

Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2023
SUBJECT NAME MATHEMATICS (BASIC) (SUBJECT CODE 241)
(PAPER CODE 430/6/1)

General Instructions: -

1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its’ leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under various rules of the Board and IPC.”
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one’s own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. However, while evaluating, Answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In class-X, while evaluating two competency-based questions, please try to understand given Answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.
4	The Marking scheme carries only suggested value points for the Answers . These are in the nature of Guidelines only and do not constitute the complete Answer . The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five Answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining Answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark($\sqrt{}$) wherever Answer is correct. For wrong Answer CROSS ‘X’ be marked. Evaluators will not put right ($\checkmark$) while evaluating which gives an impression that Answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
9	If a student has attempted an extra question, Answer of the question deserving more marks should be retained and the other Answer scored out with a note “Extra Question” . However, for MCQs (Q1 to Q20) only first attempt to be evaluated.

10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of marks _____(example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the Answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 Answer books per day in main subjects and 25 Answer books per day in other subjects (Details are given in Spot Guidelines).
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- • Leaving Answer or part thereof unassessed in an Answer book. • Giving more marks for an Answer than assigned to it. • Wrong totaling of marks awarded on an Answer. • Wrong transfer of marks from the inside pages of the Answer book to the title page. • Wrong question wise totaling on the title page. • Wrong totaling of marks of the two columns on the title page. • Wrong grand total. • Marks in words and figures not tallying/not same. • Wrong transfer of marks from the Answer book to online award list. • Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect Answer.) • Half or a part of Answer marked correct and the rest as wrong, but no marks awarded.
14	While evaluating the Answer books if the Answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.
15	Any un assessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16	The Examiners should acquaint themselves with the guidelines given in the “ Guidelines for spot Evaluation ” before starting the actual evaluation.
17	Every Examiner shall also ensure that all the Answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each Answer as given in the Marking Scheme.

MARKING SCHEME
MATHEMATICS (BASIC) 430/6/1

SECTION A

1. The time, in seconds, taken by 150 athletes to run a 100 m hurdle race are tabulated below :

Time (sec.)	13-14	14-15	15-16	16-17	17-18	18-19
Number of Athletes	2	4	5	71	48	20

The number of athletes who completed the race in less than 17 seconds is

- (a) 11 (b) 71
(c) 82 (d) 68

Answer (c) 82

1

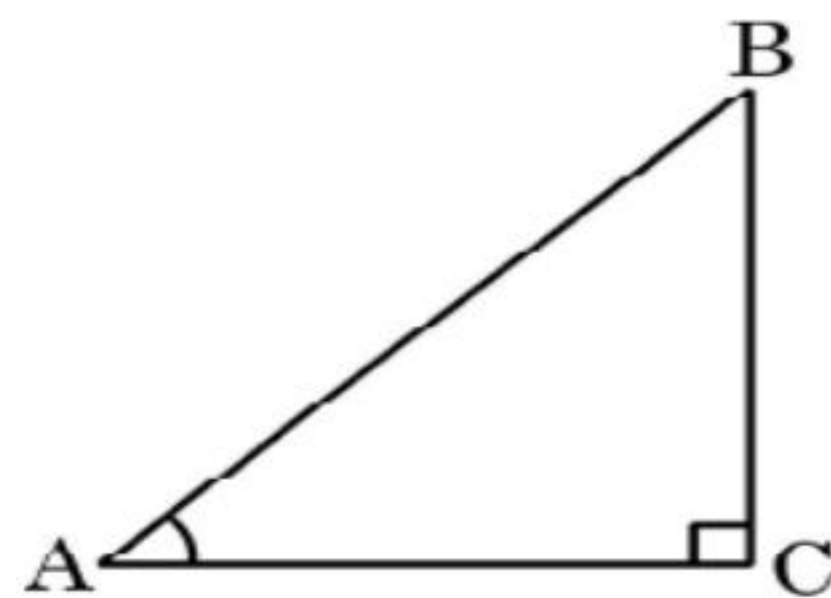
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2. The distance of the point (5, 0) from the origin is

- (a) 0 (b) 5
(c) $\sqrt{5}$ (d) 5^2

Answer (b) 5

1

-
3. In $\triangle ABC$, right angled at C, if $\tan A = \frac{8}{7}$, then the value of $\cot B$ is



- (a) $\frac{7}{8}$ (b) $\frac{8}{7}$
(c) $\frac{7}{\sqrt{113}}$ (d) $\frac{8}{\sqrt{113}}$

Answer (b) $\frac{8}{7}$

1

4. Area of a quadrant of a circle of radius 7 cm is

(a) 154 cm^2

(b) 77 cm^2

(c) $\frac{77}{2} \text{ cm}^2$

(d) $\frac{77}{4} \text{ cm}^2$

Answer (c) $\frac{77}{2} \text{ cm}^2$

1

5. If HCF (72, 120) = 24, then LCM (72, 120) is

(a) 72

(b) 120

(c) 360

(d) 9640

Answer (c) 360

1

6. One card is drawn at random from a well-shuffled deck of 52 playing cards. What is the probability of getting a black king?

(a) $\frac{1}{26}$

(b) $\frac{1}{13}$

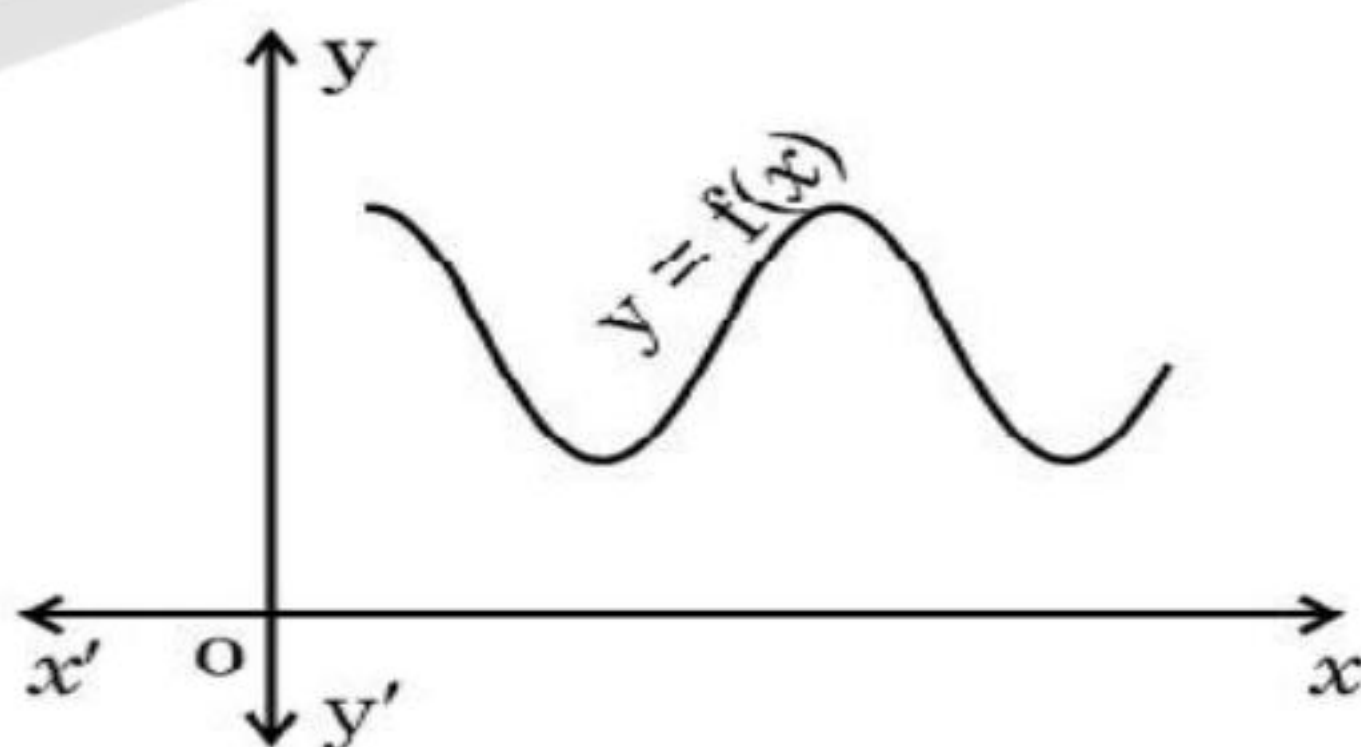
(c) $\frac{1}{52}$

(d) $\frac{1}{2}$

Answer (a) $\frac{1}{26}$

1

7. The graph of $y = f(x)$ is shown in the figure for some polynomial $f(x)$.



The number of zeroes of $f(x)$ is

(a) 0

(b) 2

(c) 3

(d) 4

Answer (a) 0

1

8. The value of k , if $(6, k)$ lies on the line represented by $x - 3y + 6 = 0$, is

- (a) -4 (b) 12
(c) -12 (d) 4

Answer (d) 4

1

9. The prime factorisation of the number 2304 is

- (a) $2^8 \times 3^2$ (b) $2^7 \times 3^3$
(c) $2^8 \times 3^1$ (d) $2^7 \times 3^2$

Answer (a) $2^8 \times 3^2$

1

10. If n is a natural number, then 8^n cannot end with digit

- (a) 0 (b) 2
(c) 4 (d) 6

Answer (a) 0

1

11. The median of first seven prime numbers is

- (a) 5 (b) 7
(c) 11 (d) 13

Answer (b) 7

1

12. If $(2, 4)$ is the mid-point of the line-segment joining $(6, 3)$ and $(a, 5)$, then the value of a is

- (a) 2 (b) 4
(c) -4 (d) -2

Answer (d) -2

1

13. The value of 'k' for which the system of equations $kx + 2y = 5$ and $3x + 4y = 1$ have no solution, is

(a) $k = \frac{3}{2}$

(b) $k \neq \frac{3}{2}$

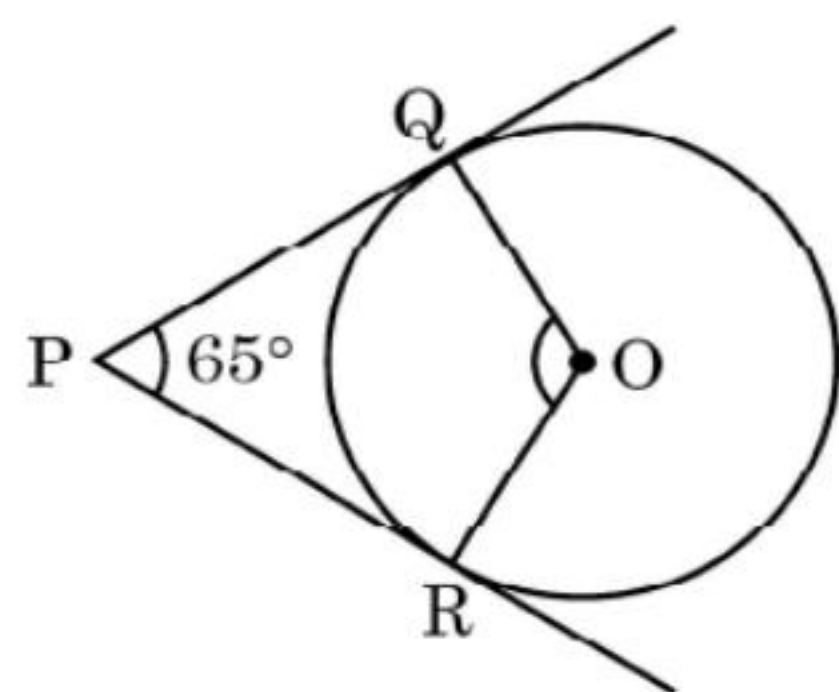
(c) $k \neq \frac{2}{3}$

(d) $k = 15$

Answer (a) $k = \frac{3}{2}$

1

14. In the given figure, PQ and PR are tangents drawn from P to the circle with centre O such that $\angle QPR = 65^\circ$. The measure of $\angle QOR$ is.



(a) 65°

(b) 125°

(c) 115°

(d) 90°

Answer (c) 115°

1

15. The zeroes of the quadratic polynomial $16x^2 - 9$ are :

(a) $\frac{3}{4}, \frac{3}{4}$

(b) $-\frac{3}{4}, \frac{3}{4}$

(c) $\frac{9}{16}, \frac{9}{16}$

(d) $-\frac{3}{4}, -\frac{3}{4}$

Answer (b) $-\frac{3}{4}, \frac{3}{4}$

1

16. If $-5, x, 3$ are three consecutive terms of an A.P., then the value of x is

(a) -2

(b) 2

(c) 1

(d) -1

Answer (d) -1

1

17. An unbiased die is thrown. The probability of getting an odd prime number is

(a) $\frac{1}{6}$

(b) $\frac{1}{2}$

(c) $\frac{2}{3}$

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

Answer (d) $\frac{1}{3}$

1

18. If the mean of 6, 7, x , 8, y , 14 is 9, then

(a) $x + y = 21$

(b) $x + y = 19$

(c) $x - y = 19$

(d) $x - y = 21$

Answer (b) $x + y = 19$

1

Directions for Q. 19 & Q. 20 : In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option :

(a) Both Assertion (A) and Reason (R) are true; and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

19. **Assertion (A) :** The probability that a leap year has 53 Sundays is $\frac{2}{7}$.

Reason (R) : The probability that a non-leap year has 53 Sundays is $\frac{1}{7}$.

Answer (b) Both Assertion(A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

1

20. **Assertion (A) :** For $0 < \theta \leq 90^\circ$, $\operatorname{cosec} \theta - \cot \theta$ and $\operatorname{cosec} \theta + \cot \theta$ are reciprocal of each other.

Reason (R) : $\cot^2 \theta - \operatorname{cosec}^2 \theta = 1$

Answer (c) Assertion(A) is true, but Reason (R) is false.

1

SECTION B

21. Evaluate : $5 \operatorname{cosec}^2 45^\circ - 3 \sin^2 90^\circ + 5 \cos 0^\circ$.

Solution $5 \operatorname{cosec}^2 45^\circ - 3 \sin^2 90^\circ + 5 \cos 0^\circ$

$$= 5(\sqrt{2})^2 - 3(1)^2 + 5(1)$$

$$= 12$$

$1\frac{1}{2}$
 $\frac{1}{2}$

22. (a) Find a quadratic polynomial whose zeroes are 6 and -3.

Solution (a) Sum of zeroes = $6 + (-3) = 3$

$$\text{Product of zeroes} = 6(-3) = -18$$

$$\text{Quadratic polynomial is } (x^2 - 3x - 18) \text{ or } k(x^2 - 3x - 18)$$

OR

(b) Find the zeroes of the polynomial $x^2 + 4x - 12$.

Solution (b) $x^2 + 4x - 12 = (x + 6)(x - 2)$

Zeroes are -6, 2

$\frac{1}{2}$
 $\frac{1}{2}$
 1
 1

23. (a) Find the value of k for which the roots of the quadratic equation $5x^2 - 10x + k = 0$ are real and equal.

Solution $a = 5, b = -10, c = k$

Roots are real and equal

$$D = 0 \Rightarrow b^2 - 4ac = 0$$

$$(-10)^2 - 4(5)(k) = 0 \Rightarrow 100 - 20k = 0$$

$$k = 5$$

$\frac{1}{2}$
 $\frac{1}{2}$
 $\frac{1}{2}$
 $\frac{1}{2}$

OR

(b) If one root of the quadratic equation $3x^2 - 8x - (2k + 1) = 0$ is seven times the other, then find the value of k.

Solution Let roots be $\alpha, 7\alpha$

$$\alpha + 7\alpha = -\left(\frac{-8}{3}\right) = \frac{8}{3} \Rightarrow 8\alpha = \frac{8}{3} \text{ gives } \alpha = \frac{1}{3}$$

$$\alpha(7\alpha) = -\frac{(2k+1)}{3} \Rightarrow 7\alpha^2 = -\frac{(2k+1)}{3}$$

$$k = -\frac{5}{3}$$

$\frac{1}{2}$
 $\frac{1}{2}$
 $\frac{1}{2}$
 $\frac{1}{2}$

-
24. A box contains 20 discs which are numbered from 1 to 20. If one disc is drawn at random from the box, then find the probability that the number on the drawn disc is a

- (i) 2-digit number
(ii) number less than 10

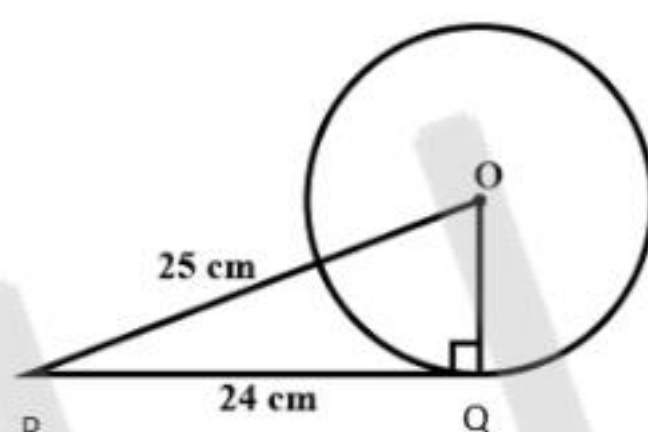
Solution $P(2 \text{ digit number}) = \frac{11}{20}$

1

$$P(\text{number less than 10}) = \frac{9}{20}$$

1

-
25. From a point P, the length of the tangent to a circle is 24 cm and the distance of P from the centre of the circle is 25 cm. Find the radius of the circle.



Solution

$$OQ = \sqrt{25^2 - 24^2}$$

$$OQ = 7 \text{ cm}$$

figure $\frac{1}{2}$

1

$\frac{1}{2}$

SECTION C

26. The sum of the reciprocals of Varun's age (in years) 3 years ago and 5 years from now is $\frac{1}{3}$. Find his present age.

Solution Let Varun's present age = x years

$$\text{ATQ, } \frac{1}{x-3} + \frac{1}{x+5} = \frac{1}{3}$$

1

$$\frac{x+5+x-3}{(x-3)(x+5)} = \frac{1}{3} \Rightarrow \frac{2x+2}{x^2+2x-15} = \frac{1}{3}$$

$$6x+6 = x^2+2x-15 \Rightarrow x^2-4x-21=0$$

1

$$(x-7)(x+3)=0$$

$\frac{1}{2}$

$$x=7, x=-3 \text{ (rejecting)}$$

$\frac{1}{2}$

$$\therefore \text{Varun's present age} = 7 \text{ years}$$

27. A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household :

Family size	1-3	3-5	5-7	7-9	9-11
Number of Families	7	8	2	2	1

Find the median of this data.

Solution

Family size	1 – 3	3 – 5	5 – 7	7 – 9	9 – 11
Number of families	7	8	2	2	1
Cf	7	15	17	19	20

For correct cf $1\frac{1}{2}$

Median class 3 – 5

$$\text{Median} = l + \frac{\frac{N}{2} - C}{f} \times h$$

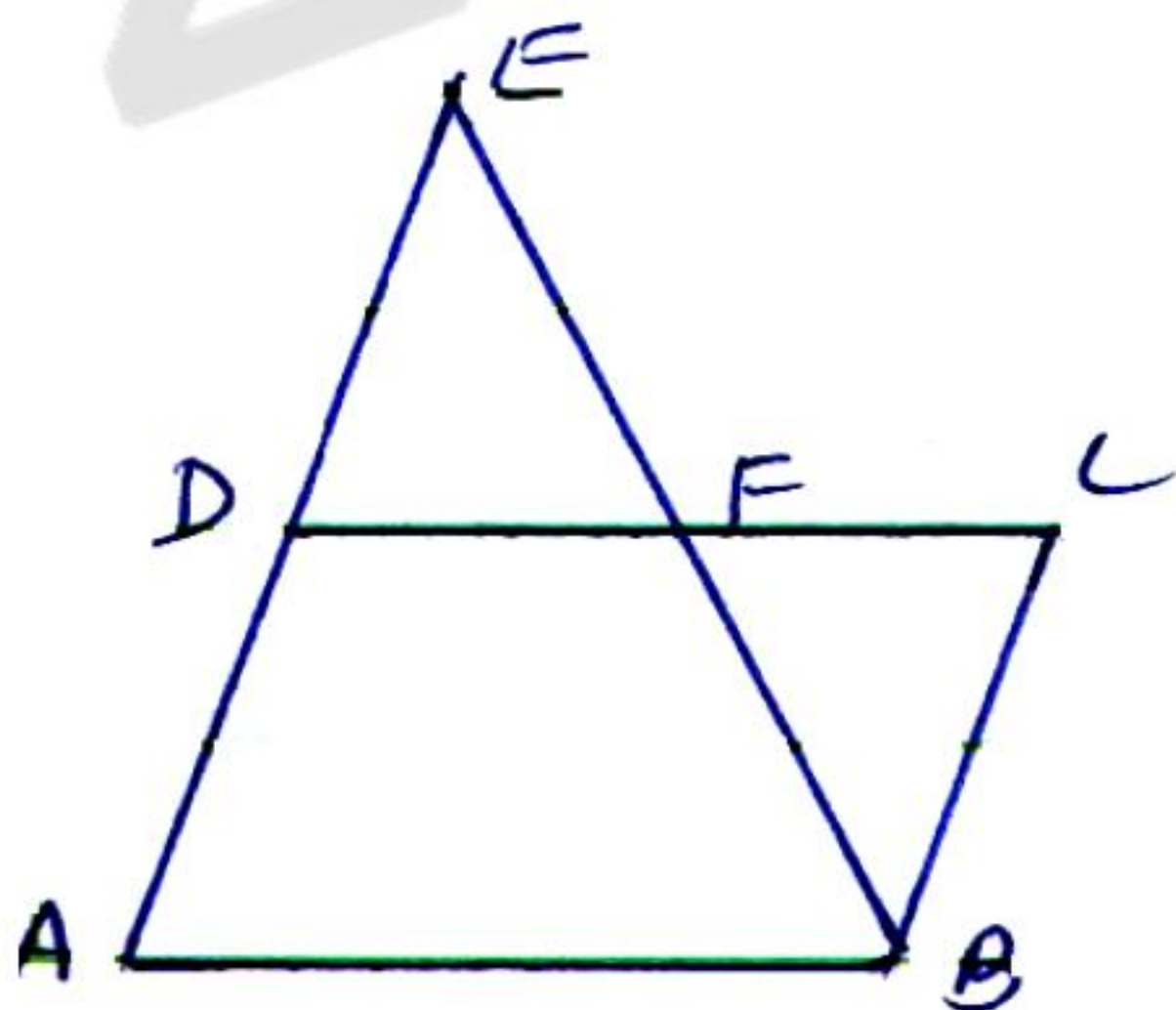
$$= 3 + \frac{10 - 7}{8} \times 2$$

$$= 3.75$$

$1\frac{1}{2}$

28. (a) E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$.

Solution



(a) ABCD is a parallelogram

(1 for figure)

To prove: $\triangle ABE \sim \triangle CFB$

In $\triangle ABE$ and $\triangle CFB$,

$\angle A = \angle C$ (opp. angles of parallelogram)

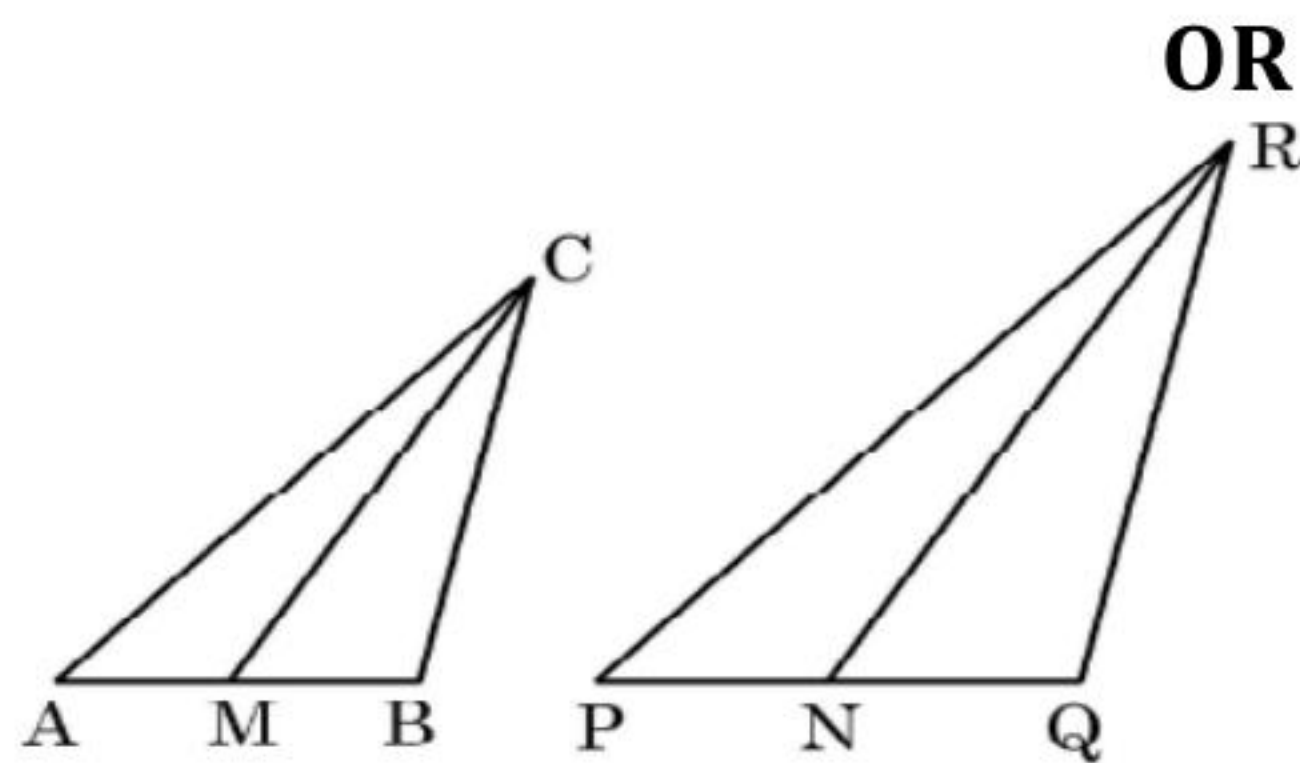
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$\angle AEB = \angle CBF$ (alt. int. angles)

$1/2$

$\therefore \triangle ABE \sim \triangle CFB$ (AA similarity)

1



- (b) In the given figure, CM and RN are respectively the medians of $\triangle ABC$ and $\triangle PQR$. If $\triangle ABC \sim \triangle PQR$, then prove that $\triangle AMC \sim \triangle PNR$.

Solution $\triangle ABC \sim \triangle PQR$

$$\frac{AB}{PQ} = \frac{AC}{PR} \Rightarrow \frac{2AM}{2PN} = \frac{AC}{PR}$$

$$\frac{AM}{PN} = \frac{AC}{PR}$$

$\frac{1}{2} + 1$

Also $\angle A = \angle P$ ($\triangle ABC \sim \triangle PQR$)

$\therefore \triangle AMC \sim \triangle PNR$ (SAS similarity)

$1\frac{1}{2}$

29. Find the co-ordinates of the points of trisection of the line-segment joining the points (5, 3) and (4, 5).

Solution



Let C divides AB in the ratio 1 : 2

$$\therefore C\left(\frac{1 \times 4 + 2 \times 5}{1 + 2}, \frac{1 \times 5 + 2 \times 3}{1 + 2}\right), \text{ i.e., } C\left(\frac{14}{3}, \frac{11}{3}\right)$$

$\frac{1}{2}$

1

Let D divides AB in the ratio 2 : 1

$$\therefore D\left(\frac{2 \times 4 + 1 \times 5}{2 + 1}, \frac{2 \times 5 + 1 \times 3}{2 + 1}\right), \text{ i.e., } D\left(\frac{13}{3}, \frac{13}{3}\right)$$

$\frac{1}{2}$

1

30. Prove that $3 - 2\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

Solution Let us assume that $3 - 2\sqrt{5}$ is a rational number.

$$\therefore 3 - 2\sqrt{5} = \frac{p}{q}, \quad q \neq 0, p \text{ and } q \text{ are integers}$$

1

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

1

Now RHS is rational but LHS is irrational

$\therefore$ Our assumption is wrong

$\therefore 3 - 2\sqrt{5}$ is an irrational number.

1

31. (a) Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\cos^2 A}{(1 + \sin A)^2}$

$$\begin{aligned}
 \text{Solution LHS} &= \frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\frac{\cos A}{\sin A} - \cos A}{\frac{\cos A}{\sin A} + \cos A} && \frac{1}{2} \\
 &= \frac{1 - \sin A}{1 + \sin A} && 1 \\
 &= \frac{(1 - \sin A)(1 + \sin A)}{(1 + \sin A)(1 + \sin A)} && 1 \\
 &= \frac{1 - \sin^2 A}{(1 + \sin A)^2} = \frac{\cos^2 A}{(1 + \sin A)^2} && \frac{1}{2}
 \end{aligned}$$

OR

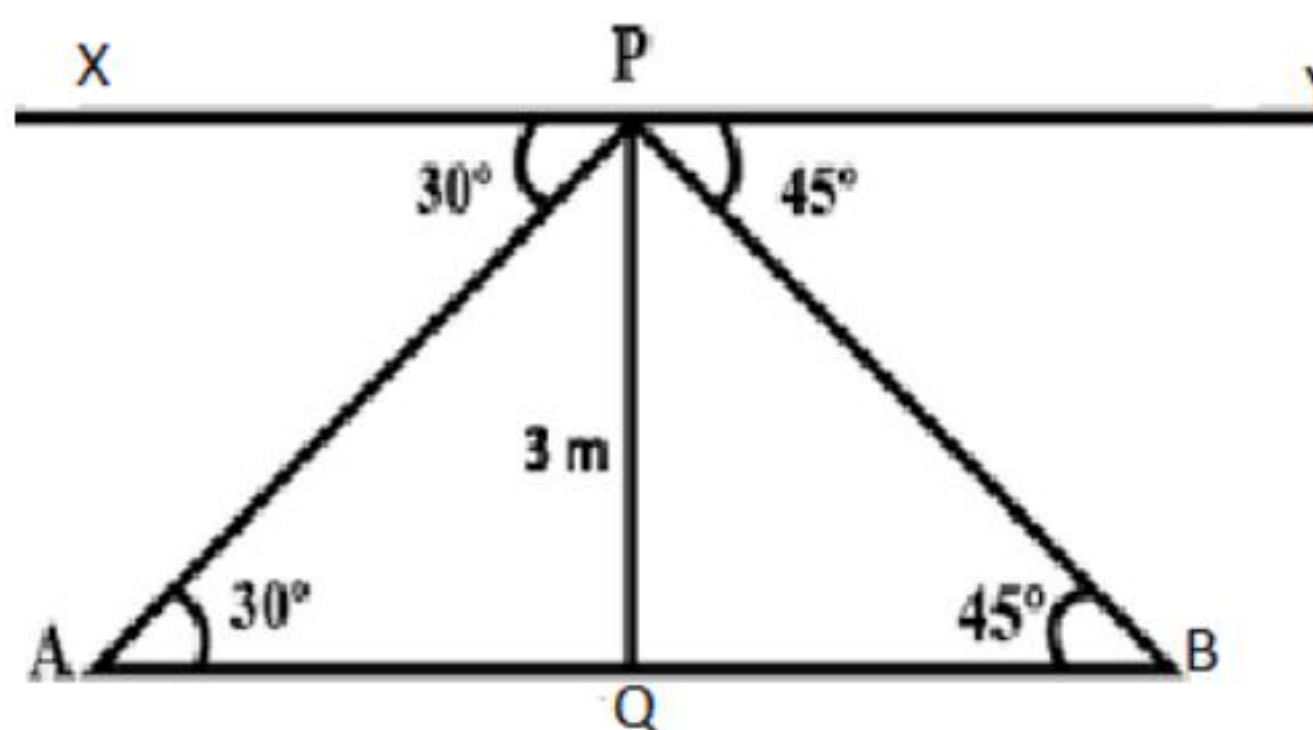
(b) Prove that $(\sec \theta + \tan \theta)(1 - \sin \theta) = \cos \theta$

$$\begin{aligned}
 \text{Solution LHS} &= (\sec \theta + \tan \theta)(1 - \sin \theta) \\
 &= \left(\frac{1}{\cos \theta} + \frac{\sin \theta}{\cos \theta} \right) (1 - \sin \theta) && 1 \\
 &= \left(\frac{1 + \sin \theta}{\cos \theta} \right) (1 - \sin \theta) = \frac{(1 - \sin^2 \theta)}{\cos \theta} && \frac{1}{2} + \frac{1}{2} \\
 &= \frac{\cos^2 \theta}{\cos \theta} = \cos \theta = \text{RHS} && 1
 \end{aligned}$$

SECTION D

32. (a) From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 45° respectively. If the bridge is at a height of 3 m from the banks, find the width of the river. (Use $\sqrt{3} = 1.73$)

Solution



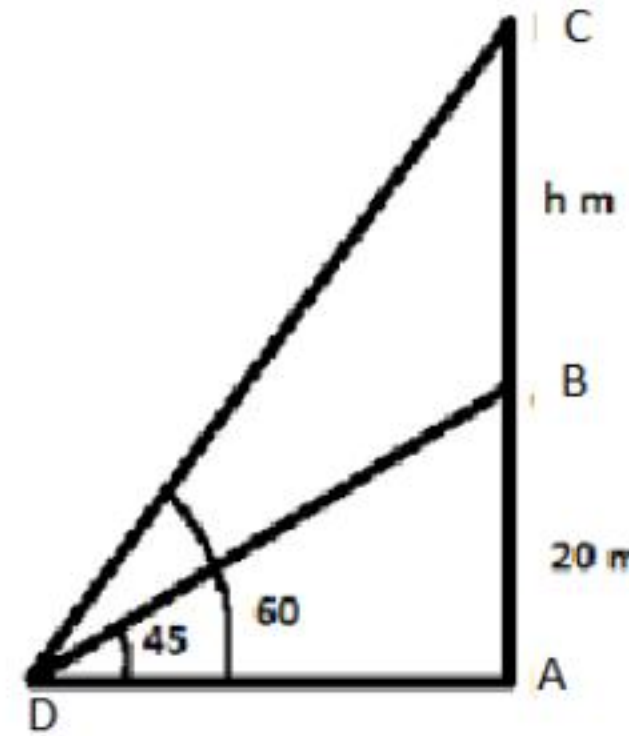
For fig. 1

$$\begin{aligned}
 \text{In } \triangle APQ, \tan 30^\circ &= \frac{3}{AQ} && 1 \\
 \frac{1}{\sqrt{3}} &= \frac{3}{AQ} \Rightarrow AQ = 3\sqrt{3} && \frac{1}{2} \\
 \text{In } \triangle PBQ, \tan 45^\circ &= \frac{3}{BQ} && 1 \\
 BQ &= 3 && \frac{1}{2} \\
 \therefore AB &= AQ + BQ = 3\sqrt{3} + 3 && \frac{1}{2} \\
 &= 3(1.73 + 1) = 8.19 \\
 \text{Width of river} &= 8.19 \text{ m} && \frac{1}{2}
 \end{aligned}$$

OR

- (b) From a point on the ground, the angle of elevation of the bottom and top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower. (Use $\sqrt{3} = 1.73$)

Solution BC = transmission tower = h and AD = x



For fig. 1

$$\text{In } \triangle ABD, \tan 45^\circ = \frac{20}{x}$$

$$x = 20$$

$$\text{In } \triangle ACD, \tan 60^\circ = \frac{20 + h}{x}$$

$$\sqrt{3}x = 20 + h$$

$$\therefore h = 20(\sqrt{3} - 1) \text{ m}$$

$$h = 14.6 \text{ m}$$

1
1/2
1
1/2
1/2

33. The first term of an A.P. is 22, the last term is -6 and the sum of all the terms is 64. Find the number of terms of the A.P. Also, find the common difference.

Solution $a = 22$, $a_n = -6$, $S_n = 64$

$$S_n = 64 \Rightarrow \frac{n}{2} [22 - 6] = 64$$

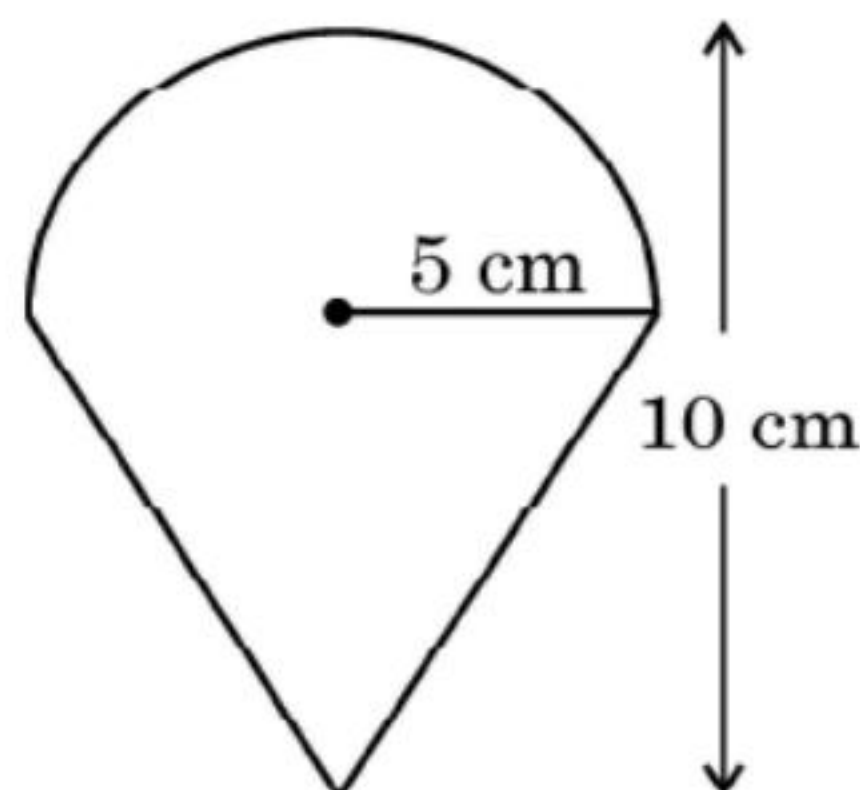
$$n = 8$$

$$22 + (8-1)d = -6$$

$$\Rightarrow d = -4$$

2
1
1
1

34. An ice-cream filled cone having radius 5 cm and height 10 cm is as shown in the figure. Find the volume of the ice-cream in 7 such cones.



Solution Height of conical part = $10 - 5 = 5$ cm

Volume of 1 ice cream cone

$$\begin{aligned}
 &= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3 \\
 &= \frac{1}{3}\pi r^2 (h + 2r) \\
 &= \frac{1}{3} \times \frac{22}{7} \times 5 \times 5 [5 + 10] \\
 &= \frac{22 \times 25 \times 15}{21} \text{ cm}^3
 \end{aligned}$$

Volume of 7 ice cream cones

$$\begin{aligned}
 &= 7 \times \frac{22 \times 25 \times 15}{21} \\
 &= 2750 \text{ cm}^3
 \end{aligned}$$

$\frac{1}{2}$

1

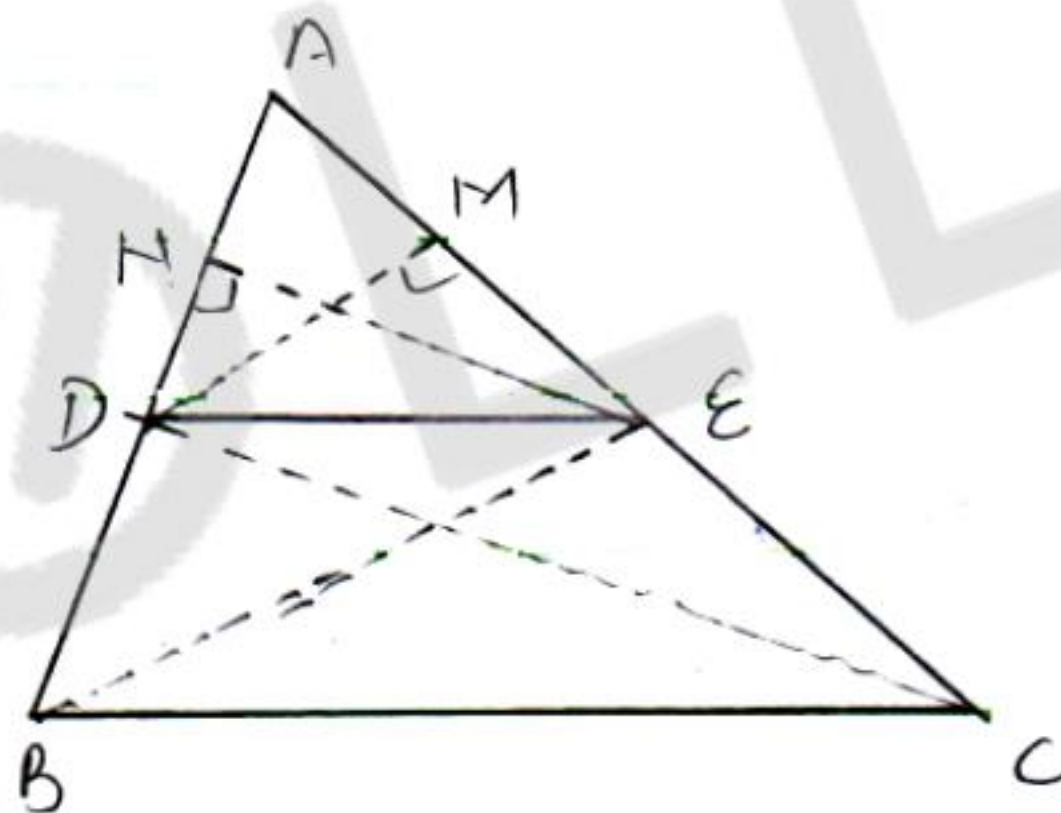
$1\frac{1}{2}$

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$\frac{1}{2}$
 $\frac{2}{1}$
 $\frac{1}{2}$

35. (a) Prove that a line drawn parallel to one side of a triangle to intersect the other two sides in distinct points, divides the two sides in the same ratio.

Solution



For figure 1

Given In ΔABC , $DE \parallel BC$

To prove : $\frac{AD}{DB} = \frac{AE}{EC}$

Const. : Join BE, CD. Draw $DM \perp AC$ and $EN \perp AB$

Proof : $\frac{\text{ar}(\Delta ADE)}{\text{ar}(\Delta BDE)} = \frac{\frac{1}{2} \times AD \times EN}{\frac{1}{2} \times DB \times EN} = \frac{AD}{DB}$ (i)

similarly $\frac{\text{ar}(\Delta ADE)}{\text{ar}(\Delta CDE)} = \frac{AE}{EC}$ (ii)

ΔBDE and ΔCDE are on the same base DE and between the same parallel lines BC and DE.

$\text{ar}(\Delta ADE) = \text{ar}(\Delta CDE)$ (iii)

From (i), (ii) and (iii) $\frac{AD}{DB} = \frac{AE}{EC}$

$\frac{1}{2}$
 $\frac{2}{1}$
 $\frac{1}{2}$

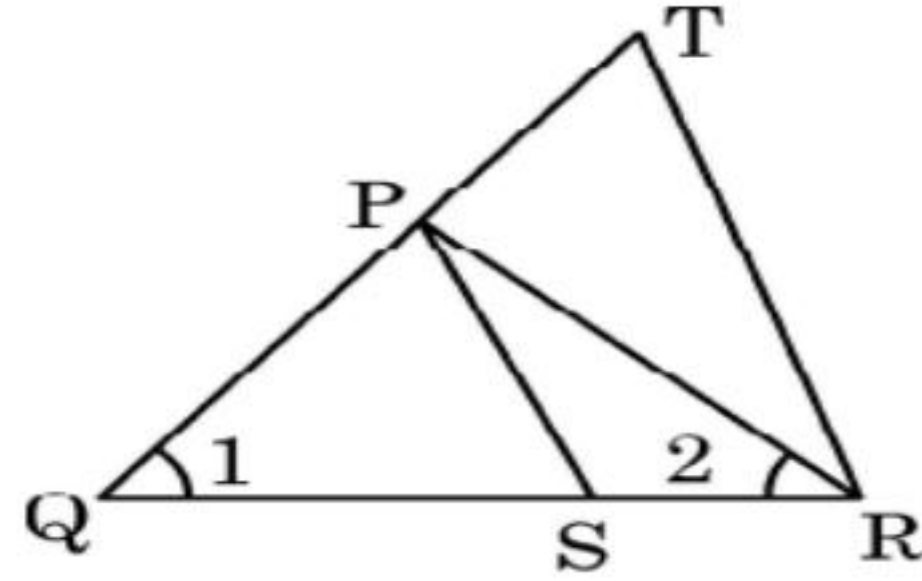
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$\frac{1}{2}$

$\frac{1}{2}$
 $\frac{2}{1}$
 $\frac{1}{2}$

OR

- (b) In the given figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$. Prove that $\Delta PQS \sim \Delta TQR$.



Solution In ΔPQR , $\angle 1 = \angle 2$

$\therefore PQ = PR$ (sides opposite to equal angles)

Now $\frac{QR}{QS} = \frac{QT}{PR}$

$\therefore \frac{QS}{QR} = \frac{PR}{QT} \Rightarrow \frac{QS}{QR} = \frac{PQ}{QT}$ (as $PR = PQ$) _____ (i)

In ΔPQS and ΔTQR ,

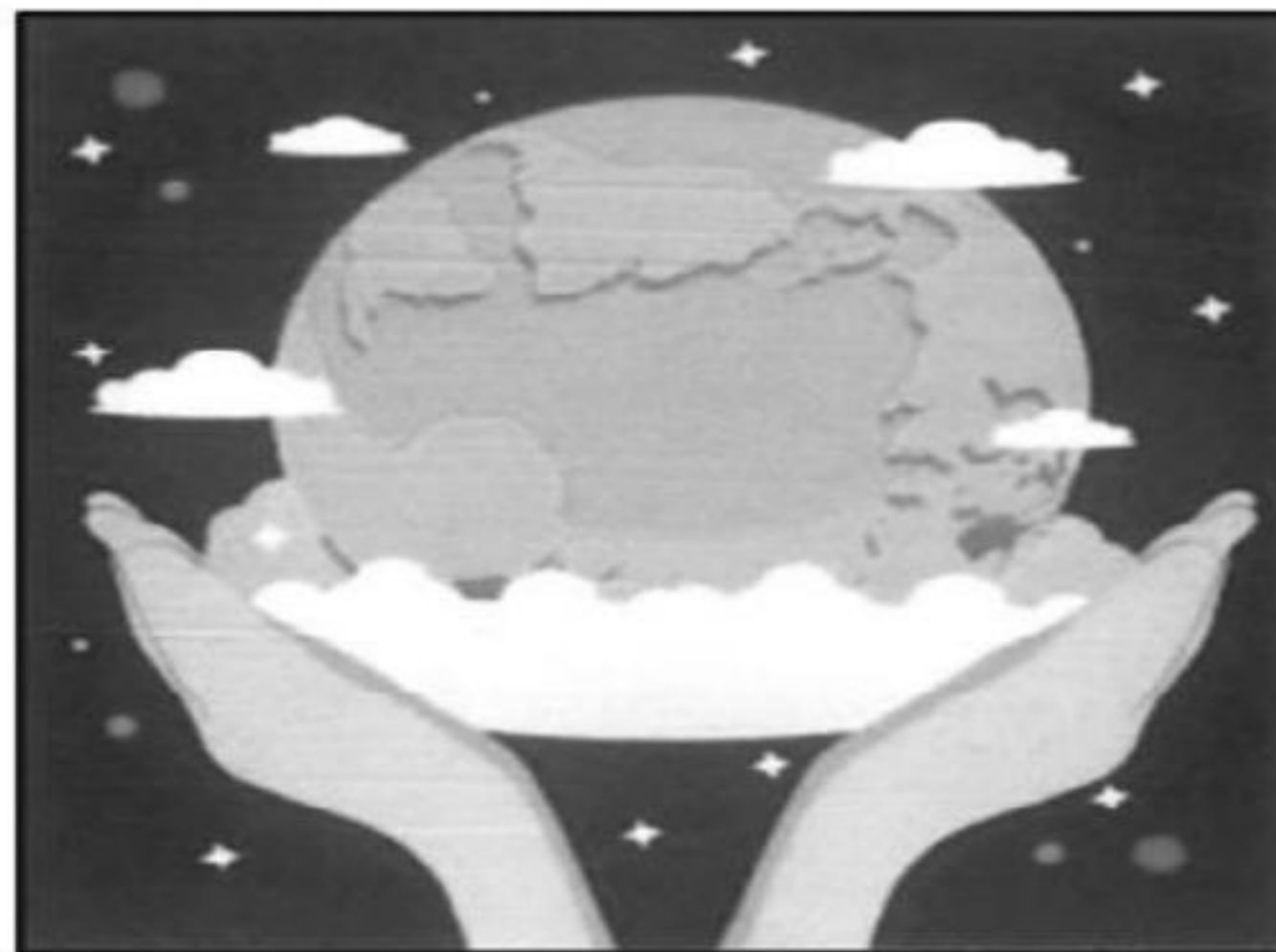
$\angle Q = \angle Q$ (common)

$\frac{QS}{QR} = \frac{PQ}{QT}$ (from (i))

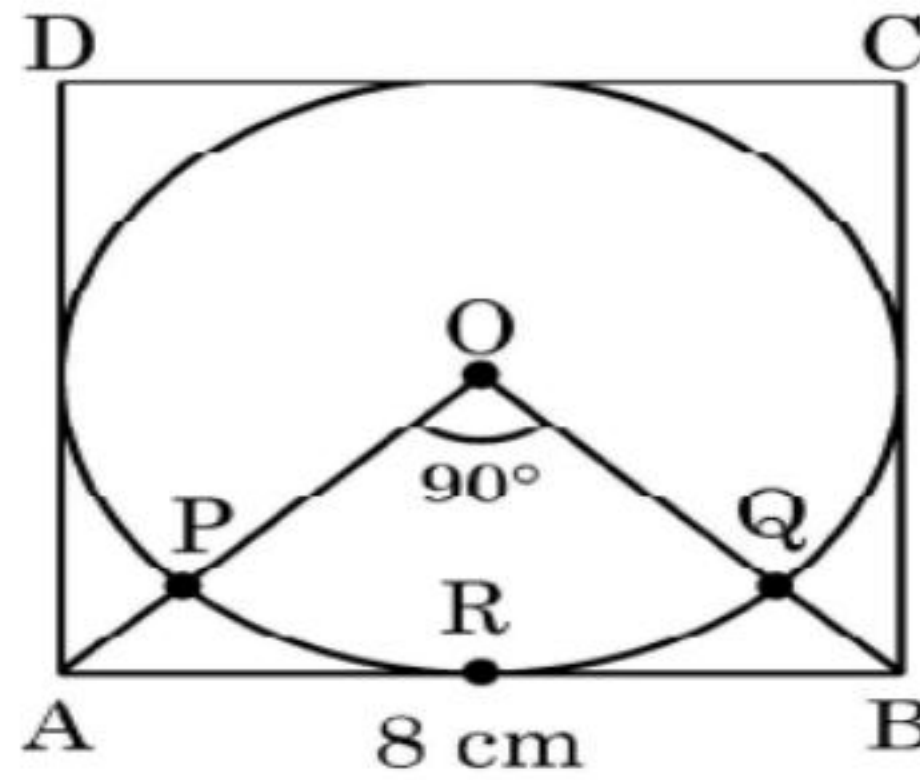
$\therefore \Delta PQS \sim \Delta TQR$ (SAS similarity)

SECTION E

36. For the inauguration of 'Earth day' week in a school, badges were given to volunteers. Organisers purchased these badges from an NGO, who made these badges in the form of a circle inscribed in a square of side 8 cm.



O is the centre of the circle and $\angle AOB = 90^\circ$:



Based on the above information, answer the following questions :

- (i) What is the area of square ABCD ?
- (ii) What is the length of diagonal AC of square ABCD ?
- (iii) Find the area of sector OPRQO.

OR

- (iii) Find the area of remaining part of square ABCD when area of circle is excluded.

Solution (i) Area of square ABCD $= (8)^2 = 64 \text{ cm}^2$

1

(ii) $AC = \sqrt{(8)^2 + (8)^2} = \sqrt{128} = 8\sqrt{2} \text{ cm}$

1

(iii) We know that diagonals of square bisect each other at 90°

$$\angle AOB = 90^\circ$$

$$\text{Area of sector OPRQ} = \frac{\pi r^2 \theta}{360^\circ}$$

$$= \frac{22}{7} \times 4 \times 4 \times \frac{90}{360}$$

1

$$= \frac{88}{7} \text{ cm}^2$$

1

OR

(iii) Area of circle $= \pi r^2 = \frac{22}{7} \times 4 \times 4 = \frac{352}{7} \text{ cm}^2$

1

$$\text{Required area} = 64 - \frac{352}{7} = \frac{96}{7} \text{ cm}^2$$

1

37.



Lokesh, a production manager in Mumbai, hires a taxi everyday to go to his office. The taxi charges in Mumbai consists of a fixed charges together with the charges for the distance covered. His office is at a distance of 10 km from his home. For a distance of 10 km to his office, Lokesh paid ₹ 105. While coming back home, he took another route. He covered a distance of 15 km and the charges paid by him were ₹ 155.

Based on the above information, answer the following questions :

- (i) What are the fixed charges ?
- (ii) What are the charges per km ?
- (iii) If fixed charges are ₹ 20 and charges per km are ₹ 10, then how much Lokesh have to pay for travelling a distance of 10 km ?

OR

- (iii) Find the total amount paid by Lokesh for travelling 10 km from home to office and 25 km from office to home. [Fixed charges and charges per km are as in (i) & (ii).

Solution (i) Let fixed charge = ₹ x and charges per km = ₹ y

$$x + 10y = 105, x + 15y = 155$$

On solving, $x = 5$

∴ Fixed charge = ₹ 5

(ii) on solving, we get $y = 10$

Charge per km = ₹ 10

(iii) $x + 10y = 20 + 10(10) = ₹ 120$

OR

(iii) Required amount = $x + 10y + x + 25y = 2x + 35y$
 $= 2(5) + 35(10) = 10 + 350 = ₹ 360$

$\frac{1}{2}$

$\frac{1}{2}$

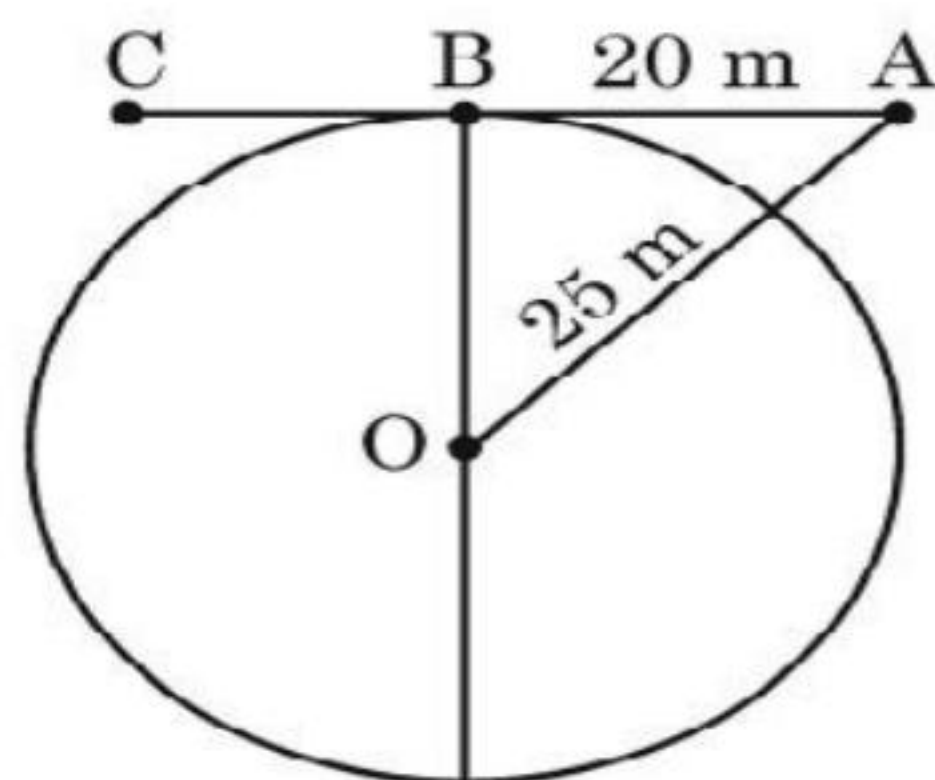
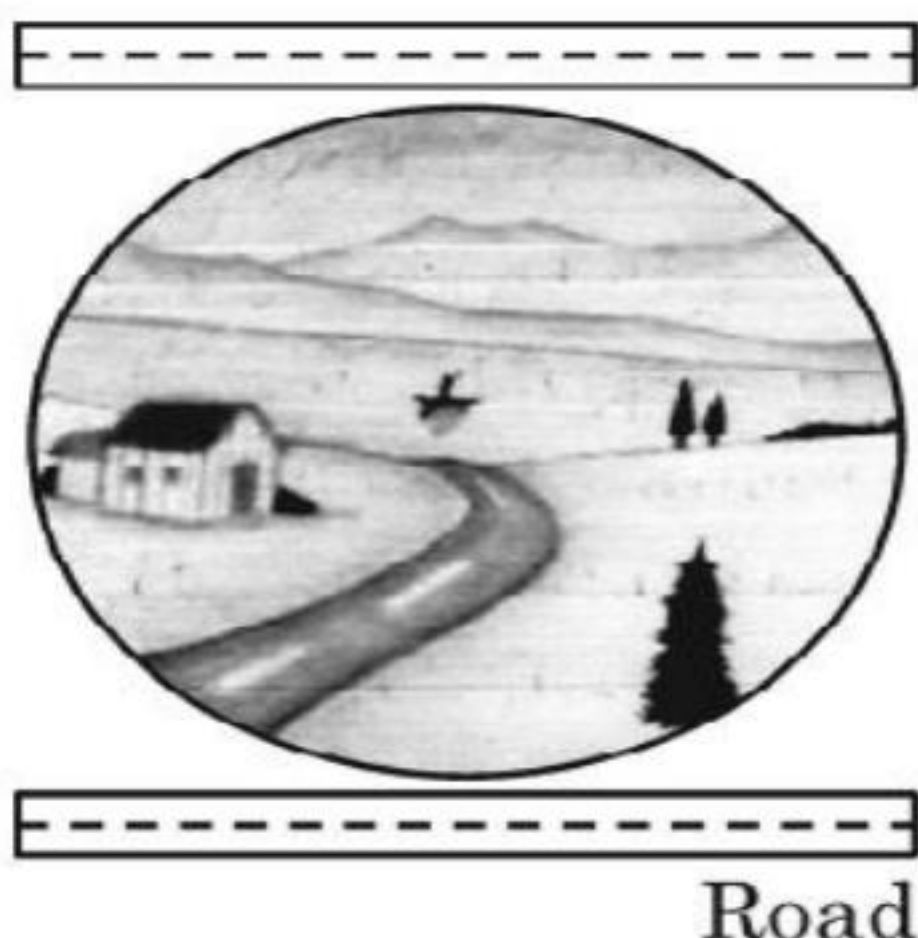
1

1+1

1

1

38.



People of a circular village Dharamkot want to construct a road nearest to it. The road cannot pass through the village. But the people want the road at a shortest distance from the centre of the village. Suppose the road starts from A which is outside the circular village (as shown in the figure) and touch the boundary of the circular village at B such that $AB = 20$ m. Also the distance of the point A from the centre O of the village is 25 m.

Based on the above information, answer the following questions :

- | | |
|---|---|
| (i) If B is the mid-point of AC, then find the distance AC. | 1 |
| (ii) Find the shortest distance of the road from the centre of the village. | 1 |
| (iii) Find the circumference of the village. | 2 |

OR

- | | |
|-------------------------------------|---|
| (iii) Find the area of the village. | 2 |
|-------------------------------------|---|

Solution (i) $AC = AB + BC = 20 + 20 = 40$ m 1

(ii) Shortest distance $OB = \sqrt{25^2 - 20^2} = 15$ m 1

(iii) Circumference $= 2\pi(15) = 30\pi$ m or $\frac{660}{7}$ m 1+1

OR

Area $= \pi(15)^2 = 225\pi$ sq. m or $\frac{4950}{7}$ sq. m 1+1