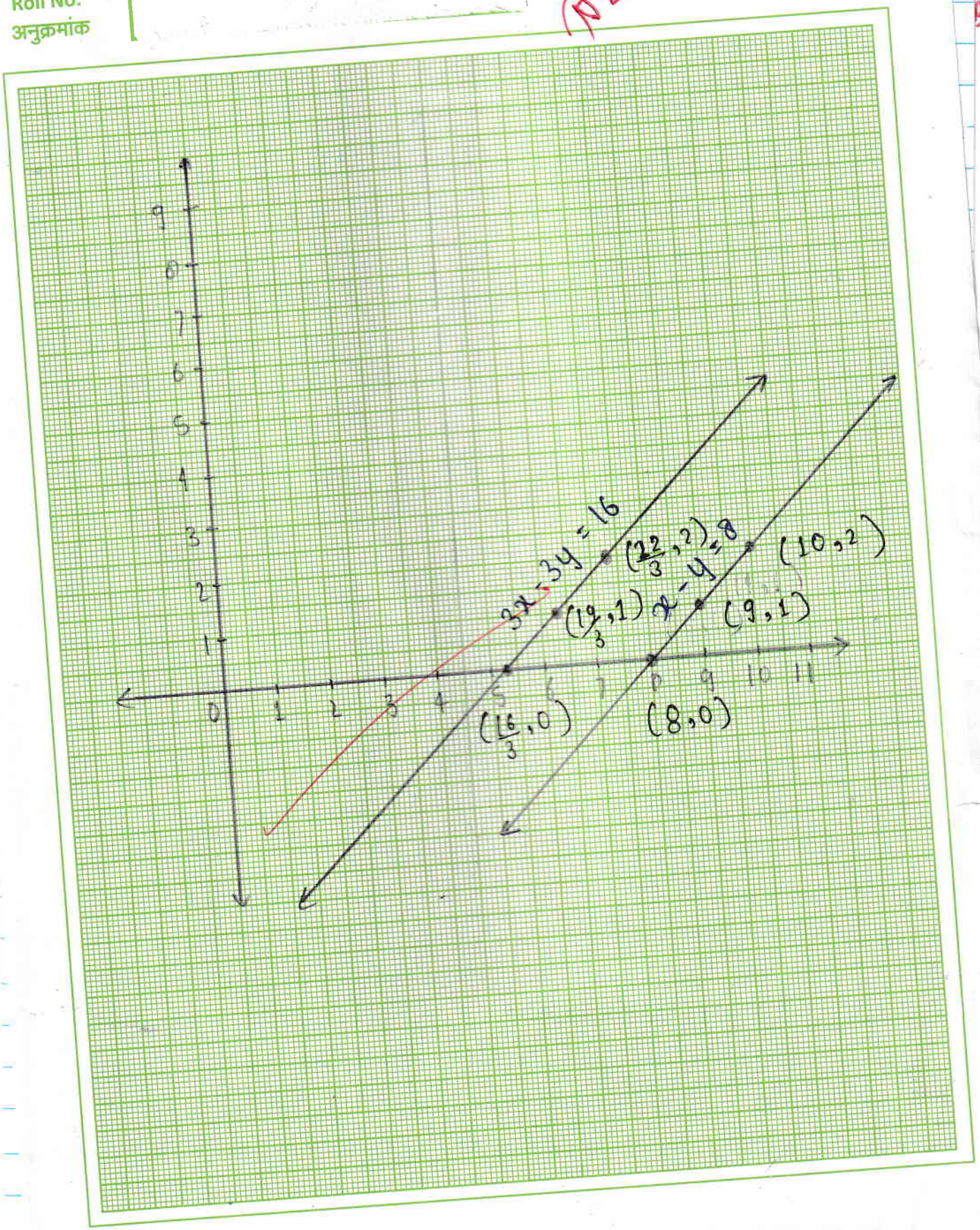
$$x = \frac{22}{3}$$

x	$16/3$	$19/3$	$22/3$
y	0	1	2

The lines formed are parallel.

2023

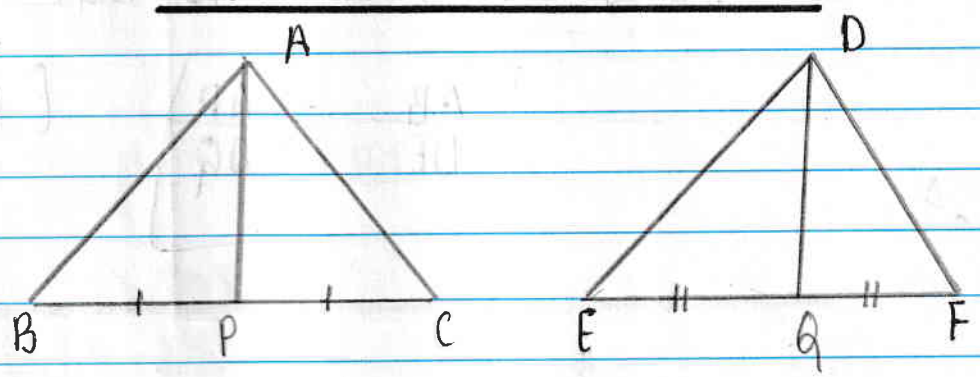
Roll No.
अनुक्रमांक



UEBB

उत्तराखण्ड विद्यालयी शिक्षा परिषद्, रामनगर (नैनीताल)	हाईस्कूल परीक्षा (उत्तराखण्ड) 'ब' 06 पन्ने

Answer - 17



Given :- $\Delta ABC \sim \Delta DEF$, $BP = PC$, $EQ = QF$

To prove :- $\frac{AB}{DE} = \frac{AP}{DQ}$

Proof :- $\Delta ABC \sim \Delta DEF$

$\angle A = \angle D$
$\angle B = \angle E$
$\angle C = \angle F$

$\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

} by CPST

In ΔAPB and ΔDQE

$\angle B = \angle E$ (Given)

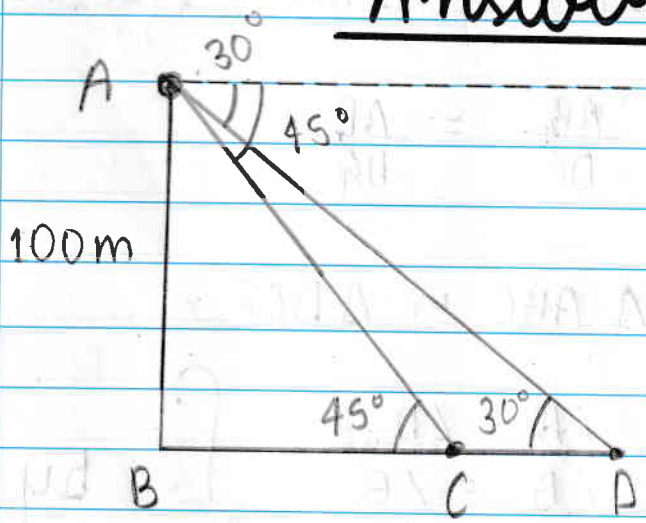
$\frac{AB}{DE} = \frac{\frac{1}{2}BC}{\frac{1}{2}EF}$ (Given)

$\frac{AB}{DE} = \frac{BP}{EQ}$

So, $\triangle APB \sim \triangle DQE$ [by SAS]

$$\frac{AB}{DE} = \frac{AP}{DQ}$$ [by CPST]

Answer - 18



Let, A be the position of drone.
AB is the height of drone above the ground.
C and D are cars.

(i) Given: AB = 100 m
To find :- BC and BD
Solution :- In $\triangle ABC$

$$\tan 45° = \frac{AB}{BC}$$

$$1 = AB/BC$$

$$\boxed{AB = BC = 100\ m}$$

In $\triangle ABD$,

$$\tan 30^\circ = \frac{AB}{BD}$$

$$\frac{1}{\sqrt{3}} = \frac{AB}{BD}$$

$$BD = AB\sqrt{3}$$

$$\boxed{BD = 100\sqrt{3}\ m}$$

The distance of cars from the point just below the drone are 100 m and $100\sqrt{3}$ m resp.

ii) Distance b/w two cars

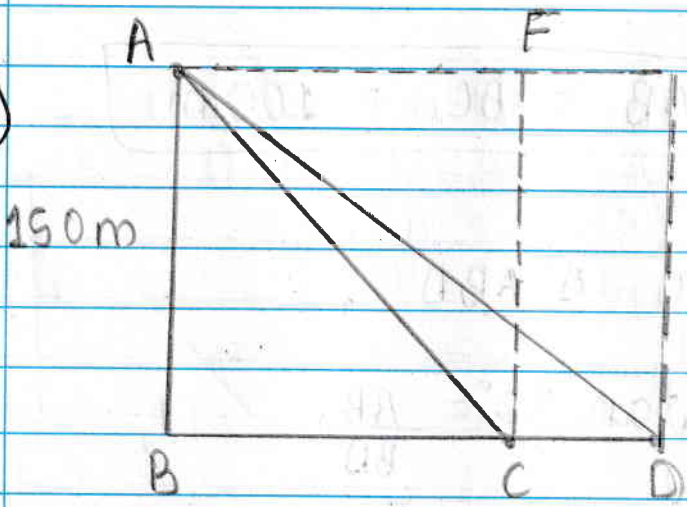
$$CD = BD - BC$$

$$= 100\sqrt{3} - 100$$

$$= \boxed{100(\sqrt{3} - 1)\ m}$$

So, the distance b/w two cars is $100(\sqrt{3} - 1)$ m.

(iii)



$BD = 100\sqrt{3}\ m$

$BC = 100\ m$

$BD = AE$

$AF = BC$

$AB = DE = FC$

In $\triangle AFC$

$$\tan A = \frac{P}{B} = \frac{FC}{AF} = \frac{150}{100} \quad \frac{3}{2}$$

$$\tan A = \frac{\cancel{150}}{\cancel{100}} \quad \frac{2}{3} \quad \frac{3}{2}$$

$$\boxed{\tan A = \frac{3}{2}}$$

The tangent of angle of depression of car C is $\frac{3}{2}$.

In $\triangle AED$

$$\tan A = \frac{P}{B} = \frac{DE}{AE} = \frac{150}{100\sqrt{3}} \quad \frac{3}{2\sqrt{3}}$$

$$\tan A = \frac{\sqrt{3}}{2}$$

The tangent of angle of depression of car D is $\frac{\sqrt{3}}{2}$.

Answer · 19

Let the present age of father be x
the present age of daughter be y.

A·T·Q Two years ago

$$(x-2) = 3(y-2)$$
$$x-2 = 3y-6$$
$$x-3y = -6+2$$
$$x-3y = -4 \quad -(1)$$

Six years later,

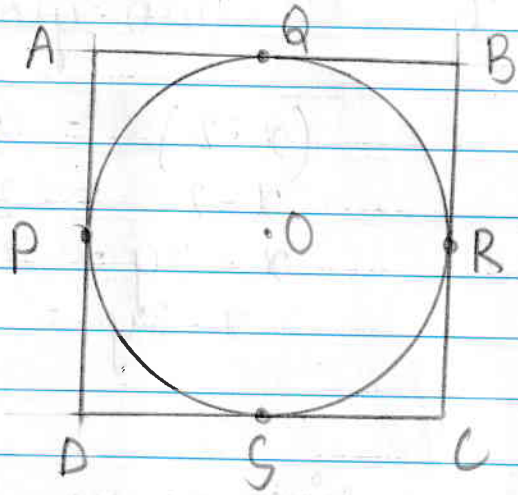
$$(x+6) = 2(y+6)+4$$
$$x+6 = 2y+12+4$$
$$x-2y = 10 \quad -(2)$$

$$x-3y = -4$$
$$x-2y = 10$$
$$-y = -14$$
$$y = 14$$

$$x = -4+3(14)$$
$$= -4+42$$
$$= 38$$

Father's present age is 38 years
Daughter's " 14 years.

Answer - 20



Given:- A circle with centre O is circumscribed by a ||gm ABCD in which AB = CD, AD = BC

To prove: AB = CD = AD = BC i.e ABCD is a rhombus

Proof: ~~Tangent AB to a circle at point Q.~~

AQ = AP - (1) [draw tangents from an ext. point to a circle equal in length
DS = DP - (2)
BQ = BR - (3)
CS = RC - (4)

Add eqⁿ (1), (2), (3) and (4)

$AQ + BQ + DS + CS = AP + DP + BR + RC$

$AB + CD = AD + BC$

$AB + AB = AD + AD$

$2AB = 2AD$

$AB = AD \quad -(6)$

$AB = CD \quad -(7)$

$AD = BC \quad -(8)$

$AB = AD$

from eqⁿ (6), (7) and (8)

$AB = CD = BC = AD$

Hence, ABCD is a Rhombus.

Answer · 22

$OD = 3.5\text{cm}$ $\quad \theta = 30°$

$OA = 7\text{cm}$

Area of sector $ODC = \frac{\theta}{360°} \pi r^2$

$= \frac{30°}{360°} \times \frac{22}{7} \times 3.5 \times 3.5$

$= \frac{11 \times 3.5}{12} = \frac{11 \times 35}{12 \times 10}$

$= \frac{77}{24}$ cm²

Area of sector OBA $= \frac{\theta}{360} \pi r^2$

$= \frac{30}{360_{12}} \times \frac{22}{7} \times 7 \times 7$

$= \frac{22 \times 7}{12_6}$

$= \frac{77}{6}$ cm²

Area of shaded region = Area of sector OAB - Area of sector ODC

$= \frac{77}{6} - \frac{77}{24}$

$= \frac{308 - 77}{24}$

$= \frac{231}{24_8} 77$

$= \boxed{\frac{77}{8}}$ cm²

Perimeter of shaded region = DC + BA + DB + AC

$DB = AC = 7 - 3.5 = 3.5$ cm

$$DC = \frac{\theta}{360} 2\pi r$$

$$= \frac{1}{\cancel{12}_{6}} \times \cancel{7} \times \frac{22}{\cancel{7}} \times \overset{0.5}{\cancel{3.5}}$$

$$= \frac{11}{6} \text{ cm}$$

$$AB = \frac{\theta}{360} 2\pi r$$

$$= \frac{1}{\cancel{12}_{\cancel{6}\,3}} \times \cancel{2} \times \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \cancel{7}$$

$$= \frac{11}{3} \text{ cm}$$

Perimeter $= \frac{11}{6} + \frac{11}{3} + 3.5 + 3.5$

$$= \frac{11 + 22}{6} + 7$$

$$= \frac{33}{6} + \frac{7}{1}$$

$$= \frac{33 + 42}{6}$$

$$= \frac{\cancel{75}}{\cancel{6}} \boxed{\frac{25}{3}} \text{ cm}$$

Answer- 23

Sol

C.I	f_i
0-20	3
20-40	10
40-60	18
60-80	14
80-100	5

modal class = 40-60

$f_1 = 18 \quad f_0 = 10 \quad f_2 = 14$

$$\text{mode} = 40 + \left(\frac{18-10}{36-10-14}\right) \times 20$$

$$= 40 + \left(\frac{8}{36-24}\right) \times 20$$

$$= 40 + \frac{8}{12} \times 20$$

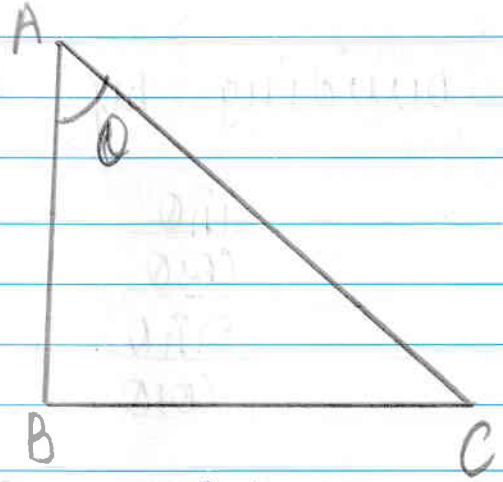
$$= 40 + \frac{40}{3} \quad 13.33\ldots$$

$$= 40 + 13.3$$

$$= 53.3 \text{ (approx)}$$

Modal class = 40-60

Answer - 21



ABC is a right angled Δ right angled at B.

By ~~PTGT~~ PGT,

$$(AB)^2 + (BC)^2 = (AC)^2$$

Dividing both sides by $(AB)^2$,

$$\frac{AB^2}{AB^2} + \frac{BC^2}{AB^2} = \frac{AC^2}{AB^2}$$

$$1 + \tan^2\theta = \sec^2\theta$$

So, $1 + \tan^2\theta = \sec^2\theta$

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

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

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

Dividing by $\cos\theta$,

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

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

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

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

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

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

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

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