

**Marking Scheme**  
**Strictly Confidential**  
**(For Internal and Restricted use only)**  
**Secondary School Examination, 2025**  
**SUBJECT NAME MATHEMATICS (BASIC) (Q.P. CODE 430/4/1)**

**General Instructions: -**

<b>1</b>	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.
<b>2</b>	<b>“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, evaluation done and several other aspects. It’s 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.”</b>
<b>3</b>	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. <b>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.</b>
<b>4</b>	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.
<b>5</b>	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.
<b>6</b>	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. <b>This is most common mistake which evaluators are committing.</b>
<b>7</b>	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.
<b>8</b>	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.
<b>9</b>	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 <b>“Extra Question”</b> .
<b>10</b>	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
<b>11</b>	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.
<b>12</b>	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.
<b>13</b>	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- <ul style="list-style-type: none"> <li>● Leaving answer or part thereof unassessed in an answer book.</li> <li>● Giving more marks for an answer than assigned to it.</li> <li>● Wrong totaling of marks awarded on an answer.</li> </ul>

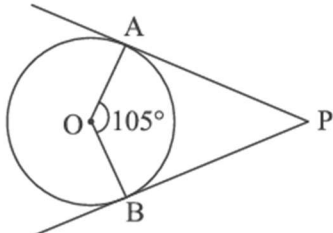
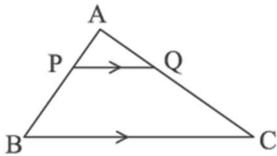
	<ul style="list-style-type: none"> <li>• Wrong transfer of marks from the inside pages of the answer book to the title page.</li> <li>• Wrong question wise totaling on the title page.</li> <li>• Wrong totaling of marks of the two columns on the title page.</li> <li>• Wrong grand total.</li> <li>• Marks in words and figures not tallying/not same.</li> <li>• Wrong transfer of marks from the answer book to online award list.</li> <li>• 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.)</li> <li>• Half or a part of answer marked correct and the rest as wrong, but no marks awarded.</li> </ul>
<b>14</b>	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.
<b>15</b>	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.
<b>16</b>	The Examiners should acquaint themselves with the guidelines given in the “ <b>Guidelines for spot Evaluation</b> ” before starting the actual evaluation.
<b>17</b>	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.
<b>18</b>	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 430/4/1

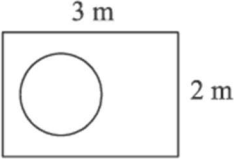
## MARKING SCHEME MATHEMATICS (Basic)

SECTION A	
<i>This section has 20 Multiple Choice Questions (MCQs) carrying 1 mark each. 20×1=20</i>	
1. If HCF $(x, 20) = 2$ and LCM $(x, 20) = 60$ , then value of $x$ is : (a) 3 (b) 6 (c) 20 (d) 10	
Ans. (b) 6	1
2. The distance between the points $(-6, 9)$ and $(2, 7)$ is : (a) $2\sqrt{17}$ (b) $4\sqrt{17}$ (c) $2\sqrt{5}$ (d) $2\sqrt{15}$	
Ans. (a) $2\sqrt{17}$	1
3. If $n^{\text{th}}$ term of an A.P. is $5n - 6$ , then its common difference is : (a) $-6$ (b) $5n$ (c) 5 (d) 6	
Ans. (c) 5	1
4. One of the zeroes of the polynomial $p(x) = kx^2 - 9x + 3$ is $\left(-\frac{3}{2}\right)$ . The value of $k$ is : (a) $\frac{22}{3}$ (b) $-\frac{14}{3}$ (c) $\frac{14}{3}$ (d) $-\frac{22}{3}$	
Ans. (d) $-\frac{22}{3}$	1
5. Three coins are tossed together. The probability that only one coin shows tail, is : (a) $\frac{1}{2}$ (b) $\frac{3}{8}$ (c) $\frac{7}{8}$ (d) 1	
Ans. (b) $\frac{3}{8}$	1
6. Two right circular cylinders of equal volumes have their heights in the ratio 1:2. The ratio of their radii is : (a) $\sqrt{2}:1$ (b) 1:2 (c) 1:4 (d) $1:\sqrt{2}$	

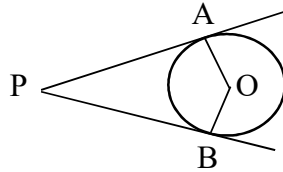
<b>Ans.</b> (a) $\sqrt{2} : 1$	1
7. If $\sqrt{2}\sin\theta = 1$ , then $\cot\theta \times \operatorname{cosec}\theta$ is equal to : (a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2\sqrt{2}}$ (c) $\sqrt{2}$ (d) $\frac{1}{2}$	
<b>Ans.</b> (c) $\sqrt{2}$	1
8. PQ and PR are tangents to the circle of radius 3 cm and centre O. If length of each tangent is 4 cm, then perimeter of $\triangle OQP$ is : (a) 5 cm (b) 12 cm (c) 9 cm (d) 8 cm	
<b>Ans.</b> (b) 12 cm	1
9. $\alpha, \beta$ are zeroes of the polynomial $2x^2 + 5x + 1$ . The value of $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ is : (a) $-\frac{5}{4}$ (b) 5 (c) $\frac{5}{4}$ (d) $-5$	
<b>Ans.</b> (d) $-5$	1
10. The 20 <sup>th</sup> term of the A.P. : $10\sqrt{2}, 6\sqrt{2}, 2\sqrt{2}, \dots$ is : (a) $-76 + 10\sqrt{2}$ (b) $-62\sqrt{2}$ (c) $-66\sqrt{2}$ (d) $86\sqrt{2}$	
<b>Ans.</b> (c) $-66\sqrt{2}$	1
11. If $\sec\theta - \tan\theta = 2$ , then $\sec\theta + \tan\theta$ is equal to : (a) $\frac{1}{2}$ (b) $\sqrt{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) 2	
<b>Ans.</b> (a) $\frac{1}{2}$	1
12. A card is drawn at random from a well shuffled deck of 52 playing cards. The probability that drawn card shows number '9' is : (a) $\frac{1}{26}$ (b) $\frac{4}{13}$ (c) $\frac{1}{52}$ (d) $\frac{1}{13}$	
<b>Ans.</b> (d) $\frac{1}{13}$	1

<p><b>13.</b> The length of arc subtending an angle of <math>210^\circ</math> at the centre of the circle, is <math>\frac{44}{3}</math> cm. The radius of the circle is :</p> <p>(a) <math>2\sqrt{2}</math> cm      (b) 4 cm      (c) 8 cm      (d) <math>\frac{1}{4}</math> cm</p>	
<b>Ans.</b> (b) 4 cm	1
<p><b>14.</b> The value of <math>m</math> for which lines <math>14x + my = 20</math> and <math>-3x + 2y = 16</math> are parallel, is :</p> <p>(a) <math>-\frac{3}{14}</math>      (b) <math>-\frac{7}{3}</math>      (c) <math>-\frac{28}{3}</math>      (d) <math>-\frac{3}{28}</math></p>	
<b>Ans.</b> (c) $-\frac{28}{3}$	1
<p><b>15.</b> The curved surface area of a cone with base radius 7 cm, is <math>550 \text{ cm}^2</math>. The slant height of the cone is :</p> <p>(a) 25 cm      (b) 14 cm      (c) 20 cm      (d) 24 cm</p>	
<b>Ans.</b> (a) 25 cm	1
<p><b>16.</b> If <math>\sin A = \frac{2}{3}</math>, then <math>\cos A</math> is equal to :</p> <p>(a) <math>\frac{3}{2}</math>      (b) <math>\frac{\sqrt{5}}{3}</math>      (c) <math>\frac{1}{3}</math>      (d) <math>\frac{1}{\sqrt{3}}</math></p>	
<b>Ans.</b> (b) $\frac{\sqrt{5}}{3}$	1
<p><b>17.</b> PA and PB are tangents to a circle with centre O. If <math>\angle AOB = 105^\circ</math> then <math>\angle OAP + \angle APB</math> is equal to :</p> <p>(a) <math>75^\circ</math>      (b) <math>175^\circ</math> (c) <math>180^\circ</math>      (d) <math>165^\circ</math></p>	
	
<b>Ans.</b> (d) $165^\circ$	1
<p><b>18.</b> In <math>\triangle ABC</math>, <math>PQ \parallel BC</math>. It is given that <math>AP = 2.4</math> cm, <math>PB = 3.6</math> cm and <math>BC = 5.4</math> cm. PQ is equal to :</p> <p>(a) 2.7 cm      (b) 1.8 cm (c) 3.6 cm      (d) 2.16 cm</p>	
	
<b>Ans.</b> (d) 2.16 cm	1

<p><b>Directions :</b>  <b>Question numbers 19 and 20 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :</b></p> <p>(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 <i>not</i> 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.</p>	
<p><b>19. Assertion (A) :</b> Median marks of students in a class test is 16. It means half of the class got marks less than 16.  <b>Reason (R) :</b> Median divides the distribution in two equal parts.</p>	
<b>Ans. (a)</b> Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	1
<p><b>20. Assertion (A) :</b> If E is an event such that <math>P(E) = \frac{1}{999}</math>,  then <math>P(\bar{E}) = 0.001</math>.  <b>Reason (R) :</b> <math>P(E) + P(\bar{E}) = 1</math></p>	
<b>Ans. (d)</b> Assertion (A) is false, but Reason (R) is true.	1
<p><b>SECTION B</b></p>	
<p><i>This section has 5 Very Short Answer (VSA) type questions of 2 marks each. <span style="float: right;">5×2=10</span></i></p>	
<p><b>21.</b> Show that <math>45^n</math> can not end with the digit 0, <math>n</math> being a natural number. Write the prime number 'a' which on multiplying with <math>45^n</math> makes the product end with the digit 0.</p>	
<p><b>Solution:</b> <math>45^n = (3 \times 3)^n \times 5^n</math>  To end with digit 0, <math>45^n</math> should have prime factors 2 and 5 both.  So it cannot end with digit 0.    <math>45^n</math> should be multiplied by 2 <math>\Rightarrow a = 2</math></p>	<p>1  <math>\frac{1}{2}</math>  <math>\frac{1}{2}</math></p>
<p><b>22.</b> Point P(x, 0) divides the line segment joining the points (2, 8) and (−3, −5) in a certain ratio. Find the ratio and hence find the value of x.</p>	

<p style="text-align: center;"> <math>\xrightarrow{k}</math>  <math>A(2,8) \quad \quad \quad P(x,0) \quad \quad \quad \xrightarrow{1} B(-3,-5)</math> </p> <p><b>Solution:</b> Let <math>AP : PB = k : 1</math> therefore <math>0 = \frac{-5k + 8}{k + 1} \Rightarrow k = \frac{8}{5}</math></p> <p style="text-align: center;">Hence required ratio is <math>8 : 5</math></p> <p style="text-align: center;"><math>x = \frac{-24 + 10}{13} = \frac{-14}{13}</math></p>	<p style="text-align: center;"><math>1\frac{1}{2}</math></p> <p style="text-align: center;"><math>\frac{1}{2}</math></p>
<p><b>23. (A)</b> A coin is dropped at random on the rectangular region shown in the figure. What is the probability that it will land inside the circle with radius 0.7 m ?</p> <div style="display: flex; align-items: center; justify-content: center;">  </div> <p style="text-align: center;"><b>OR</b></p> <p><b>(B)</b> A die is thrown twice. What is the probability that (i) difference between two numbers obtained is 3 ? (ii) sum of the numbers obtained is 8 ?</p>	
<p><b>Solution:</b> (A) Area of circle = <math>\frac{22}{7} \times \frac{7}{10} \times \frac{7}{10} = \frac{154}{100}</math> sq m</p> <p style="text-align: center;">Area of rectangle = 6 sq m</p> <p style="text-align: center;"><math>P(\text{coin lands inside the circle}) = \frac{154}{600}</math> or <math>\frac{77}{300}</math></p> <p style="text-align: center;"><b>OR</b></p> <p>(B) (i) <math>P(\text{difference between two numbers obtained is 3}) = \frac{6}{36}</math> or <math>\frac{1}{6}</math></p> <p style="text-align: center;">(ii) <math>P(\text{sum of numbers obtained is 8}) = \frac{5}{36}</math></p>	<p style="text-align: center;"><math>\frac{1}{2}</math></p> <p style="text-align: center;"><math>\frac{1}{2}</math></p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>
<p><b>24. (A)</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.</p> <p style="text-align: center;"><b>OR</b></p> <p><b>(B)</b> Prove that the tangents drawn at the ends of a diameter of a circle are parallel.</p>	

**Solution: (A)**



$$\angle OAP = \angle OBP = 90^\circ \quad (\text{tangent} \perp \text{radius})$$

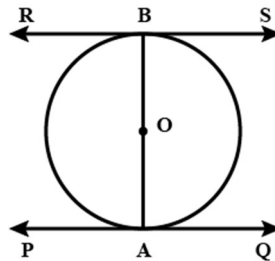
$$\angle APB + \angle PBO + \angle BOA + \angle OAP = 360^\circ$$

therefore  $\angle APB + \angle AOB = 180^\circ$

Hence,  $\angle AOB$  and  $\angle APB$  are supplementary

**OR**

**(B)**



Let AB be the diameter of the circle.

$$\text{therefore } \angle OAP = \angle OBR = 90^\circ \quad (\text{tangent} \perp \text{radius})$$

$$\Rightarrow \angle OAP + \angle OBR = 180^\circ$$

$\Rightarrow$  Co-interior angles are supplementary

$$\Rightarrow PQ \parallel RS$$

Hence tangents at the ends of a diameter of a circle are parallel.

Correct  
figure  $\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$

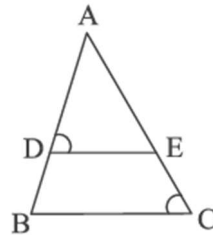
Correct figure  
 $\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$

- 25.** In the given figure  $\angle ADE = \angle ACB$  and  $\frac{AD}{DB} = \frac{AE}{EC}$ . Prove that  $\triangle ABC$  is an isosceles triangle.





<p><b>Solution:</b> Since <math>\frac{AD}{DB} = \frac{AE}{EC}</math> therefore <math>DE \parallel BC</math> (By converse of BPT)</p> <p><math>\Rightarrow \angle ADE = \angle ABC</math> (corresponding angles)</p> <p>given <math>\angle ADE = \angle ACB</math> therefore <math>\angle ABC = \angle ACB</math></p> <p><math>\Rightarrow AC = AB</math> or <math>\Delta ABC</math> is an isosceles triangle.</p>	$\frac{1}{2}$  $\frac{1}{2}$  $\frac{1}{2}$  $\frac{1}{2}$
<p><b>26. Find the zeroes of the polynomial <math>p(x) = 6x^2 + 13x - 5</math> and verify the relationship between its zeroes and the coefficients.</b></p>	
<p><b>Solution:</b> <math>p(x) = 6x^2 + 13x - 5 = (3x - 1)(2x + 5)</math></p> <p>Zeroes of <math>p(x)</math> are <math>\frac{1}{3}, \frac{-5}{2}</math></p> <p>Sum of zeroes = <math>\frac{1}{3} - \frac{5}{2} = \frac{-13}{6} = \frac{-\text{coefficient of } x}{\text{coefficient of } x^2}</math></p> <p>Product of zeroes = <math>\frac{1}{3} \times \frac{-5}{2} = \frac{-5}{6} = \frac{\text{constant term}}{\text{coefficient of } x^2}</math></p>	<p>1</p> <p>1</p> <p>1</p>
<p><b>27. (A) Find the sum of the A.P. <math>7, 10\frac{1}{2}, 14, \dots, 84</math>.</b></p> <p style="text-align: center;"><b>OR</b></p> <p><b>(B) If the sum of first <math>n</math> terms of an A.P. is given by <math>S_n = \frac{n}{2}(2n + 8)</math>. Then, find its first term and common difference. Hence, find its 15<sup>th</sup> term.</b></p>	
<p><b>Solution:</b> (A) <math>a = 7, d = \frac{21}{2} - 7 = \frac{7}{2}</math></p> <p><math>84 = 7 + (n - 1) \times \frac{7}{2} \Rightarrow n = 23</math></p> <p><math>S_{23} = \frac{23}{2}(7 + 84) = \frac{2093}{2}</math></p> <p style="text-align: center;"><b>OR</b></p> <p>(B) <math>S_1 = a = 5</math></p> <p><math>S_2 = 12</math></p> <p>Therefore, <math>d = 2</math></p> <p>Hence, <math>a_{15} = 33</math></p>	<p>1</p> <p>1</p> <p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>1</p> <p>1</p>

**28.** Prove that  $\sqrt{3}$  is an irrational number.

**Solution:** (a) Let us assume that  $\sqrt{3}$  is a rational number such that

$$\sqrt{3} = \frac{p}{q} \quad (\text{p, q are co-prime integers and } q \neq 0)$$

So  $\sqrt{3} q = p \Rightarrow 3q^2 = p^2$

$$3 \text{ divides } p^2 \Rightarrow 3 \text{ divides } p \text{ as well}$$

hence  $p$  is a multiple of 3  $\Rightarrow p = 3m$

$$\Rightarrow p^2 = 9m^2$$

$$3q^2 = 9m^2 \Rightarrow q^2 = 3m^2$$

$$3 \text{ divides } q^2 \Rightarrow 3 \text{ divides } q \text{ as well}$$

Hence,  $p$  and  $q$  have a common factor 3. This contradicts our assumption that they are co-prime.

$\therefore$  our assumption is wrong

So  $\sqrt{3}$  is an irrational number.

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

1

1

$$\frac{l}{2}$$

**29. (A)** If points  $A(-5, y)$ ,  $B(2, -2)$ ,  $C(8, 4)$  and  $D(x, 5)$  taken in order, form a parallelogram ABCD, then find the values of  $x$  and  $y$ . Hence, find lengths of sides of the parallelogram.

**OR**

**(B)** A(6, - 3), B(0, 5) and C(- 2, 1) are vertices of  $\triangle ABC$ . Points P(3, 1) and Q(2, - 1) lie on sides AB and AC respectively. Check whether

$$\frac{AP}{PB} = \frac{AQ}{QC}.$$

**Solution:** (A) ABCD is a parallelogram

$\therefore$  Coordinates of mid pt. of BD = Coordinates of mid pt. of AC

$$\left(\frac{2+x}{2}, \frac{-2+5}{2}\right) = \left(\frac{8-5}{2}, \frac{4+y}{2}\right)$$

Getting  $x = 1$  and  $y = -1$

$$AB = \sqrt{7^2 + (-1)^2} = \sqrt{50} \text{ or } 5\sqrt{2}$$

$$\text{BC} = \sqrt{6^2 + 6^2} = \sqrt{72} \text{ or } 6\sqrt{2}$$

**OR**

1

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

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

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



$\Rightarrow \angle 1 = \angle 8 \text{ (cpct)}$ <p>Similarly <math>\angle 4 = \angle 5</math>, <math>\angle 6 = \angle 7</math> and <math>\angle 2 = \angle 3</math></p> <p>Also <math>\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360^\circ</math></p> $\therefore \angle 1 + \angle 2 + \angle 5 + \angle 6 = 180^\circ$ $\angle AOB + \angle COD = 180^\circ$	<p>1</p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p>
<p style="text-align: center;"><b>SECTION – D</b></p> <p><b>Question Nos. 32 to 35 are long answer questions of 5 marks each.</b></p> <p><b>32. (A)</b> It is given that <math>p^2x^2 + (p^2 - q^2)x - q^2 = 0</math> ; (<math>p \neq 0</math>)</p> <p>(i) Show that the discriminant (D) of above equation is a perfect square.</p> <p>(ii) Find the roots of the equation.</p> <p style="text-align: center;"><b>OR</b></p> <p><b>(B)</b> Three consecutive positive integers are such that the sum of the square of smallest and product of other two is 67. Find the numbers, using quadratic equation.</p>	
<p><b>Solution:</b> (A) (i) Discriminant <math>= (p^2 - q^2)^2 + 4p^2q^2</math></p> $= (p^2 + q^2)^2$ <p>(ii) <math>x = \frac{-(p^2 - q^2) \pm \sqrt{(p^2 + q^2)^2}}{2p^2}</math></p> $= \frac{q^2}{p^2}, -1$ <p style="text-align: center;"><b>OR</b></p> <p>(B) Let the three consecutive positive integers be <math>x</math>, <math>x + 1</math> and <math>x + 2</math></p> <p>A.T.Q. <math>x^2 + (x + 1)(x + 2) = 67</math></p> $\Rightarrow 2x^2 + 3x - 65 = 0$ $\Rightarrow (2x + 13)(x - 5) = 0$ $\Rightarrow x = 5,$ $x = \frac{-13}{2} \text{ (rejected)}$ <p>So the three consecutive positive integers are 5, 6 and 7</p>	<p>1</p> <p>1</p> <p>1</p> <p>1+1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

33. Find 'mean' and 'mode' of the following data :

Class	15-20	20-25	25-30	30-35	35-40	40-45
Frequency	6	16	17	4	5	2

**Solution:**

Class	$x_i$	$f_i$	$u_i = \frac{x - 27.5}{5}$	$f_i u_i$
15 – 20	17.5	6	– 2	– 12
20 – 25	22.5	16	– 1	– 16
25 – 30	27.5	17	0	0
30 – 35	32.5	4	1	4
35 – 40	37.5	5	2	10
40 – 45	42.5	2	3	6
		$\sum f_i = 50$		$\sum f_i u_i = -8$

$$\begin{aligned}\text{Mean} &= 27.5 - \left( \frac{8}{50} \times 5 \right) \\ &= 26.7\end{aligned}$$

Modal class is 25 – 30

$$\begin{aligned}\text{Mode} &= 25 + 5 \times \frac{17 - 16}{34 - 16 - 4} \\ &= 25.36\end{aligned}$$

Correct  
table

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

$$1$$

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

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

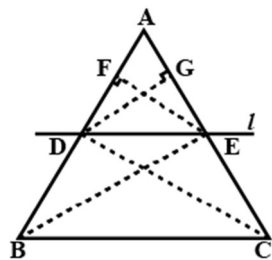
$$1 \frac{1}{2}$$

34. (A) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

**OR**

(B) In a  $\Delta ABC$ , P and Q are points on AB and AC respectively such that  $PQ \parallel BC$ . Prove that the median AD, drawn from A to BC, bisects PQ.

**Solution: (A)**



Given: In  $\triangle ABC$ ,  $DE \parallel BC$

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

Construction: Join BE, DC, Draw  $DG \perp AC$  and  $EF \perp AB$

$$\text{Proof : } \frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle BDE)} = \frac{\frac{1}{2} \times AD \times EF}{\frac{1}{2} \times DB \times EF} \Rightarrow \frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle BDE)} = \frac{AD}{DB} \quad \dots\dots\dots(i)$$

$$\text{and } \frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle CED)} = \frac{\frac{1}{2} \times AE \times DG}{\frac{1}{2} \times EC \times DG} \Rightarrow \frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle CED)} = \frac{AE}{EC} \quad \dots\dots\dots(ii)$$

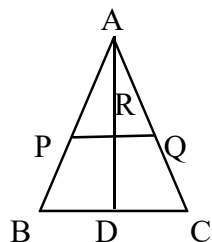
As  $\triangle BDE$  and  $\triangle CED$  are on the same base DE and between the same parallels DE and BC.

$$\therefore \text{ar}(\triangle BDE) = \text{ar}(\triangle CED) \quad \dots\dots\dots(iii)$$

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

**OR**

**(B)**



Given  $PQ \parallel BC \Rightarrow PR \parallel BD$

Therefore in  $\triangle ARP$  and  $\triangle ADB$ ,  $\angle PAR = \angle BAD$

and  $\angle APR = \angle ABD$

$\therefore \triangle ARP \sim \triangle ADB$  (By AA similarity criterion)

$$\Rightarrow \frac{AR}{AD} = \frac{PR}{BD} \quad \dots\dots\dots(i)$$

Similarly  $\triangle ARQ \sim \triangle ADC$

$$\Rightarrow \frac{AR}{AD} = \frac{RQ}{DC} \quad \dots\dots\dots(ii)$$

Correct figure  $\frac{1}{2}$

1

1

1

1

$\frac{1}{2}$

Correct figure  $\frac{1}{2}$

1

$\frac{1}{2}$

1

Using (i) and (ii)	$\frac{PR}{BD} = \frac{RQ}{DC}$	$\frac{1}{2}$
AD is the median $\therefore BD = DC \Rightarrow PR = RQ$		1
i.e. AD bisects PQ		$\frac{1}{2}$

35. From a point on the ground, the angle of elevation of the top of a pedestal is  $30^\circ$  and that of the top of the flagstaff fixed on the pedestal is  $60^\circ$ . If the length of the flagstaff is 5 m, then find the height of the pedestal and its distance from the point of observation on ground. (Use  $\sqrt{3} = 1.73$ )

**Solution:**

Let AB be the pedestal of height  $h$  and distance from the point of observation on ground be  $x$ .

In  $\Delta ABC$ ,  $\tan 30^\circ = \frac{h}{x} \Rightarrow x = h\sqrt{3}$  .....(i)

In  $\Delta DBC$ ,  $\tan 60^\circ = \frac{h + 5}{x} \Rightarrow h + 5 = x\sqrt{3}$  .....(ii)

Using (i) & (ii)  $h = 2.5$  and  $x = 4.33$

$\therefore$  The height of the pedestal is 2.5 m and its distance from the point of observation is 4.33m.

Correct figure 1

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

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

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

**SECTION – E**

**Question Nos. 36 to 38 are case-based questions of 4 marks each.**

36. A telecommunication company came up with two plans– plan A and plan B for its customers.

The plans are represented by linear equations where ‘ $t$ ’ represents the time (in minutes) bought and ‘ $C$ ’ represents the cost. The equations are :



Plan A :  $3C = 20t$

Plan B :  $3C = 10t + 300$

Based on above information, answer the following questions :

- (i) If you purchase plan B, how much initial amount you have to pay ?
- (ii) Charu purchased plan A. How many minutes she bought for ₹ 250 ?
- (iii) (a) At how many minutes, do both the plans charge the same amount? What is that amount?

**OR**

- (iii) (b) Which plan is better if you want to buy 60 minutes? Give reason for your answer.

**Solution:** (i) At  $t = 0$ ,  $3C = 300 \Rightarrow C = 100$

₹100 have to be paid initially.

(ii)  $3 \times 250 = 20t \Rightarrow t = 37.5$  minutes

(iii) (a)  $20t = 10t + 300 \Rightarrow t = 30$

Both plans charge same amount if a person buys 30 minutes.

$$\text{Amount} = \frac{20 \times 30}{3} = ₹ 200$$

**OR**

(iii) (b) At  $t = 60$ , cost under plan A = ₹ 400

At  $t = 60$ , cost under plan B = ₹ 300

Plan B is better as ₹ 100 are saved.

1

1

1

1

$\frac{1}{2}$

$\frac{1}{2}$

1



37. Playing in a ball pool is good entertainment for kids. Suhana bought 600 new balls of diameter 7 cm to fill in the pool for her kids. The cuboidal box containing 600 balls has dimensions  $42 \text{ cm} \times 91 \text{ cm} \times 50 \text{ cm}$  ( $l \times b \times h$ ).



Based on above information, answer the following questions :

- (i) Find the volume of one ball.
- (ii) 10 balls are painted with neon colours. Determine the area of painted surface.
- (iii) (a) Find the volume of empty space in the box.

**OR**

- (iii) (b) The lowermost layer of the balls covers the base of the box edge to edge when balls are placed evenly adjacent to each other.  
(A) How much area is covered by one ball? (B) How many balls are there in lowermost layer?

**Solution:** (i) Volume of one ball =  $\frac{4}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times \frac{7}{2} = \frac{539}{3}$  or 179.67 cu. cm

(ii) Area of painted surface =  $10 \times 4 \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = 1540$  sq. cm

(iii) (a) Volume of box =  $42 \times 91 \times 50 = 191100$  cu. cm

Volume of 600 balls =  $600 \times \frac{539}{3} = 107800$  cu. cm

Volume of empty space =  $191100 - 107800 = 83300$  cu. cm

**OR**

(iii) (b) (A) Area covered by one ball =  $7 \times 7 = 49$  sq. cm

(B) Number of balls in lowermost layer = 78

It is decided that Rahim will fence the triangular plot ABC and Nadeem will fence along the sides AF, FE and BE.

Observe the diagram carefully and answer the following questions :

- (i) Find length BC.
- (ii) Find length AG.
- (iii) (a) Calculate perimeter of  $\triangle ABC$ .

$BH = 40\text{m}$   
 $HD = 10\text{m}$   
 $DG = 40\text{m}$   
 $GF = 38\text{m}$   
 $FE = 53\text{m}$   
 $AF = 53.58\text{m}$

**OR**

(iii) (b) Calculate length of  $(AF + FE + EB)$ .

**Solution:** (i)  $\cos 45^\circ = \frac{50}{BC} \Rightarrow BC = 50 \times 1.41 = 70.5 \text{ m}$

1

$$(ii) \quad \tan 45^\circ = \frac{38}{AG} \Rightarrow AG = 38 \text{ m}$$

1

$$\text{(iii) (a) } \sin 60^\circ = \frac{78}{AC} \Rightarrow AC = 89.96 \text{ m}$$

1

$$\text{Perimeter of } \triangle ABC = 70.5 + 89.96 + 38 + 50 + 40 = 288.46 \text{ m}$$

1

**OR**

$$(b) \quad \cos 30^\circ = \frac{40}{BE} \Rightarrow BE = 46.13 \text{ m}$$

1

$$AF + FE + EB = 53.58 + 53 + 46.13 = 152.71 \text{ m}$$

1