

CLASS - X (MATHEMATICS)

TARGET MATHEMATICS

The Excellence Key...

by

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(M.Sc, B.Ed., M.Phill, P.hd)



Maximum Marks:

CODE-AG-TMC-TS-X-08-S-PR-0

Time Allowed: 3 hours

General Instructions:

- i. All the questions are compulsory.
- ii. The question paper consists of 40 questions divided into 4 sections A, B, C, and D.
- iii. Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises of 6 questions of 4 marks each.
- iv. There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each, and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
- v. Use of calculators is not permitted.

Section A

1. The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280, then the other number is
 - a. 150
 - b. 80
 - c. 100
 - d. 120
2. Every positive odd integer is of the form _____ where 'q' is some integer.

-
- a. $2q + 2$
- b. $5q + 1$
- c. $3q + 1$
- d. $2q + 1$
3. $Mode + \frac{3}{2}(Median - Mode) =$
- a. None of these
- b. Median
- c. Mean
- d. Mode
4. Rohan's mother is 26 years older than him. The product of their ages 3 years from now will be 360, then Rohan's present age is
- a. 6 years
- b. 7 years
- c. 10 years
- d. 8 years
5. Given that $\sin \theta = \frac{a}{b}$, then $\cos \theta$ is equal to
- a. $\frac{\sqrt{b^2 - a^2}}{b}$
- b. $\frac{b}{a}$
- c. $\frac{\sqrt{b^2 + a^2}}{b}$
- d. $\frac{b}{\sqrt{b^2 - a^2}}$
6. If $5 \tan \alpha = 4$, then the value of $\frac{5 \sin \alpha - 3 \cos \alpha}{5 \sin \alpha + 2 \cos \alpha}$ is
-

-
- a. $\frac{1}{5}$
- b. $\frac{4}{5}$
- c. $\frac{1}{4}$
- d. $\frac{1}{6}$
7. The angle of elevation and the angle of depression from an object on the ground to an object in the air are related as
- a. greater than
- b. equal
- c. less than
- d. None of these
8. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is
- a. 15 units
- b. 10 units
- c. 9 units
- d. 12 units
9. The distance between $(at^2, 2at)$ and $(\frac{a}{t^2}, \frac{-2a}{t})$ is
- a. $a\left(t^2 + \frac{1}{t^2}\right) \text{ units}$
- b. $a\left(t - \frac{1}{t}\right)^2 \text{ units}$
- c. $a\left(t + \frac{1}{t}\right)^2 \text{ units}$
- d. $\left(t + \frac{1}{t}\right)^2 \text{ units}$
10. The probability of guessing the correct answer to certain text questions is $\frac{x}{12}$. If the probability of not guessing the answer is $\frac{5}{8}$, then the value of x is

-
- a. 1
 - b. 0
 - c. 4
 - d. 4.5

11. Fill in the blanks:

The mirror image of (3, 9) on x-axis is _____.

12. Fill in the blanks:

If 'x + a' is a factor (zero) of the polynomial $2x^2 + 2ax + 5x + 10$, the value of 'a' is _____.

OR

Fill in the blanks:

The degree of polynomial $p(x) = x + \sqrt{2 + 1}$ is _____.

13. Fill in the blanks:

$\triangle ABC$ and $\triangle DEF$ are similar. Area of $\triangle ABC$ is 9cm^2 and Area of $\triangle DEF$ is 64cm^2 . If $DE = 5.1\text{cm}$, then the value of AB is _____.

14. Fill in the blanks:

If S_n and S_{n-1} is the sum of first n and (n - 1) term of an AP, then its n^{th} term, a_n is given by _____.

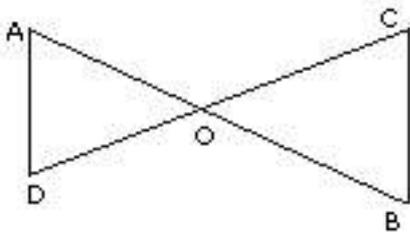
15. Fill in the blanks:

The Abscissa is _____ to the right of y-axis and is _____ to the left of y-axis.

16. If - 1 is a zero of the polynomial $f(x) = x^2 - 7x - 8$, then calculate the other zero.

17. In the given figure, $OA \times OB = OC \times OD$ or $\frac{OA}{OC} = \frac{OD}{OB}$ prove that $\angle A = \angle C$ and $\angle B$

$= \angle D$

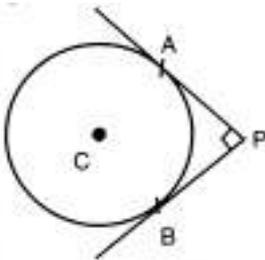


18. For the following APs, write the first term and the common difference : 3, 1, -1, -3,

OR

Find the 9th term from the end (towards the first term) of the A.P. 5, 9, 13, ..., 185.

19. In fig., PA and PB are two tangents drawn from an external point P to a circle with centre C and radius 4 cm. If $PA \perp PB$, then find the length of each tangent.



20. Find the positive root of $\sqrt{3x^2 + 6} = 9$.

Section B

21. A child has a die whose six faces show the letters as given below:

A		B		C		D		E		A
----------	--	----------	--	----------	--	----------	--	----------	--	----------

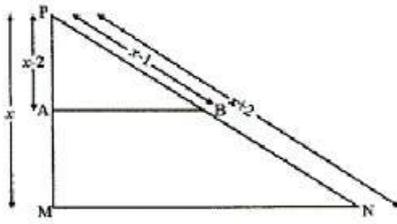
The die is thrown once. What is the probability of getting (i) A? (ii) D?

22. Find the roots of the equation, if they exist, by applying the quadratic formula: $x^2 + x + 2 = 0$.

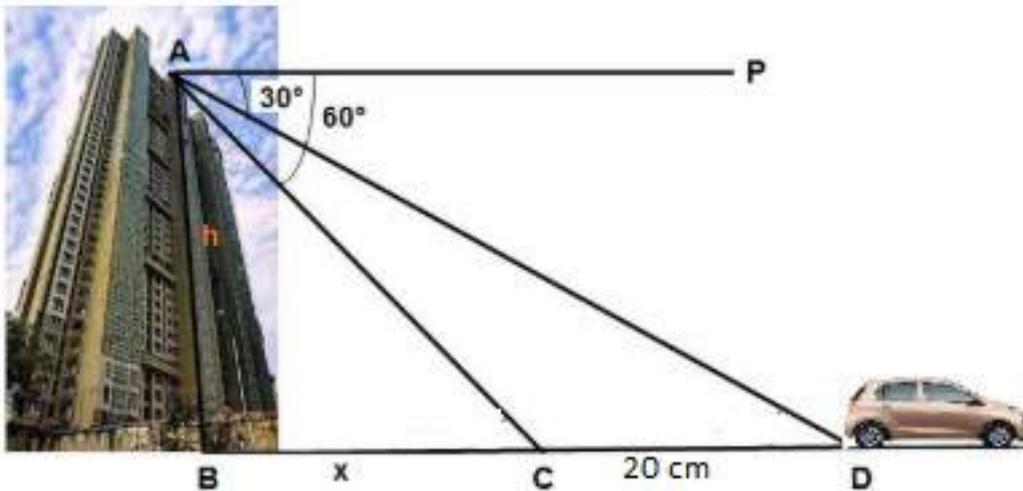
23. In $\triangle ABC$, AD is the bisector of $\angle A$. If $AB = 5.6$ cm, $AC = 4$ cm and $DC = 3$ cm, find BC.

OR

$AB \parallel MN$. If $PA = x - 2$, $PM = x$, $PB = x - 1$ and $PN = x + 2$, Find the value of x .

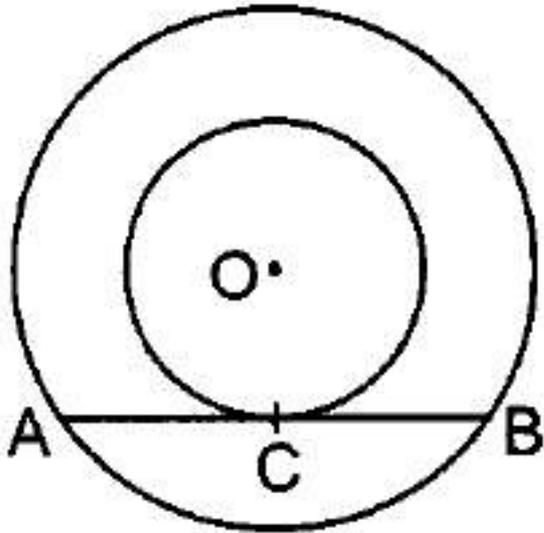


24. Vijay lives in a flat in a multi-story building. His driving was rough so his father keeps eye on his driving. Once he drives from his house to Faridabad. His father was standing on the top of the building at point A as shown in the figure. At point C, the angle of depression of a car from the building was 60° . After accelerating 20 m from point C, Vijay stops at point D to buy ice-cream and the angle of depression changed to 30° .



By analysing the above given situation answer the following questions:

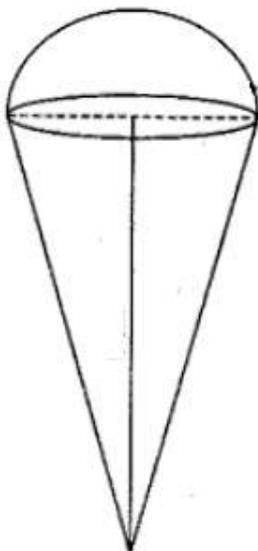
- i. Find the value of x .
 - ii. Find the height of the building AB .
25. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact. Using the above, do the following: In figure, O is the centre of the two concentric circles. AB is a chord of the larger circle touching the smaller circle at C . Prove that $AC = BC$.



OR

PA and PB are tangents from P to the circle with centre O. At the point M, a tangent is drawn cutting PA at K and PB at N. Prove that $KN = AK + BN$.

26. An 'ice-cream seller used to sell different kinds and different shapes of ice-cream like rectangular shaped with one end hemispherical, cone-shaped and rectangular brick, etc. One day a child came to his shop and purchased an ice-cream which has the following shape: ice-cream cone as the union of a right circular cone and a hemisphere that has the same (circular) base as the cone. The height of the cone is 9 cm and the radius of its base is 2.5 cm.



By reading the above-given information, find the following:

- i. The volume of the ice-cream without hemispherical end.

ii. The volume of the ice-cream with a hemispherical end.

Section C

27. Express the number $0.\overline{3178}$ in the form of rational number $\frac{a}{b}$.

OR

Find the LCM of the following polynomials: $a^8 - b^8$ and $(a^4 - b^4)(a + b)$

28. In an AP: $d = 5$, $S_9 = 75$, find a and a_9 .

29. Solve the following pairs of equations by reducing them to a pair of linear equations:

$$\frac{1}{(3x+y)} + \frac{1}{(3x-y)} = \frac{3}{4} \text{ and } \frac{1}{2(3x+y)} - \frac{1}{2(3x-y)} = \frac{-1}{8}$$

OR

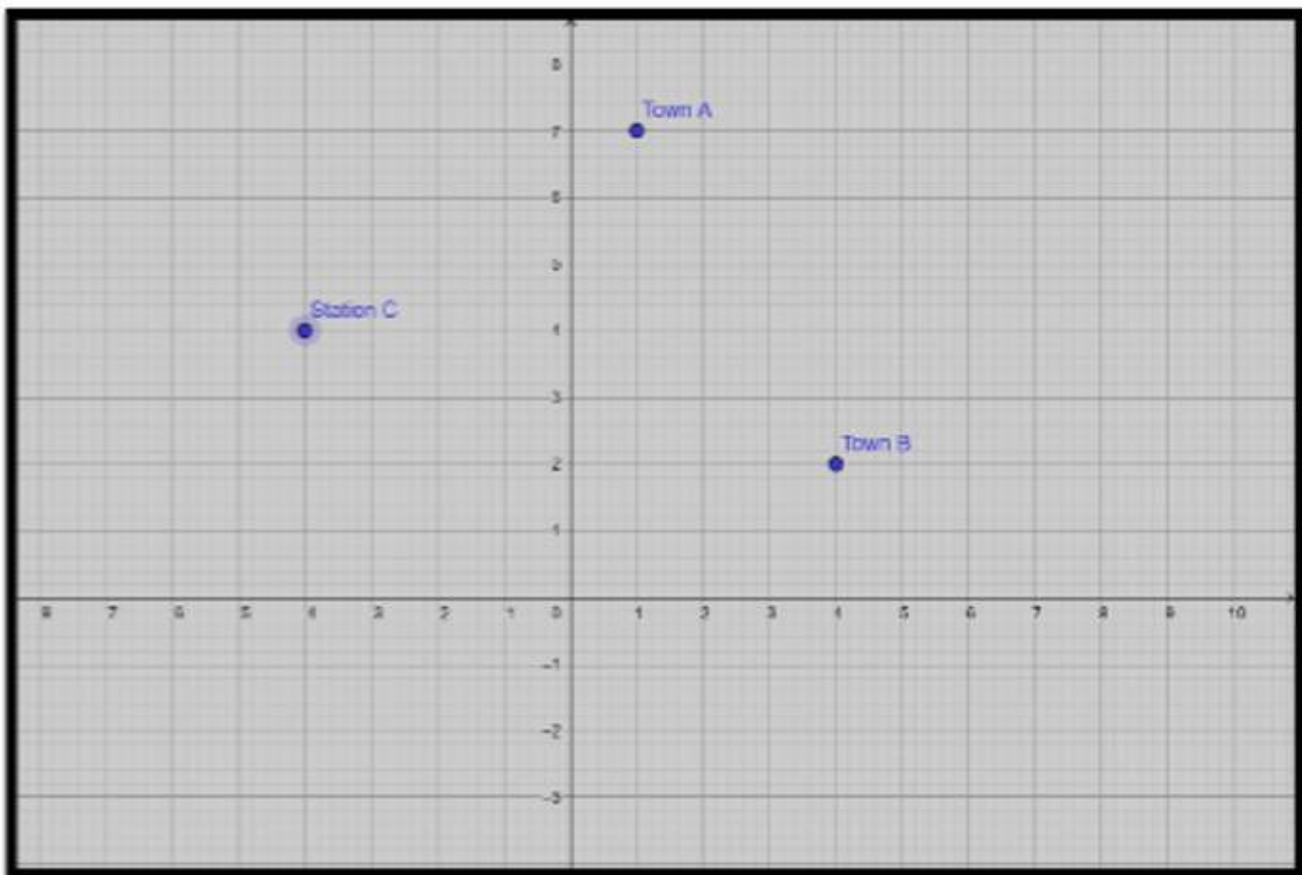
The sum of a two digit number and the number formed by interchanging its digits is 110. If 10 is subtracted from the first number. The new number is 4 more than 5 times the sum of the digits in the first number. Find the first number.

30. Obtain all zeros of the polynomial $(2x^3 - 4x - x^2 + 2)$, if two of its zeros are $\sqrt{2}$ and $-\sqrt{2}$

31. Two friends Seema and Aditya work in the same office in Delhi. In the Christmas vacations, both decided to go their hometowns represented by Town A and Town B respectively in the figure given below. Town A and Town B are connected by trains from the same station C (in the given figure) in Delhi. Based on the given situation answer the following questions:



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- i. Who will travel more distance, Seema or Aditya, to reach to their hometown?
- ii. Seema and Aditya planned to meet at a location D situated at a point D represented by the mid-point of the line joining the point represented by Town A and Town B. Find the coordinates of the point represented by the point D.
- iii. Find the area of the triangle formed by joining the points represented by A, B and C.

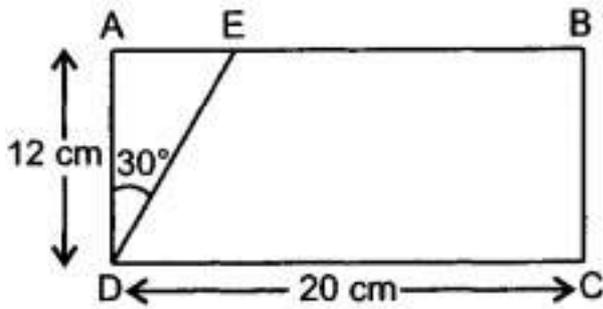
32. If $\tan A = n \tan B$ and $\sin A = m \sin B$, then prove that $\cos^2 A = \frac{m^2 - 1}{n^2 - 1}$

OR

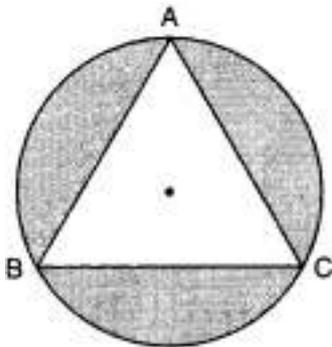
In the given figure, ABCD is a rectangle with AD = 12 cm and DC = 20 cm. Line segment DE is drawn making an angle of 30° with AD, intersecting AB at E. Find the length of DE and AE.

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33. In fig., an equilateral triangle ABC of side 6 cm has been inscribed in a circle. Find the area of the shaded region. (Take $\pi = 3.14$).



34. Find the mean of the following data :

Class	Less than 20	Less than 40	Less than 60	Less than 80	Less than 100
Cumulative Frequency	15	37	74	99	120

Section D

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35. Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle and measure their lengths.
36. In a $\triangle ABC$, 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.
37. Solve the following pair of equations graphically:(i.e. has no solution):

$$3x - 4y - 1 = 0$$

$$2x - \frac{8}{3}y + 5 = 0$$

OR

Solve the following system of equations graphically:

$$x + 2y - 7 = 0$$

$$2x - y - 4 = 0$$

38. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank which is 10 m in diameter and 2 m deep. If the water flows through the pipe at the rate of 4 km/hr, in how much time will the tank be filled completely?

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OR

From a solid cylinder of height 14 cm and base diameter 7 cm, two equal conical holes each of radius 2.1 cm and height 4 cm are cut off. Find the volume of the remaining solid.

39. An aeroplane flying horizontally 1 km above the ground is observed at an elevation of 60° . After 10 seconds, its elevation is observed to 30° . Find the speed of the aeroplane in km/hr.
40. A survey regarding the heights (in cm) of 50 girls of a class was conducted and the following data was obtained:

Height(in cm)	120 - 130	130 - 140	140 - 150	150 - 160	160 - 170	170 -180
Number of girls	2	8	12	20	8	50

Find the mean, median and mode of the above data.



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