

Annexure - ' E '

SYLLABUS/CURRICULUM
MATHEMATICS (041)

CLASS-X

Second Term

Marks : 90

UNITS	MARKS
II. ALGEBRA (Contd.)	23
III. GEOMETRY (Contd.)	17
IV. TRIGONOMETRY (Contd.)	08
V. PROBABILITY	08
VI. COORDINATE GEOMETRY	11
VII. MENSURATION	23
TOTAL	90

The Question Paper will include value based question(s) to the extent of 3-5 marks.

UNIT II : ALGEBRA (Contd.)

3. QUADRATIC EQUATIONS

(15) Periods

Standard form of a quadratic equation $ax^2 + bx + c = 0$, ($a \neq 0$). Solution of the quadratic equations (only real roots) by factorization, by completing the square and by using quadratic formula. Relationship between discriminant and nature of roots.

Problems related to day to day activities to be incorporated.

4. ARITHMETIC PROGRESSIONS

(8) Periods

Motivation for studying AP. Derivation of standard results of finding the n^{th} term and sum of first n terms and their application in solving daily life problems.

UNIT III : GEOMETRY (Contd.)

2. CIRCLES

(8) Periods

Tangents to a circle motivated by chords drawn from points coming closer and closer to the point.

- (**Prove**) The tangent at any point of a circle is perpendicular to the radius through the point of contact.
- (**Prove**) The lengths of tangents drawn from an external point to circle are equal.

3. CONSTRUCTIONS**(8) Periods**

1. Division of a line segment in a given ratio (internally)
2. Tangent to a circle from a point outside it.
3. Construction of a triangle similar to a given triangle.

UNIT IV : TRIGONOMETRY**3. HEIGHTS AND DISTANCES****(8) Periods**

Simple and believable problems on heights and distances. Problems should not involve more than two right triangles. Angles of elevation / depression should be only 30° , 45° , 60° .

UNIT V : STATISTICS AND PROBABILITY**2. PROBABILITY****(10) Periods**

Classical definition of probability. Connection with probability as given in Class IX. Simple problems on single events, not using set notation.

UNIT VI : COORDINATE GEOMETRY**1. LINES (In two-dimensions)****(14) Periods**

Review the concepts of coordinate geometry done earlier including graphs of linear equations. Awareness of geometrical representation of quadratic polynomials. Distance between two points and section formula (internal). Area of a triangle.

UNIT VII : MENSURATION**1. AREAS RELATED TO CIRCLES****(12) Periods**

Motivate the area of a circle; area of sectors and segments of a circle. Problems based on areas and perimeter / circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of 60° , 90° & 120° only. Plane figures involving triangles, simple quadrilaterals and circle should be taken.)

2. SURFACE AREAS AND VOLUMES**(12) Periods**

- (i) Problems on finding surface areas and volumes of combinations of any two of the following: cubes, cuboids, spheres, hemispheres and right circular cylinders/cones. Frustum of a cone.
- (ii) Problems involving converting one type of metallic solid into another and other mixed problems. (Problems with combination of not more than two different solids be taken.)

RECOMMENDED BOOKS

1. Mathematics - Textbook for class IX - NCERT Publication
2. Mathematics - Textbook for class X - NCERT Publication
3. Guidelines for Mathematics laboratory in schools, class IX - CBSE Publication
4. Guidelines for Mathematics laboratory in schools, class X - CBSE Publication
5. A hand book for designing mathematics laboratory in schools - NCERT Publication
6. Laboratory manual - Mathematics, secondary stage - NCERT Publication.

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Design of Sample Question Paper
Mathematics (047)
Summative Assessment-II
Class X-

Type of Question	Marks per question	Total no. of Questions	Total Marks
M.C.Q	1	8	8
SA-I	2	6	12
SA-II	3	10	30
LA	4	10	40
TOTAL		34	90

**The Question Paper will include value based question(s)
to the extent of 3-5 marks**

Weightage

S.No.	Unit No.	Topic	Weightage
1	II	Algebra (contd.) [Quadratic Equations A.P.]	23
2	III	Geometry (contd.) [Circles, Constructions]	17
3	IV	Trigonometry (contd.) [Height and Distances]	08
4	V	Probability	08
5	VI	Coordinate Geometry	11
6	VII	Mensuration	23
		Total	90

SAMPLE QUESTIONS MATHEMATICS (047)

CLASS-X

MCQ- 1 Mark

Q.1 The tenth term of an A.P. $-1.0, -1.5, -2.0, \dots$ is

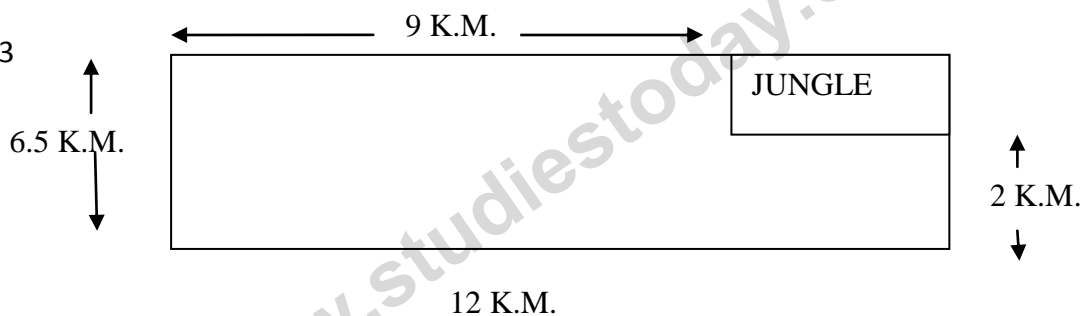
- (a) 3.5 (b) 5.5
(c) -5.5 (d) -6.5

Q.2 A sphere and a cone of height 'h' have the same radius and same volume, then $r : h$ is

- (a) 4:1 (b) 1:4
(c) 16:1 (d) 1:16

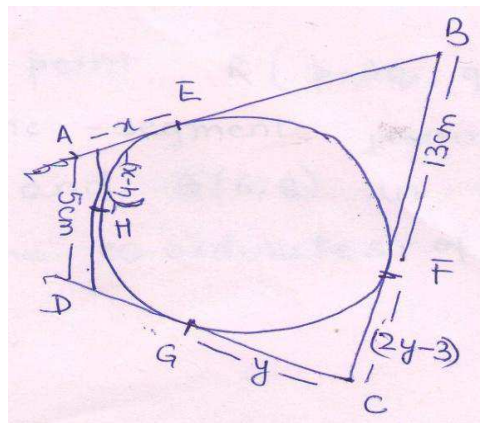
SA-II - 2 Marks

Q.3



A helicopter has to make an emergency landing as shown in the figure. What is the probability of a safe landing?

Q.4.



In the figure, quadrilateral ABCD circumscribes the circle. Find the length of the side CD.

SA-III - 3 Marks

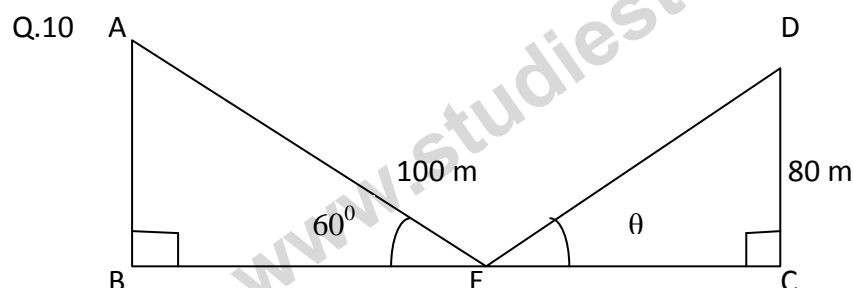
- Q.5 The sum of first, third and seventeen term of an A.P. is 216. Find the sum of the first 13 terms of the A.P.
- Q.6 The point R ($p-3q$, q) divides the line segment joining the points A (3, 5) and B (6, 8) in the ratio 2:1. Find the co-ordinates of R.
- Q.7 Draw a triangle ABC with side BC= 7cm, AB= 6cm and $\angle ABC = 60^\circ$. Construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of ΔABC . Also write steps of construction.

LA - 4 Marks

- Q.8 A cone of height 3.25 cm is surmounted by a hemisphere having same base. If the diameter of the base is 3.5 cm, then find the curved surface area. (Take $\pi = \frac{22}{7}$)
- Q.9 If the sum of the roots of the equation

$$Kx^2 - 2\sqrt{2}x + 1 = 0$$

is $\sqrt{2}$, then find the roots of the equation.



In ΔDCE

$$\tan \theta - \tan (90 - \theta) = 0$$

Also $AE = 100$ m and $DC = 80$ m.

Find BC.

ANSWER KEY

1. (c)

2. (b)

3. Length of a Jungle = $(12 - 9)$ km = 3 kmBreadth of a Jungle = $(6.5 - 2)$ km = 4.5 km

$$\left. \begin{array}{l} \text{Length of a Jungle} = 3 \text{ km} \\ \text{Breadth of a Jungle} = 4.5 \text{ km} \end{array} \right\} \left(\frac{1}{2} \right)$$

Area of Jungle = 13.5 sq. km

Area of Total field = $12 \times 6.5 = 78$ sq. km

$$\left(\frac{1}{2} \right)$$

$$P \text{ (Safe landing)} = \frac{(78 - 13.5)}{78}$$

$$= \frac{64.5}{78}$$

$$= \frac{43}{52}$$

(1)

4. AE = AH (length of tangents from external points are equal)

$$x = 4 - x$$

$$2x = 4$$

$$x = 2$$

$$DH = (5 - 2) = 3 \text{ cm}$$

$$DH = DG = 3 \text{ cm}$$

(1)

$$CF = CG$$

$$2y - 3 = y$$

$$\left(\frac{1}{2} \right)$$

$$y = 3$$

$$DC = DG + GC = 3 + 3 = 6 \text{ cm}$$

$$\left(\frac{1}{2} \right)$$

5. $a + a + 2d + a + 16d = 216$

(1)

$$3a + 18d = 216$$

$$a + 6d = 72$$

$$\left(\frac{1}{2} \right)$$

$$S_{13} = \frac{13}{2} \left[2a + (13 - 1) d \right]$$

$$= \frac{13}{2} \left[2a + 12d \right]$$

$$\left(\frac{1}{2} \right)$$

$$\begin{aligned}
 &= \frac{13}{2} \times 2 (a + 6d) \\
 &= 13 \times 72 \\
 &= 936
 \end{aligned}$$

(1)

$$6. \quad p - 3q = \frac{2 \times 6 + 1 \times 3}{2 + 1}$$

$$p - 3q = \frac{12 + 3}{3}$$

$$p - 3q = 5 \quad (1)$$

(1 mark)

$$\text{Also } q = \frac{2 \times 8 + 1 \times 5}{2 + 1}$$

$$q = \frac{16 + 5}{3} = \frac{21}{3} = 7 \quad (2)$$

(1 mark)

\therefore Substituting (2) in (1) we get

$$p - 3 \times 7 = 5$$

$$p = 26$$

(1 mark)

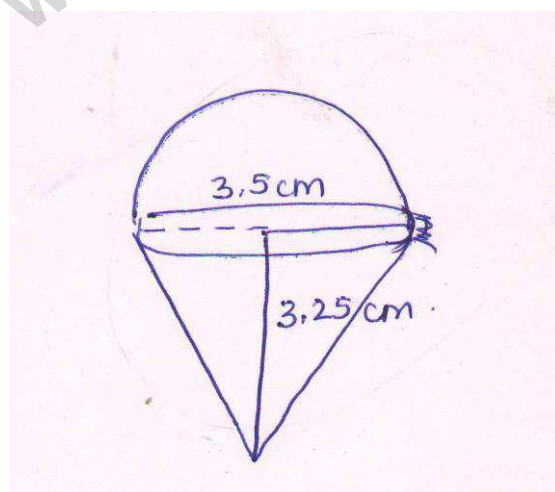
7. correct construction

(2 marks)

Steps of construction

(1 mark)

8.



$$\text{Curved surface area of the hemisphere} = \frac{1}{2} (4\pi r^2)$$

$$= \left(2 \times \frac{22}{7} \times \frac{3.5}{2} \times \frac{3.5}{2} \right) \text{ cm}^2 \quad (1 \text{ mark})$$

$$\text{Slant height of the cone (l)} = \sqrt{r^2 + h^2} = \sqrt{\frac{(3.5)^2}{(2)^2} + (3.25)^2}$$

$$= 3.7 \text{ cm (approx.)} \quad (1 \text{ mark})$$

$$\text{CSA of cone} = \pi r l = \frac{22}{7} \times \frac{3.5}{2} \times 3.7 \text{ cm}^2 \quad (1 \text{ mark})$$

$$\text{Total Curved Surface Area} = \frac{22}{7} \times \frac{3.5}{2} (3.5 + 3.7) \text{ cm}^2$$

$$= \frac{11}{2} \times 7.2 = 39.6 \text{ cm}^2 \text{ (approx.)} \quad (1 \text{ mark})$$

9. Sum of the roots = $\frac{-b}{a}$

$$\sqrt{2} = \frac{2\sqrt{2}}{k}$$

$$K = 2 \quad (1)$$

Now the quadratic equation is

$$2x^2 - 2\sqrt{2}x + 1 = 0$$

$$D = b^2 - 4ac = 8 - 8 = 0 \quad (1)$$

Roots are real and equal

$$x = \frac{2\sqrt{2} \pm \sqrt{0}}{4}$$

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

$$\therefore \text{Roots are } \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \quad (2)$$

10. $\tan \theta = \tan (90 - \theta)$

$$\tan \theta = \cot \theta$$

$$\rightarrow \theta = 45^\circ \quad (1)$$

In ΔDCE

$$\tan 45^\circ = \frac{80}{EC}$$

$$EC = 80 \text{ m} \quad (1)$$

In ΔABE

$$\frac{B}{H} = \cos 60^\circ$$

$$\frac{BE}{100} = \frac{1}{2}$$

$$BE = 50 \quad (1)$$

$$\therefore BC = BE + EC$$

$$= 50 + 80$$

$$= 130 \text{ m} \quad (1)$$

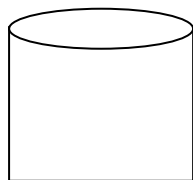
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VALUE BASED QUESTIONS

MATHEMATICS (047)

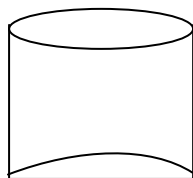
CLASS-X

Ramesh, a juice seller has set up his juice shop. He has three types of glasses of inner diameter 5 cm to serve the customers. The height of the glasses is 10 cm. (use $\pi = 3.14$)



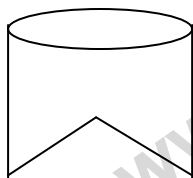
Type A

- A glass with a plane bottom.



Type B

- A glass with hemispherical raised bottom.



Type C

- A glass with conical raised bottom of height 1.5 cm.

He decided to serve the customer in "A" type of glasses.

1. Find the volume of glass of type A.
2. Which glass has the minimum capacity?
3. Which mathematical concept is used in above problem?
4. By choosing a glass of type A, which value is depicted by juice seller Ramesh?

ANSWER KEY

1. Diameter = 5 cm
 radius = 2.5 cm
 height = 10 cm

Volume of glass of type A = $\pi r^2 h$

$$= 3.14 \times 2.5 \times 2.5 \times 10$$

$$= 196.25 \text{ cm}^3$$

Volume of hemisphere = $\frac{2}{3} \pi r^3$

$$= \frac{2}{3} \times 3.14 \times 2.5 \times 2.5 \times 2.5$$

$$= 32.71 \text{ cm}^3$$

\therefore Volume of glass of type B = $196.25 - 32.71 = 163.54 \text{ cm}^3$

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

$$= \frac{1}{3} \times 3.14 \times 2.5 \times 2.5 \times 1.5$$

$$= 3.14 \times 2.5 \times 2.5 \times 0.5$$

$$= 9.81 \text{ cm}^3$$

Volume of glass of type C = $196.25 - 9.81$

$$= 186.44 \text{ cm}^3$$

(1) The volume of glass of type A = 196.25 cm^3 .

(2) The glass of type B has the minimum capacity of 163.54 cm^3 .

(3) Volume of solid figures (Mensuration)

(4) Honesty