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1. The distance between the points $P\left(-\frac{11}{3}, 5\right)$ and $Q\left(-\frac{2}{3}, 5\right)$ is :

(a) 6 units (b) 4 units
(c) 2 units (d) 3 units

(D)

2. In the given figure, $AB = BC = 10$ cm. If $AC = 7$ cm, then the length of BP is :

Let BP

(a) 3·5 cm (b) 7 cm
(c) 6·5 cm (d) 5 cm

(C)

3. Water in a river which is 3 m deep and 40 m wide is flowing at the rate of 2 km/h. How much water will fall into the sea in 2 minutes ?

(a) $800\ m^3$ (b) $4000\ m^3$
(c) $8000\ m^3$ (d) $2000\ m^3$

(C)

water collected in 1Hr $= 3 \times 40 \times 2000$

So in 2 minutes $= \frac{3\times 40\times 2000}{30} = 8000\ m^3$

4. If the mean and the mode of a distribution are 15 and 18 respectively, then the median of the distribution is :

(a) 17 (b) 15
(c) 16 (d) 18

(C)

$3(\text{med}) - 2(\text{mean}) = \text{mode}$

$\text{med} = x$
$3x - 2(15) = 18$
$3x = 48$
$x = 16$

5. The 11^{th} term from the end of the A.P. : 10, 7, 4, ..., − 62 is :

(a) 25 (b) 16
(c) − 32 (d) 0

(C)

$T_{11}(\text{end}) = -62 + 10(3)$
$= -62 + 30$
$= -32$

6. One card is drawn at random from a well shuffled pack of 52 playing cards. The probability that the drawn card is a queen, is :

(a) $\frac{4}{13}$ (b) $\frac{4}{52}$
(c) $\frac{2}{13}$ (d) $\frac{1}{26}$

(B)

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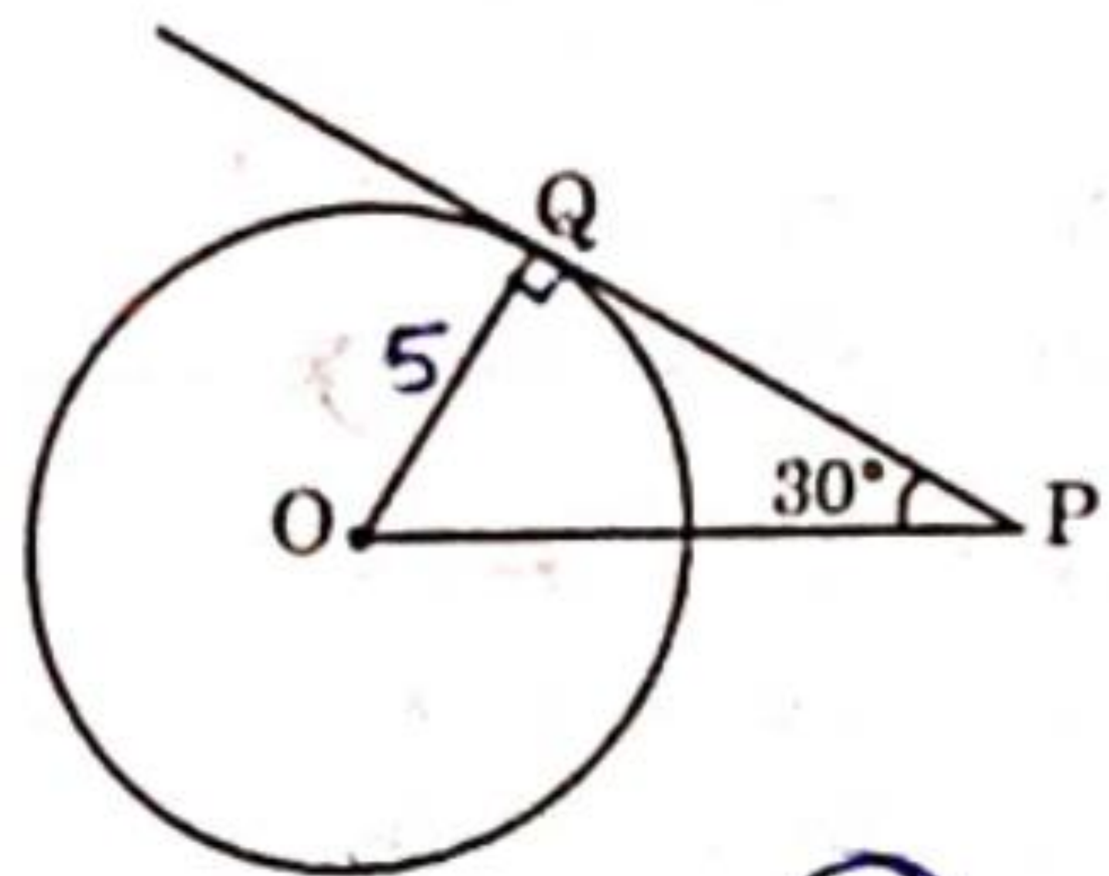
7. PQ is tangent to a circle centered at O. If the radius of the circle is 5 cm, then the length of the tangent PQ is :



$PQ = 5\sqrt{3}$

$\tan 30 = \frac{5}{PQ} \Rightarrow PQ = 5\sqrt{3}$

(a) $5\sqrt{3}$ cm A (b) $\frac{10}{\sqrt{3}}$ cm

(c) 10 cm (d) $\frac{5}{\sqrt{3}}$ cm

8. Which of the following numbers *cannot* be the probability of happening of an event ?

(a) 0 B (b) $\frac{7}{0 \cdot 01}$

(c) $0 \cdot 07$ (d) $\frac{0 \cdot 07}{3}$

because $\frac{7}{.01}$ is greater than 1.

9. If $\sec\theta - \tan\theta = \frac{1}{3}$, then the value of $(\sec\theta + \tan\theta)$ is :

(a) $\frac{4}{3}$ (b) $\frac{2}{3}$

(c) $\frac{1}{3}$ D (d) 3

$$\boxed{\begin{aligned}\sec\theta + \tan\theta &= \frac{1}{\sec\theta - \tan\theta} \\ &= \frac{1}{1/3} \\ &= 3\end{aligned}}$$

10. A quadratic equation whose roots are $(3 - \sqrt{2})$ and $(3 + \sqrt{2})$ is :

(a) $x^2 - 6x + 7 = 0$ A (b) $x^2 + 6x + 7 = 0$

(c) $9x^2 - 2 = 0$ (d) $x^2 - 7 = 0$

$x^2 - (\text{sum})x + P = 0$

$x^2 - 6x + 7 = 0$

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11. If every term of the statistical data consisting of n terms is decreased by 2, then the mean of the data :

(a) decreases by 2

(b) remains unchanged

(c) decreases by 2n

(d) decreases by 1

A

12. The number of polynomials having zeroes -3 and 5 is :

(a) only one (b) infinite

(c) exactly two (d) at most two

B

13. The solution of the pair of equations $x + y = a + b$ and $ax - by = a^2 - b^2$ is :

(a) $x = b, y = a$ (b) $x = -a, y = b$

(c) $x = a, y = b$ (d) $x = a, y = -b$

C

(Trial method)
$x = a, y = b$
is satisfying

14. The common difference of the A.P. whose n^{th} term is given by $a_n = 3n + 7$, is :

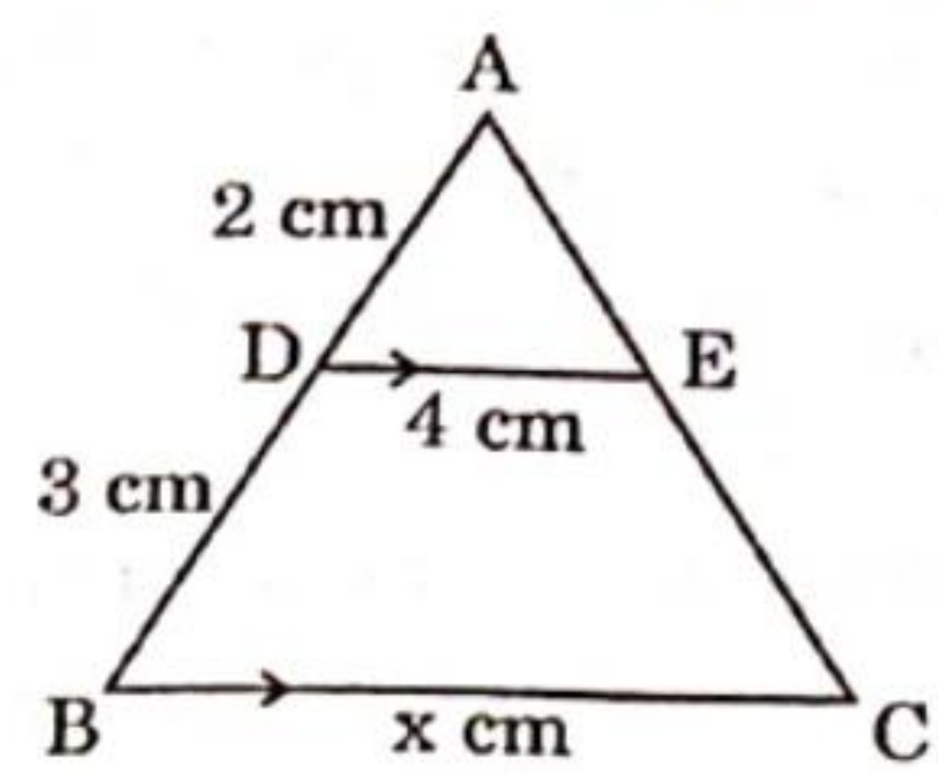
(a) 7 (b) 3

(c) 3n (d) 1

B

C.D. = 3

15. In the given figure, DE ∥ BC. The value of x is :



$$\frac{2}{5} = \frac{4}{x} \Rightarrow \boxed{x = 10}$$

(a) 6 (b) 12·5

(c) 8 (d) 10

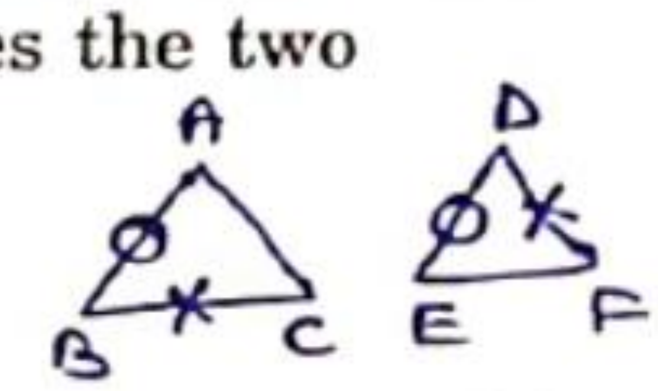
D

16. In Δ ABC and Δ DEF, $\frac{AB}{DE} = \frac{BC}{FD}$. Which of the following makes the two triangles similar ?

(a) $\angle A = \angle D$ (b) $\angle B = \angle D$

(c) $\angle B = \angle E$ (d) $\angle A = \angle F$

B



$\angle B = \angle D$

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17. $\left(\dfrac{2\tan 30°}{1+\tan^2 30°}\right)$ is equal to :

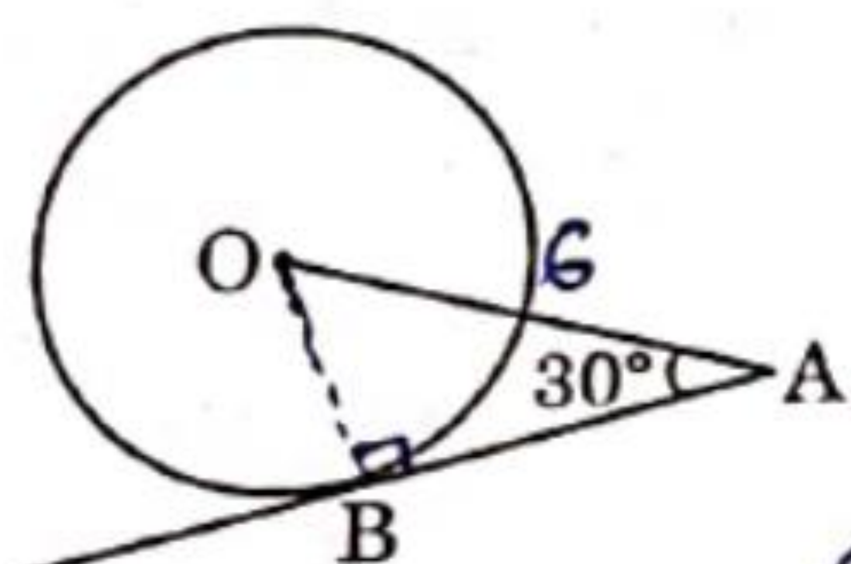
(a) sin 60° (b) cos 60°

(c) tan 60° (d) sin 30°

∴ A

$$\boxed{\frac{2\tan 30}{1+\tan^2 30°} = \frac{2/\sqrt{3}}{1+\frac{1}{3}} = \frac{\sqrt{3}}{2} = \sin 60°}$$

18. In the given figure, AB is a tangent to the circle centered at O. If OA = 6 cm and ∠ OAB = 30°, then the radius of the circle is :



OB = r (rad)

$\sin 30 = \frac{r}{6} \Rightarrow \frac{1}{2} = \frac{r}{6}$

$\Rightarrow \boxed{r=3}$

A

(a) 3 cm (b) $3\sqrt{3}$ cm

(c) 2 cm (d) $\sqrt{3}$ cm

19. *Assertion (A) :* The number 5^n cannot end with the digit 0, where n is a natural number. True

Reason (R): Prime factorisation of 5 has only two factors, 1 and 5. True

A

20. *Assertion (A) :* If the points A(4, 3) and B(x, 5) lie on a circle with centre O(2, 3), then the value of x is 2. TRUE

Reason (R) : Centre of a circle is the mid-point of each chord of the circle. False

C

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21. Find the greatest 3-digit number which is divisible by 18, 24 and 36.

$\boxed{\text{LCM} = 72, \text{ Greatest 3 digit} = 936}$

Q.21 LCM = 72

Greatest 3 digit no = 999

we want greatest 3 digit divisible by 72

So divide 999 by 72, rem = 63

So req. no = 999 − 63 = 936 Ans.

22. (a) If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, then prove that $a^2 + b^2 = m^2 + n^2$.

$a\cos\theta + b\sin\theta = m$ —①
$a\sin\theta - b\cos\theta = n$ —②
$\Rightarrow ①^2 + ②^2 \Rightarrow a^2 + b^2 = m^2 + n^2$

OR

(b) Prove that :

$$\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2\,\text{cosec}\,A$$

Q.22 a

$a\cos\theta + b\sin\theta = m$ —①

$a\sin\theta - b\cos\theta = n$ —②

$①^2 + ②^2 \Rightarrow (a\cos\theta + b\sin\theta)^2 + (a\sin\theta - b\cos\theta)^2 = m^2 + n^2$

$\Rightarrow a^2\cos^2\theta + 2ab\sin\theta\cos\theta + b^2\sin^2\theta + a^2\sin^2\theta - 2ab\sin\theta\cos\theta + b^2\cos^2\theta = m^2 + n^2$

$\Rightarrow a^2 + b^2 = m^2 + n^2$

OR

Q.22 (b)

$$\text{LHS} = \sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}}$$

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

(multiply num & den of both by sec A − 1 & sec A + 1, resp)

$$= \frac{2\sec A}{\tan A}$$

$$= \frac{2}{\sin A} = 2\,\text{cosec}\,A = \text{RHS}$$

(Hence Proved)

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23. Find the ratio in which y-axis divides the line segment joining the points $(5, -6)$ and $(-1, -4)$. 5 : 1 Ans.

Q.23

$$\underset{(5,-6)}{\bullet}\xrightarrow{\quad k \quad}\underset{(0,y)}{\bullet}\xrightarrow{\quad 1 \quad}\underset{(-1,-4)}{\bullet}$$

any point on y axis is $(0, y)$

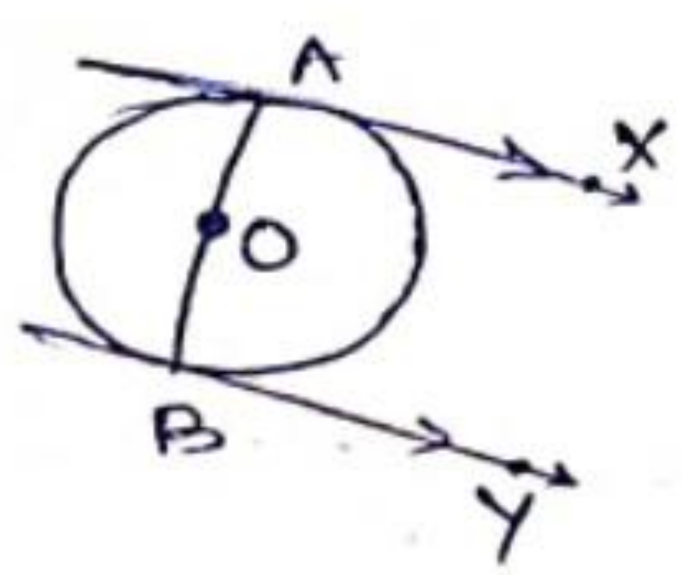
Let $(0, y)$ divides the line seg. into ratio $k:1$

$\Rightarrow \quad 0 = \dfrac{-k+5}{k+1} \Rightarrow k = 5$

$\boxed{\text{Ratio} = 5:1}$ $\boxed{\text{Ans. } 5:1}$

24. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

Q.24



Given : A circle with centre O.
AB is diameter.
AX & AY are tangents at A & B.

To Prove : $AX \parallel BY$

Proof :

$AX \perp AB$ (Theorem 10.1)

$BY \perp BA$ (— " —)

$\Rightarrow \angle A + \angle B = 90^\circ$

$\Rightarrow AX \parallel BY$ (Sum of coint angles is 180°)

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25. (a) The line segment joining the points A(4, – 5) and B(4, 5) is divided by the point P such that AP : AB = 2 : 5. Find the coordinates of P.

(4, −1)

OR

(b) Point P(x, y) is equidistant from points A(5, 1) and B(1, 5). Prove that x = y.

Q.25

A (4,−5) —— P —— B(4,5)

2 P 3

$$\frac{AP}{AB} = \frac{2}{5} \Rightarrow \frac{AP}{PB} = \frac{2}{3}$$

$$\Rightarrow P = \left(\frac{12+8}{5}, \frac{-15+10}{5}\right) \quad \text{(section formula)}$$

$$= (4, -1) \quad \text{Ans.}$$

Q.25 (OR)

(x, y) P —— A (5,1)

P —— B(1,5)

$$PA^2 = PB^2$$

$$\Rightarrow (x-5)^2 + (y-1)^2 = (x-1)^2 + (y-5)^2$$

$$\Rightarrow \cancel{x^2} + \cancel{y^2} - 10x - 2y + \cancel{26} = \cancel{x^2} + \cancel{y^2} - 2x - 10y + \cancel{26}$$

$$\Rightarrow -8x = -8y \Rightarrow \boxed{x = y} \quad \text{Hence Proved}$$

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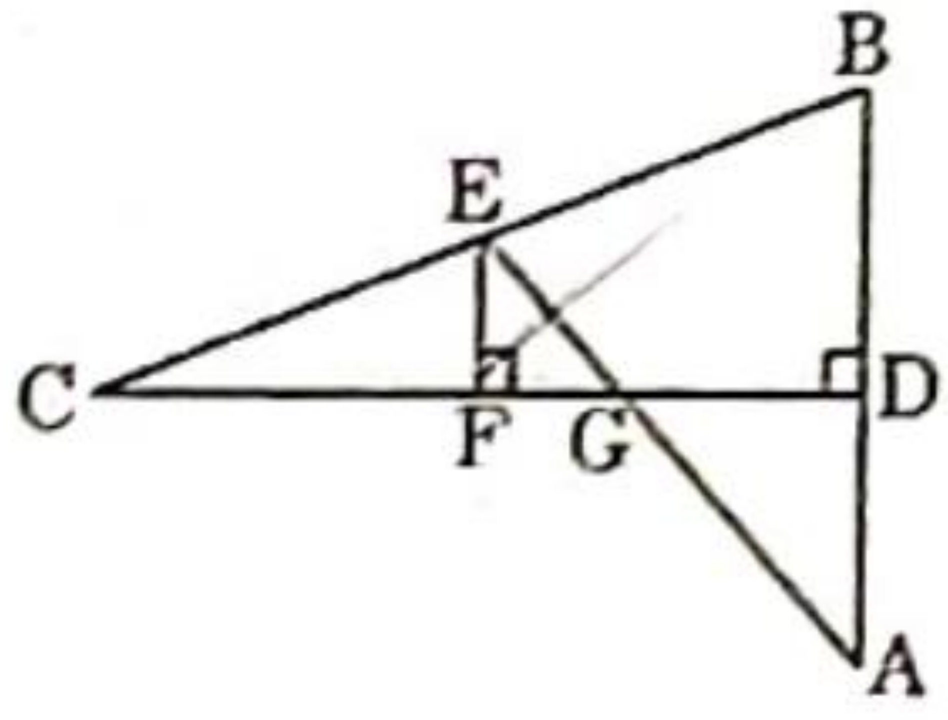
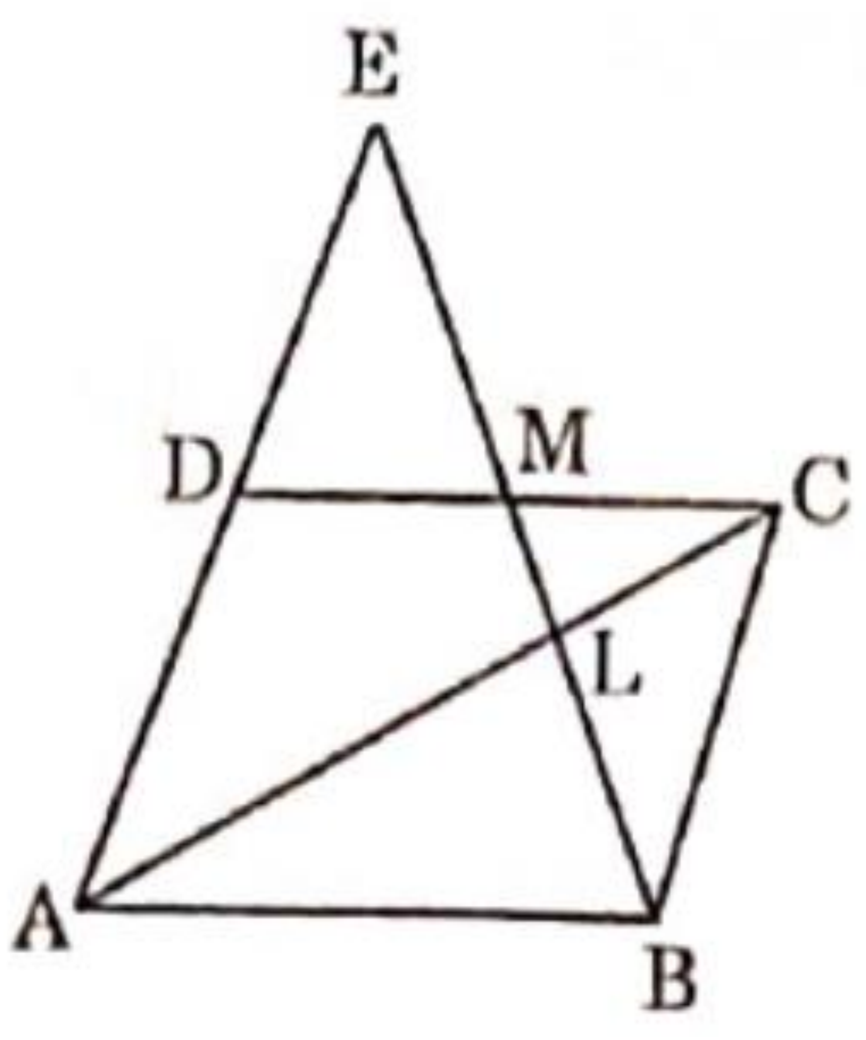
26. (a) In the given figure, CD is the perpendicular bisector of AB. EF is perpendicular to CD. AE intersects CD at G. Prove that $\frac{CF}{CD} = \frac{FG}{DG}$.



OR

(b) In the given figure, ABCD is a parallelogram. BE bisects CD at M and intersects AC at L. Prove that EL = 2BL.



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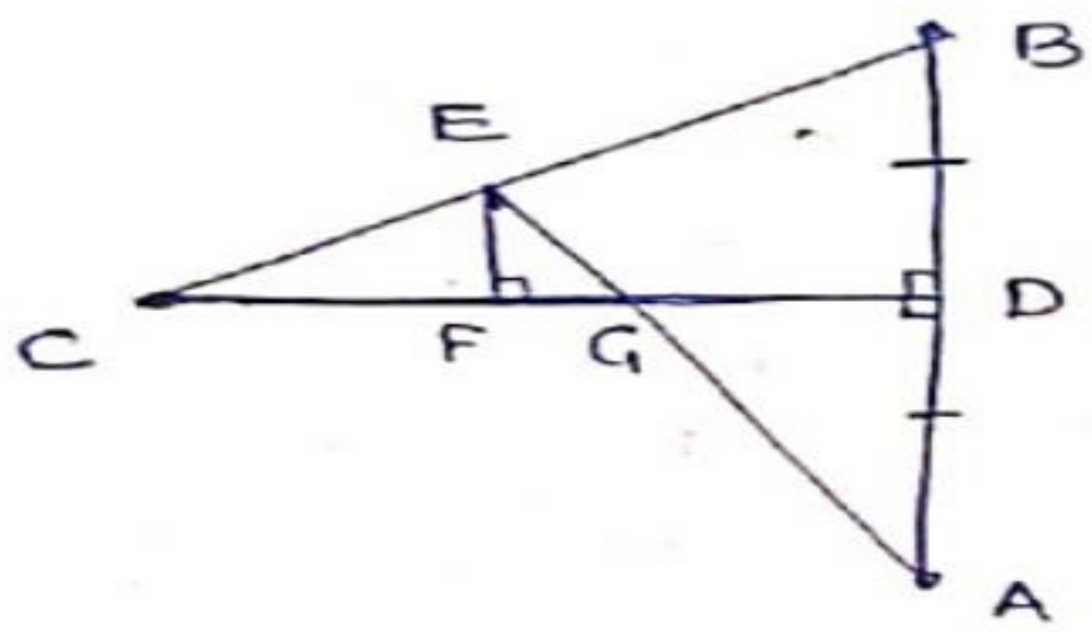
26



AD = BD (given)

To Prove: $\frac{CF}{CD} = \frac{FG}{DG}$

Sol^n ① $\Delta CFE \sim \Delta CDB$ (AA)

$\Rightarrow \frac{CF}{CD} = \frac{FE}{DB}$ (CPST)

$\Rightarrow \frac{CF}{CD} = \frac{FE}{DA}$ (AD = BD) —— ①

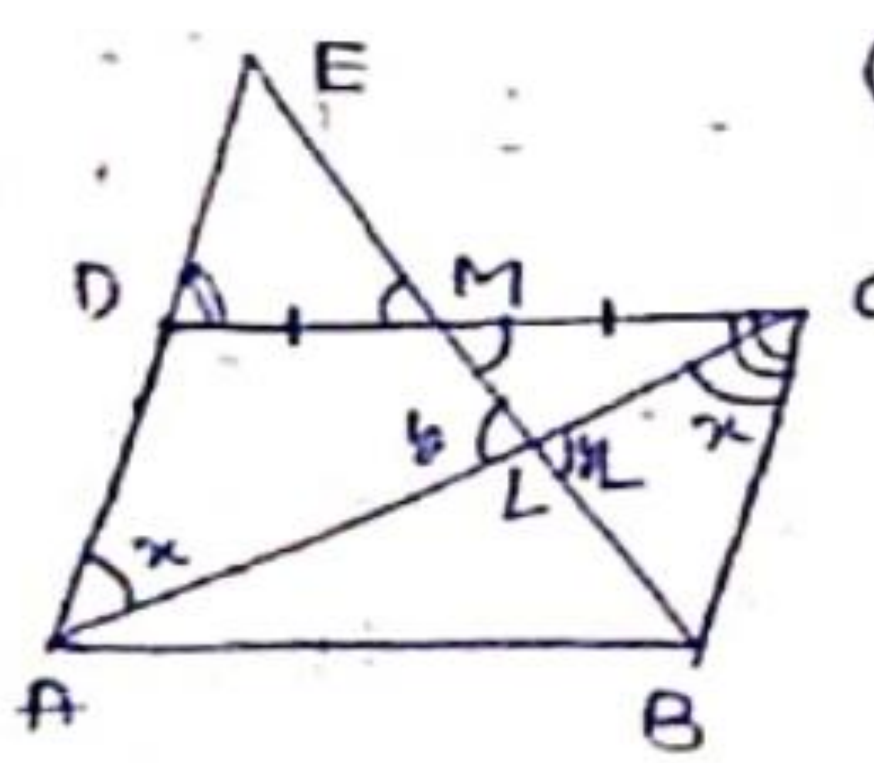
② $\Delta FEG \sim \Delta DAG$ (AA)

$\Rightarrow \frac{FE}{DA} = \frac{FG}{DG}$ —— ②

from ① & ② $\boxed{\frac{CF}{CD} = \frac{FG}{DG}}$ Hence Proved

(OR)

26 (OR)



Given

i) ABCD is a ∥gm

ii) DM = MC.

Sol^n (I) $\Delta DME \cong \Delta CMB$ (ASA)

$\Rightarrow$ EM = MB, DE = BC (CPCT)

(II) $\Delta AEL \sim \Delta CBL$ (AA, x = x, y = y)

$\Rightarrow \frac{AE}{BC} = \frac{EL}{BL} \Rightarrow \frac{EL}{BL} = \frac{AD + DE}{BC}$

$\Rightarrow \frac{EL}{BL} = \frac{2\cancel{DE}}{\cancel{DE}}$ (BC = DE = AD)

$\Rightarrow \boxed{EL = 2BL}$ Hence Proved

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27. A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator. It becomes $\frac{1}{4}$ when 8 is added to the denominator. Find the fraction. $\frac{5}{12}$ Ans.

Q.27 Let fraction be $\frac{x}{y}$

Case-1

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

$$\Rightarrow 3x - 3 = y$$

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

Case-2

$$\frac{x}{y+8} = \frac{1}{4}$$

$$\Rightarrow 4x = y + 8$$

$$\boxed{4x - y = 8} \quad \text{—(2)}$$

Solving (1) & (2)

$$3x - y = 3$$
$$4x - y = 8$$
$$- \quad + \quad -$$
$$-x = -5 \Rightarrow x = 5, \; y = 12$$

Fraction is $\frac{5}{12}$ Ans.

28. Prove that :

$$\frac{\tan A}{1+\sec A} - \frac{\tan A}{1-\sec A} = 2 \operatorname{cosec} A$$

Q.28

$$\text{LHS} = \frac{\tan A}{1+\sec A} - \frac{\tan A}{1-\sec A}$$

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

$$= \tan A \left(\frac{1}{\sec A + 1} + \frac{1}{\sec A - 1} \right)$$

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

$$= \frac{2 \cos A}{\cos A \cdot \sin A} = 2 \operatorname{cosec} A = \text{RHS}$$

Hence Proved

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29. Find the mean of the following frequency distribution :

Classes	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55	55 – 60
Frequency	14	22	16	6	5	3	4

Q.29

Class	x_i	f_i	$u_i = \frac{x_i - a}{h}$	$f_i u_i$
25–30	27.5	14	−3	−42
30–35	32.5	22	−2	−44
35–40	37.5	16	−1	−16
40–45	42.5	6	0	0
45–50	47.5	5	1	5
50–55	52.5	3	2	6
55–60	57.5	4	3	12
		$\Sigma = 70$		$\Sigma = -79$

assumed mean $(a) = 42.5$

$h = 5$

mean $(\bar{x}) = \bar{u} \times h + a$

or

$a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$

$= 42.5 + \frac{(-79)}{70} \times 5$

$= 42.5 - \frac{79}{14}$

$= 42.5 - 5.64 = 36.86$

$\boxed{\text{Ans } 36.86}$ Ans.

30. (a) Prove that $\sqrt{3}$ is an irrational number.

OR

(b) The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 a.m., at what time will they change together next ?

07 : 07 : 12 AM

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30. (a) Refer NCERT (it's simple Q, repeated Q)

OR

b) we need to find LCM in this Q.

$LCM(48, 72, 108) = ?$

$48 = 2^4 \times 3$

$72 = 2^3 \times 3^2$

$108 = 2^2 \times 3^3$

$LCM = 2^4 \times 3^3 = 16 \times 27$

$= \underline{432}$

432 seconds $= \frac{432}{60} = 7 + \frac{12}{60}$

$= 7$ min 12 sec.

So the time when they change simultaneously after 7 AM is

$= \underline{07:07:12}$ A.M

31. Find the common difference of an A.P. whose first term is 8, the last term is 65 and the sum of all its terms is 730. $\boxed{\text{Common diff} = 3}$

31 AP, $d = ?$ $a = 8$ (first term)

$l = 65$ (last term)

$S_n = 730$

$S_n = \frac{n}{2}(a + l)$

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

$\Rightarrow 730 = \frac{n}{2}(73)$

$\Rightarrow n = 20$

$\Rightarrow T_{20} = 65$

$a + 19d = 65$

$\Rightarrow 8 + 19d = 65$

$\Rightarrow 19d = 57 \Rightarrow d = 3$ Ans.

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32. (a) A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km/h more than the first speed. If it takes 3 hours to complete the journey, what was its first average speed? $\boxed{36 \text{ km/hr}}$

OR

(b) Two pipes together can fill a tank in $\frac{15}{8}$ hours. The pipe with larger diameter takes 2 hours less than the pipe with smaller diameter to fill the tank separately. Find the time in which each pipe can fill the tank separately. 3 hrs, 5 hrs.

32 (a) Let first average speed = x km/hr

time in First case (Part) = $\frac{54}{x}$ hrs.

2nd Part: distance = 63, speed = $x+6$

time = $\frac{63}{x+6}$

total time = 3

$\Rightarrow \frac{54}{x} + \frac{63}{x+6} = 3$

$\Rightarrow \frac{18}{x} + \frac{21}{x+6} = 1 \Rightarrow 18x + 108 + 21x = x(x+6)$

$\Rightarrow x^2 + 6x - 39x - 108 = 0$

$\Rightarrow x^2 - 33x - 108 = 0$

$(x-36)(x+3) = 0$

$\Rightarrow \boxed{x = 36 \text{ Km/hr}}$

First average speed = 36 Km/hr

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OR

32 (b). Let time taken by pipe (larger dia) to fill tank $= x$ hrs
(smaller dia) $= x+2$

In 1 hr, pipe (smaller dia), fills the tank $= \frac{1}{x+2}$ tank
Pipe (larger dia), $= \frac{1}{x}$ tank

They are on for $\frac{15}{8}$ hrs.

$$\frac{15}{8}\left(\frac{1}{x+2}+\frac{1}{x}\right) = 1$$

$$\Rightarrow \frac{1}{x}+\frac{1}{x+2} = \frac{8}{15}$$

$$\Rightarrow \frac{x+2+x}{x(x+2)} = \frac{8}{15} \Rightarrow 30x+30 = 8x^2+16x$$

$$\Rightarrow 8x^2-14x-30=0 \Rightarrow 4x^2-7x-15=0$$

$$4x^2-12x+5x-15=0$$

$$\Rightarrow 4x(x-3)+5(x-3)=0$$

$\boxed{x=3}$, $x=-5/4$ ✗

Time taken by smaller pipe = 5 hrs
Time taken by larger pipe = 3 hrs

33. A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find the area of that part of the field in which the horse can graze. Also, find the increase in grazing area if length of rope is increased to 10 m. (Use $\pi = 3{\cdot}14$)

$19{\cdot}6\ m^2$, $58{\cdot}87\ m^2$

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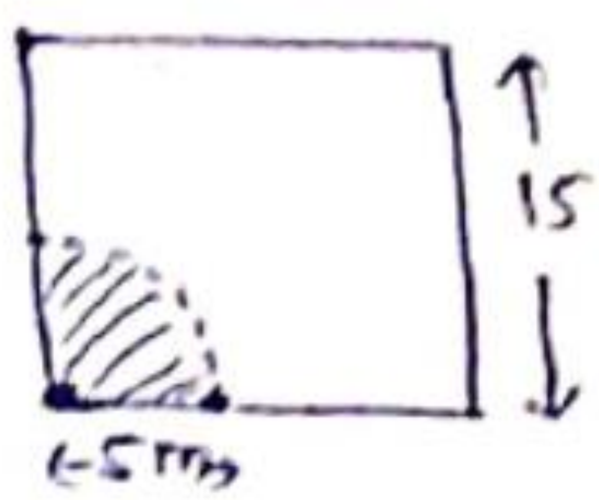
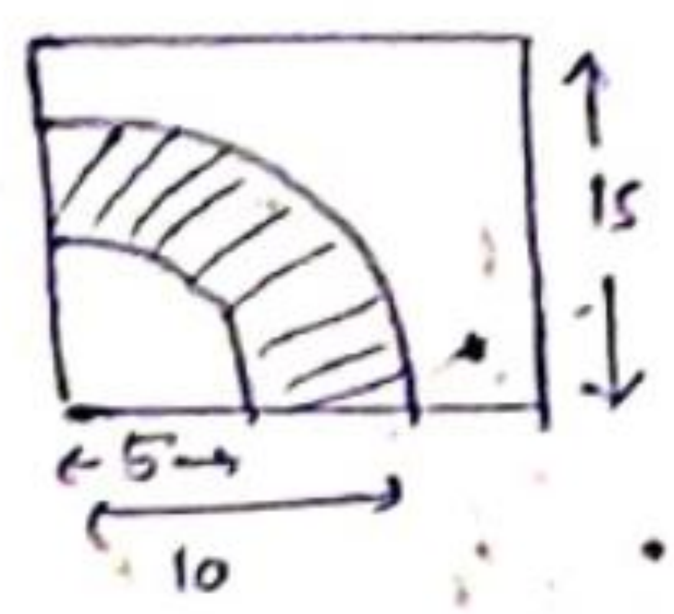
Q.33





(i) Area which can be grazed by horse with 5 m rope

$$= \frac{1}{4} \times \pi (5)^2 = \frac{25\pi}{4} m^2$$

$$= \frac{25}{4} \times 3.14 = \frac{314}{16} m^2$$

$$\approx \underline{19.6 \ m^2}$$

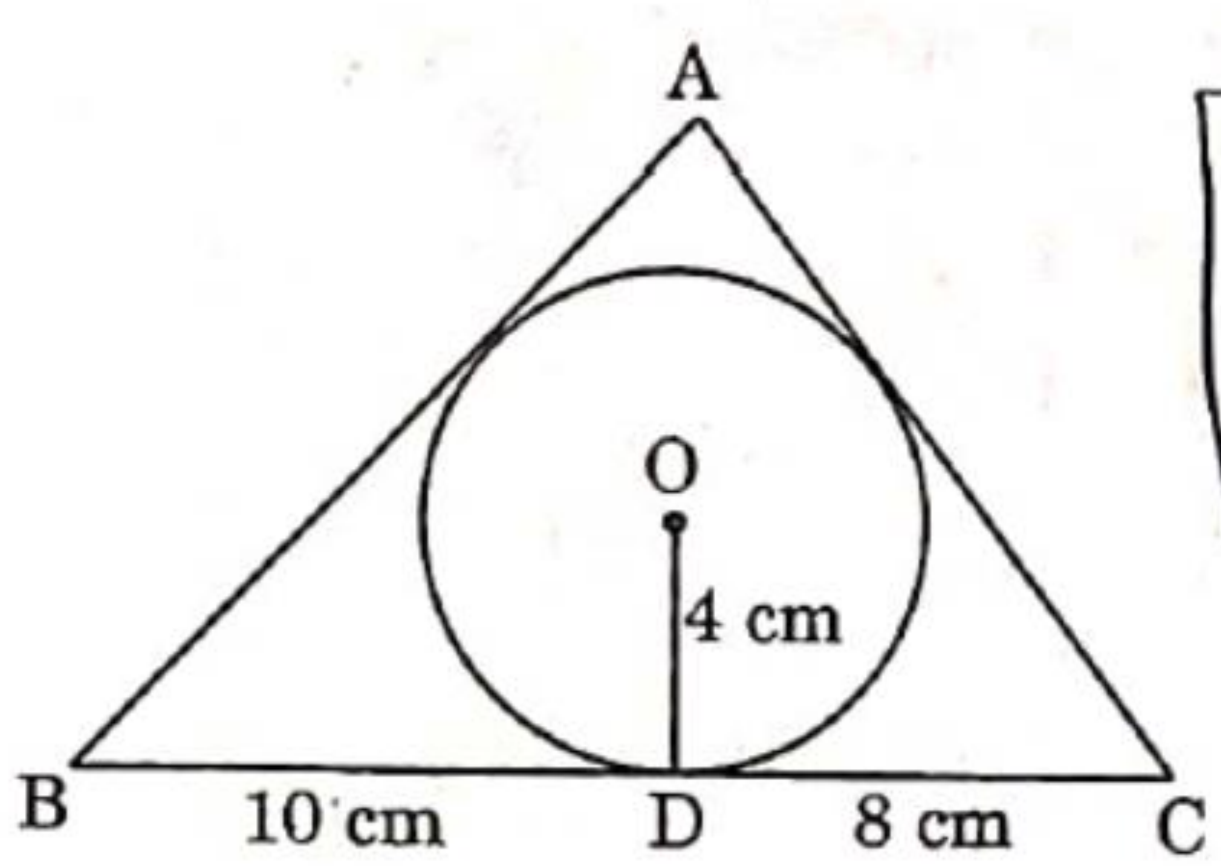
(ii) Increase in area when rope is changed from 5 m to 10 m length

$$= \frac{1}{4}\pi (10)^2 - \frac{1}{4}\pi (5)^2$$

$$= \frac{\pi}{4}(100-25) = \frac{75\pi}{4} \ m^2$$

$$= \frac{75}{4} \times 3.14 = \underline{58.87 \ m^2}$$

34. (a) A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC are of lengths 10 cm and 8 cm respectively. Find the lengths of the sides AB and AC, if it is given that area Δ ABC = 90 cm^2.



AB = 14.5 cm
AC = 12.5 cm.

OR

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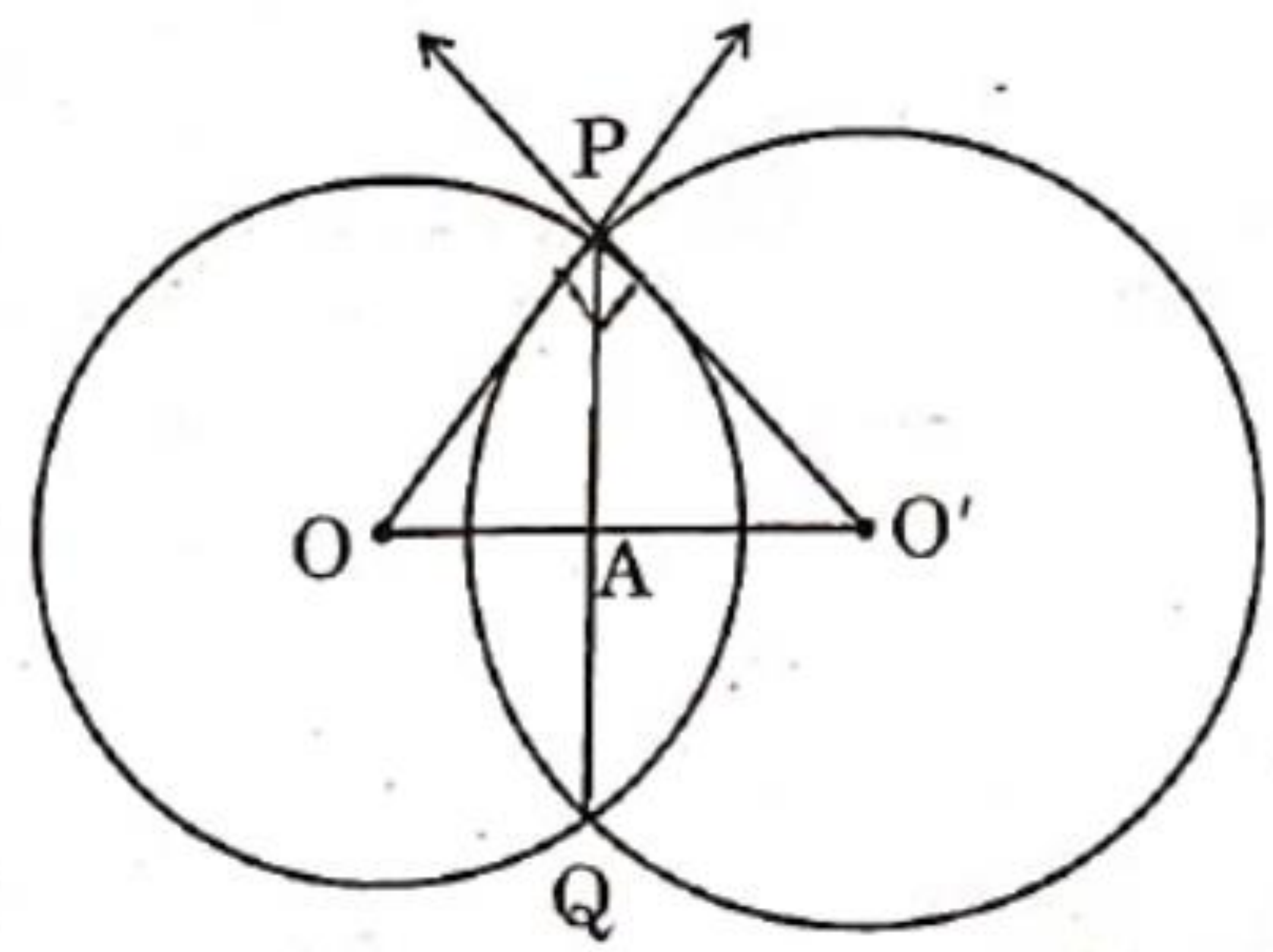
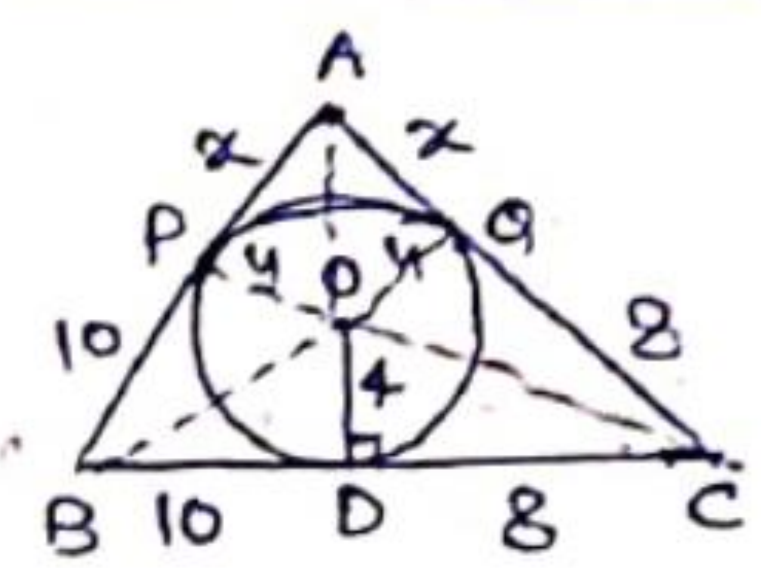
(b) Two circles with centres O and O′ of radii 6 cm and 8 cm, respectively intersect at two points P and Q such that OP and O′P are tangents to the two circles. Find the length of the common chord PQ.



$\boxed{9.6 \text{ cm}}$

Q.34 (a)



AB = ?
AC = ?
Let AP = AQ = x (Thm 10.1)

Construction: Join OP, OQ (P, Q are point of contact)
Join OA, OB, OC

$Ar(\Delta ABC) = Ar(AOB) + Ar(BOC) + Ar(AOC)$

$90 = \frac{1}{2} \times 4 \times (x+10) + \frac{1}{2} \times 4 \times (18) + \frac{1}{2}(4)(x+8)$

$\Rightarrow 90 = 2[x + 10 + 18 + x + 8]$

$\Rightarrow 45 = 2x + 36 \Rightarrow 2x = 45 - 36 \Rightarrow \boxed{x = 4.5}$

So

Ans $\boxed{\begin{array}{l} AB = 10 + x = 14.5 \\ AC = 8 + x = 12.5 \end{array}}$

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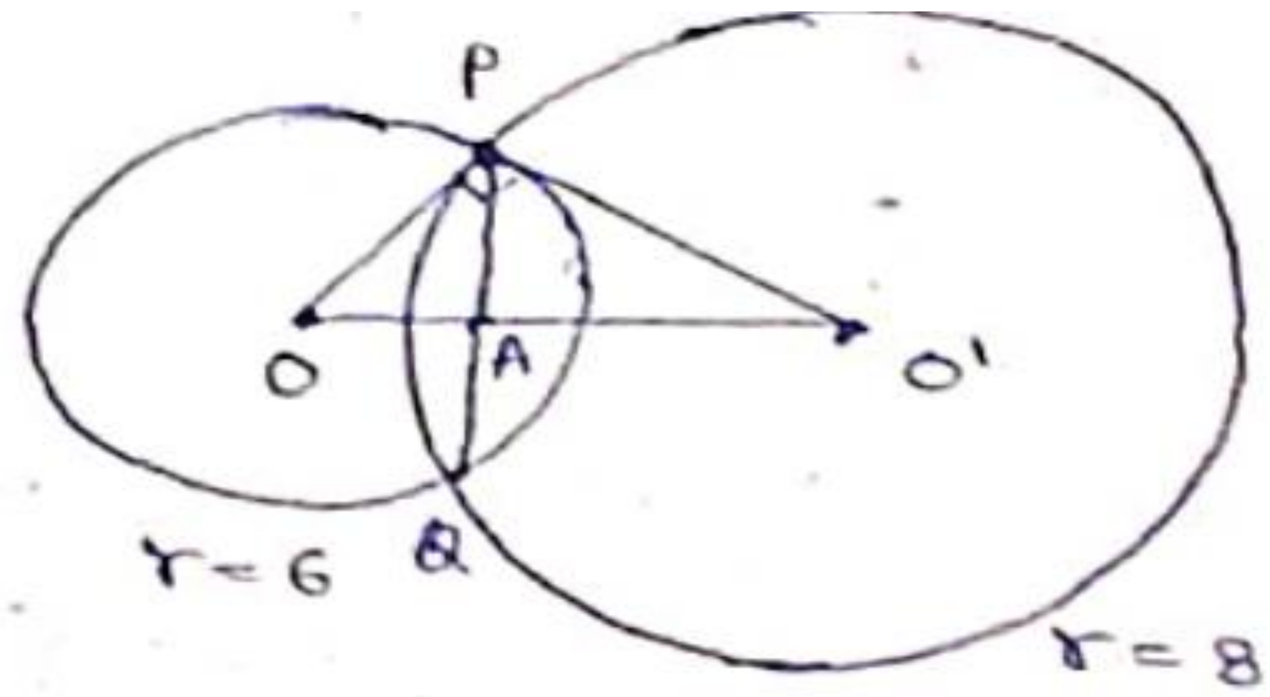
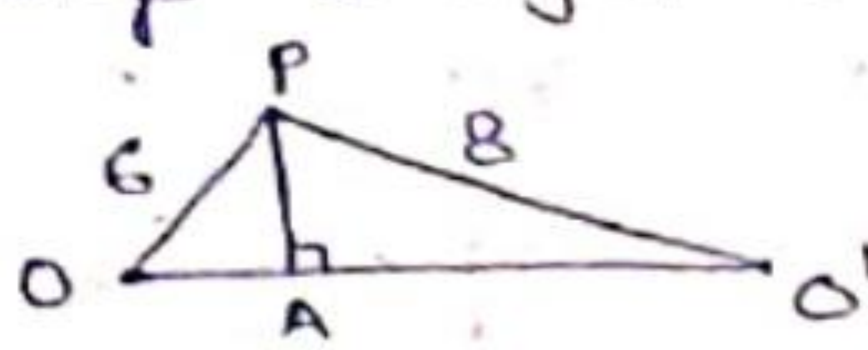
Q.34(b) OR



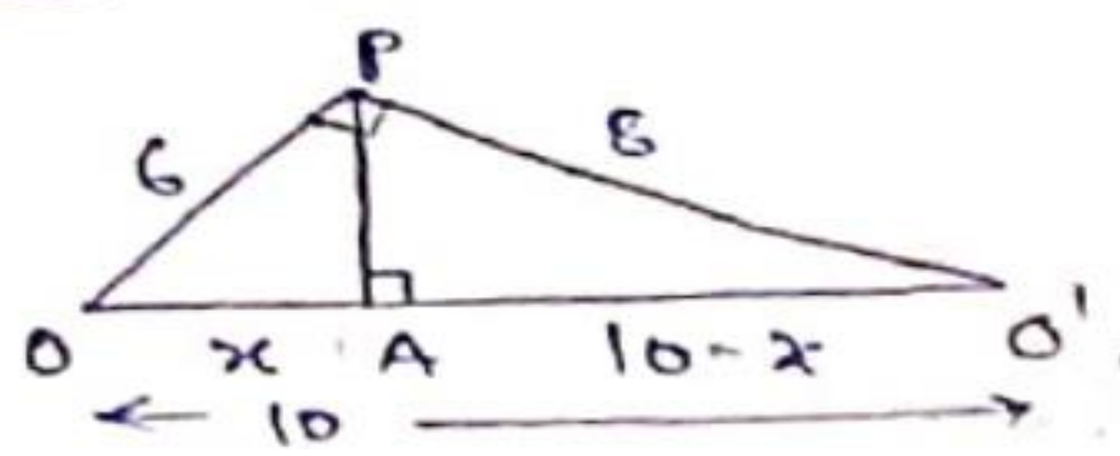
PQ = ? O'P is tangent ⇒ $OP \perp O'P$

Now the figure belongs to right Δ



only ⊥ bisector of PQ can pass through O & O'

⇒ $PA \perp OO'$ So



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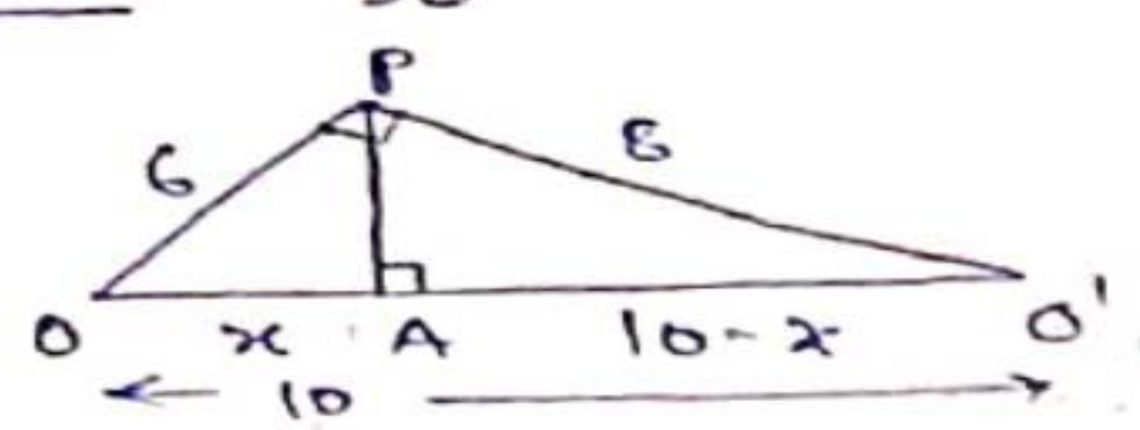

$OO' = 10$ (PGT in $\Delta OPO'$) ⇒ $OA = x$, $O'A = 10 - x$

So $PA = AQ$

Now $\Delta PAO' \sim \Delta OPO'$ (AA criteria)

⇒ $\dfrac{PA}{OP} = \dfrac{PO'}{OO'}$ ⇒ $\dfrac{PA}{6} = \dfrac{8}{10}$ ⇒ $PA = \dfrac{48}{10} = 4.8$

⇒ $\boxed{PQ = 2 \times 4.8 = 9.6\text{ cm}}$

Tip : you could use trigonometry here instead of similarity.

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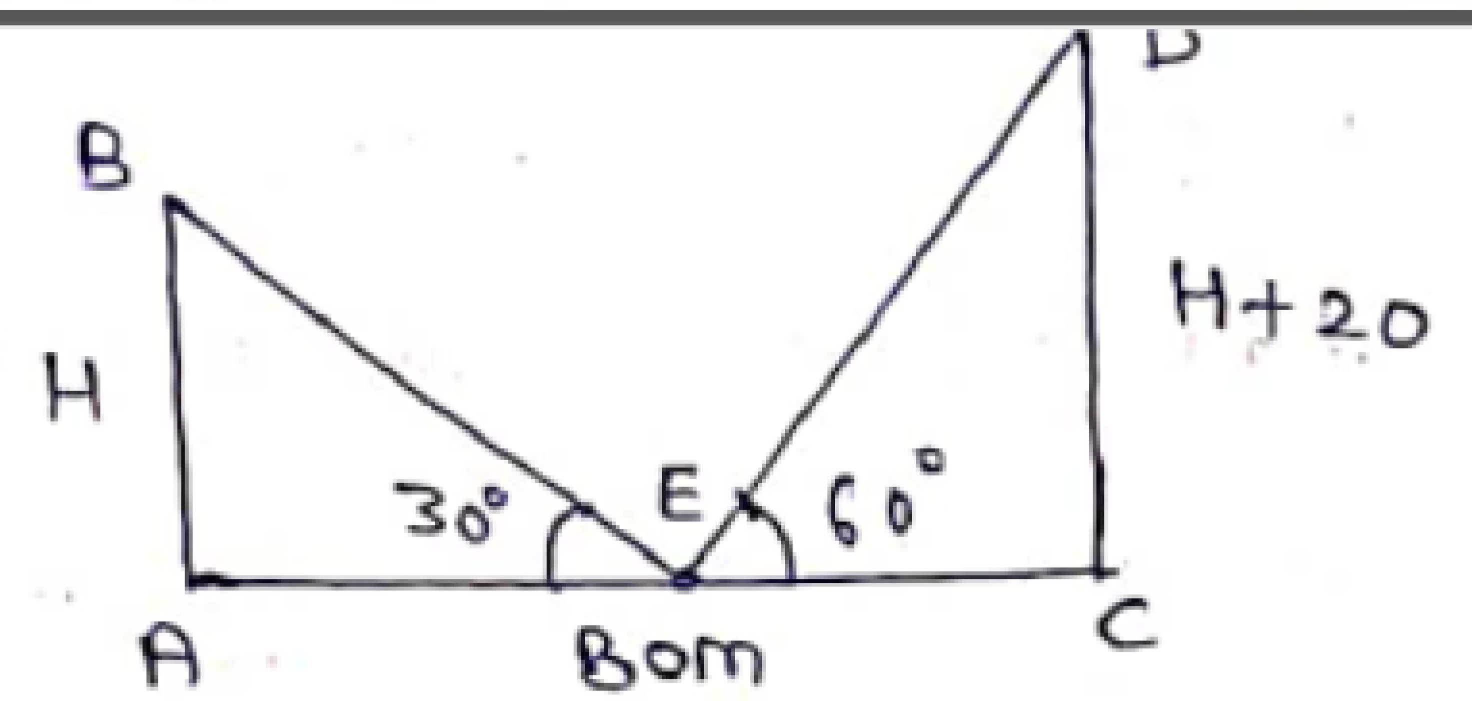
35. Two pillars are standing on either side of a 80 m wide road. Height of one pillar is 20 m more than the height of the other pillar. From a point on the road between the pillars, the angle of elevation of the higher pillar is 60°, whereas that of the other pillar is 30°. Find the position of the point between the pillars and the height of each pillar. (Use $\sqrt{3} = 1{\cdot}73$)

35



$\Rightarrow AE = \sqrt{3}H, \quad EC = \dfrac{H+20}{\sqrt{3}}$

$\sqrt{3}H + \dfrac{H+20}{\sqrt{3}} = 80$

$\Rightarrow 3H + H + 20 = 80\sqrt{3} \Rightarrow 4H = 80\sqrt{3} - 20$

$\Rightarrow H = 20\sqrt{3} - 5$

$= 20 \times 1{\cdot}73 - 5$

$= 34{\cdot}6 - 5 = 29{\cdot}6$ m

Height of pillars : Smaller $= 20\sqrt{3} - 5$

$= 29{\cdot}6$ m Ans.

Higher $= 49{\cdot}6$ m Ans.

position of point $= \sqrt{3}H$ m far from smaller pill

$= \sqrt{3}(20\sqrt{3} - 5)$

$= 60 - 5\sqrt{3}$

$= 60 - 5 \times 1{\cdot}73$

$= 60 - 8{\cdot}65 = 51{\cdot}35$ m

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SECTION E

This section comprises 3 case study based questions of 4 marks each.

Case Study – 1

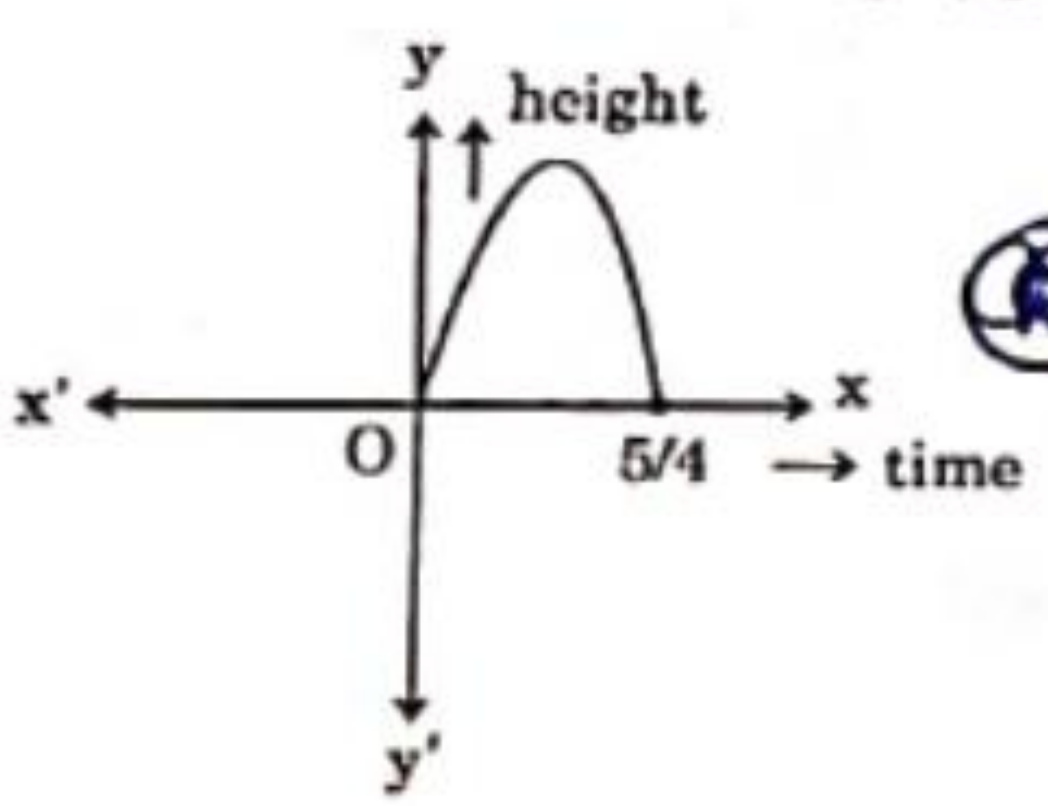
36. In a pool at an aquarium, a dolphin jumps out of the water travelling at 20 cm per second. Its height above water level after t seconds is given by $h = 20t - 16t^2$.

Based on the above, answer the following questions :

(i) Find zeroes of polynomial $p(t) = 20t - 16t^2$. $0, \frac{4}{5}$ *1*

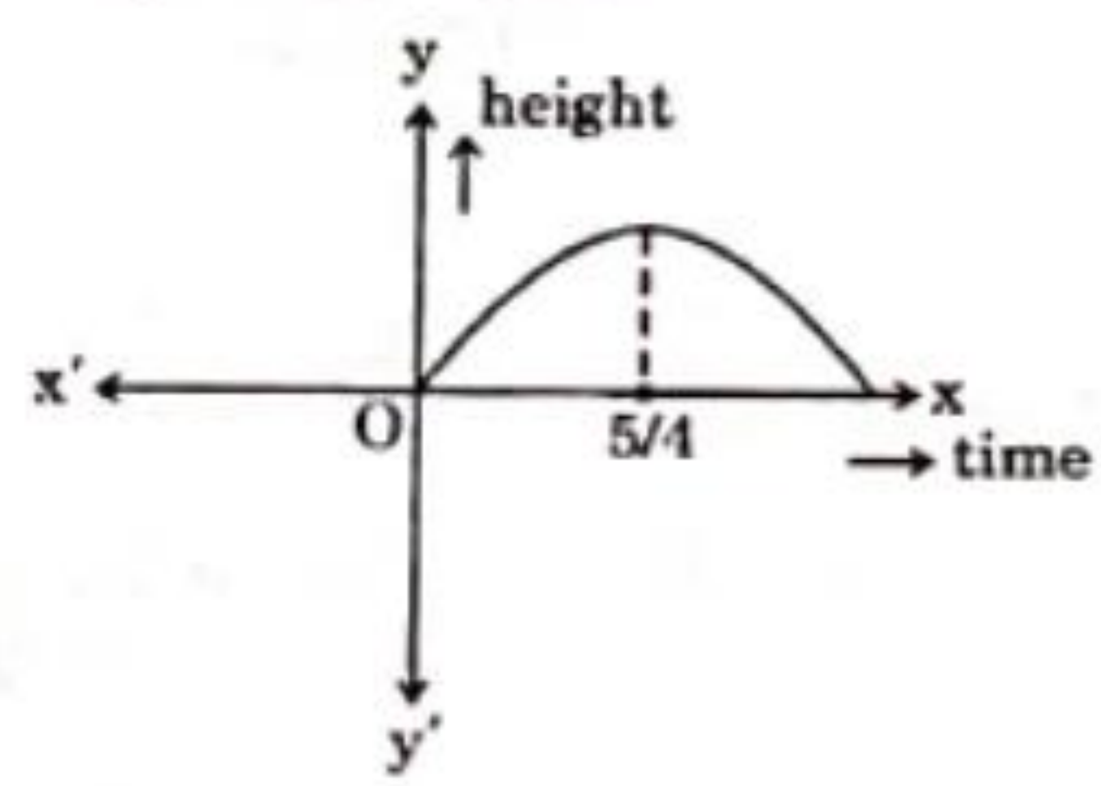
(ii) Which of the following types of graph represents p(t) ? *1*

(a)

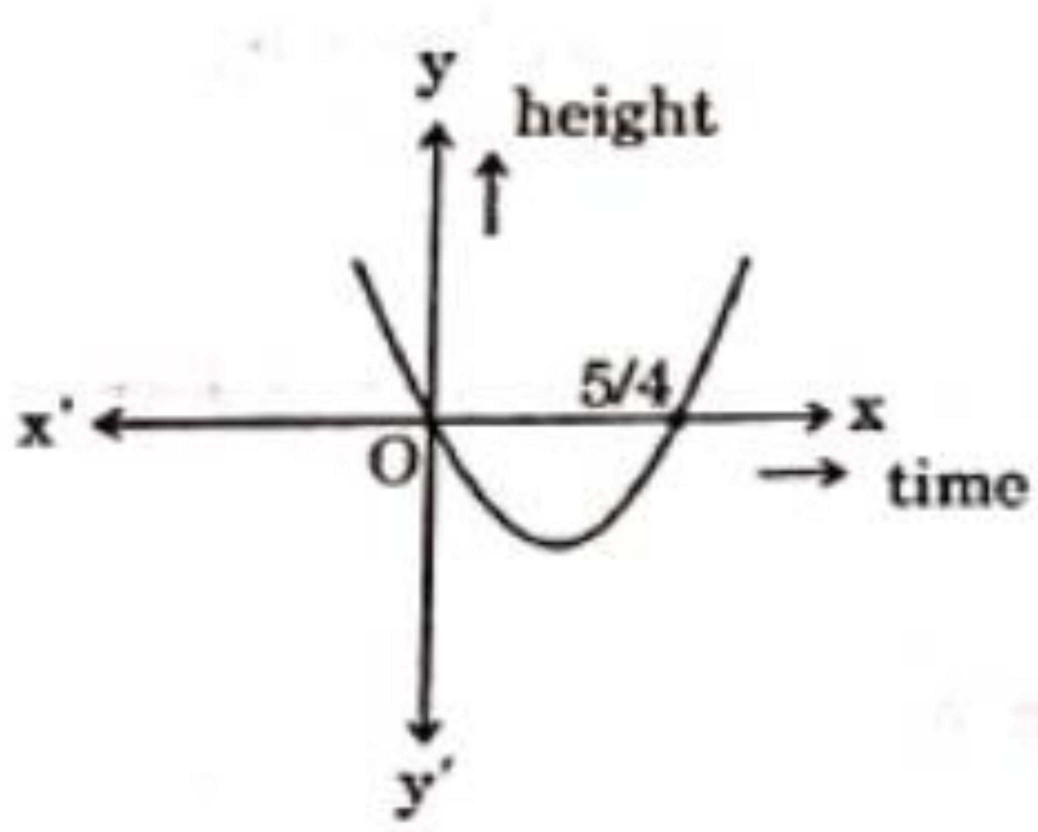


A

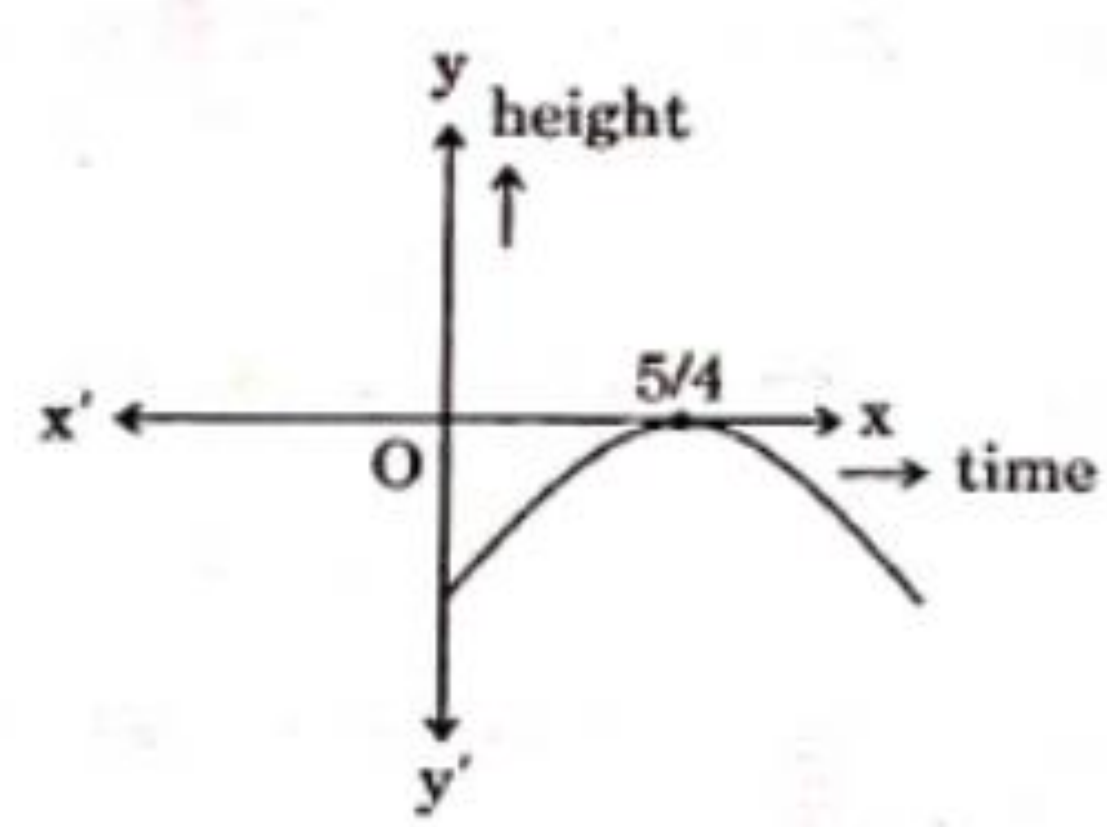
(b)



(c)



(d)



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(iii) (a) What would be the value of h at $t = \frac{3}{2}$? Interpret the result. 2

-6 cm, 6 cm below water level.

OR

(iii) (b) How much distance has the dolphin covered before hitting the water level again ? 2

25 cm.

case 36

$h = 20t - 16t^2$, t = time in sec, h = height above water level

(i) zeroes of polynomial

$20t - 16t^2 = 0 \Rightarrow t = 0$ or $\frac{20}{16}$

$0, \frac{5}{4}$ Ans.

(ii) (A), because, $y = 0$ at $t = 0$ & $\frac{5}{4}$ from above

and height (y) first increases then decreases.

(iii) at $t = \frac{3}{2}$ sec, $h = 20 \times \frac{3}{2} - 16 \times \frac{9}{4} = 30 - 36 = -6$ cm

$\Rightarrow$ Dolphin is 6 cm below the water level

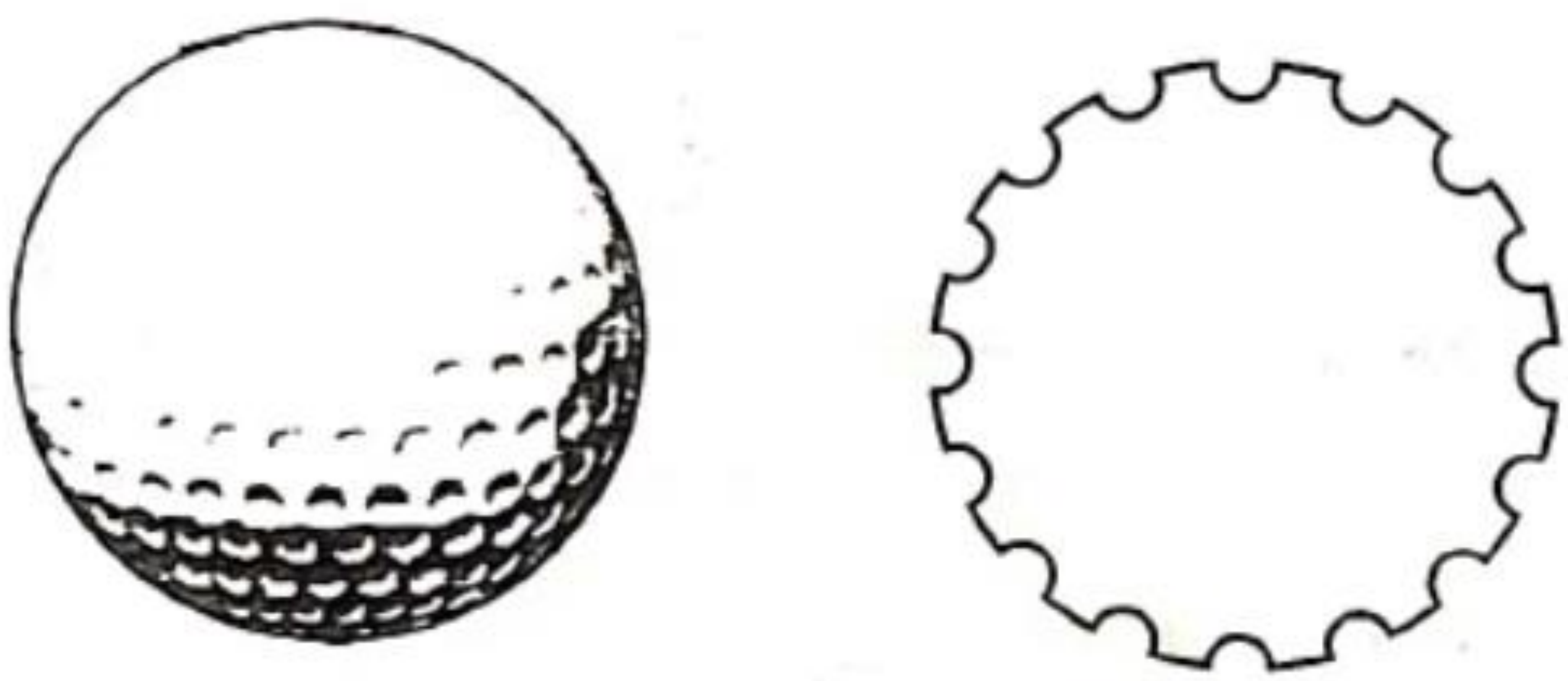
36 (iii) b: Speed of dolphin = 20 cm/sec

time of flight (above water level) $= \frac{5}{4}$ secs.

So distance $= 20 \times \frac{5}{4} = 25$ cm

Case Study – 2

37. A golf ball is spherical with about 300 – 500 dimples that help increase its velocity while in play. Golf balls are traditionally white but available in colours also. In the given figure, a golf ball has diameter 4·2 cm and the surface has 315 dimples (hemi-spherical) of radius 2 mm.



Based on the above, answer the following questions :

(i) Find the surface area of one such dimple. $0{\cdot}08\pi\ cm^2$ *1*

(ii) Find the volume of the material dug out to make one dimple. $\frac{0{\cdot}016\pi}{3}\ cm^3$ *1*

(iii) (a) Find the total surface area exposed to the surroundings. *2*

$30{\cdot}24\pi\ cm^2$

OR

(iii) (b) Find the volume of the golf ball. $11{\cdot}256\pi\ cm^3$ *2*

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Case- Study-2

37

large sphere
$R = 2.1\ cm$

hemisphere (dimple)
$r = 2\ mm$
$= 0.2\ cm$

no of dimples = 315

(i) S.A of one such dimple $= 2\pi r^2$

$= 2 \times \pi \times (0.2)^2$

$= 2\pi \times 0.04$

$= 0.08\pi\ cm^2$

(ii) material dug out to make one dimple = Vol of one hemisphere

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

$= \frac{2}{3}\pi\ (0.2)^3$

$= \frac{2}{3}\pi \times 0.008 = \frac{0.016\pi}{3}\ cm^3$

3

(iii) a Total surface area exposed to surrounding

$= TSA \text{ of Sphere} - 315\ \pi r^2 + 315(2\pi r^2)$

$= 4\pi R^2 + 315\pi r^2$

$= \pi\left[4(2.1)^2 + 315 \times (0.2)^2\right]$

$= \pi\left[17.64 + 12.6\right]$

$= 30.24\pi\ cm^2$

~~(iii) b~~

(iii) b Vol of golf ball $= \frac{4}{3}\cdot\pi\cdot R^3 - \overset{105}{\cancel{315}} \times \frac{2}{\cancel{3}}\pi r^3$

$= \pi\left[\frac{4}{3}(2.1)^3 - 210\ (0.2)^3\right]$

$= \pi\left[12.936 - 1.68\right] = 11.256\pi\ cm^3$

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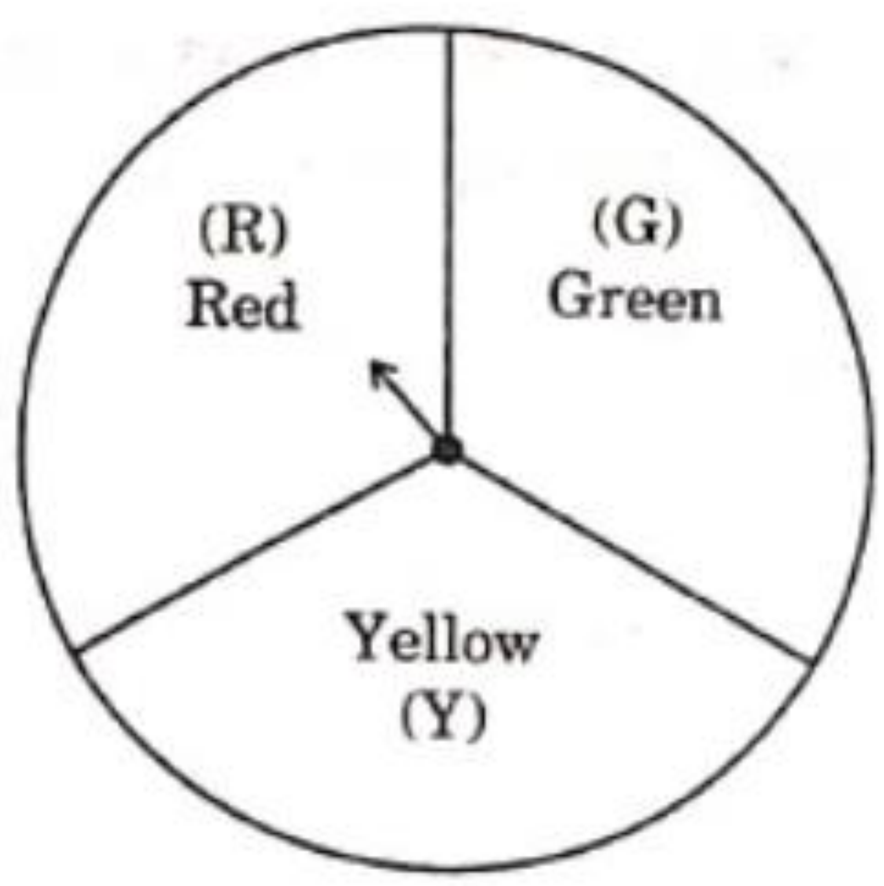
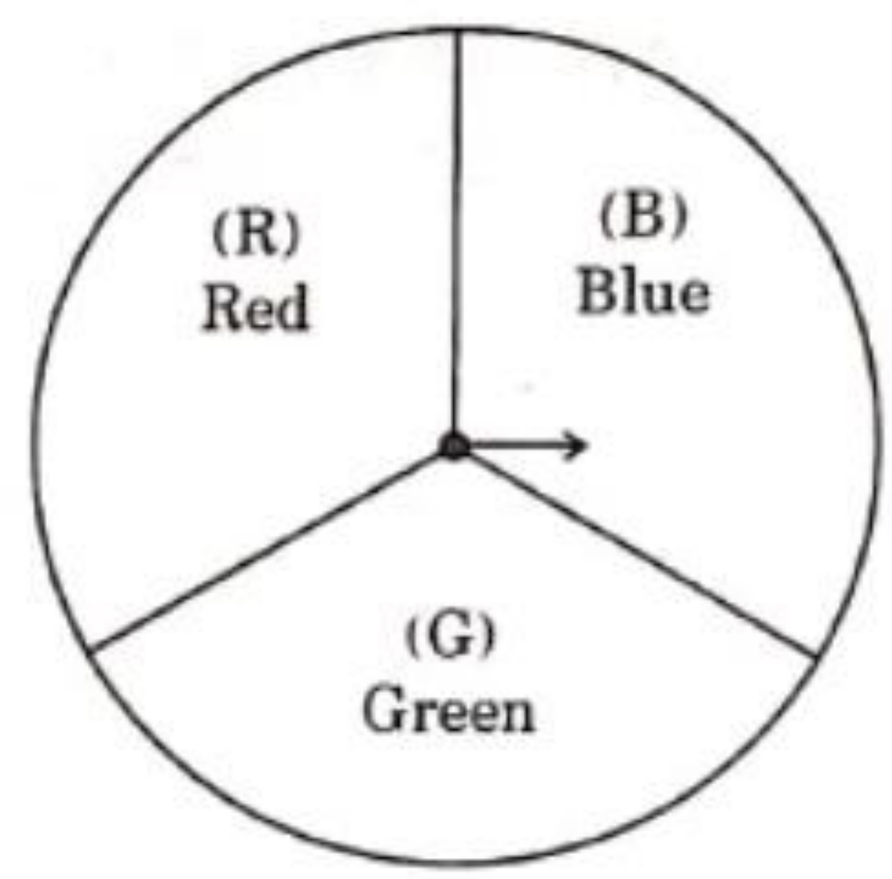
Case Study – 3

38. A middle school decided to run the following spinner game as a fund-raiser on Christmas Carnival.



I



II

Making Purple : Spin each spinner once. Blue and red make purple. So, if one spinner shows Red (R) and another Blue (B), then you 'win'. One such outcome is written as 'RB'.

Based on the above, answer the following questions :

(i) List all possible outcomes of the game. RR, RB, RG, GR, GB, GG, YR, YB, YG *1*

(ii) Find the probability of 'Making Purple'. $\frac{1}{9}$ *1*

(iii) (a) For each win, a participant gets ₹ 10, but if he/she loses, he/she has to pay ₹ 5 to the school.
If 99 participants played, calculate how much fund could the school have collected. *2*

OR

(iii) (b) If the same amount of ₹ 5 has been decided for winning or losing the game, then how much fund had been collected by school ? (Number of participants = 99) *2*

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38 (i)

List of all the outcomes

RR, RB, RG, GR, GB, GG, YR, YB, YG (9 outcomes)

(ii) $P(\text{making purple}) = \dfrac{n(\text{Fav. outcomes})}{n(\text{Total})} = \dfrac{1}{9}$ Ans.

Fav. outcomes = RB

(iii) 99 participants play the game

so no of possible winners $= \frac{1}{9} \times 99 = 11$

losers $= \frac{8}{9} \times 99 = 88$

amount (possible) which, school could collect

$= 88 \times 5 - 11 \times 10$

$= 440 - 110$

$= 330$ Rs.

* This question ~~has~~ is ~~out~~ not appropriate, amount must be written as possible amount.

(iii) b 5 for win, 5 for lose

So possible amount ~~collected~~ (which could be collected)

$= 5 \times$ no of losers $- 5 \times$ no of winners

$= 5 \times 88 - 5 \times 11$

$= 440 - 55$

$= 385$