COMPETENCY FOCUSED PRACTICE QUESTIONS

ICSE – CLASS X

MATHEMATICS

PREFACE

With a growing emphasis on competency-based education globally, the educational landscape in India has also steered towards high-quality learning experiences that allow learners to incorporate critical thinking and problem-solving approaches. This approach goes beyond rote memorisation and focuses on developing the skills and knowledge that students need to apply in their real-world scenarios.

The Council for the Indian School Certificate Examinations (CISCE), as a national-level progressive examination board, has taken several steps to infuse competency-based education in CISCE schools through teacher capacity-building on item development for competency-based assessments and the incorporation of competency-focused questions at the ICSE and ISC levels from the examination year 2024.

To further facilitate the adoption of competency-based assessment practices in schools and to support teachers and students towards the preparation for attempting higher-order thinking questions in future board examinations, Item Banks of **Competency-Focused Practice Questions** for selected subjects at the ICSE and ISC levels have been developed. This Item Bank consists of a rich variety of questions, both objective and subjective in categories, aimed at enhancing the subject-specific critical and analytical thinking skills of the students.

In this Item Bank, each question is accompanied by the topic and cognitive learning domain/s that it intends to capture. The cognitive domains reflected in these questions include understanding, analysis, application, evaluation and creativity, along with some questions of the higher-order recall domain. The Answer Key at the end presents the possible answers to a given question, but it is neither limiting nor exhaustive.

These practice questions are also meant to serve as teacher resources for classroom assignments and as samplers to develop their own repository of competency-focused questions. Apart from offering a good practice of higher-order thinking skills, engaging with these questions would allow students to gauge their own subject competencies and use these *assessments for learning* to develop individual learning pathways.

During the development of this Item Bank, a large pool of questions was prepared by a team of experienced CISCE teachers. The questions that were finalised by the internal and external reviewers as being higher-order competency-focused questions have been collated in this item bank.

I acknowledge and appreciate all the ICSE and the ISC subject matter experts who have contributed to the development and review of these high-quality competency-focused questions for CISCE students.

We are hopeful that teachers and students will utilise these questions to support their teaching-learning processes.

August 2024   **Dr. Joseph Emmanuel**
                                                   Chief Executive & Secretary
                                                   CISCE

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COMPETENCY-FOCUSED PRACTICE QUESTIONS

ICSE – CLASS X

Mathematics

I: Multiple Choice Questions Type (1 Mark Each)

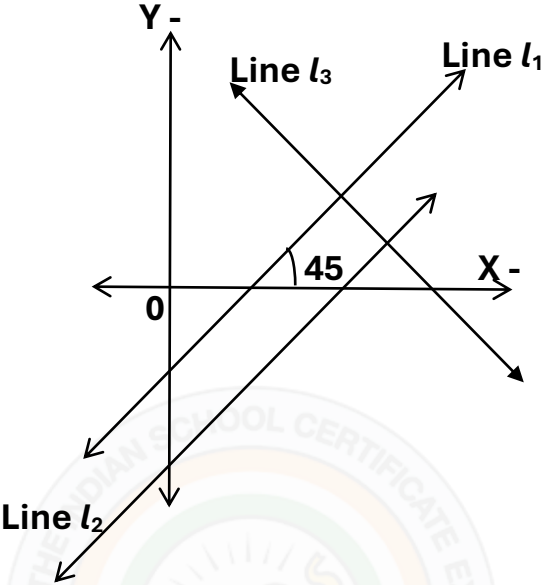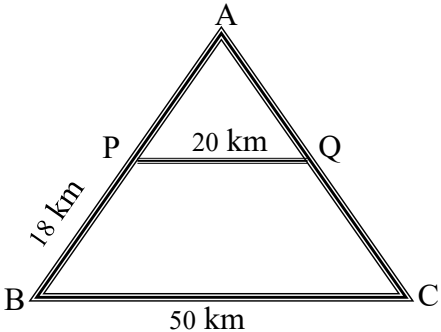| S.No.	Questions
1.	*[Commercial Mathematics]* A retailer buys an article at its listed price from a wholesaler and sells it to a consumer in the same state after marking up the price by 20%. The list price of the article is ₹ 2500, and the rate of GST is 12%. What is the tax liability of the retailer to the central government? (a) ₹0 (b) ₹15 (c) ₹30 (d) ₹60 **[Analysis & Evaluate]**
2.	*[Commercial Mathematics]* Dev bought an electrical fan which has a marked price of ₹800. If the GST on the goods is 7%, then the SGST is: (a) ₹ 24 (b) ₹ 28 (c) ₹ 56 (d) ₹ 80 **[Evaluate]**
3.	*[Commercial Mathematics]* ₹ P is deposited for n number of months in a recurring deposit account which pays interest at the rate of r % per annum. The nature and time of interest calculated is: (a) compound interest for n number of months. (b) simple interest for n number of months. (c) compound interest for one month. (d) simple interest for one month. **[Understanding & Application]**

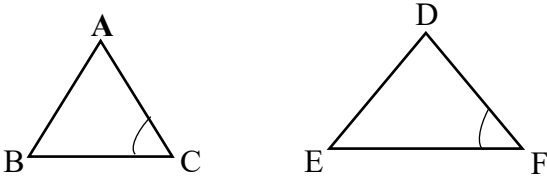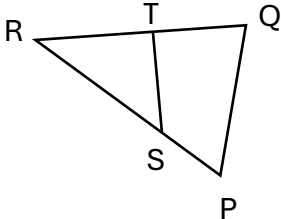| S.No.	Questions
4.	*[Commercial Mathematics]* Anwesha intended to open a Recurring Deposit account of ₹1000 per month for 1 year in a Bank, paying a 5% per annum rate of simple interest. The bank reduced the rate to 4% per annum. How much must Anwesha deposit monthly for 1 year so that her interest remains the same? (a) ₹12325 (b) ₹1250 (c) ₹1200 (d) ₹1000 **[Analysis & Evaluate]**
5.	*[Commercial Mathematics]* Mr. Das invests in ₹100, 12% shares of Company A available at ₹60 each. Mr. Singh invests in ₹50, 16 % shares of Company B available at ₹40 each. Use this information to state which of the following statements is *true*. (a) The rate of return for Mr. Das is 12% (b) The rate of return for Mr. Singh is 10% (c) Both Mr. Das and Mr. Singh have the same rate of return of 10% (d) Both Mr. Das and Mr. Singh have the same rate of return of 20% **[Application & Evaluate]**
6.	*[Commercial Mathematics]* Amit invested a certain sum of money in ₹100 shares, paying a 7.5% dividend. The rate of return on his investment is 10%. The money invested by Amit to purchase 10 shares is: (a) ₹ 250 (b) ₹ 750 (c) ₹ 900 (d) ₹ 1100 **[Application & Evaluate]**
7.	*[Algebra]* If $-3 \leq -4x+5$ and $x \, \varepsilon \, W$, then the solution set is: (a) { ….-3,-2,-1,0,1,2,3…} (b) { 1, 2 } (c) { 0,1,2} (d) { 2, 3 4,5} **[Understanding & Application]**
8.	*[Algebra]* If $-4x > 8y$, then (a) $x > 2y$ (b) $x > -2y$ (c) $x < -2y$ (d) $x < 2y$ **[Understanding & Application]**

S.No.	Questions
9.	*[Algebra]* The value/s of 'k' for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is(are): (a) 0 only (b) 4,0 (c) 8 only (d) 0,8 **[Understanding & Application]**
10.	*[Algebra]* If x = -2 is one of the solutions of the quadratic equation $x^2 + 3a\text{-}x = 0$, then the value of 'a' is: (a) -8 (b) -2 (c) -1/3 (d) 1/3 **[Understanding & Application]**
11.	*[Algebra]* In solving a quadratic equation, one of the values of the variable x is 233.356. The solution rounded to two significant figures is: (a) 233.36 (b) 233.35 (c) 233.3 (d) 230 **[Understanding & Application]**
12.	*[Algebra]* In the adjoining diagram, AB = x cm, BC=y cm and $x - y$ = 7 cm. Area of ΔABC = 30 cm^2. The length of AC is: (a) 10 cm (b) 12 cm (c) 13 cm (d) 15 cm **[Analysis & Evaluate]**
13.	*[Algebra]* If p, q, and r are in continued proportion, then: (a) p : q = p: r (b) q : r = $p^2 : q^2$ (c) p : q^2 = r : p^2 (d) p : r = p^2: q^2 **[Understanding & Application]**

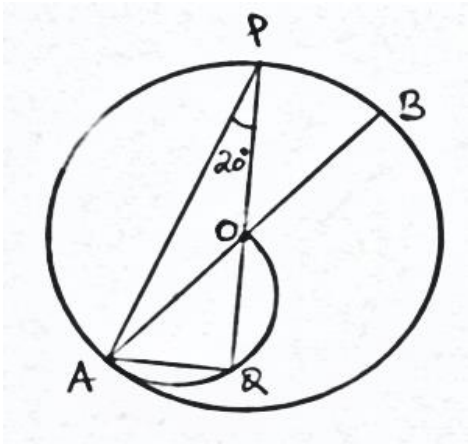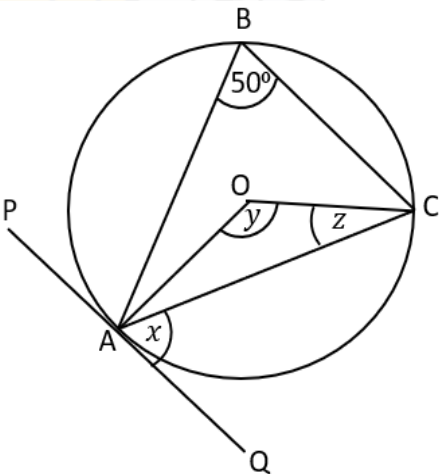| S.No.	Questions
14.	*[Mensuration]* The ratio of diameter to height of a Borosil cylindrical glass is 3:5. If the actual diameter of the glass is 6cm, then the curved surface area of the glass is: (a) 120π (b) 60π (c) 30π (d) 18π **[Analysis & Evaluate]**
15.	*[Algebra]* If the polynomial $2\,x^3 + 3\,x^2 - 2x - 3$ is completely divisible by $(2x + a)$, and the quotient is equal to $(x^2 - 1)$, then one of the values of a is: (a) -3 (b) -1 (c) 1 (d) 3 **[Analysis]**
16.	*[Algebra]* A polynomial in x is $x^3 + 5x^2 - kx$ -24. Which of the following is a factor of the given polynomial so that the value of k is 2? (a) $(x + 2)$ (b) $(x - 3)$ (c) $(x + 4)$ (d) $(x - 4)$ **[Analysis & Evaluate]**
17.	*[Algebra]* If $A = \begin{bmatrix} a & b \end{bmatrix}$ and $B = \begin{bmatrix} c \\ d \end{bmatrix}$, then: (a) only matrix AB is possible. (b) only matrix BA is possible. (c) both matrices AB and BA are possible. (d) both matrices AB and BA are possible, AB = BA. **[Understanding & Application]**
18.	*[Algebra]* Matrix $A = \begin{bmatrix} 6 & 9 \\ -4 & k \end{bmatrix}$ such that $A^2 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$. Then k is: (a) 6 (b) -6 (c) 36 (d) ± 6 **[Analysis & Evaluate]**

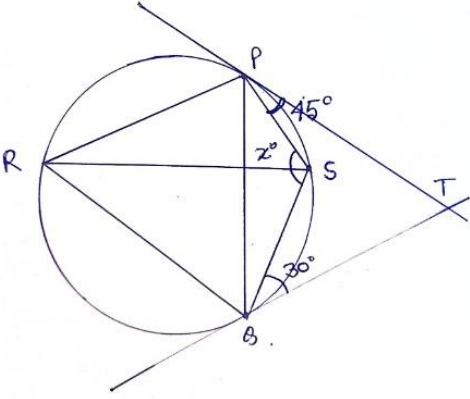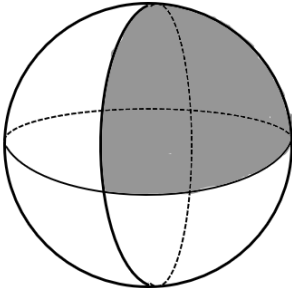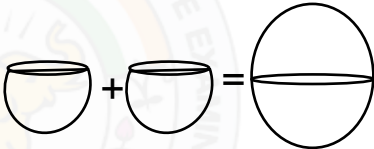| S.No.	Questions
19.	*[Algebra]* If the sum of n terms of an arithmetic progression $S_n = n^2 - n$, then the third term of the series is: (a) 2 (b) 4 (c) 6 (d) 9 **[Understanding & Application]**
20.	*[Algebra]* Which of the following is **NOT** a geometric progression? (a) 1/3, 1, 3, 9 (b) 1/5, 1/5,1/5,1/5 (c) -2, 4, -8, 16 (d) 2,0,4,0,8,0 **[Understanding]**
21.	*[Algebra]* In the adjoining diagram, G is the centroid of ∆ABC. A (3,-3), B (2,-6), C *(x, y)* and G (5,-5). The coordinates of point D are: (a) (2,- 6) (b) (3,- 6) (c) (6,- 6) (d) (10,- 6) **[Analysis & Application]**
22.	*[Algebra]* In the given diagram, O is the origin, and P is the midpoint of AB. The equation of OP is: (a) $y = x$ (b) $2y = x$ (c) $y = 2x$ (d) $y = -x$ **[Analysis & Application]**

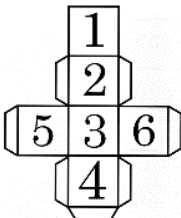| S.No.	Questions
23.	*[Algebra]* In the given figure Line l_1 is a parallel to Line l_2. If line l_3 is perpendicular to Line l_1, then the slopes of lines l_2 and l_3 respectively are: (a) 1, 1 (b) -1, -1 (c) 1, -1 (d) -1, 1 **[Analysis & Application]**
24.	*[Algebra]* Which of the following lines cut the positive *x*-axis and positive *y*-axis at equal distances from the origin? (a) $3x+3y=6$ (b) $5x +10y = 10$ (c) $-x + y = 1$ (d) $10x +5y = 5$ **[Understanding & Application]**
25.	*[Geometry]* In the given diagram (not drawn to scale), railway stations A, B, C, P and Q are connected by straight tracks. Track PQ is parallel to BC. The time taken by a train travelling at 90km/hr to reach B from A by the shortest route is: (a) 8 minutes (b) 12 minutes (c) 16.8 minutes (d) 20 minutes **[Analysis & Application]**

S.No.	Questions
26.	*[Geometry]* In the given diagram, Δ ABC and ΔDEF (not drawn to scale) are such that $\angle C = \angle$ F and $\frac{AB}{DE} = \frac{BC}{EF}$, then (a) Δ ABC ~ Δ DEF (b) Δ BCA ~ Δ DEF (c) Δ CAB ~ Δ DEF (d) the similarity of given triangles cannot be determined. **[Analysis]**
27.	*[Geometry]* In the adjoining diagram, ST is not parallel to PQ. The necessary and sufficient conditions for ΔPQR ~ΔTSR is: (a) $\angle$PQR=$\angle$STR (b) $\angle$QPR=$\angle$TSR (c) $\angle$PQR=$\angle$TSR (d) $\angle$PRQ=$\angle$RST **[Understanding & Application]**
28.	*[Geometry]* The scale factor of a picture and the actual height of Sonia is 20cm: 1.6m. If her height in the picture is 18cm, then her actual height is: (a) 14.4m (b) 2.25m (c) 1.78m (d) 1.44m **[Analysis & Application]**

S.No.	Questions
29.	*[Geometry]* In the adjoining figure, O is the centre of the circle, and a semicircle is drawn on OA as the diameter. ∠APQ=20°.The degree measure of ∠OAQ is: (a) 25° (b) 40° (c) 50° (d) 65° **[Analysis & Application]**
30.	*[Geometry]* In the given diagram, O is the centre of the circle, and DE is a tangent at B. If ∠ABC=50°, then values of *x,y* and *z* respectively are: (a) $50^0, 100^0,\ 40^0$ (b) $50^0, 50^0, 65^0$ (c) $40^0, 80^0, 50^0$ (d) $50^0, 25^0, 78^0$ **[Analysis & Evaluation]**

S.No.	Questions
31.	*[Geometry]* In the given figure, PT and QT are tangents to a circle such that $\angle TPS = 45^0$ and $\angle TQS = 30^0$. Then, the value of *x* is: (a) 30^0 (b) 45^0 (c) 75^0 (d) 105^0 **[Analysis & Evaluation]**
32.	*[Mensuration]* A cylindrical metallic wire is stretched to double its length. Which of the following will **NOT** change for the wire after stretching? (a) Its curved surface area. (b) Its total surface area. (c) Its volume. (d) Its radius. **[Understanding]**
33.	*[Mensuration]* A right circular cone has the radius of the base equal to the height of the cone. If the volume of the cone is 9702 cu. cm, then the diameter of the base of the cone is: (a) 21cm (b) 42cm (c) $21\sqrt{7}$ cm (d) $2\sqrt{7}$ cm. *[Use $\pi = 22/7$]* **[Understanding & Application]**

S.No.	Questions
34.	*[Mensuration]* A solid sphere with a radius of 4cm is cut into 4 identical pieces by two mutually perpendicular planes passing through its centre. Find the total surface area of one-quarter piece. (a) 24π (b) 32π (c) 48π (d) 64π **[Understanding & Application]**
35.	*[Mensuration]* Two identical solid hemispheres are kept in contact to form a sphere. The ratio of the total surface areas of the two hemispheres to the surface area of the sphere formed is: (a) 1 : 1 (b) 3 : 2 (c) 2 : 3 (d) 2 : 1 **[Analysis & Application]**
36.	*[Trigonometry]* $cosec^2\theta + sec^2\theta$ is equal to: (a) $tan^2\theta + cot^2\theta$ (b) $cot\theta + tan\theta$ (c) $(cot\theta + tan\theta)^2$ (d) 1 **[Application]**
37.	*[Trigonometry]* Given $a = 3\,sec^2\theta$ and $b = 3\,tan^2\theta - 2$. The value of *(a – b)* is: (a) 1 (b) 2 (c) 3 (d) 5 **[Application]**

S.No.	Questions
38.	*[Trigonometry]* At a certain time of day, the ratio of the height of the pole to the length of its shadow is 1 : $\sqrt{3}$, then the angle of elevation of the sun at that time of the day is: (a) 30° (b) 45° (c) 60° (d) 90° **[Understanding & Application]**
39.	*[Trigonometry]* A man standing on a ship approaching the port towards the lighthouse is observing the top of the lighthouse. In 10 minutes, the angle of elevation of the top of the lighthouse changes from α to β. Then: (a) $\alpha > \beta$ (b) $\alpha < \beta$ (c) $\alpha = \beta$ (d) $\alpha \leq \beta$ **[Analysis & Evaluation]**
40.	*[Statistics]* **Assertion (A):** The difference in class marks of the modal class and the median class of the following frequency distribution table is 0. <table><tr><td>**Class interval**</td><td>20 – 30</td><td>30 – 40</td><td>40 – 50</td><td>50 – 60</td><td>60 -70</td></tr><tr><td>**Frequency**</td><td>1</td><td>3</td><td>2</td><td>6</td><td>4</td></tr></table> **Reason (R):** Modal class and median class are always the same for a given frequency distribution. (a) Both A and R are correct, and R is the correct explanation for A. (b) Both A and R are correct, and R is not the correct explanation for A. (c) A is true, but R is false. (d) Both A and R are true. **[Analysis]**
41.	*[Statistics]* **Assertion(A):** For a collection of 11 arrayed data, the median is the middle number. **Reason (R):** For the data 5, 9,7, 13,10,11,10, the median is 13. (a) Both A and R are correct, and R is the correct explanation for A. (b) Both A and R are correct, and R is not the correct explanation for A. (c) A is true, but R is false. (d) Both A and R are true. **[Analysis]**

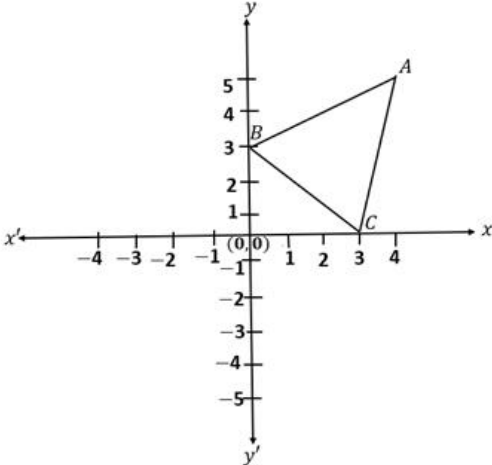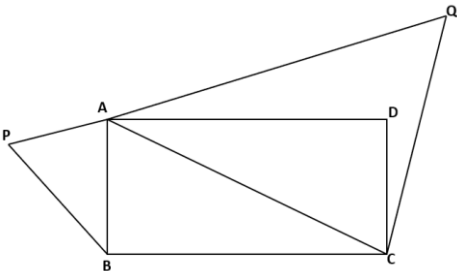| S.No.	Questions
42.	*[Commercial Mathematics]* Ankit had the option of investing in company A, where 7%, ₹ 100 shares are available at ₹ 120 or in company B, where 8%, ₹ 1000 shares are available at ₹ 1620. **Assertion (A):** Investment in Company A is better than Company B. **Reason (R):** The rate of income in Company A is better than in Company B. (a) Both A and R are true, and R is the correct explanation. (b) Both A and R are true, but R is not the correct explanation. (c) A is false, but R is true. (d) Both A & R are false. **[Analysis]**
43.	*[Algebra]* **Assertion (A):** $x^3 + 2x^2 - x - 2$ is a polynomial of degree 3. **Reason (R):** $x + 2$ is a factor of the polynomial. (a) Both A and R are correct, and R is the correct explanation for A. (b) Both A and R are correct, and R is not the correct explanation for A. (c) A is true, but R is false. (d) Both A and R are true. **[Analysis]**
44.	*[Algebra]* **Assertion(A):** The point (-2, 8) is invariant under reflection in line x = - 2. **Reason (R):** If a point has its *x*-coordinate 0, it is invariant under reflection in both axes. (a) Both A and R are correct, and R is the correct explanation for A. (b) Both A and R are correct, and R is not the correct explanation for A. (c) A is true, but R is false. (d) Both A and R are true. **[Analysis]**
45.	*[Algebra]* When a die is cast with numbering on its faces, as shown, the ratio of the probability of getting a composite number to the probability of getting a prime number is _____. (a) 2:3 (b) 3:2 (c) 1:3 (d) 1:2 **[Analysis]**

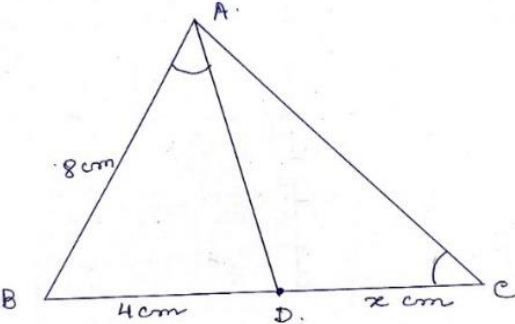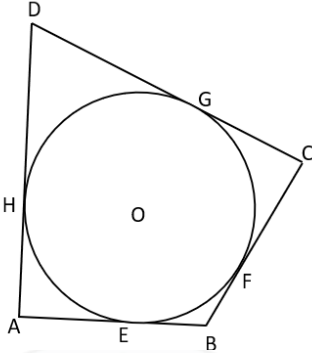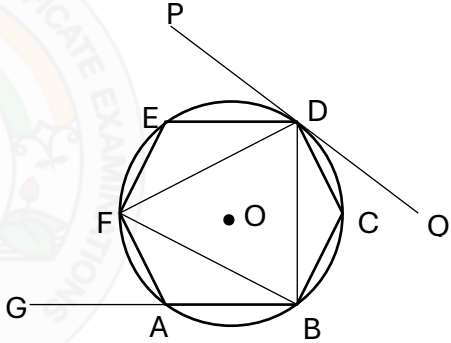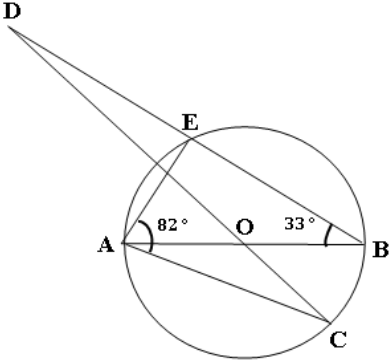| S.No.	Questions
46.	*[Algebra]* The product of $A = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$ and matrix M, AM = B where $B = \begin{bmatrix} 2 \\ 24 \end{bmatrix}$, then the order of matrix M is _____. (a) 2x2 (b) 2x1 (c) 1x2 (d) 4x1 **[Understanding & Application]**
47.	*[Algebra]* Given, $a_1, a_2, a_3, \ldots$ and $b_1, b_2, b_3, \ldots$ are real numbers such that $a_1 - b_1 = a_2 - b_2 = a_3 - b_3 = \cdots \ldots$ are all equal. $a_1 - b_1, a_2 - b_2, a_3 - b_3 \ldots$ forms a _____ progression. (a) Geometric (r=1) (b) Arithmetic (d=1) (c) Geometric (r<1) (d) Arithmetic (d=0) **[Analysis & Application]**
48.	*[Geometry]* Locus of a moving point is _____ if it moves such that it keeps a fixed distance from a fixed point. (a) Circle (b) Line (c) Angle (d) Line segment **[Recall & Understanding]**
49.	*[Geometry]* The point of concurrence of the angle bisectors of a triangle is called the _____ of the triangle. (a) centroid (b) incentre (c) circumcentre (d) orthocentre **[Recall & Understanding]**

II. Short Answer Questions - 1 (3 Marks)

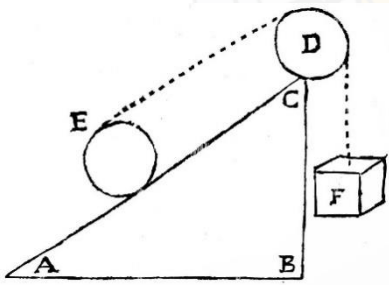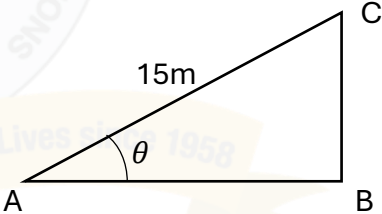| S.No.	Questions
50.	*[Commercial Mathematics]* A shopkeeper marked a pressure cooker at ₹1800.The rate of GST on pressure cooker is 12%. The customer has only ₹1792 with him and he requests the shopkeeper to reduce the price so that he can buy the cooker in ₹1792. What percent discount must the shopkeeper give? **[Application & Evaluation]**
51.	*[Commercial Mathematics]* A man opened a recurring deposit account in a branch of PNB. The man deposits certain amount of money per month such that after 2 years , the interest accumulated is equal to his monthly deposits. Find the rate of interest per annum that the bank was paying for the recurring deposit account. **[Application & Evaluation]**
52.	*[Commercial Mathematics]* Akshay buys 350 shares of ₹50 par value of a company. The dividend declared by the company is 14%. If his return percent from the shares is 10%, find the market value of each share. **[Application & Evaluation]**
53.	*[Algebra]* Solve the following inequation and answer the questions given below. $\frac{1}{2}(2x-1) \leq 2x + \frac{1}{2} \leq 5\frac{1}{2} + x$ (a) Write the maximum and minimum values of x for $x \in$ R. (b) What will be the change in maximum and minimum values of x if $x \in$ W. **[Evaluate & Analysis]**
54.	*[Algebra]* Solve for x, if $\frac{5}{x} + 4\sqrt{3} = \frac{2\sqrt{3}}{x^2}$, $x \neq 0$ **[Application & Evaluate]**
55.	*[Algebra]* The marked price of a toy is same as the percentage of GST that is charged. The price of the toy is ₹ 24 including GST. Taking the marked price as x, form an equation and solve it to find x. **[Application & Evaluate]**
56.	*[Algebra]* The mean proportion between two numbers is 6 and their third proportion is 48. Find the two numbers. **[Application & Evaluate]**

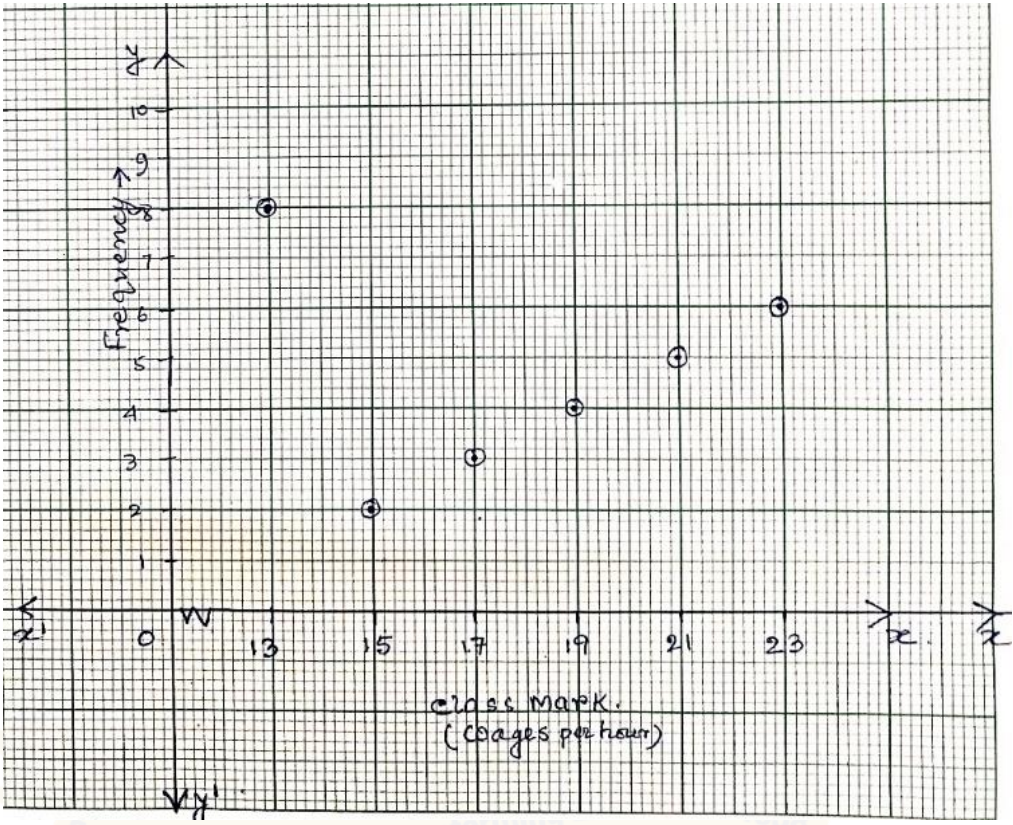| S.No.	Questions
57.	*[Algebra]* Pamela factorized the following polynomial: $$2x^3 + 3x^2 - 3x - 2$$ She found the result as (x+2)(x-1)(x-2). Using remainder and factor theorem, verify whether her result is *correct*. If incorrect, give the correct result. **[Analysis & Application]**
58.	*[Algebra]* $A = \begin{bmatrix} -6 & 0 \\ 4 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 1 & 3 \end{bmatrix}$. Find matrix M, if M = $\frac{1}{2}$A -2B + 5*l*, where *l* is the identity matrix. **[Application & Evaluate]**
59.	*[Algebra]* (a) Write the nth term (T_n) of an Arithmetic Progression (A.P.) consisting of all whole numbers which are divisible by 3 and 7. (b) How many of these are two-digit numbers? Write them. (c) Find the sum of first 10 terms of this A.P. **[Application & Evaluate]**
60.	*[Algebra]* Write the first five terms of the sequence given by $\left(\sqrt{3}\right)^n$, $n \in$ N. (a) Is the sequence an A.P. or G.P? (b) If the sum of its first ten terms is $p(3+\sqrt{3})$, find the value of *p*. **[Application & Evaluate]**

S.No.	Questions
61.	*[Algebra]* ABC is a triangle as shown in the figure below. (a) Write down the coordinates of A, B, and C on reflecting through the origin. (b) Write down the coordinates of the point/s which remain invariant on reflecting the triangle ABC on the *x*-axis and *y*-axis respectively. **[Analysis & Evaluate]**
62.	*[Algebra]* Determine the ratio in which the line $y = 2 + 3x$ divides the line segment AB joining the points A (-3, 9) and B (4 , 2). **[Understanding & Application]**
63.	*[Algebra]* Square ABCD lies in the third quadrant of a XY plane such that its vertex A is at (-3,-1) and the diagonal DB produced is equally inclined to both the axes.The diagonals AC and BD meets at P (-2,-2). Find the: (a) slope of BD (b) equation of AC **[Analysis, Create & Evaluate]**
64.	*[Geometry]* ABCD is a rectangle where side BC is twice side AB. If ΔACQ~ΔBAP, find area of ΔBAP: area of ΔACQ. **[Analysis & Evaluate]**

S.No.	Questions
65.	*[Geometry]* Given a triangle ABC, and D is a point on BC such that BD = 4cm and DC = x cm. If ∠BAD = ∠C, and AB = 8cm, then, (a) prove that triangle ABD is similar to triangle CBA. (b) find the value of 'x'. **[Understanding, Application & Evaluate]**
66.	*[Geometry]* In the extract of Survey of India map G43S7, prepared on a scale of 2cm to 1 km, a child finds the length of the cart track between two settlements is 7.6 cm. Find: (a) the actual length of the cart track on the ground. (b) actual area of a grid square, if each has an area of 4 cm^2. **[Understanding & Evaluate]**

67.	*[Geometry]*
	
	 Construct a triangle ABC such that AB = 7cm, BC = 6cm and CA = 5cm. (use ruler and compass to do so).
	
	 (a) Draw the locus of the points such that
	    (i) it is equidistant from BC and BA.
	    (ii) it is equidistant from points A and B.
	 (b) Mark P where the loci (i) and (ii) meet, measure and write length of PA.
	
	 [Analysis & Create]

S.No.	Questions
68.	*[Geometry]* In the given figure O is the centre of the circle. ABCD is a quadrilateral where sides AB, BC, CD and DA touch the circle at E, F, G and H respectively. If AB = 15 cm, BC= 18 cm and AD=24 cm , find the length of CD. **[Application & Evaluate]**
69.	*[Geometry]* In the given diagram, ABCDEF is a regular hexagon inscribed in a circle with centre O. PQ is a tangent to the circle at D. Find the value of: (a) ∠FAG (b) ∠BCD (c) ∠PDE **[Application & Evaluate]**
70.	*[Geometry]* AB and CD intersect at the centre O of the circle given in the above diagram. If ∠EBA=33° and ∠EAC=82 °, find (a)∠BAE (b)∠BOC (c)∠ODB **[Application & Evaluate]**

S.No.	Questions
71.	*[Mensuration]* A famous sweet shop "Madanlal Sweets" sells tinned rasgullas. The tin container is cylindrical in shape with diameter 14cm, height 16cm, and it can hold 20 spherical rasgullas of diameter 6cm and sweetened liquid such that the can is filled and then sealed. Find out how much sweetened liquid the can contains. Take π=3.14. **[Analysis, Application & Evaluate]**
72.	*[Mensuration]* The ratio of the radius and the height of a solid metallic right circular cylinder is 7 : 27. This is melted and made into a cone of diameter 14 cm and slant height 25cm. Find the height of the: (a) cone (b) cylinder **[Analysis, Application & Evaluate]**
73.	*[Trigonometry]* An inclined plane AC is prepared with its base AB which is $\sqrt{3}$ times its vertical height BC.The length of the inclined plane is 15 m.Find: (a) value of θ. (b) length of its base AB,in nearest metre. **[Analysis, Application & Evaluate]**
74.	*[Trigonometry]* Prove that $$tan^2\theta + cos^2\theta - 1 = tan^2\theta \cdot sin^2\theta$$ **[Analysis & Application]**

S.No.	Questions
75.	*[Statistics]* The class mark and frequency of a data is given in the graph. From the graph, Find: (a)　the table showing the class interval and frequency. (b)　the mean. **[Analysis, Application & Evaluate]**
76.	*[Statistics]* The mean of 5,7, 8 , 4 and m is n and the mean of 5, 7 , 8 , 4 , m and n is m. Find the values of m and n.　　　　　　　**[Understanding & Application]**
77.	*[Probability]* The probability of selecting a blue marble and a red marble from a bag containing red,blue and green marbles is 1/3 and 1/5 respectively. If the bag contains 14 green marbles,then find: (a)　number of red marbles. (b)　total number of marbles in the bag.　　　　**[Analysis & Evaluate]**

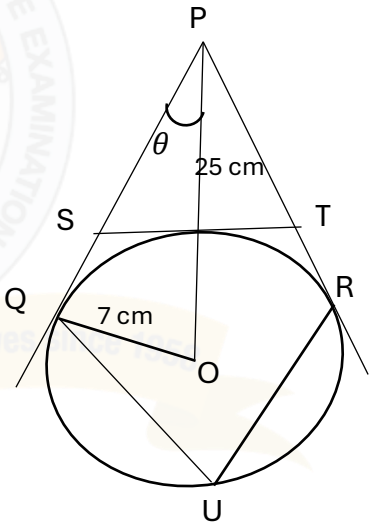## III. Short Answer Questions - 2 (4 Marks)

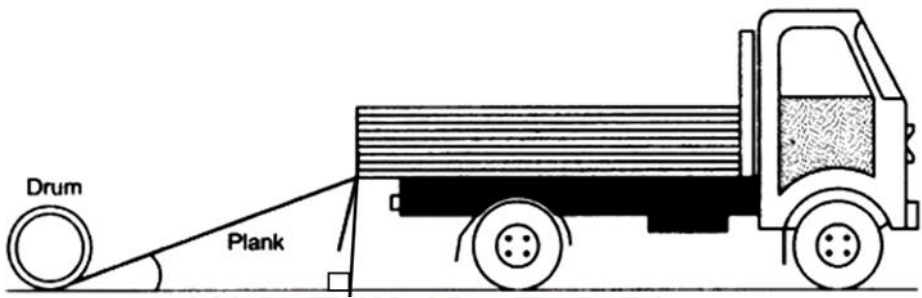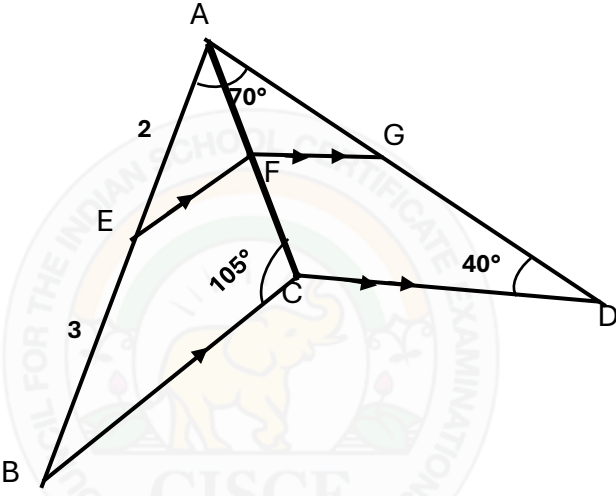| S.No.	Questions
78.	*[Commercial Mathematics]* The following bill shows the GST rate and the marked price of items: <table><tr><td colspan="5" align="center">**Grow Shree Groceries**</td></tr><tr><td>**S. No.**</td><td>**Item**</td><td>**Marked Price (₹)**</td><td>**Quantity**</td><td>**Rate of GST**</td></tr><tr><td>1.</td><td>Wheat Flour (unpacked)</td><td>35.00</td><td>5 kg</td><td>x %</td></tr><tr><td>2.</td><td>Basmati Rice (Branded & Packed)</td><td>180.00</td><td>5 kg</td><td>5%</td></tr><tr><td>3.</td><td>Surf Excel Quick Wash Detergent</td><td>220.00</td><td>y kg</td><td>18 %</td></tr></table> Find: (a) the value of x if the total GST on wheat flour and basmati rice is ₹45. (b) the value of y, if CGST paid for detergent powder is ₹39.60. (c) total amount to be paid (including GST) for the above bill. **[Understanding, Analysis & Evaluate]**
79.	*[Commercial Mathematics]* Amit deposited ₹ 600 per month in a recurring deposit account. The bank pays a simple interest of 12% p.a. Calculate the: (a) number of monthly instalments Amit deposits to get a maturity amount of ₹11826? (b) total interest paid by the bank. (c) total amount deposited by him. **[Application & Evaluate]**
80.	*[Commercial Mathematics]* Aman has 500, ₹100 shares of a company quoted at ₹ 120, paying a 10% dividend. When the share price rises to ₹ 200 each, he sells all his shares. He invests half of the sale proceeds in ₹10, 12% shares at ₹25, and the remaining sale proceeds in ₹400, 9% shares at ₹500. Find his: (a) sales proceeds. (b) investment in ₹10, 12% shares at ₹25. (c) original income. (d) change in income. **[Application & Evaluate]**

S.No.	Questions
81.	*[Commercial Mathematics]* Solve the following inequation. $$\frac{11 + 3x}{5} \geq 3 - x > -\frac{3}{2}, x \in R$$ (a) Write the solution set. (b) Represent the solution on the number line. **[Application & Create]**
82.	*[Algebra]* Determine whether the following quadratic equation has real roots. $$5x^2 - 9x + 4 = 0$$ (a) Give reasons for your answer. (b) If the equation has real roots, identify them. **[Analysis & Application]**
83.	*[Algebra]* The profit in rupees in a local restaurant and the number of customers who visited the restaurant are tabulated below for each week for one month. | Week number	Week 1	Week 2	Week 3	Week 4
---	---	---	---	---
Number of customers	1400	5600	x	3212
Profit in ₹	28000	112000	32140	y	 Find: (a) if the number of customers and profit per week in continued proportion or not? Justify your answer. (b) the value of x and y. **[Analysis & Evaluation]**
84.	*[Algebra]* Given, $9x^2 - 4$ is a factor of $9x^3 - mx^2 - nx + 8$: (a) find the value of m and n using the remainder and factor theorem. (b) factorise the given polynomial completely. **[Understanding & Application]**

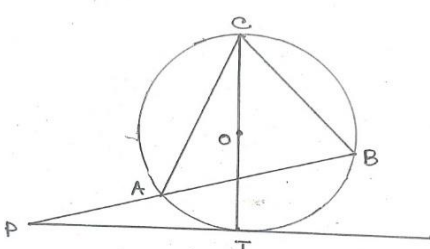| S.No.	Questions
85.	*[Probability]* The marks scored by 100 students are given below: <table><tr><th>Marks scored</th><th>No. of students</th></tr><tr><td>0-10</td><td>4</td></tr><tr><td>10- 20</td><td>5</td></tr><tr><td>20-30</td><td>9</td></tr><tr><td>30-40</td><td>7</td></tr><tr><td>40-50</td><td>13</td></tr><tr><td>50-60</td><td>12</td></tr><tr><td>60-70</td><td>15</td></tr><tr><td>70-80</td><td>11</td></tr><tr><td>80-90</td><td>14</td></tr><tr><td>90-100</td><td>10</td></tr></table> A student in the class is selected at random. Find the probability that the student has scored: (a) less than 20. (b) below 60 but 30 or more. (c) more than or equal to 70. (d) above 89. **[Analysis & Evaluation]**
86.	*[Algebra]* Given, matrix A = $\begin{bmatrix} x & 1 \\ y & 2 \end{bmatrix}$ and B = $\begin{bmatrix} x \\ x-2 \end{bmatrix}$ such that AB is a null matrix. Find: (a) order of the null matrix. (b) possible values of x and y. **[Understanding & Application]**
87.	*[Algebra]* The sum of a certain number of terms of the Arithmetic Progression (A.P.) 20, 17, 14, …. is 65. Find the: (a) number of terms. (b) last term. **[Understanding & Application]**
88.	*[Algebra]* (a) Point P (2, -3) on reflection becomes P'(2,3). Name the line of reflection (say L_1). (b) Point P' is reflected to P'' along the line (L_2), which is perpendicular to the line L_1 and passes through the point, which is invariant along both axes. Write the coordinates of P''. (c) Name and write the coordinates of the point of intersection of the lines L_1 and L_2. (d) Point P is reflected to P''' on reflection through the point named in the answer of part I of this question. Write the coordinates of P'''. Comment on the location of the points P'' and P'''. **[Analysis & Create]**

S.No.	Questions
89.	*[Algebra]* In the given figure, if the line segment AB is intercepted by the *y*-axis and *x*-axis at *C* and *D,* respectively, such that AC: AD = 1: 4 and D is the midpoint of CB. Find the coordinates of D, C and B. **[Understanding & Application]**
90.	*[Algebra]* Find the equation of the straight line perpendicular to the line $x+2y=4$, which cuts an intercept of 2 units from the positive *y*-axis. Hence, find the intersection point of the two lines. **[Analysis & Application]**
91.	*[Geometry]* While preparing a PowerPoint presentation, ΔABC is enlarged along the side BC to ΔAB'C', as shown in the diagram, such that BC: B'C' is 3:5. Find: (a) AB:BB' (b) length AB, if BB' = 4 cm. (c) Is ΔABC ~ΔAB'C'? Justify your answer. (d) ar (ΔABC): ar (quad. BB'C'C). **[Understanding & Evaluate]**

S.No.	Questions
92.	*[Geometry]* The approximate volume of a human eye is 6.5 cm3. The volume of a laboratory model (excluding base and stand) of the human eye is 1404 cm3. (a) State whether the scale factor k is less than, equals to or greater than 1. (b) Calculate the: (i) value of k (ii) diameter of the human eye if the radius of the model is 7.2 cm. (iii) the external surface area of the human eye if the surface area of the model is 651.6 cm2. **[Analysis & Evaluate]**
93.	*[Geometry]* In the adjoining diagram PQ, PR and ST are the tangents to the circle with centre O and radius 7 cm. Given OP=25 cm. Find: (a) length of ST (b) value of $\angle$OPQ, i.e. θ (c) $\angle$QUR, in nearest degree *(use mathematical tables)* **[Application & Evaluate]**
94.	*[Geometry]* Use ruler and compass to answer this question Construct a triangle ABC where AB=5.5 cm, BC= 4.5 cm and angle ABC=135º. Construct the circumcircle to the triangle ABC. Measure and write down the length of AC. **[Create & Evaluate]**

S.No.	Questions
95.	*[Mensuration]* The curved surface area of a right circular cone is half of another right circular cone. If the ratio of their slant heights is 2:1 and that of their volumes is 3:1, find ratio of their: (a) radii (b) heights **[Understanding & Application]**
96.	*[Trigonometry]* A cylindrical drum is unloaded from a truck by rolling it down along a wooden plank. The length of the plank is 10 m and it is making an angle of 10° with the horizontal ground. Find the height from which the cylindrical drum was rolled down. Give your answer correct to 3 significant figures. **[Analysis & Evaluate]**
97.	*[Statistics]* The data given below shows the marks of 12 students in a test, arranged in ascending order: 2, 3, 3, 3,4, *x, x*+2, 8, *p, q*,8, 9 If the given value of the median and mode is 6 and 8 respectively, then find the values of *x, p, q*. **[Understanding & Evaluate]**
98.	*[Algebra]* Solve the linear inequation, write down the solution set and represent it on the real number line: $5(2 - 4x) > 18 - 16x > 22 - 20x$, $x \in R$ **[Application & Create]**
99.	*[Algebra]* If a polynomial $x^3 + 2x^2 - ax + b$ leaves a remainder -6 when divided by $x +1$ and the same polynomial has $x - 2$ as a factor, then find the values of *a* and *b*. **[Application & Evaluate]**

S.No.	Questions
100.	*[Algebra]* If A= $\begin{bmatrix} -1 & 3 \\ 2 & 0 \end{bmatrix}$, B= $\begin{bmatrix} 1 & -2 \\ 0 & 3 \end{bmatrix}$, C= $\begin{bmatrix} 1 & -4 \end{bmatrix}$ and D = $\begin{bmatrix} 4 \\ 1 \end{bmatrix}$. (a) Is the product AC possible? Justify your answer. (b) Find the matrix *X*, such that $X = AB + B^2 - DC$ **[Analysis & Evaluate]**
101.	*[Geometry]* In the given figure(not drawn to scale), BC is parallel to EF, CD is parallel to FG, AE : EB = 2:3, ∠BAD= 70°, ∠ACB = 105°, ∠ADC = 40° and AC is bisector of ∠BAD. (a) Prove Δ AEF ~ ΔAGF (b) Find: i. AG: AD ii. area of ΔACB: area Δ ACD iii. area of quadrilateral ABCD: area of Δ ACB. **[Analysis, Application & Evaluate]**

S.No.	Questions
102.	*[Geometry]* In the given figure angle ABC = 700 and angle ACB = 500. Given, O is the centre of the circle and PT is the tangent to the circle. Then calculate the following angles (a) ∠CBT (b) ∠BAT (c) ∠PBT (d) ∠APT **[Application & Evaluate]**
103.	*[Geometry]* *(Use a ruler and a compass for this question.)* (a) Construct a triangle ABC such that BC = 8cm , AC = 10 cm and ∠ABC = 90°. (b) Construct an incircle to this triangle. Mark the centre as I. (c) Measure and write the length of the in-radius. (d) Measure and write the length of the tangents from vertex C to the incircle. (e) Mark points P, Q and R where the incircle touches the sides AB, BC, and AC of the triangle respectively. Write the relationship between ∠RIQ and ∠QCR. **[Analysis & Create]**
104.	*[Statistics]* The daily wages of workers in a constuction unit were recorded as follows: <table><tr><td>**Class Marks (Wages)**</td><td>425</td><td>275</td><td>525</td><td>575</td><td>625</td><td>675</td></tr><tr><td>**No. of workers**</td><td>6</td><td>12</td><td>15</td><td>17</td><td>7</td><td>13</td></tr></table> Form a frequency distribution table with class intervals and find modal wage by plotting a histogram. **[Analysis & Create]**
105.	*[Probability]* A bag contains 13 red cards , 13 black cards and 13 green cards. Each set of cards are numbered 1 to 13. From these cards, a card is drawn at random. What is the probability that the card drawn is a: (a) green card? (b) a card with an even number? (c) a red or black card with a number which is a multiple of three? **[Understanding & Evaluate]**

IV. Long Answer Questions - 1 (Graph-based) (5 Marks)

S.No.	Questions
106.	*[Algebra]* *(For this question, use a graph paper. Scale: 2cm = 1 unit along both x and y-axis.)* Plot the points A(2,2), and B (6, -2) in the graph and answer the following: (a) Reflect points A in origin to point D and write the co-ordinates of point D. (b) Reflect points A in line y = - 2 to point C and write the co-ordinates of points C. (c) Find a point P on CD which is invariant under reflection in x = 0, write its co-ordinates. (d) Write the geometrical name of the closed figure ABCD. (e) Write the co-ordinates of the point of intersection of the diagonals of ABCD. **[Understanding & Create]**
107.	*[Algebra]* *(For this question, use a graph paper. Scale: 1cm = 1unit along both x and y-axis.)* Plot points A (0,3) , B (4,0) , C (6,2) and D (5,0). Reflect the points as given below and write their coordinates: (a) Reflect A on x-axis to A'. (b) Reflect B on y- axis to B'. (c) Reflect C on x-axis to C'. (d) D remain invariant when reflected on the line whose equation is _____ . (e) Join the points A, B, C, D,C',B,A' , B' and A to form a closed figure. Name the closed figure BCDC'. **[Understanding & Create]**
108.	*[Statistics]* The following data represents the daily wages in rupees of a certain number of employees of a company: <table><tr><th>Daily wages (in ₹)</th><th>30 – 40</th><th>40 -50</th><th>50 – 60</th><th>60 -70</th><th>70-80</th><th>80-90</th><th>90-100</th><th>100-110</th></tr><tr><td>No. of Employees</td><td>8</td><td>14</td><td>12</td><td>17</td><td>20</td><td>26</td><td>13</td><td>10</td></tr></table> Use a graph to answer the following questions: (a) Represent the above distribution by an ogive. (b) Find the following on the graph drawn: (i) median wage. (ii) percentage of employees who earn more than ₹ 84 per day. (iii) number of employees who earn ₹56 and below. **[Create & Evaluate]**

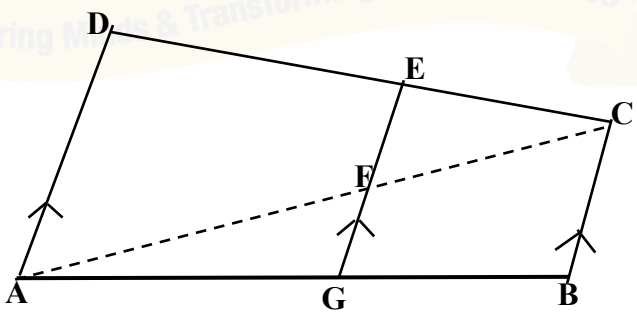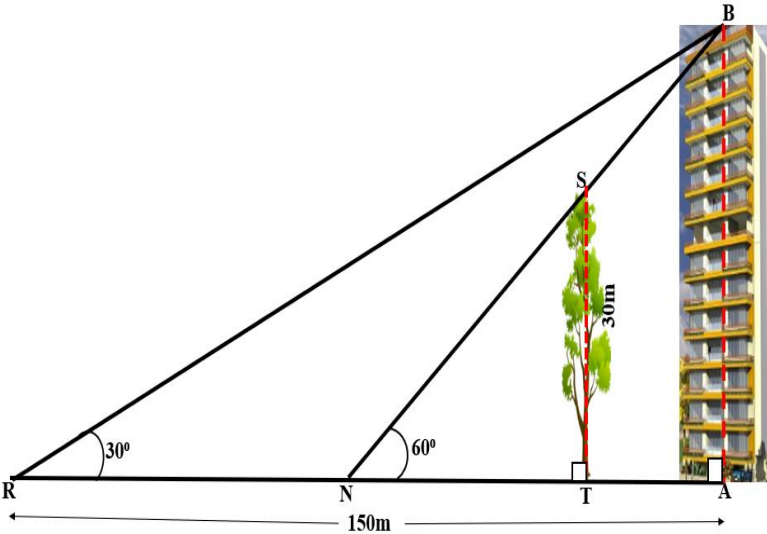| S.No.	Questions
109.	*[Statistics]* Study the graph and answer the questions that follow: (a) Make a frequency table for the information provided in the graph. (b) The number of students whose height is less than 150 cm. (c) The total number of students. (d) The modal height. (e) The difference in the modal height and the mean height, if the average height of the students is 145.5 cm. **[Analysis & Application]**
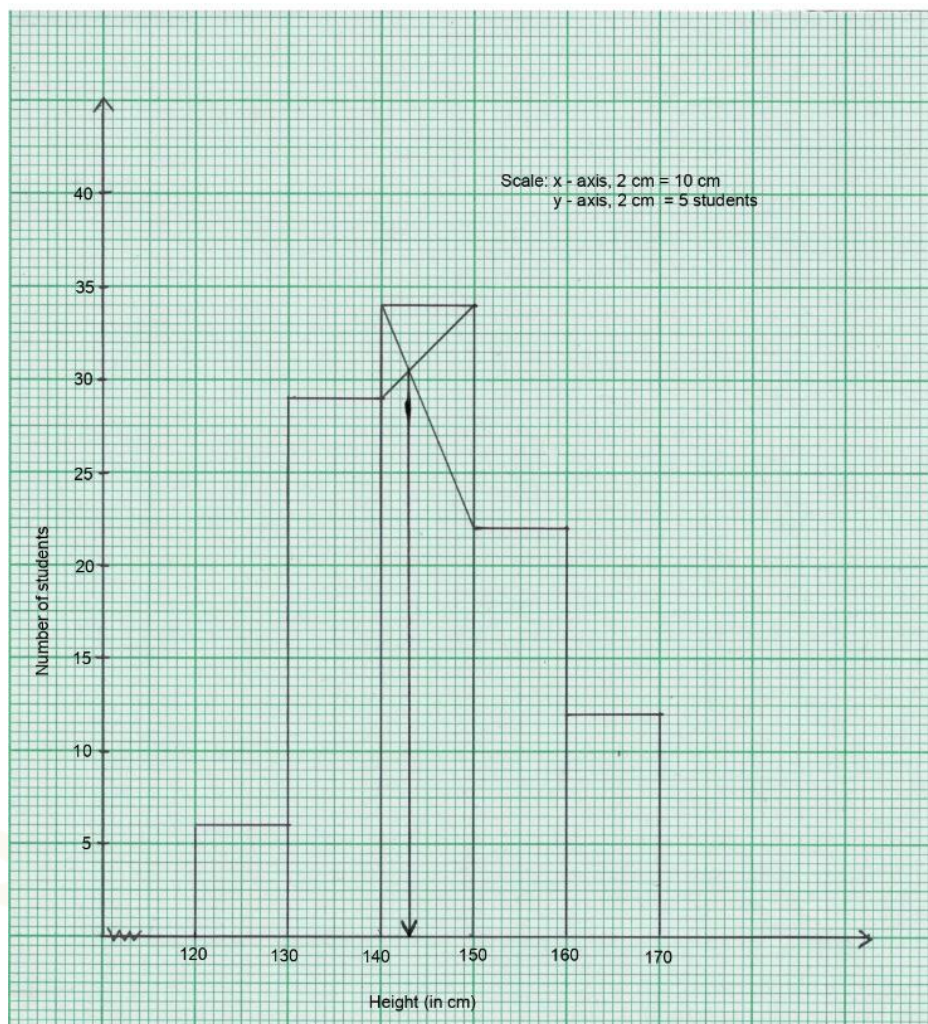
V. Long Answer Question - 2   (5 Marks)

S.No.	Questions
110.	*[Commercial Mathematics]* On seeing the above display board outside Pearl Stationary Shop, Chetan enters the shop to buy the following items:

	Pen	**Pencil**	**Rainbow Cover Notebook**
Price	₹5 each	₹7 each	₹200 each
Discount	5% on a dozen pens	10% on 20 pencils	--
Premium	-	-	₹50 on each notebook
Items purchased	1 dozen	20 pencils	5
GST	18%	12%	12%

The shopkeeper handed over the bill to Chetan saying that he has given further discount of 2% on total bill. Chetan became so happy hearing about the discount that he did not check the bill until he reached home. He later found out that though shopkeeper has given 2% discount as promised, he had also mcharged uniform 18% GST on all the items.

(a) Calculate :
    (i) total selling price of all the items as per the offers displayed on the board.
    (ii) total amount to be paid by Chetan including GST with correct rates.
    (iii) actual amount charged by the shopkeeper.
(b) Did the shopkeeper overcharge Chetan? Justify your answer.

[Application & Evaluate]

S.No.	Questions
111.	*[Algebra]* Using remainder and factor theorem, show that $(2x+3)$ is a factor of the polynomial $2x^2+11x+12$. Hence, factorise it completely. What must be multiplied to the given polynomial so that $x^2 + 3x - 4$ is a factor of the resulting polynomial? Also, write the resulting polynomial. **[Understanding, Application & Evaluate]**
112.	*[Algebra]* The sequence 2,9,16,……is given. (a) Identify if the given sequence is an AP or a GP. Give reasons to support your answer. (b) Find the 20th term of the sequence. (c) Find the difference between the sum of its first 22 and 25 terms. (d) Is the term 102 belong to this sequence? (e) If 'k' is added to each of the above terms, will the new sequence be in A.P. or G.P.? **[Analysis & Evaluate]**
113.	*[Algebra]* Given the equations of two straight lines, L1 and L2 are $x - y = 1$ and $x + y = 5$ respectively . If L1 and L2 intersects at point Q (3, 2).Find : (a) the equation of line L3 which is parallel to L1 and has y-intercept 3. (b) the value of k, if the line L3 meets the line L2 at a point P (k,4). (c) the coordinate of R and the ratio PQ: QR, if line L2 meets x-axis at point R. **[Analysis & Evaluate]**
114.	*[Geometry]* In the figure given above (not drawn to scale), AD ∥ GE ∥ BC, DE = 18 cm, EC = 3cm, AD = 35 cm. Find : (a) AF:FC (b) length of EF (c) area(trapezium ADEF) : area(ΔEFC) (d) BC: GF **[Application & Evaluate]**

S.No.	Questions
115.	*[Geometry]* *(Use a ruler and a compass for this question.)* (a) Construct the locus of a moving point which moves such that it keeps a fixed distance of 4.5 cm from a fixed-point O. (b) Draw line segment AB of 6 cm where A and B are two points on the locus (a). (c) Construct the locus of all points equidistant from A and B. Name the points of intersection of the loci (a) and (c) as P and Q respectively. (d) Join PA. Find the locus of all points equidistant from AP and AB. (e) Mark the point of intersection of the locus (a) and (d) as R. Measure and write down the length of AR. **[Create & Analysis]**
116	*[Constructions]* *(Use a ruler and a compass for this question.)* Construct a regular hexagon ABCDEF of side 4.3 cm and construct its circumscribed circle. Also, construct tangents to the circumscribed circle at points B and C which meets each other at point P. Measure and record ∠BPC. **[Create & Analysis]**
117.	*[Mensuration]* A mathematics teacher uses certain amount of terracotta clay to form different shaped solids. First, she turned it into a sphere of radius 7cm and then she made a right circular cone with base radius 14 cm. Find the height of the cone so formed. If the same clay is turned to make a right circular cylinder of height 7/3 cm, then find the radius of the cylinder so formed. Also,compare the total surface areas of sphere and cylinder so formed. **[Understanding, Application & Evaluate]**

S.No.	Questions
118.	*[Trigonometry]*

A tree (TS) of height 30 m stands in front of a tall building (AB). Two friends Rohit and Neha are standing at R and N respectively, along the same straight line joining the tree and the building (as shown in the diagram). Rohit, standing at a distance of 150 m from the foot of the building, observes the angle of elevation of the top of the building as 30°. Neha from her position observes that the top of the building and the tree has the same elevation of 60°.

Find the:

(a)   height of the building
(b)   distance between
    (i)   Neha and the foot of the building
    (ii)   Rohit and Neha
    (iii)   Neha and the tree
    (iv)   building and the tree.   **[Analysis, Application & Evaluate]**

S.No.	Questions
119.	*[Statistics]* A life insurance agent found the following data of age distribution of 100 policy holders, where f is an unknown frequency. <table><tr><th>Age in years</th><th>No. of Policy Holders</th></tr><tr><td>15-20</td><td>7</td></tr><tr><td>20-25</td><td>12</td></tr><tr><td>25-30</td><td>15</td></tr><tr><td>30-35</td><td>22</td></tr><tr><td>35-40</td><td>f</td></tr><tr><td>40-45</td><td>14</td></tr><tr><td>45-50</td><td>8</td></tr><tr><td>50-55</td><td>4</td></tr></table> (a) If the mean age of the policy holders is 35.65 years, find the unknown frequency f. (b) Find the median class of the distribution. **[Application & Evaluate]**
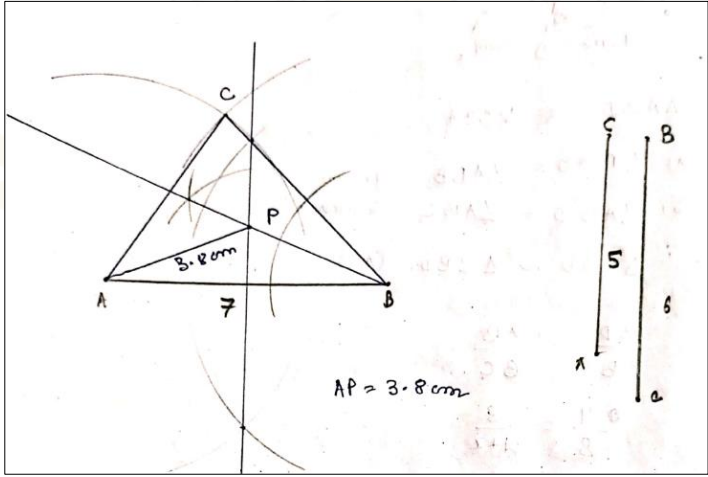
Answer Key

S.No	Expected Answer
1.	(c) ₹30
2.	(b) ₹ 28
3.	(d) simple interest for one month.
4.	(b) ₹1250
5.	(d) Both Mr. Das and Mr. Singh have same rate of return of 20%.
6.	(b) ₹ 750
7.	(c) { 0,1,2}
8.	(c) $x < -2y$
9.	(d) 0 , 8
10.	(b) – 2
11.	(d) 230
12.	(c) 13 cm
13.	(d) p : r = $p^2 : q^2$
14.	(b) 60π
15.	(d) 3
16.	(c) $(x+4)$
17.	(d) both matrices AB and BA are possible, AB=BA.
18.	(b) -6
19.	(b) 4
20.	(d) 2, 0, 4, 0, 8, 0
21.	(c) (6, -6)
22.	(b) 2y = x

S.No	Expected Answer
23.	(c) 1, -1
24.	(a) $3x + 3y = 6$
25.	(d) 20 minutes
26.	(d) the similarity of given triangles cannot be determined.
27.	(c) $\angle PQR = \angle TSR$
28.	(d) 1.44m
29.	(c) 50°
30.	(a) $50^0, 100^0, 40^0$
31.	(d) 105°
32.	(c) Its volume
33.	(b) 42cm
34.	(b) 32π
35.	(b) 3 : 2
36.	(c) $(cot\theta + tan\theta)^2$
37.	(d) 5
38.	(a) 30°
39.	(b) α < β
40.	(c) A is true, but R is false.
41.	(c) A is true, but R is false.
42.	(a) Both A and R are true, and R is the correct explanation.
43.	(d) Both A and R are true.
44.	(c) A is true, but R is false.
45.	(a) 2:3
46.	(b) 2 x 1
47.	(d) Arithmetic (*d*=0)

S.No	Expected Answer
48.	(a) Circle
49.	(b) incentre
50.	11.11%
51.	4%
52.	₹70
53.	$-1 \leq x \leq 5$ (a) 5, -1 (b) No change in maximum value, minimum value will change to 0.
54.	$x = -\dfrac{2}{\sqrt{3}}, x = \dfrac{\sqrt{3}}{4}$
55.	$x = 20$ and GST rate = 20%
56.	3 and 12
57.	$(x+2)$ $(x-1)$ $(2x+1)$
58.	$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
59.	(a) $T_n = 21 + (n-1)21$ or $21n$ (b) Four are two-digit numbers. 21, 42, 63, 84 (c) 1155
60.	(a) G.P. (b) p=121
61.	(a) (- 4, -5), (0, -3), (-3, 0) (b) For x-axis C (3,0); for y-axis B (0,3)
62.	4:3
63.	(a) $m=1$ (b) $x+y+4=0$
64.	1:5

S.No	Expected Answer
65.	(a) In Δ ABD and ΔCBA, ∠B is common to both triangles, ∠BAD = ∠BCA (given) ∴ Δ ABD ~ ΔCBA (by A.A.A. postulate) (b) Since the triangles are similar, their corresponding sides are proportional. ∴ $\dfrac{AC}{AD} = \dfrac{AB}{DB} = \dfrac{BC}{BA}$ ∴ $\dfrac{AC}{AD} = \dfrac{8}{4} = \dfrac{4+x}{8}$ ∴ 2 x 8 = 4 + x ∴ 16 = 4 + x ∴ x = 16 - 4 ∴ x = 12cm
66.	(a) 3.8 km (b) 1 km^2
67.	
68.	27 cm
69.	(a) 60° (b) 120° (c) 30°

S.No	Expected Answer
70.	(a) 57 ° (b) 50 ° (c) 17 °
71.	200.96 cm³
72.	(a) 24 cm (b) 18 cm
73.	(a) 30° (b) 8 m
74.	$L.H.S. = tan^2\theta + cos^2\theta - 1$ $= tan^2\theta - (1 - cos^2\theta)$ $= \frac{sin^2\theta}{cos^2\theta} - sin^2\theta$ $= \frac{sin^2\theta(1-cos^2\theta)}{cos^2\theta}$ $= \frac{sin^2\theta}{cos^2\theta} \times sin^2\theta$ $= tan^2\theta . sin^2\theta = R.H.S$
75.	(a) | Class interval	frequency
---	---
12-14	8
14-16	2
16-18	3
18-20	4
20-22	5
22-24	6 | (b) Mean = 18
76.	*m*= 6; *n*= 6
77.	(a) 6 (b) 30
78.	(a) 0% (b) y = 2 kg (c) ₹1639.20

S.No	Expected Answer
79.	(a) 18 instalments (b) ₹1026 (c) ₹10800
80.	(a) ₹100000 (b) ₹ 50000 (c) ₹5000 (d) ₹4600 (gain)
81.	$\left\{ x: \dfrac{1}{2} \le x < \dfrac{9}{2}, x \in R \right\}$
82.	(a) Discriminant is positive and a perfect square. Hence, roots are real and rational. (b) 1 and 4/5
83.	(a) No. $\dfrac{1400}{28000} = \dfrac{5600}{112000} = \dfrac{1}{20}$ Hence the numbers are in proportion. Number of customers and profit per week are not continued in proportion. (b) $x = 1607$, $y = 64240$
84.	(a) $m = 18$, $n = 4$ (b) $(3x - 2)(3x + 2)(x - 2)$
85.	(a) 9/100 (b) 32/100 = 8/25 (c) 35/100 = 7/20 (d) 10/100 = 1/10
86.	(a) Order of the null matrix is 2 x 1. (b) $x = 1$, $y = 2$ and $x = -2$, $y = -4$
87.	(a) 10 (b) -7
88.	(a) x-axis. (b) P" (-2, 3) (c) Origin (0,0); P'''(-2,3) (d) P" & P'' are coincident points.

S.No	Expected Answer
89.	D (6,0), C (0,9/2) B (12, - 9/2)
90.	$2x - y + 2 = 0$ (0, 2)
91.	(a) $AB:BB' = 3:2$ (b) $AB = 6\ cm$ (c) $Yes, \because BC \parallel B'C'$ (d) $9:16$
92.	(a) k>1 (b) (i) k=6 (ii) 2.4 cm (iii) 18.1cm^2
93.	(a) 10.5 cm (b) θ=16°16' (c) 73°44' = 74°
94.	AC = 9.1 cm Radius = 6.5 cm
95.	(a) 1:4 (b) 48:1
96.	1.74 m
97.	$x = 5$ and $p = 8, q = 8$
98.	$\{x : x<-2$ or $x >1$, x $\in$ R$\}$
99.	$a = 3, b = -10$
100.	No, number of columns in A is not equal to number of rows in C. b) $\begin{bmatrix} -4 & 19 \\ 1 & 9 \end{bmatrix}$

S.No	Expected Answer
101.	(a) In ΔAFE, ∠AFE = 105° (corresponding angle) ∠EAF = $\frac{70°}{2}$ = 35° (∵ AC is the bisector) ∴ ∠AEF = 180° -(105°- 35°) = 40° (sum of angles of triangle) ∠AGF = ∠ADC = 40° (corresponding angles) In ΔAEF, and ΔAGF, ∠EAF = ∠GAF = 35° (AC being the bisector) ∠AEF = ∠ACF = 40° (as shown above) ∴Δ AEF ∼ Δ AGF (A.A.A.) (b) i. 2:5 ii. 1:1 iii. 2:1
102.	(a) 90^0 (b) 30^0 (c) 20^0 (d) 10^0
103.	(b) 2cm (c) 5.8cm (d) ∠RIQ +∠QCR=180°
104.	Frequency table | Wages in ₹	f
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400-450	6
450-500	12
500-550	15
550-600	17
600-650	7
650-700	3 | Mode = ₹557.50
105.	(a) 1/3, (b) 6/13 (c) 8/39

S.No	Expected Answer
106.	(a) D (-2, -2) (b) C (2, -6) (c) P (0, -4) (d) square (e) (2, -2)
107.	(a) (0, -3) (b) (-4,0) (c) (6, -2) (d) Y = 0 (e) Concave quadrilateral
108.	(b) i) ₹74 　　ii) 32.5% 　　iii) 30
109.	(a) | Class	*f*	*cf* | |-------|---|----| | 120-130 | 6 | 6 | | 130-140 | 29 | 35 | | 140-150 | 34 | 69 | | 150-160 | 22 | 91 | | 160-170 | 12 | 103 | (b) 69 (c) 103 (d) 143 cm (e) 2.5 cm
110.	(a) (i) ₹1433 　　(ii) ₹1608.38 　　(iii)₹1657.12 b) Yes, the shopkeeper overcharged an amount of ₹48.78
111.	$(x + 4)(2x + 3)$ to multiplied by $(x - 1)$ $2x^3 + 9x^2 + x - 12$

S.No	Expected Answer
112.	(a) AP as d = 7 (b) 135 (c) 489 (d) No (e) A.P.
113.	(a) $x - y + 3 = 0$ (b) $k = 1$ (c) R (5,0); 1:1
114.	(a) 6:1 (b) 5 cm (c) 48:1 (d) 7:6
115.	(e) AR≈ 8.8cm or 4.8cm
116.	∠BPC=120°
117.	h_{cone}=7 cm $r_{cylinder}$=14 cm $\dfrac{\text{TSA sphere}}{\text{TSA cylinder}} = \dfrac{3}{7}$
118.	(a) 86.6 m (b) i. 50 m ii. 100 m iii. 17.32 m iv. 32.68 m.
119.	(a) 18 (b) 30-35

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