Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2023
SUBJECT NAME MATHEMATICS (BASIC) (SUBJECT CODE 241) (PAPER CODE 430/1/3)

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 the 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)

SECTION A

1. If $\sqrt{3}\tan\theta = 1$, then the value of θ is

(a) $30°$ (b) $45°$

(c) $60°$ (d) $90°$

Ans. (a) $30°$ *1*

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2. The prime factorisation of 1728 is

(a) $2^5 \times 3^3$ (b) $2^5 \times 3^4$

(c) $2^6 \times 3^3$ (d) $2^6 \times 3^2$

Ans. (c) $2^6 \times 3^3$ *1*

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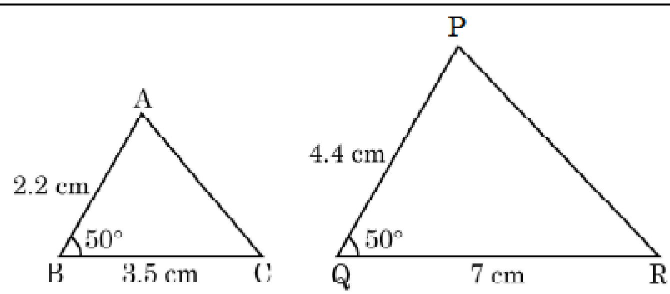
3. In an AP, if $d = -4$, $n = 7$ and $a_n = 4$, then the value of a is

(a) 6 (b) 7

(c) 20 (d) 28

Ans. (d) 28 *1*

4.



In the above figure, the criterion of similarity by which $\Delta ABC \sim \Delta PQR$ is :

(a) SSA (Side – Side – Angle) Similarity

(b) ASA (Angle – Side – Angle) Similarity

(c) SAS (Side – Angle – Side) Similarity

(d) AA (Angle – Angle) Similarity

Ans. (c) SAS (Side – Angle – Side) Similarity *1*

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5. The volume of a cone of radius 'r' and height '3r' is :

(a) $\frac{1}{3}\pi r^3$ (b) $3\pi r^3$

(c) $9\pi r^3$ (d) πr^3

Ans. (d) πr^3 *1*

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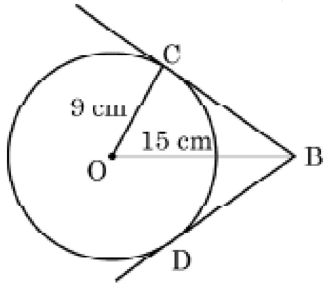
6. In the given figure, BC and BD are tangents to the circle with centre O and radius 9 cm. If OB = 15 cm, then the length (BC + BD) is :



(a) 18 cm (b) 12 cm
(c) 24 cm (d) 36 cm

Ans. (c) 24 cm *1*

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7. The distance between the points (3, 0) and (0, –3) is
(a) $2\sqrt{3}$ units (b) 6 units
(c) 3 units (d) $3\sqrt{2}$ units

Ans. (d) $3\sqrt{2}$ units *1*

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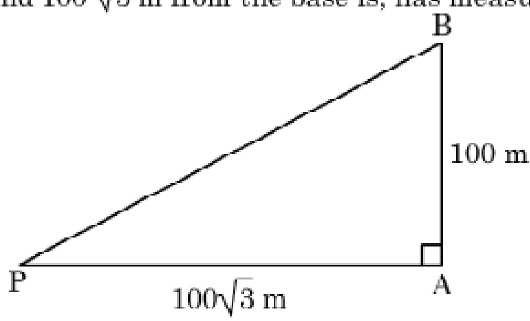
8. The angle subtended by a vertical pole of height 100 m at a point on the ground $100\sqrt{3}$ m from the base is, has measure of



(a) 90° (b) 60°
(c) 45° (d) 30°

Ans. (d) 30° *1*

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9. The larger of two supplementary angles exceeds the smaller by 18 degrees. What is the measure of larger angle ?
(a) 81° (b) 99°
(c) 36° (d) 54°

Ans. (b) 99° *1*

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10. The discriminant of the quadratic equation $2x^2 - 5x - 3 = 0$ is

(a) 1 (b) 49

(c) 7 (d) 19

Ans. (b) 49 *1*

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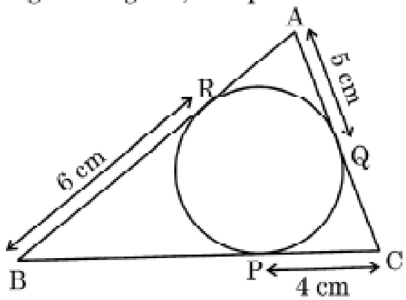
11. In the given figure, the perimeter of ΔABC is :



(a) 30 cm (b) 15 cm

(c) 45 cm (d) 60 cm

Ans. (a) 30 cm *1*

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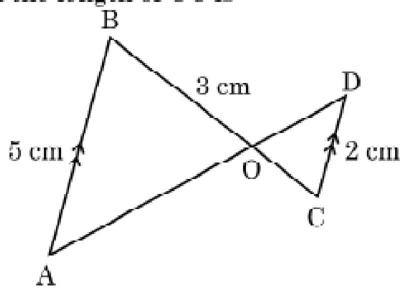
12. In the given figure, AB || CD. If AB = 5 cm, CD = 2 cm and OB = 3 cm, then the length of OC is



(a) $\frac{15}{2}$ cm (b) $\frac{10}{3}$ cm

(c) $\frac{6}{5}$ cm (d) $\frac{3}{5}$ cm

Ans. (c) $\frac{6}{5}$ cm *1*

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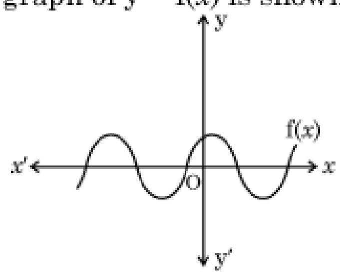
13. The graph of y = f(x) is shown in the figure for some polynomial f(x).



The number of zeroes of f(x) is

(a) 5 (b) 6

(c) 4 (d) 8

Ans. (a) 5 *1*

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14. The sum and product of zeroes of the polynomial $p(x) = 3x^2 - 5x + 2$ are

(a) $\frac{5}{3}, \frac{2}{3}$ (b) $\frac{-5}{3}, \frac{2}{3}$

(c) $1, \frac{2}{3}$ (d) $\frac{-5}{3}, \frac{-2}{3}$

Ans. (a) $\frac{5}{3}, \frac{2}{3}$ *1*

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15. A die is thrown once. The probability of getting an odd prime number is

(a) $\frac{1}{2}$ (b) $\frac{1}{6}$

(c) $\frac{1}{3}$ (d) $\frac{2}{3}$

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

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16. The sides of two similar triangles are in the ratio 4 : 7. The ratio of their perimeters is

(a) 4 : 7 (b) 12 : 21

(c) 16 : 49 (d) 7 : 4

Ans. (a) 4 : 7 *1*

---

17. The distance between two parallel tangents of a circle of diameter 7 cm is :

(a) 7 cm (b) 14 cm

(c) $\frac{7}{2}$ cm (d) 28 cm

Ans. (a) 7 cm *1*

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18. A card is drawn at random from a well-shuffled deck of 52 cards. The probability of getting a red card is :

(a) $\frac{1}{26}$ (b) $\frac{1}{13}$

(c) $\frac{1}{4}$ (d) $\frac{1}{2}$

Ans. (d) $\frac{1}{2}$ *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 system of linear equations $3x + 5y - 4 = 0$ and $15x + 25y - 25 = 0$ is inconsistent.

Reason (R) : The pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ is inconsistent if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$.

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

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20. **Assertion (A) :** A tangent to a circle is perpendicular to the radius through the point of contact.

Reason (R) : The lengths of tangents drawn from the external point to a circle are equal.

Ans. (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A) *1*

SECTION B

21. Evaluate : $\frac{3}{2}\tan^2 30^\circ - 2\cos^2 90^\circ - \frac{1}{2}\ \text{cosec}^2 30^\circ$

Solution: $\frac{3}{2}\left(\frac{1}{\sqrt{3}}\right)^2 - 2(0)^2 - \frac{1}{2}(2)^2$ $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$

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

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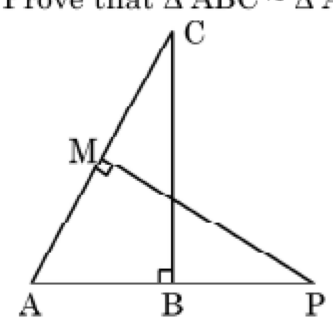
22. In the given figure, ABC and AMP are two right triangles, right angled at B and M, respectively. Prove that $\Delta ABC \sim \Delta AMP$.



Solution: In Δ ABC and Δ AMP,

∠ ABC = ∠ AMP (90° each) $\frac{1}{2}$

∠ BAC = ∠ MAP (common) 1

By AA Similarity

Δ ABC ~ Δ AMP $\frac{1}{2}$

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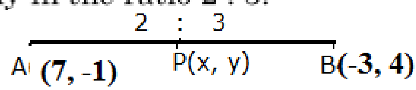
23. (a) Find the coordinates of the point which divides the line segment joining the points (7, –1) and (–3, 4) internally in the ratio 2 : 3.

Solution:



Let P(x, y) divide AB internally in the ratio 2 : 3

$x = \frac{2 \times -3 + 3 \times 7}{2+3} = \frac{15}{5} = 3$ 1

$y = \frac{2 \times 4 + 3 \times -1}{2+3} = \frac{5}{5} = 1$ 1

Coordinates of the required point are P (3, 1)

OR

(b) Find the value(s) of y for which the distance between the points A(3, –1) and B(11, y) is 10 units.

Solution: AB = 10 units $\Rightarrow AB^2 = 100$

$\Rightarrow (11-3)^2 + (y+1)^2 = 100$ 1

$\Rightarrow y + 1 = \pm 6$

$\Rightarrow y = 5, -7$ $\frac{1}{2}+\frac{1}{2}$

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24. Find the LCM and HCF of 92 and 510, using prime factorisation.

Solution: $92 = 2 \times 2 \times 23$ $\frac{1}{2}$

$510 = 2 \times 3 \times 5 \times 17$ $\frac{1}{2}$

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

$LCM = 2 \times 2 \times 3 \times 5 \times 17 \times 23 = 23460$ $\frac{1}{2}$

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25. (a) Solve for x and y : $x + y = 6$, $2x - 3y = 4$.

Solution: On solving the given equations and getting

$x = \frac{22}{5}$ and $y = \frac{8}{5}$ *1+1*

OR

(b) Find out whether the following pair of linear equations are consistent or inconsistent :

$5x - 3y = 11, \quad -10x + 6y = 22$

Solution: $-\frac{5}{10} = -\frac{3}{6} \neq \frac{11}{22}$ or $-\frac{1}{2} = -\frac{1}{2} \neq \frac{1}{2}$ *$1\frac{1}{2}$*

$\Rightarrow$ given pair of linear equations is inconsistent *$\frac{1}{2}$*

SECTION C

26. Prove that $3 + 7\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is an irrational number.

Solution: Let us assume that $3+7\sqrt{2}$ is a rational number.

Let $3 + 7\sqrt{2} = \frac{p}{q}$, p, q are integers and $q \neq 0$ *1*

$\Rightarrow \sqrt{2} = \frac{p-3q}{7q}$ *1*

RHS is rational but LHS is irrational

$\therefore$ Our assumption is wrong

Hence, $3 + 7\sqrt{2}$ is an irrational number *1*

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27. If α, β are zeroes of the quadratic polynomial $x^2 + 3x + 2$, find a quadratic polynomial whose zeroes are α + 1, β + 1.

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

α, β are its zeroes

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

Now,

$(\alpha + 1) + (\beta + 1) = \alpha + \beta + 2 = -3 + 2 = -1$ *$\frac{1}{2}$*

$(\alpha + 1)(\beta + 1) = \alpha\beta + (\alpha + \beta) + 1 = +2 - 3 + 1 = 0$ *1*

$\therefore$ Required Polynomial is $k(x^2 + x)$ or $x^2 + x$ *$\frac{1}{2}$*

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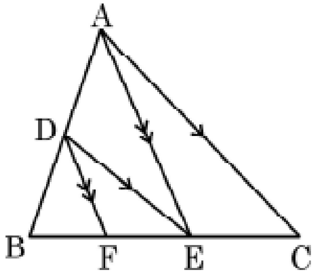
28. (a) In the given figure, DE || AC and DF || AE



Prove that

$$\frac{BF}{FE} = \frac{BE}{EC}$$

Solution: In Δ ABE, DF || AE (given), hence by BPT

$\frac{BD}{DA} = \frac{BF}{FE}$ ________ (i) $1\frac{1}{2}$

In Δ ABC, DE || AC (given), hence by BPT

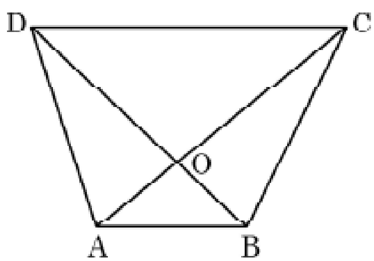
$\frac{BD}{DA} = \frac{BE}{EC}$ ________ (ii) *1*

From (i) and (ii)

$\frac{BF}{FE} = \frac{BE}{EC}$ $\frac{1}{2}$

OR

(b) The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{BO} = \frac{CO}{OD}$



Show that quadrilateral ABCD is a trapezium.

Solution: In Δ AOB and Δ COD,

$\frac{AO}{BO} = \frac{CO}{OD} \Rightarrow \frac{OA}{OC} = \frac{OB}{OD}$

∠ AOB = ∠ COD (vertically opp. angles)

⇒ Δ AOB ~ Δ COD (SAS Similarity) *2*

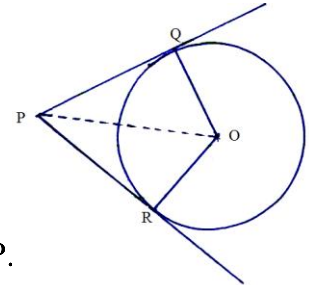
⇒ ∠ CAB= ∠ACD (or ∠ DBA= ∠ BDC)

But, these are alternate interior angles

∴ AB || CD ⇒ □ABCD is a trapezium *1*

29. Prove that the tangents drawn from an external point to a circle are equal in length.

Solution:



1 (For Fig.)

Given: A circle with centre O and PQ, PR are tangents to the circle from an external point P.
To Prove: PQ = PR

Construction: Join OP, OQ, OR $\frac{1}{2}$

Proof : In Δ OPQ and Δ OPR
OP = OP (common)
OQ = OR (radii of the same circle)
∠ OQP = ∠ ORP (each 90°)
⇒ Δ POQ ≅ Δ POR (RHS congruence) *1*

∴ PQ = PR $\frac{1}{2}$

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30. If the point Q(0, 1) is equidistant from the points P (5, – 3) and R (x, 6); find the value of x. Also, find the distance PR.

Solution: $PQ = QR \Rightarrow PQ^2 = QR^2$

$(5-0)^2 + (-3-1)^2 = (x-0)^2 + (6-1)^2$ *1*

$x^2 = 16$

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

$\Rightarrow R(4, 6)$ or $(-4, 6)$

If R(4, 6), $PR = \sqrt{(5-4)^2 + (-3-6)^2} = \sqrt{82}$ $\frac{1}{2}$

If R(– 4, 6), $PR = \sqrt{(5+4)^2 + (-3-6)^2} = \sqrt{162}$ or $9\sqrt{2}$ $\frac{1}{2}$

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

Solution: (a) $\text{LHS} = \frac{\cos A}{1+\sin A} + \frac{1+\sin A}{\cos A}$

$= \frac{\cos^2 A + (1+\sin A)^2}{(1+\sin A)\cos A}$ *1*

$= \frac{\cos^2 A + 1 + \sin^2 A + 2\sin A}{(1+\sin A)\cos A}$ *1*

$= \frac{1+1+2\sin A}{(1+\sin A)\cos A} = \frac{2(1+\sin A)}{(1+\sin A)\cos A}$ $\frac{1}{2}$

$$= \frac{2}{\cos A} = 2 \sec A = \text{RHS}$$ *1/2*

OR

(b) Prove that $(\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$.

(b) LHS $= (\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2$

$= \sin^2 A + \text{cosec}^2 A + 2 \sin A \text{ cosec } A + \cos^2 A + \sec^2 A + 2 \cos A \sec A$ *1*

$= (\sin^2 A + \cos^2 A) + \text{cosec}^2 A + \sec^2 A + 2 \sin A \cdot \frac{1}{\sin A} + 2 \cos A \cdot \frac{1}{\cos A}$ *1*

$= 1 + (1 + \cot^2 A) + (1 + \tan^2 A) + 2 + 2$ *1/2*

$= 7 + \tan^2 A + \cot^2 A = \text{RHS}$ *1/2*

SECTION D

32. A survey conducted on 20 families in a locality by a group of students resulted in the following frequency table for the number of family members in a family.

Family size	1 – 3	3 – 5	5 – 7	7 – 9	9 – 11
Number of families	7	8	2	2	1

Determine the mean and mode of the above data.

Solution: For Table: *1*

Family size	X_i	F_i	$f_i x_i$
1 – 3	2	7	14
3 – 5	4	8	32
5 – 7	6	2	12
7 – 9	8	2	16
9 – 11	10	1	10
		20	84

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{84}{20} = 4.2$$ *1+1/2*

Mode: Modal Class = 3 – 5 *1/2*

$l = 3,\ f_1 = 8,\ f_0 = 7,\ f_2 = 2,\ h = 2$

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

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

$= \frac{23}{7}$ or 3.287 $\frac{1}{2}$

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33. A heap of rice is in the form of a cone of base diameter 24 m and height $\frac{7}{2}$ m. Find the volume of rice. How much canvas cloth is required to just cover the heap ?

Solution: Radius of cone = 12 m, $h = \frac{7}{2}$ m $\frac{1}{2}$

Volume of cone $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times 12 \times 12 \times \frac{7}{2}$ $1\frac{1}{2}$

$= 528 \text{ m}^3$ $\frac{1}{2}$

l (slant height) $= \sqrt{h^2 + r^2} = \frac{25}{2}$ m 1

Curved surface area of cone $= \pi r l$

$= \frac{22}{7} \times 12 \times \frac{25}{2}$ 1

$= \frac{3300}{7} \text{ m}^2$ or $471{\cdot}43 \text{ m}^2$ $\frac{1}{2}$

Cloth required to cover the heap = $471{\cdot}43 \text{ m}^2$

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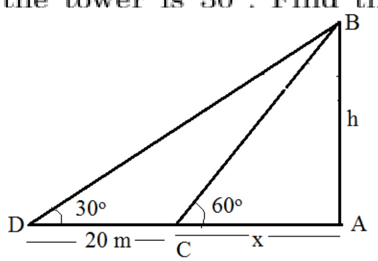
34. (a) A TV tower stands vertically on the bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60°. From another point 20 m away from the point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30°. Find the height of the tower.



For figure 1

Solution:

In Δ ABC, $\tan 60° = \frac{h}{x} \Rightarrow h = \sqrt{3}\,x$ $1+\frac{1}{2}$

In Δ ABD, $\tan 30° = \frac{h}{20+x} \Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{20+x}$ $1+\frac{1}{2}$

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

$\Rightarrow x = 10$ $\frac{1}{2}$

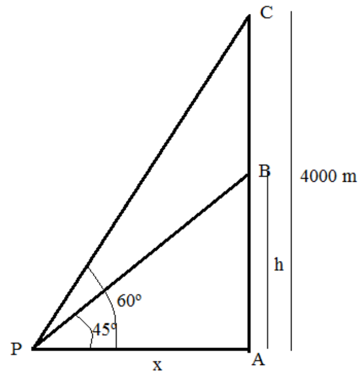
$\Rightarrow h = \sqrt{3}\, x = 10\sqrt{3}$

$\Rightarrow$ Height of tower = $10\sqrt{3}$ m or 17.3 m $\frac{1}{2}$

OR

(b) An aeroplane when flying at a height of 4000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. (Use $\sqrt{3} = 1.73$)

Solution:



For figure *1*

In Δ APB, $\frac{h}{x} = \tan 45° \Rightarrow h = x$ $1+\frac{1}{2}$

In Δ APB, $\frac{4000}{x} = \tan 60° \Rightarrow x = \frac{4000}{\sqrt{3}}$ $1+\frac{1}{2}$

$\Rightarrow h = x = \frac{4000}{\sqrt{3}}$

Distance between the aeroplanes = $4000 - \frac{4000}{\sqrt{3}}$ $\frac{1}{2}$

$= 4000\left(1 - \frac{1}{\sqrt{3}}\right)$

$= \frac{5080}{3}$ m or 1693.33 m (approx.) $\frac{1}{2}$

(**Note**: ½ mark to be deducted for not using $\sqrt{3}$=1.73)

35. (a) The diagonal of a rectangular field is 60 m more than the shorter side. If the longer side is 80 m more than the shorter side, find the length of the sides of the field.

Note: There is an error in the question, so full marks to be awarded to the Candidate, who attempted.

OR

(b) The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present age.

Solution: Let age of father = x years

and age of son = 45 – x *1*

Five years ago, age of father = x – 5

Age of son = 40 – x *1*

ATQ, (x – 5) (40 – x) = 124 *1*

$$x^2 - 45x + 324 = 0$$

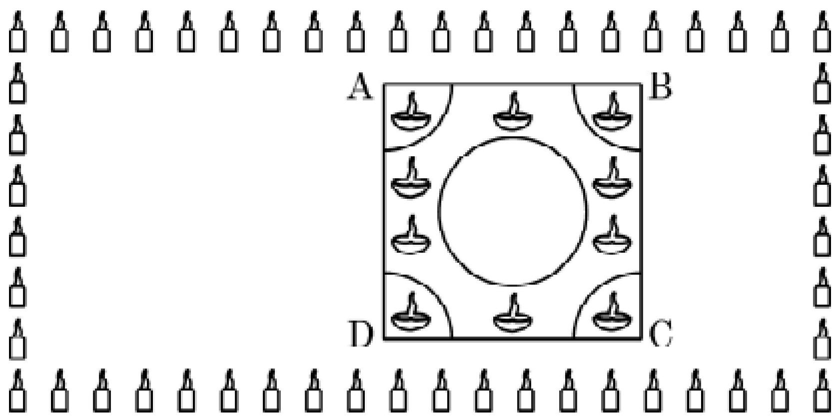
$$(x - 36)(x - 9) = 0$$ *1*

x = 36, x = 9 (rejected) $\frac{1}{2}$

⇒ Father's age = 36 years and son's age = 9 years $\frac{1}{2}$

SECTION E

36. Interschool Rangoli Competition was organized by one of the reputed schools of Odissa. The theme of the Rangoli Competition was Diwali celebrations where students were supposed to make mathematical designs. Students from various schools participated and made beautiful Rangoli designs. One such design is given below.



Rangoli is in the shape of square marked as ABCD, side of square being 40 cm. At each corner of a square, a quadrant of circle of radius 10 cm is drawn (in which diyas are kept). Also a circle of diameter 20 cm is drawn inside the square.

(i) What is the area of square ABCD ?

(ii) Find the area of the circle.

(iii) If the circle and the four quadrants are cut off from the square ABCD and removed, then find the area of remaining portion of square ABCD.

OR

(iii) Find the combined area of 4 quadrants and the circle, removed.

Solution: (i) Area of square ABCD = $(40)^2 = 1600\ \text{cm}^2$ *1*

(ii) Area of circle = $\pi r^2 = \frac{22}{7} \times 10 \times 10$

$= \frac{2200}{7}\ \text{cm}^2$ or $314.28\ \text{cm}^2$ *1*

(iii) Area of 4 quadrants = $4(\frac{1}{4}\pi r^2) = \frac{2200}{7}\ \text{cm}^2$ *1*

Remaining area = $1600 - \left(\frac{2200}{7} + \frac{2200}{7}\right)$

$= 1600 - \frac{4400}{7} = \frac{6800}{7}\ \text{cm}^2$ or $971.43\ \text{cm}^2$ *1*

OR

(iii) Area of 4 quadrants = $4(\frac{1}{4}\pi r^2) = \frac{2200}{7}\ \text{cm}^2$ *1*

Combined area of circle + 4 quadrants

$= \frac{2200}{7} + \frac{2200}{7} = \frac{4400}{7}\ \text{cm}^2$ or $628.57\ \text{cm}^2$ *1*

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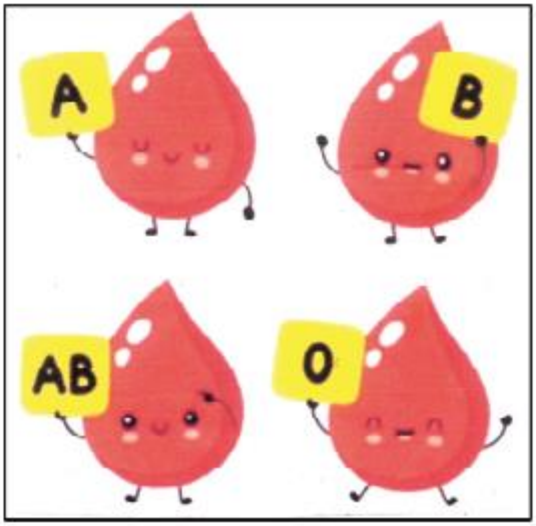
37. Blood group describes the type of blood a person has. It is a classification of blood based on the presence or absence of inherited antigenic substances on the surface of red blood cells. Blood types predict whether a serious reaction will occur in a blood transfusion.

In a sample of 50 people, 21 had type O blood, 22 had type A, 5 had type B and rest had type AB blood group.



Based on the above, answer the following questions :

(i) What is the probability that a person chosen at random had type O blood ?

(ii) What is the probability that a person chosen at random had type AB blood group ?

(iii) What is the probability that a person chosen at random had neither type A nor type B blood group ?

OR

(iii) What is the probability that person chosen at random had either type A or type B or type O blood group ?

Solution: (i) P(type O) = $\frac{21}{50}$ *1*

(ii) No. of people with AB type blood group = 50 – (21 + 22 + 5) = 2 $\frac{1}{2}$

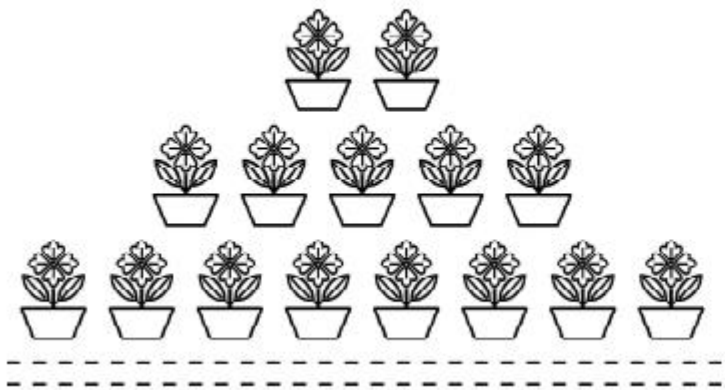
P(type AB) = $\frac{2}{50}$ or $\frac{1}{25}$ $\frac{1}{2}$

(iii) P(neither type A nor type B) = $\frac{21+2}{50} = \frac{23}{50}$ *1+1*

OR

(iii) P(type A or type B or type O) = $\frac{21+22+5}{50} = \frac{24}{25}$ *1+1*

38. Aahana being a plant lover decides to convert her balcony into beautiful garden full of plants. She bought few plants with pots for her balcony. She placed the pots in such a way that number of pots in the first row is 2, second row is 5, third row is 8 and so on.



Based on the above information, answer the following questions :

(i) Find the number of pots placed in the 10^{th} row.

(ii) Find the difference in the number of pots placed in 5^{th} row and 2^{nd} row.

(iii) If Aahana wants to place 100 pots in total, then find the total number of rows formed in the arrangement.

OR

(iii) If Aahana has sufficient space for 12 rows, then how many total number of pots are placed by her with the same arrangement ?

Solution: $a = 2, d = 3$

(i) Number of pots in the 10^{th} row

$= a_{10} = a + 9d = 29$ *1*

(ii) $a_5 - a_2 = (a + 4d) - (a + d) = 3d = 9$ *1*

(iii) $S_n = 100 \Rightarrow \frac{n}{2}[2(2) + (n-1)3] = 100$ *1*

$3n^2 + n - 200 = 0 \Rightarrow (3n + 25)(n - 8) = 0$

$\therefore n = 8 \quad (n = -\frac{25}{3}$ rejected), *1*

OR

(iii) $S_{12} = \frac{12}{2}[2(2) + 11(3)]$ *1*

$= 222$ *1*