

ACHIEVERS FOUNDATION

SAMPLE PAPER TEST 03 (BOARD EXAM)

SUBJECT: MATHEMATICS

MAX. MARKS : 80

CLASS : X

DURATION : 3 HRS

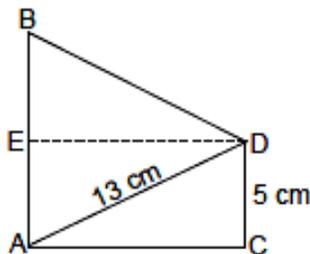
General Instruction:

1. This Question Paper has 5 Sections A-E.
2. **Section A** has 20 MCQs carrying 1 mark each.
3. **Section B** has 5 questions carrying 02 marks each.
4. **Section C** has 6 questions carrying 03 marks each.
5. **Section D** has 4 questions carrying 05 marks each.
6. **Section E** has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

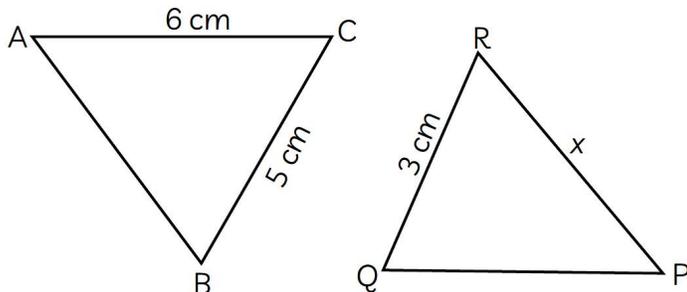
SECTION – A

Questions 1 to 20 carry 1 mark each.

1. The solution of the following pair of equation is:
 $x - 3y = 2, 3x - y = 14$
(a) $x = 5, y = 1$ (b) $x = 2, y = 3$ (c) $x = 1, y = 2$ (d) $x = 1, y = 4$
2. In $\triangle ABC$, right angled at B, $AB = 5$ cm and $\sin C = 1/2$. Determine the length of side AC.
(a) 10 cm (b) 15 cm (c) 20 cm (d) none of these
3. In the given figure, if $AB = 14$ cm, then the value of $\tan B$ is:



- (a) $\frac{4}{3}$ (b) $\frac{14}{3}$ (c) $\frac{5}{3}$ (d) $\frac{13}{3}$
4. If the distance between the points $(4,p)$ and $(1,0)$ is 5, then value of p is
(a) 4 only (b) ± 4 (c) -4 only (d) 0
 5. In the given figure, $\triangle ABC \sim \triangle QPR$. If $AC = 6$ cm, $BC = 5$ cm, $QR = 3$ cm and $PR = x$; then the value of x is:



- (a) 3.6 cm (b) 2.5 cm (c) 10 cm (d) 3.2 cm

6. 108 can be expressed as a product of its primes as
 (a) $2^3 \times 3^2$ (b) $2^3 \times 3^3$ (c) $2^2 \times 3^2$ (d) $2^2 \times 3^3$
7. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then the value of k is
 (a) 10 (b) -10 (c) 5 (d) -5
8. If $x = a \cos \theta$ and $y = b \sin \theta$, then the value of $b^2x^2 + a^2y^2$ is
 (a) $a^2 + b^2$ (b) a^2/b^2 (c) a^2b^2 (d) None of these
9. If angle between two radii of a circle is 130° , the angle between the tangents at the ends of the radii is :
 (a) 90° (b) 50° (c) 70° (d) 40°
10. The relationship between mean, median and mode for a moderately skewed distribution is
 (a) mode = median - 2 mean (b) mode = 3 median - 2 mean
 (c) mode = 2 median - 3 mean (d) mode = median - mean

11. For the following distribution:

Class	0-5	6-11	12-17	18-23	24-29
Frequency	13	10	15	8	11

the upper limit of the median class is

- (a) 18.5 (b) 20.5 (c) 25.5 (d) 17.5
12. Two cubes each with 6 cm edge are joined end to end. The surface area of the resulting cuboid is
 (a) 180 cm^2 (b) 360 cm^2 (c) 300 cm^2 (d) 260 cm^2
13. A cone, a hemisphere and cylinder are of the same base and of the same height. The ratio of their volumes is
 (a) 1 : 2 : 3 (b) 2 : 1 : 3 (c) 3 : 1 : 2 (d) 3 : 2 : 1
14. A card is selected from a deck of 52 cards. The probability of being a red face card is
 (a) $3/26$ (b) $3/13$ (c) $2/13$ (d) $1/2$
15. If the radii of two circles are in the ratio of 4 : 3, then their areas are in the ratio of :
 (a) 4 : 3 (b) 8 : 3 (c) 16 : 9 (d) 9 : 16
16. In the $\triangle ABC$, D and E are points on side AB and AC respectively such that $DE \parallel BC$.
 If $AE = 2 \text{ cm}$, $AD = 3 \text{ cm}$ and $BD = 4.5 \text{ cm}$, then CE equals
 (a) 1 cm (b) 2 cm (c) 3 cm (d) 4 cm
17. What is the positive real root of $64x^2 - 1 = 0$?
 (a) $1/8$ (b) $1/4$ (c) $1/2$ (d) $1/6$
18. If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$, where x and y are prime numbers, then the HCF (a, b) is:
 (a) xy (b) xy^2 (c) x^3y^3 (d) x^2y^2

DIRECTION: In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option

- (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 and reason (R) is not 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.

19. Assertion (A): The HCF of two numbers is 9 and their LCM is 2016. If the one number is 54, then the other number is 336.

Reason (R): Relation between numbers and their HCF and LCM is product of two numbers $a, b = \text{HCF}(a, b) \times \text{LCM}(a, b)$.

20. Assertion (A): The value of y is 3, if the distance between the points $P(2, -3)$ and $Q(10, y)$ is 10.

Reason (R): Distance between two points is given by $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

SECTION – B

Questions 21 to 25 carry 2 marks each.

21. For what value of k for which the following pair of linear equations have infinitely many solutions: $2x + 3y = 7$, $(k - 1)x + (k + 2)y = 3k$ is

22. Simplify: $\frac{\tan^2 \theta}{1 + \tan^2 \theta} + \frac{\cot^2 \theta}{1 + \cot^2 \theta}$

OR

If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta$ and $x \sin \theta = y \cos \theta$ then find $x^2 + y^2$.

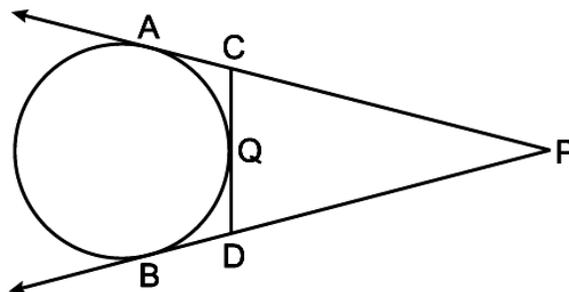
23. X is a point on the side BC of $\triangle ABC$. XM and XN are drawn parallel to AB and AC respectively meeting AB in N and AC in M . MN produced meets CB produced at T . Prove that $TX^2 = TB \times TC$.

24. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

OR

In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find (i) the length of the arc (ii) area of the sector formed by the arc

25. In figure PA and PB are tangents to the circle drawn from an external point P . CD is the third tangent touching the circle at Q . If $PA = 15$ cm, find the perimeter of $\triangle PCD$.



SECTION – C

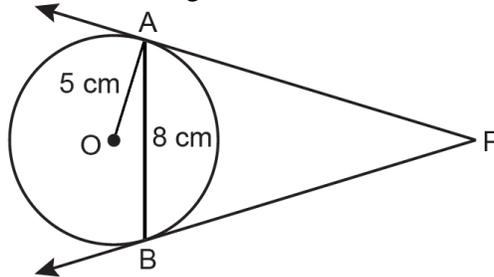
Questions 26 to 31 carry 3 marks each.

26. A part of monthly hostel charges in a college is fixed and the remaining depends on the number of days one has taken food in the mess. When a student 'A' takes food for 22 days, he has to pay Rs. 1380 as hostel charges; whereas a student 'B', who takes food for 28 days, pays Rs. 1680 as hostel charges. Find the fixed charges and the cost of food per day.

OR

Meena went to a bank to withdraw Rs 2,000. She asked the cashier to give her Rs. 50 and Rs. 100 notes only. Meena got 25 notes in all. How many notes of Rs. 50 and Rs. 100 she received?

27. If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of $2x^2 - 5x - 3$, then find the values of p and q
28. Two dice are thrown at the same time. What is the probability that the sum of the two numbers appearing on the top of the dice is
(i) 8? (ii) 7? (iii) less than or equal to 12?
29. In the given figure, AB is a chord of length 8 cm of a circle of radius 5 cm. The tangents to the circle at A and B intersect at P . Find the length of AP .



OR

Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

30. If $\sec \theta + \tan \theta = p$, prove that $\sin \theta = \frac{p^2 - 1}{p^2 + 1}$.

31. Prove that $\sqrt{5}$ is an irrational number.

SECTION – D

Questions 32 to 35 carry 5 marks each.

32. Some students planned a picnic. The total budget for food was Rs. 2,000. But 5 students failed to attend the picnic and thus the cost of food for each member increased by Rs. 20. How many students attended the picnic and how much did each student pay for the food?

OR

A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produced in a day. On a particular day, the total cost of production was Rs. 750. Find out the number of toys produced on that day.

33. The following frequency distribution gives the monthly consumption of 68 consumers of a locality. Find median, mean and mode of the data and compare them.

Monthly consumption of electricity (in units)	Number of consumers
65-85	4
85-105	5
105-125	13
125-145	20
145-165	14
165-185	8
185-205	4

34. (a) Two cubes each of volume 125 cm^3 are joined end to end. Find the volume and the surface area of the resulting cuboid.

OR

- (b) A solid is in the shape of a cone surmounted on a hemisphere with both their diameters being equal to 7 cm and the height of the cone is equal to its radius. Find the volume of the solid.

35. State and Prove Basic Proportionality Theorem.

SECTION – E(Case Study Based Questions)

Questions 36 to 38 carry 4 marks each.

36. Case Study – 1

Lakshman Jhula is located 5 kilometers north-east of the city of Rishikesh in the Indian state of Uttarakhand. The bridge connects the villages of Tapovan to Jonk. Tapovan is in Tehri Garhwal district, on the west bank of the river, while Jonk is in Pauri Garhwal district, on the east bank. Lakshman Jhula is a pedestrian bridge also used by motorbikes. It is a landmark of Rishikesh. A group of Class X students visited Rishikesh in Uttarakhand on a trip. They observed from a point (P) on a river bridge that the angles of depression of opposite banks of the river are 60° and 30° respectively. The height of the bridge is about 18 meters from the river.



Based on the above information answer the following questions.

- (i) Find the distance PA. (1)
(ii) Find the distance PB (1)
(iii) Find the width AB of the river. (2)

OR

- (iii) Find the height BQ if the angle of the elevation from P to Q be 30° . (2)

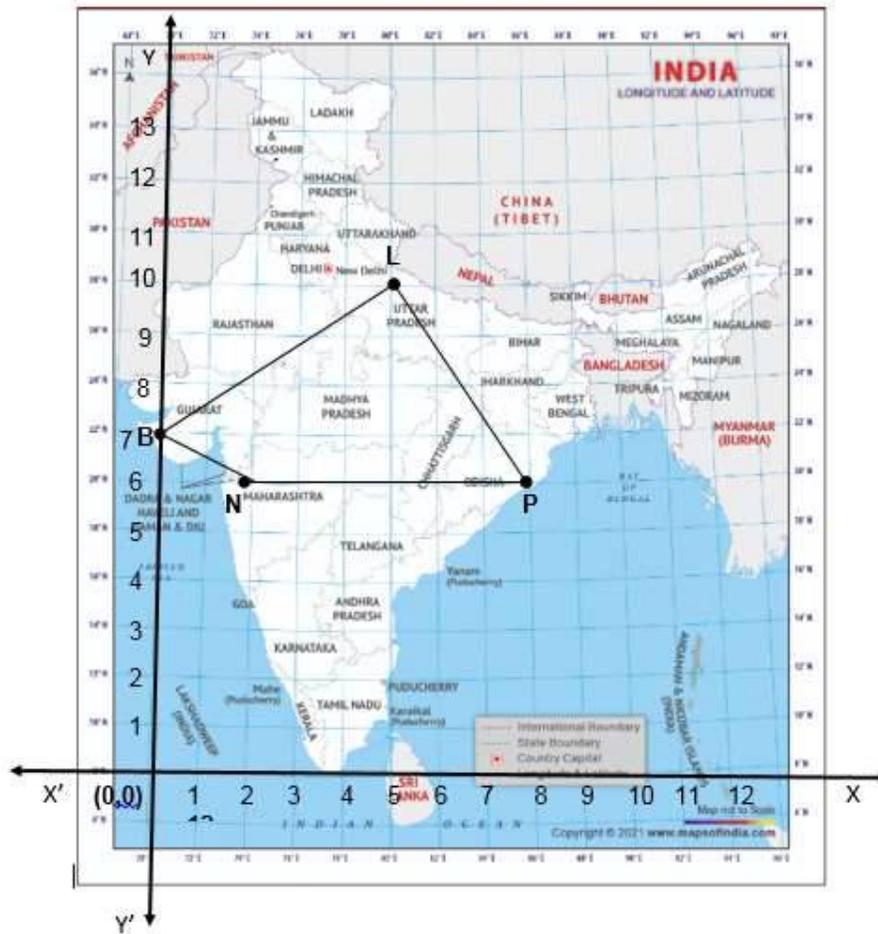
37. Case Study – 2

In a GPS, The lines that run east-west are known as lines of latitude, and the lines running north-south are known as lines of longitude. The latitude and the longitude of a place are its coordinates and the distance formula is used to find the distance between two places. The distance between two parallel lines is approximately 150 km. A family from Uttar Pradesh planned a round trip from Lucknow (L) to Puri (P) via Bhuj (B) and Nashik (N) as shown in the given figure below. Based on the above information answer the following questions using the coordinate geometry.

- (i) Find the distance between Lucknow (L) to Bhuj(B).
(ii) If Kota (K), internally divide the line segment joining Lucknow (L) to Bhuj (B) into 3 : 2 then find the coordinate of Kota (K).
(iii) Name the type of triangle formed by the places Lucknow (L), Nashik (N) and Puri (P)

OR

Find a place (point) on the longitude (y-axis) which is equidistant from the points Lucknow (L) and Puri (P).



38. Case Study – 3

In the month of April to June 2022, the exports of passenger cars from India increased by 26% in the corresponding quarter of 2021–22, as per a report. A car manufacturing company planned to produce 1800 cars in 4th year and 2600 cars in 8th year. Assuming that the production increases uniformly by a fixed number every year.



Based on the above information answer the following questions.

- (i) Find the production in the 1st year. (1)
- (ii) Find the production in the 12th year. (1)
- (iii) Find the total production in first 10 years. (2)

OR

- (iii) In how many years will the total production reach 31200 cars? (2)