ACHIEVERS FOUNDATION

ICSE FULL TEST-1

Sub. : Mathematics

Duration: 2½ hours.

CLASS : X

Max. Marks: 80

General Instructions:

1. Answers to this paper must be written on the paper provided separately.
2. You will not be allowed to write during first **15 minutes**.
3. This time is to be spent in reading the question paper.
4. The time given at the head of this paper is the time allowed for writing the answers.
5. **Attempt all questions from Section A and any four questions from Section B.**
6. **All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.**
7. **Omission of essential working will result in loss of marks.**
8. The intended marks for questions or parts of questions are given in brackets **[.]**
9. Mathematical tables are provided.

Section – A
*(Attempt **all** questions from this Section)*

Question 1

Choose the correct answers to the questions from the given options. **[15]**

(Do not copy the question, write the correct answers only.)

(i) If $A = \begin{bmatrix} 5 & 0 \\ 4 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 2 \\ 4 & 1 \end{bmatrix}$, then $A - 2B =$

    (a) $\begin{bmatrix} 1 & 4 \\ 4 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & -4 \\ -4 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & -4 \\ 4 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 4 \\ -4 & 0 \end{bmatrix}$

(ii) If $x - 2$ is a factor of $x^3 - kx - 12$, then the value of k is:

    (a) 3   (b) 2   (c) –2   (d) –3

(iii) The roots of the equation $x^2 + 7x + 10 = 0$ are:

    (a) –5, –2   (b) 5, 2   (c) 5, –2   (d) –5, 2

(iv) A letter is chosen at random from all the letters of the English alphabets. The probability that the letter chosen is a vowel, is:
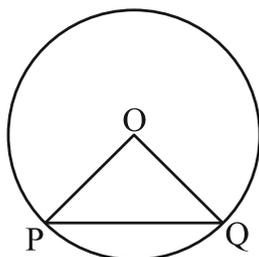
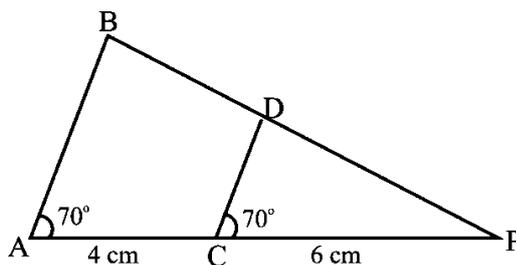   (a) $\dfrac{4}{26}$ (b) $\dfrac{5}{26}$ (c) $\dfrac{21}{26}$ (d) $\dfrac{5}{24}$

(v) In the given figure, O is the centre of a circle. If the length of chord PQ is equal to the radius of the circle, ∠POQ is:

(a) 60° (b) 45° (c) 30° (d) 15°

(vi) In the given figure ∠BAP = ∠DCP = 70° , PC = 6 cm and CA = 4 cm, then PD : DB is:

(a) 5 : 3 (b) 3 : 5 (c) 3 : 2 (d) 2 : 3

(vii) If Rohan invested ₹12,500 in shares and get annual dividend of ₹500, the rate of return of his investment is:
(a) 5% (b) 4% (c) 2.5% (d) None of these

(viii) Which of the following cannot be determined graphically for a grouped frequency distribution?
(a) Median (b) Mode (c) Quartiles (d) Mean

(ix) The mean proportional between 4 and 9 is:
(a) 4 (b) 6 (c) 9 (d) 36

(x) The nth term of an Arithmetic Progression (A.P.) is $2n + 5$. The common difference is:
(a) 7 (b) 5 (c) 2 (d) 3

(xi) The coordinates of the vertices of ΔABC are respectively (–4, –2), (6, 2) and (4, 6). The centroid G of ΔABC is:
(a) (2, 2) (b) (2, 3) (c) (3, 3) (d) (0, –1)

(xii) $(1 + \sin A)(1 - \sin A)$ is equal to:
(a) $\csc^2 A$ (b) $\sin^2 A$ (c) $\sec^2 A$ (d) $\cos^2 A$

(xiii) Volume of a cylinder of height 3 cm is 48π. Radius of the cylinder is:
(a) 48 cm (b) 16 cm (c) 4 cm (d) 24 cm

(xiv) Which of the following equation of a line passing through the point (–2, 3) and having X–intercept 4 units?
(a) x + 2y = 8 (b) x + 2y = 4 (c) 2x + y = 8 (d) x + y + 4 = 0

(xv) The solution set for the inequation $2x + 4 \le 14$, x ∈ w is:
(a) {1, 2, 3, 4, 5} (b) {0, 1, 2, 3, 4, 5} (c) {1, 2, 3, 4} (d) {0, 1, 2, 3, 4}

Question 2

(i)   Find the value of 'a' if x – a is a factor of the polynomial $3x^3 + x^2 - ax - 81$.   **[4]**

(ii)   Katrina opened a recurring deposit account with a Nationalized Bank for a period of 2 years. If the bank pays interest at the rate of 6% per annum and the monthly installment is ₹1000, find the: **[4]**
(a) Interest earned in 2 years.
(b) Maturity value.

(iii)   In the given figure, O is the centre of the circle. CE is a tangent to the circle at A. If $\angle ABD = 36°$, then find: **[4]**
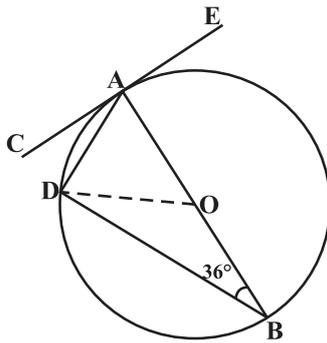
(a) ∠BDA   (b) ∠BAD   (c) ∠CAD   (d) ∠ODB

Question 3

(i)   Solve the following quadratic equation: **[4]**
$x^2 + 7x - 7 = 0$
Give your answer correct to one decimal place.
(Use mathematical tables if necessary.)

(ii)   Prove the following identity: **[4]**
$$\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2\sec A$$

(iii)   Use graph sheet to answer this question. Take 2 cm = 1 unit along both the axes.   **[5]**
(a) Plot A, B, C where A(0, 4), B(1, 1) and C(4, 0)
(b) Reflect A and B on the x-axis and name them as E and D respectively.
(c) Reflect B through the origin and name it F. Write down the coordinates of F.
(d) Reflect B and C on the y-axis and name them as H and G respectively.
(e) Join points A, B, C, D, E, F, G, H and A in order and name the closed figure formed.
SECTION B (40 Marks)
(Attempt any four questions from this Section.)

Question 4
(i)   Find x and y. If,   **[3]**
$$3\begin{bmatrix} 5 & -6 \\ 4 & x \end{bmatrix} - \begin{bmatrix} 6 & y \\ 0 & 6 \end{bmatrix} = 3\begin{bmatrix} 3 & -2 \\ 4 & 0 \end{bmatrix}$$

(ii)   ABC is a triangle whose vertices are A(1, –1), B(0, 4) and C(–6, 4).   **[3]**
D is the midpoint of BC. Find the:
(a) Coordinates of D.
(b) Equation of the median AD.

(iii) In the given figure PQ is a tangent to the circle at A. AB and AD are bisectors of ∠CAQ and ∠PAC respectively. If ∠BAQ = 30° prove that:
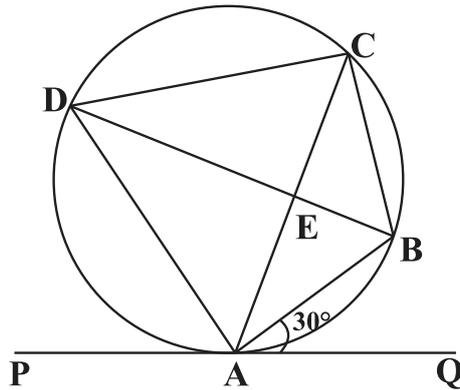
(a) BD is a diameter of the circle.
(b) ABC is an isosceles triangle.

Question 5

(i) The following bill shows the GST rates and the marked price of articles: **[3]**

Bill : Computers		
Articles	Marked price	Rate of GST
Graphic Card	₹15500.00	18%
Laptop adapter	₹1900.00	28%

Find the total amount to be paid for the above bill.

(ii) ₹480 is divided equally among the children. If the number of children was 20 more, then each would have got ₹12 less. Taking x to be the number of children, form a quadratic equation in x and solve it to find the value of x. **[4]**

(iii) In the given figure, AC ǁ DE ǁ BF . If AC = 24 cm, EG=8 cm, GB=16 cm, BF=30 cm. **[4]**
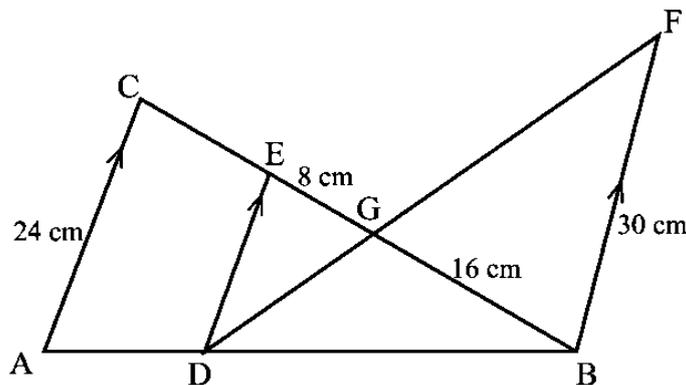
(a) Prove ΔGED ~ ΔGBF
(b) Find DE
(c) DB : AB

Question 6

(i) The first and last term of a Geometrical Progression (G.P.) are 3 and 96 respectively. If the common ratio is 2, find: **[3]**
(a) 'n' the number of terms of the G.P
(b) Sum of the n terms.

(ii) The table given below shows the weekly wages of the people. **[3]**

Weekly Wages (in₹)	No. of People
3000 – 4000	4
4000 – 5000	9
5000 – 6000	18
6000 – 7000	6
7000 – 8000	7
8000 – 9000	2
9000 – 10000	4

Use graph sheet for this question. Take 2 cm =₹1000 along one axis and 2cm = 2 members along the other axis.

(a) Draw a histogram representing the above distribution.

(b) Hence find the modal weekly wages of the people.

(iii) A conical tent is to accommodate 77 persons. Each person must have 16 m^3 of air to breathe. Given the radius of the tent as 7m, find: **[4]**

(a) The height of the tent.

(b) Its curved surface area. $\left[\text{Use } \pi = \dfrac{22}{7} \right]$

Question 7

(i) A bag contains 25 cards, numbered through 1 to 25. A card is drawn at random. What is the probability that the number on the card drawn is: **[3]**

(a) Multiple of 5

(b) A perfect square

(c) A prime number?

(ii) Solve the following inequation. Write the solution set and represent it on the real number line.

$\dfrac{3x}{5} + 2 < x + 4 \le \dfrac{x}{2} + 5, \, x \in R$ **[3]**

(iii) A solid is in the shape of a hemisphere of radius 7 cm, surmounted by a cone of height 4 cm. The solid is immersed completely in a cylindrical container filled with water to a certain height. If the radius of the cylinder is 14 cm, find the rise in the water level. **[3]**
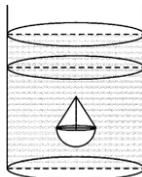
Question 8

(i) In the given figure PQRS is a cyclic quadrilateral where PQ and SR produced to meet at T.
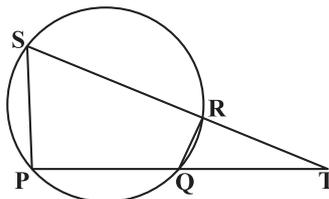
(a) Prove ΔTPS~ΔTRQ **[3]**

(b) Find SP if TP = 18 cm, RQ = 4cm and TR = 6cm

(ii) The following table gives the marks scored by a set of students in an examination. Calculate the mean of the distribution by using the short cut method. **[3]**

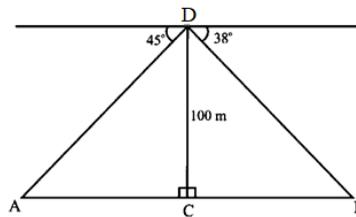| Marks	Number of Students (*f*)
0 - 10	3
10 - 20	8
20 - 30	14
30 - 40	9
40 - 50	4
50 - 60	2

(iii) Using ruler and compass construct a triangle ABC in which AB = 6 cm, ∠BAC =120° and AC = 5 cm. Construct a circle passing through A, B and C. Measure and write down the radius of the circle. **[4]**

Question 9

(i) Using componendo and dividendo, find the value of x. **[3]**

$$\frac{\sqrt{3x + 4} + \sqrt{3x - 5}}{\sqrt{3x + 4} - \sqrt{3x - 5}} = 9$$

(ii) Which term of the Arithmetic Progression (A.P.) 12, 24, 36, 48 … is 240 ? Hence find the sum of all the terms of the Arithmetic Progression (A.P.) **[3]**

(iii) From the top of a tower 100 m high a man observes the angles of depression of two ships A and B, on opposite sides of the tower as 45° and 38° respectively. If the foot of the tower and the ships are in the same horizontal line. Find the distance between the two ships A and B to the nearest metre. [tan38° = 0.7813, tan52° = 1.2799]

Question 10

(i) Factorize completely using factor theorem: **[4]**

$$x^3 + 10x^2 - 37x + 26$$

(ii) Use graph paper to answer this question. **[6]**

During a medical checkup of 60 students in a school, weights were recorded as follows:

Weight (in kg)	Number of Students
28 - 30	2
30 - 32	4
32 - 34	10
34 - 36	13
36 - 38	15
38 - 40	9
40 - 42	5
42 - 44	2

Taking 2 cm = 2 kg along one axis and 2 cm = 10 students along the other axis draw an give.

Use your graph to find the:

(a) Median

(b) Upper Quartile

(c) Number of students whose weight is above 37 kg