Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2024
SUBJECT NAME MATHEMATICS (BASIC) (Q.P. CODE 430/2/1)

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(✓) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓)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"**.
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 (0-80) (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).This is in view of the reduced syllabus and number of questions in question paper.
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 unassessed 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.

Set 430/2/1

MARKING SCHEME
MATHEMATICS (BASIC)

SECTION A

1. The HCF of smallest 2 – digit number and the smallest composite number is :

(A) 2 (B) 20

(C) 40 (D) 4

Ans. (A) 2 *1*

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2. The value of 'k' for which the pair of linear equations $x + y - 4 = 0$ and $2x + ky - 8 = 0$ has infinitely many solutions, is

(A) $k \neq 2$ (B) $k \neq -2$

(C) $k = 2$ (D) $k = -2$

Ans. (C) $k = 2$ *1*

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3. Which of the following equations has 2 as a root ?

(A) $x^2 - 4x + 5 = 0$ (B) $x^2 + 3x - 12 = 0$

(C) $2x^2 - 7x + 6 = 0$ (D) $3x^2 - 6x - 2 = 0$

Ans. (C) $2x^2 - 7x + 6 = 0$ *1*

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4. In an A.P., if $d = -4$ and $a_7 = 4$, then the first term 'a' is equal to

(A) 6 (B) 7

(C) 20 (D) 28

Ans. (D) 28 *1*

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5. The distance of the point (5, 4) from the origin is

(A) 41 (B) $\sqrt{41}$

(C) 3 (D) 9

Ans. (B) $\sqrt{41}$ *1*

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6. If $\sin A = \frac{3}{5}$, then value of cot A is :

(A) $\frac{3}{4}$ (B) $\frac{4}{3}$

(C) $\frac{4}{5}$ (D) $\frac{5}{4}$

Ans. (B) $\frac{4}{3}$ *1*

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7. $\frac{1+\tan^2 A}{1+\cot^2 A}$ is equal to

(A) $\sec^2 A$ (B) -1

(C) $\cot^2 A$ (D) $\tan^2 A$

Ans. (D) $\tan^2 A$ *1*

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8. $\frac{2\tan 30°}{1-\tan^2 30°}$ is equal to

(A) cos 60° (B) sin 60°

(C) tan 60° (D) sin 30°

Ans. (C) tan 60° *1*

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9. A quadratic polynomial, the sum of whose zeroes is –5 and their product is 6, is

(A) $x^2 + 5x + 6$ (B) $x^2 - 5x + 6$

(C) $x^2 - 5x - 6$ (D) $-x^2 + 5x + 6$

Ans. (A) $x^2 + 5x + 6$ *1*

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10. The zeroes of the polynomial $3x^2 + 11x - 4$ are :

(A) $\frac{1}{3}, 4$ (B) $\frac{-1}{3}, -4$

(C) $\frac{1}{3}, -4$ (D) $\frac{-1}{3}, 4$

Ans. (C) $\frac{1}{3}, -4$ *1*

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11. The annual rainfall record of a city for 66 days is given in the following table :

Rainfall (in cm) :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Number of days :	22	10	8	15	5	6

The difference of upper limits of modal and median classes is :

(A) 10 (B) 15

(C) 20 (D) 30

Ans. (C) 20 *1*

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12. If P(A) denotes the probability of an event A, then

(A) $P(A) < 0$ (B) $P(A) > 1$

(C) $0 \leq P(A) \leq 1$ (D) $-1 \leq P(A) \leq 1$

Ans. (C) $0 \leq P(A) \leq 1$ *1*

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13. The total surface area of a solid hemisphere of radius 7 cm is :

(A) $98\ \pi\ cm^2$ (B) $147\ \pi\ cm^2$

(C) $196\ \pi\ cm^2$ (D) $228\ \frac{2}{3}\pi\ cm^2$

Ans. (B) $147\ \pi\ cm^2$ *1*

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14. The difference of the areas of a minor sector of angle 120° and its corresponding major sector of a circle of radius 21 cm, is

(A) $231\ cm^2$ (B) $462\ cm^2$

(C) $346.5\ cm^2$ (D) $693\ cm^2$

Ans. (B) $462\ cm^2$ *1*

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15. The graph of a pair of linear equations $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$ in two variables x and y represents parallel lines, if

(A) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

(C) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (D) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

Ans. (D) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ *1*

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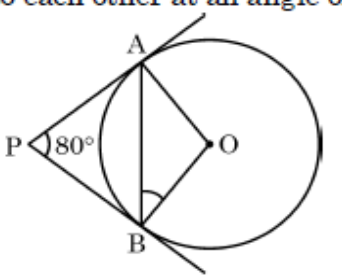
16. In the given figure, tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80°. ∠ABO is equal to



(A) 40° (B) 80°

(C) 100° (D) 50°

Ans. (A) 40° *1*

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17. A line intersecting a circle in two distinct points is called a

(A) secant (B) chord

(C) diameter (D) tangent

Ans. (A) secant *1*

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18. If a pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then the sun's elevation is

(A) 30° (B) 45°

(C) 60° (D) 90°

Ans. (C) 60° *1*

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19. **Assertion (A) :** A line drawn parallel to any one side of a triangle intersects the other two sides in the same ratio.

Reason (R) : Parallel lines cannot be drawn to any side of a triangle.

Ans. (C) Assertion (A) is true, but Reason (R) is false *1*

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20. **Assertion (A) :** The point (0, 4) lies on y – axis.

Reason (R) : The x-coordinate of a point, lying on y – axis, is zero.

Ans. (A) Both Assertion (A) and Reason (R) are correct and Reason (R) is the correct explanation of Assertion (A). *1*

SECTION B

21. Find the HCF of 84 and 144 by prime factorisation method.

Solution: $84 = 2 \times 2 \times 3 \times 7$ $\frac{1}{2}$

$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$ $\frac{1}{2}$

$\therefore$ HCF $= 2 \times 2 \times 3 = 12$ *1*

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22. (a) The sum of two natural numbers is 70 and their difference is 10. Find the natural numbers.

OR

(b) Solve for x and y :

$x - 3y = 7$

$3x - 3y = 5$

Solution: (a) Let the numbers be x & y

$x + y = 70$ $\frac{1}{2}$

$x - y = 10$ $\frac{1}{2}$

Solving to get x = 40 and y = 30 $\frac{1}{2} + \frac{1}{2}$

OR

(b) $x - 3y = 7$ & $3x - 3y = 5$

Solving to get $x = -1$ *1*

$y = -\frac{8}{3}$ *1*

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23. 15 defective pens are accidentally mixed with 145 good ones. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.

Solution: Total pens = 145 + 15 = 160 *1*

P (Good pen) = $\frac{145}{160}$ or $\frac{29}{32}$ *1*

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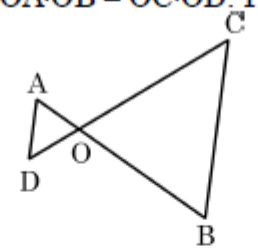
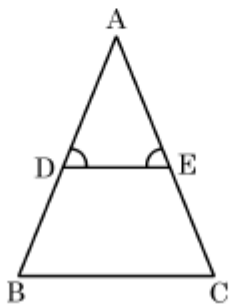
24. (a) In the given figure, OA·OB = OC·OD. Prove that ΔAOD ~ ΔCOB.



OR

(b) In the given figure, ∠D = ∠E and $\frac{AD}{DB}=\frac{AE}{EC}$. Prove that ΔABC is isosceles.



Solution: (a) OA . OB = OC . OD

$\Rightarrow \frac{OA}{OC}=\frac{OD}{OB}$ _____ (i) $\frac{1}{2}$

In Δ AOD and Δ COB

$\frac{OA}{OC}=\frac{OD}{OB}$ (from (i))

∠ AOD = ∠ BOC (Vertically opp. angles) *1*

∴ Δ AOD ~ Δ COB (SAS similarity) $\frac{1}{2}$

OR

(b) In Δ ADE,

$$\frac{AD}{DB} = \frac{AE}{EC} \text{ (Given)}$$

$\Rightarrow$ DE // BC (by converse of B. P. T.) $\frac{1}{2}$

$\Rightarrow \angle D = \angle B$ & $\angle E = \angle C$ (Corresponding angles) $\frac{1}{2}$

But $\angle D = \angle E$ (given)

$\therefore \angle B = \angle C$ $\frac{1}{2}$

$\Rightarrow$ AB = AC (sides opposite to equal angles of a triangle) $\frac{1}{2}$

$\Rightarrow \Delta$ ABC is isosceles.

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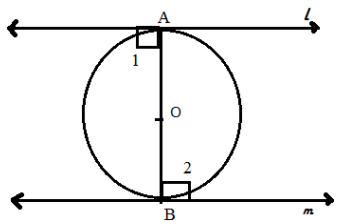
25. **Prove that the tangents drawn at the ends of a diameter of a circle are parallel to each other.**

Solution: Tangents *l* and m are drawn at the end points A & B of diameter of the circle with centre O



for fig. $\frac{1}{2}$

To prove: *l* || m

Proof $\rightarrow$ $\angle 1 = 90°$ ($\because$ radius $\perp$ tangent)
$\angle 2 = 90°$ *1*

$\Rightarrow \angle 1 = \angle 2$

But these are alternate interior angles

$\therefore$ *l* || m $\frac{1}{2}$

SECTION C

26. **Two dice are tossed simultaneously. Find the probability of getting**
    (a) **an even number on both the dice.**
    (b) **the sum of two numbers more than 9.**

Solution: Total outcomes = 36

(i) Even number on both the dice

{(2, 2), (2, 4), (2, 6), (4, 2), (4, 4), (4, 6) (6, 2), (6, 4), (6, 6)}

$\therefore$ favourable outcomes = 9 *1*

$\therefore$ required probability = $\frac{9}{36}$ or $\frac{1}{4}$ $\frac{1}{2}$

(ii) Sum of two numbers more than 9

{(4, 6), (5, 5), (5, 6), (6, 4), (6, 5), (6, 6)}

Favourable outcomes = 6 *1*

Required probability = $\frac{6}{36}$ or $\frac{1}{6}$ $\frac{1}{2}$

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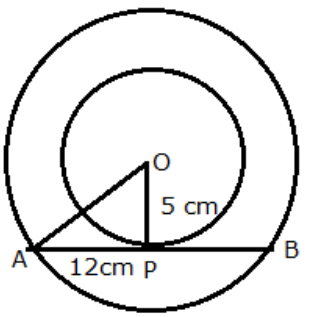
27. (a) In two concentric circles, a chord of length 24 cm of larger circle touches the smaller circle, whose radius is 5 cm. Find the radius of the larger circle.

OR

(b) Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.

Solution:



For fig. $\frac{1}{2}$

(a) In Δ OAP,

$AP = \frac{1}{2}(24) = 12$ *1*

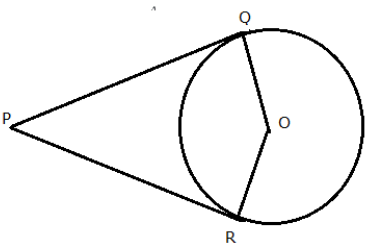
$(OA)^2 = (5)^2 + (12)^2$ *1*

$OA = 13$ $\frac{1}{2}$

$\therefore$ radius of the larger circle be 13 cm

OR

(b)



For fig. $\frac{1}{2}$

Let PQ and PR be the tangents drawn from an external point P to the circle with centre O.

To Prove: $\angle QPR + \angle QOR = 180°$

Proof – $\angle OQP = 90°$

$\angle ORP = 90°$ (radius $\perp$ tangent) } *1*

In Quadrilateral OQPR,

$\angle OQP + \angle QPR + \angle ORP + \angle QOR = 360°$ *1*

$90° + \angle QPR + 90° + \angle QOR = 360°$

$\angle QPR + \angle QOR = 180°$ *$\frac{1}{2}$*

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28. **Prove that $7 - 3\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.**

Solution: (a) Let us assume that $x = 7 - 3\sqrt{5}$ is a rational number *1*

$\Rightarrow \sqrt{5} = \frac{7 - x}{3}$ *1*

RHS is rational

$\Rightarrow \sqrt{5}$ is rational

Which contradicts the fact that $\sqrt{5}$ is an irrational number *1*

$\therefore$ our assumption is wrong.

Hence, $7 - 3\sqrt{5}$ is irrational.

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29. (a) **Zeroes of the quadratic polynomial $x^2 - 3x + 2$ are α and β. Construct a quadratic polynomial whose zeroes are $2\alpha + 1$ and $2\beta + 1$.**

OR

(b) **Find the zeroes of the polynomial $4x^2 - 4x + 1$ and verify the relationship between the zeroes and the coefficients.**

Solution: (a) $p(x) = x^2 - 3x + 2$

α, β are its zeroes

$\therefore \alpha + \beta = \frac{-b}{a} = 3$ *$\frac{1}{2}$*

$\alpha\,\beta = 2$ $\frac{1}{2}$

Required sum of zeroes = $(2\alpha+1) + (2\beta+1) = 2(\alpha + \beta) + 2 = 8$ $\frac{1}{2}$

Required product of zeroes = $(2\alpha+1)(2\beta+1) = 4\alpha\beta + 2(\alpha + \beta) + 1$

$= 4 \times 2 + 2 \times 3 + 1 = 15$ *1*

Required quadratic polynomial is $k(x^2 - 8x + 15)$ or $x^2 - 8x + 15$ $\frac{1}{2}$

OR

(b) $p(x) = 4x^2 - 4x + 1 = (2x - 1)(2x - 1)$ *1*

$\therefore$ Zeroes are $\frac{1}{2}$ and $\frac{1}{2}$ *1*

Sum of zeroes = $\frac{1}{2} + \frac{1}{2} = 1 = \frac{-(-4)}{(4)} = \frac{-\,Coeff.\,of\ x}{Coeff.\,of\ x^2}$ $\frac{1}{2}$

Product of zeroes = $\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4} = \frac{Constant\ term}{Coeff.\,of\ x^2}$ $\frac{1}{2}$

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30. Prove that $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\,\text{cosec}\,\theta$

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

$= \frac{\tan^3\theta - 1}{\tan\theta(\tan\theta - 1)}$ $\frac{1}{2}$

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

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

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

$= \sec\theta\,\text{cosec}\,\theta + 1 = \text{RHS}$ $\frac{1}{2}$

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31. A car has two wipers which do not overlap. Each wiper has a blade of length 21 cm sweeping through an angle of 120°. Find the area cleaned at each sweep of the blades.

Solution: (a) r = 21 cm, θ = 120° $\frac{1}{2}$

Area cleaned by one wiper = $\frac{\pi r^2 \theta}{360^\circ}$

$= \frac{22}{7} \times 21 \times 21 \times \frac{120}{360}$ $1\frac{1}{2}$

$= 462 \text{ cm}^2$ $\frac{1}{2}$

Hence, total area cleaned by two wipers

$= 2 \times 462 = 924 \text{ cm}^2$ $\frac{1}{2}$

SECTION D

32. **A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produced in a day. On a particular day, the total cost of production was ₹ 750. Find the total number of toys produced on that day.**

Solution: Let the number of toys produced on that day be x $\frac{1}{2}$

A.T.Q., $x(55 - x) = 750$ *1*

$\Rightarrow x^2 - 55x + 750 = 0$ *1*

$\Rightarrow (x - 25)(x - 30) = 0$ $1\frac{1}{2}$

$\Rightarrow x = 25, \quad x = 30$ *1*

$\therefore$ Number of toys produced are 25 or 30.

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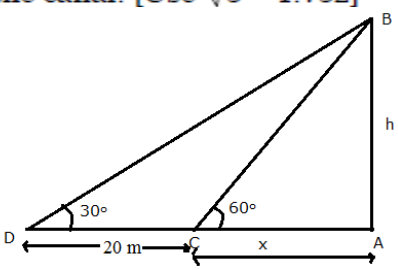
33. **A TV tower stands vertically on a bank of a canal. From a point on the other bank exactly opposite the tower, the angle of elevation of the top of the tower is 60°. From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30°.**

Find the height of the tower and the width of the canal. [Use $\sqrt{3} = 1.732$]

Solution:



For fig. *1*

In right Δ ABC, $\frac{h}{x} = \tan 60°$ *1*

$h = \sqrt{3}\, x$ _____ (i) *$\frac{1}{2}$*

In right Δ ABD, $\frac{h}{x + 20} = \tan 30° = \frac{1}{\sqrt{3}}$ *1*

$\sqrt{3}\ h = x + 20 \Rightarrow x = 10$ (from (i)) *1*

$\therefore$ Height of tower (h) = $\sqrt{3}\, x = 17.32$m *$\frac{1}{2}$*

Width of canal = 10 m

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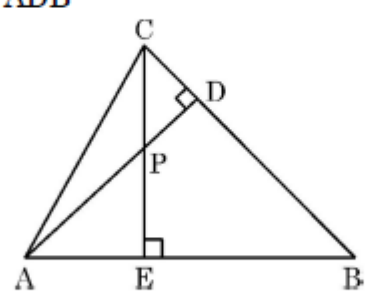
34. (a) In the given figure, altitudes CE and AD of ΔABC intersect each other at the point P. **1+2+2**

Show that

(i) Δ AEP ~ Δ CDP

(ii) Δ ABD ~ Δ CBE

(iii) Δ AEP ~ Δ ADB



OR

(b) AD and PM are medians of triangles ABC and PQR, respectively, where Δ ABC ~ Δ PQR. Prove that $\frac{AB}{PQ} = \frac{AD}{PM}$. **5**

Solution: (a) (i) In Δ AEP and Δ CDP,

$\angle$ APE = $\angle$ CPD (vertically opposite angles) *$\frac{1}{2}$*

$\angle$ AEP = $\angle$ CDP (each 90°)

$\therefore$ Δ AEP ~ Δ CDP (AA similarity) *$\frac{1}{2}$*

(ii) In Δ ABD and Δ CBE,

$\angle$ B = $\angle$ B (common) *$\frac{1}{2}$*

$\angle ADB = \angle BEC$ (each 90°) *1*

$\therefore \Delta ABD \sim \Delta CBE$ (AA similarity) $\frac{1}{2}$

(iii) In ΔAEP and ΔADB,

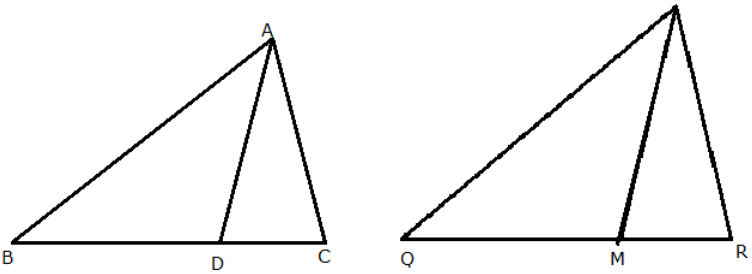
$\angle A = \angle A$ (common) $\frac{1}{2}$

$\angle AEP = \angle ADB$ (each 90°) *1*

$\therefore \Delta AEP \sim \Delta ADB$ (AA similarity) $\frac{1}{2}$

OR

(b)



For fig. *1*

Given: $\Delta ABC \sim \Delta PQR$. AD and PM are medians of ΔABC and ΔPQR, respectively

To Prove: $\frac{AB}{PQ} = \frac{AD}{PM}$

Proof: $\because \Delta ABC \sim \Delta PQR$ (Given)

$\therefore \frac{AB}{PQ} = \frac{BC}{QR}$ *1*

$\Rightarrow \frac{AB}{PQ} = \frac{2BD}{2QM}$ ($\because$ D & E are mid-points of BC & QR, respectively)

$\Rightarrow \frac{AB}{PQ} = \frac{BD}{QM}$ *1*

Now, In ΔABD and ΔPQM

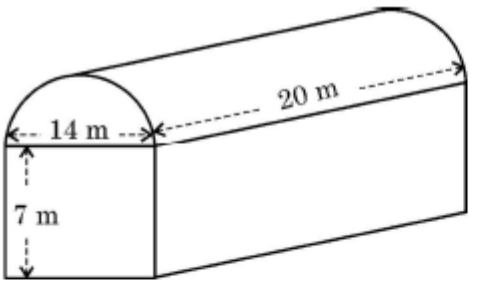
$\frac{AB}{PQ} = \frac{BD}{QM}$ (Proved above) $\frac{1}{2}$

$\angle B = \angle Q$ ($\Delta ABC \sim \Delta PQR$) $\frac{1}{2}$

$\therefore \Delta ABD \sim \Delta PQM$ (SAS similarity) $\frac{1}{2}$

$\Rightarrow \frac{AB}{PQ} = \frac{AD}{PM}$ $\frac{1}{2}$

35. (a)



A textile industry runs in a shed. This shed is in the shape of a cuboid surmounted by a half cylinder. If the base of the industry is of dimensions 14 m × 20 m and the height of the cuboidal portion is 7 m, find the volume of air that the industry can hold. Further, suppose the machinery in the industry occupies a total space of 400 m^3. Then, how much space is left in the industry ?

OR

(b) From a solid cylinder of height 8 cm and radius 6 cm, a conical cavity of the same height and same radius is carved out. Find the total surface area of the remaining solid. (Take $\pi = 3.14$)

Solution: (a) Volume of cuboid = $20 \times 14 \times 7 = 1960\ m^3$ *1*

For half cylinder: $r = \frac{14}{2}$ m, h = 20 m *1*

Volume of half cylinder = $\frac{1}{2}\pi r^2 h$

$= \frac{1}{2} \times \frac{22}{7} \times 7 \times 7 \times 20 = 1540\ m^3$ *2*

$\therefore$ Required volume of air $= 1960 + 1540 = 3500\ m^3$ $\frac{1}{2}$

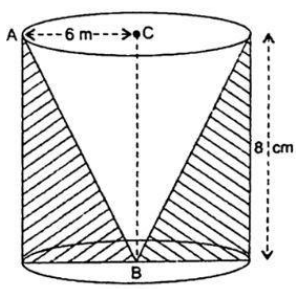
Space occupied by machinery = $400\ m^3$

$\therefore$ Space left = $3500 - 400$

$= 3100\ m^3$ $\frac{1}{2}$

OR

(b)



$l = \sqrt{6^2 + 8^2} = 10$ cm 1

Required Surface Area of the remaining solid = $2\pi rh + \pi r^2 + \pi rl$

$= 2\pi (6) \cdot 8 + \pi (6)^2 + \pi \times 6 \times 10$ $2\frac{1}{2}$

$= 192\ \pi$ 1

$= 602.88\ m^2$ $\frac{1}{2}$

SECTION E

36. Saving money is a good habit and it should be inculcated in children right from the beginning. Rehan's mother brought a piggy bank for Rehan and puts one ₹ 5 coin of her savings in the piggy bank on the first day. She increases his savings by one ₹ 5 coin daily.

Based on the above information, answer the following questions :

(i) How many coins were added to the piggy bank on 8th day ?

(ii) How much money will be there in the piggy bank after 8 days ?

(iii) (a) If the piggy bank can hold one hundred twenty ₹ 5 coins in all, find the number of days she can contribute to put ₹ 5 coins into it.

OR

(iii) (b) Find the total money saved, when the piggy bank is full.

Solution: (i) 8 coins *1*

(ii) Money in the piggy bank day wise

5, 10, 15, 20 .....

Money after 8 days = ₹180 *1*

(iii) (a) We can have at most 120 coins.

$\frac{n}{2}$ [2(1) + (n – 1) 1] = 120 *1*

$n^2 + n - 240 = 0$ $\frac{1}{2}$

Solving for n, we get, n = 15 as $n \neq -16$ $\frac{1}{2}$

∴ Number of days = 15

OR

(iii) (b) Total money saved = 120 × 5 = ₹600 *1+1*

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37. Heart Rate : The heart rate is one of the 'vital signs' of health in the human body. It measures the number of times per minute that the heart contracts or beats. While a normal heart rate does not guarantee that a person is free of health problems, it is a useful benchmark for identifying a range of health issues.

Thirty women were examined by doctors of AIIMS and the number of heart beats per minute were recorded and summarized as follows :

Number of heart beats per minute	Number of Women
65 – 68	2
68 – 71	4
71 – 74	3
74 – 77	8
77 – 80	7
80 – 83	4
83 – 86	2

Based on the above information, answer the following questions :

(i) How many women are having heart beat in the range 68 – 77 ?

(ii) What is the median class of heart beats per minute for these women ?

(iii) (a) Find the modal value of heart beats per minute for these women.

OR

(iii) (b) Find the median value of heart beats per minute for these women.

Solution: (i) Women having heart beat in range 68 – 77

$= 4 + 3 + 8 = 15$ *1*

(ii) Median class = 74 – 77 *1*

(iii)(a) Mode = $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$

$l = 74, f_1 = 8, f_0 = 3, f_2 = 7, h = 3$

$\therefore$ Modal value = $74 + \left(\frac{8 - 3}{16 - 3 - 7}\right) \times 3$ $1\frac{1}{2}$

$= 76.5$ $\frac{1}{2}$

OR

(iii) (b)

No. of heart beats	f	cf
65 – 68	2	2
68 – 71	4	6
71 – 74	3	9
74 – 77	8	17
77 – 80	7	24
80 – 83	4	28
83 – 86	2	30

For table: $\frac{1}{2}$

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

$$= 74 + \frac{(15 - 9)}{8} \times 3 \qquad 1$$

$$= 76.25 \qquad \frac{1}{2}$$

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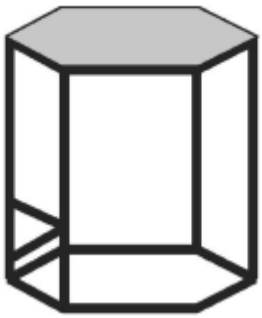
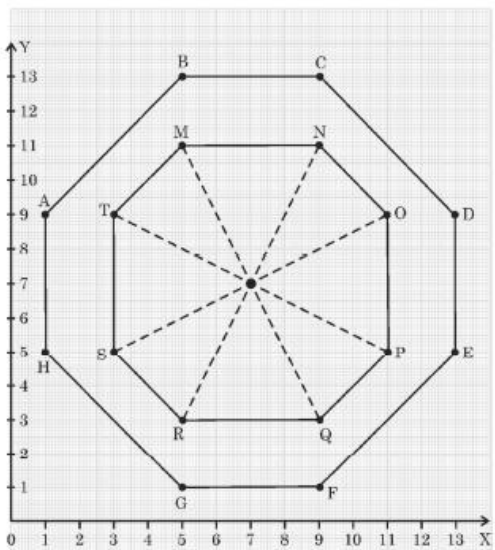
38. The top of a table is hexagonal in shape.





On the basis of the information given above, answer the following questions :

(i) Write the coordinates of A and B.

(ii) Write the coordinates of the mid-point of line segment joining C and D.

(iii) (a) Find the distance between M and Q.

OR

(iii) (b) Find the coordinates of the point which divides the line segment joining M and N in the ratio 1:3 internally.

Solution: (i) A(1, 9) and B(5, 13) $\frac{1}{2}+\frac{1}{2}$

(ii) C(9, 13) and D(13, 9) $\frac{1}{2}$

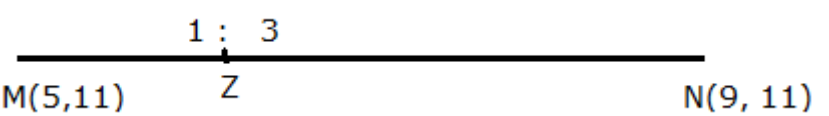
Mid-point of CD is (11, 11) $\frac{1}{2}$

(iii)(a) M(5, 11) and Q(9, 3) *1*

$MQ = \sqrt{(9-5)^2 + (3-11)^2} = \sqrt{80}$ or $4\sqrt{5}$ *1*

OR

(iii)(b) M(5, 11) and N(9, 11) *1*



$Z\left(\frac{1\times 9+3\times 5}{1+3}, \frac{1\times 11+3\times 11}{1+3}\right)$

Z (6, 11) *1*