**CBSE**
**Class X Mathematics (Standard)**
**Sample Paper – 5 (2024-25)**

**Time: 3 Hours** **Total Marks: 80**

---

**General Instructions:**

1. This Question Paper has 5 Sections A - E.
2. Section A has 18 multiple choice questions and 2 Assertion-Reason based questions 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 subparts 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 2 marks questions of Section E.
8. Draw neat figures wherever required. Take π = 22/7 wherever required if not stated.

---

## Section A

**Section A consists of 20 questions of 1 mark each.**

Choose the correct answers to the questions from the given options. [20]

**1.** If LCM of 336 and 54 is 3024, then find HCF.

A. 3
B. 6
C. 9
D. 12

**2.** Find a quadratic polynomial with the given numbers as the sum and product of its zeroes respectively: $\frac{1}{4}, -1$

A. $k(x^2 - x - 4)$
B. $k(x^2 - 4x - 4)$
C. $k(4x^2 - x - 4)$
D. $k(4x^2 - 3x - 4)$

**3.** If $\frac{4}{5}, a, 2$ are three consecutive terms of an AP, then find the value of a.

A. 14/5
B. 5/7
C. 7/5
D. 4/5

**4.** If two linear equations in x and y have more than two solutions, then the lines …

A. are parallel
B. coincide
C. intersect
D. None of these

**5.** Roots of the quadratic equation $21x^2 + 11x - 2 = 0$ are

A. −1/7 and 2/3
B. 1/7 and −2/3
C. −1/7 and −2/3
D. 1/7 and 2/3

**6.** The perimeter of the triangle formed by the points (0, 0), (1, 0) and (0, 1) is

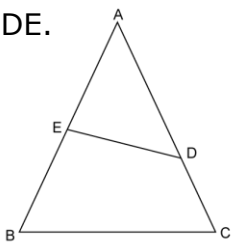
A. $\sqrt{2}$
B. $1 + \sqrt{2}$ units
C. $2 + \sqrt{2}$ units
D. $2\sqrt{2}$ units

**7.** Distance of a point (6, −6) from the origin is

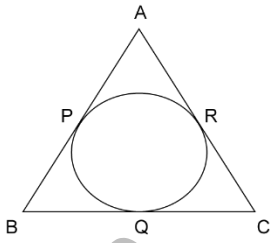
A. $6\sqrt{2}$ units
B. $\sqrt{2}$ units
C. 6 units
D. 12 units

**8.** In the given figure, if $\angle ADE = \angle B$, show that $\Delta ADE \sim \Delta ABC$. Also, if AD = 3.8 cm, AE = 3.6 cm, BE = 2.1 cm and BC = 4.2 cm, then find DE.

A. 2.2 cm
B. 2.4 cm
C. 2.6 cm
D. 2.8 cm



**9.** A circle is inscribed in a $\Delta ABC$, touching AB, BC and AC at P, Q and R, respectively. If AB = 10 cm, AR = 7 cm and CR = 5 cm, find the length of BC.




A. 2 cm
B. 5 cm
C. 7 cm
D. 8 cm

**10.** The next term of an A.P. $\sqrt{7}, \sqrt{28}, \sqrt{63}, \ldots$ is

A. $\sqrt{7}$
B. $\sqrt{28}$
C. $\sqrt{112}$
D. $\sqrt{126}$

**11.** Which of the following is not defined?

A. cosec $0^o$
B. cos $0^o$
C. sec $0^o$
D. tan $0^o$

**12.** If $2\sin^2\theta - \cos^2\theta = 2$, then find the value of $\theta$.

A. $30°$
B. $60°$
C. $90°$
D. $120°$

**13.** If $\sqrt{3}\tan\theta - 1 = 0$, find the value of $\sin^2\theta - \cos^2\theta$.

A. $\frac{-1}{2}$
B. $\frac{1}{2}$
C. $\frac{1}{3}$
D. $\frac{-1}{3}$

**14.** Curved surface area of cone is given by

A. $\pi rh$
B. $\pi r^2$
C. $2\pi rh$
D. $\pi rl$

**15.** A horse is tethered to one corner of a field which is in the shape of an equilateral triangle of side 12 m. If the length of the rope is 7 m, find the area of the field which the horse can graze.

A. 34.55 $m^2$
B. 53.57 $m^2$
C. 25.67 $m^2$
D. 45.35 $m^2$

**16.** Find the mean of the data: 3, 11, 5, 2, 6, 8, 7

A. 7
B. 6
C. 5
D. 5.5

**17.** Find the mode of the data: 1, 3, 2, 5, 6, 6, 6, 3, 2, 3, 1, 3, 4, 4, 5, 5, 3, 1, 2, 6

A. 2
B. 3
C. 5
D. 6

**18.** Out of a day's production, which is 1000 machine parts, 100 were found to be sub-standard. The probability that a part selected at random being up to the standard is

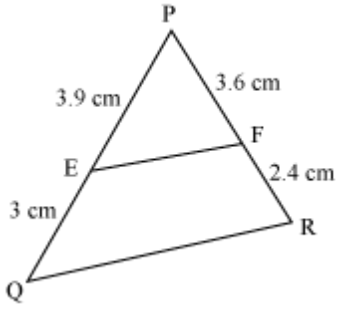
A. $\frac{9}{10}$
B. $\frac{1}{10}$
C. 0
D. None of these

**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

**19.** **Statement A (Assertion):** The length of a chain used as the boundary of a semi-circular park is 90 m. Hence the area of the park will be 481.25 $m^2$.
**Statement R (Reason):** If the radius of the circle is 'r', then, $\pi r + 2r = 90°$.

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.

**20. Statement A (Assertion):** In the following figure, EF || QR.




**Statement R (Reason):** If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.

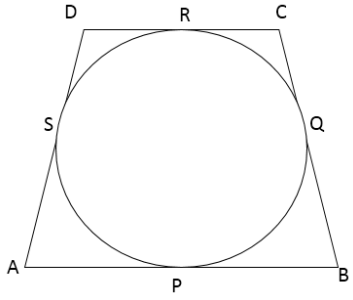
A. Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
B. Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
C. Assertion (A) is true but reason (R) is false.
D. Assertion (A) is false but reason (R) is true.

## Section B

**21.** Prove that $3 + 2\sqrt{5}$ is an irrational number. [2]

**22.** P and Q are the points on the sides AB and AC, respectively, of a $\Delta ABC$. If AP = 2 cm, PB = 4 cm, AQ = 3 cm and QC = 6 cm, show that BC = 3PQ. [2]

**23.** In the given figure, a circle touches all the four sides of a quadrilateral ABCD whose three sides are AB = 6 cm, BC = 7 cm and CD = 4 cm. Find AD. [2]




**24.** Prove that: $(\sin\theta + \cos\theta)(\tan\theta + \cot\theta) = \sec\theta + \operatorname{cosec}\theta$ [2]

**OR**

Prove that $\dfrac{1+\sec\theta-\tan\theta}{1+\sec\theta+\tan\theta} = \dfrac{1-\sin\theta}{\cos\theta}$

**25.** Find the area of a ring whose outer and inner radii are 23 cm and 12 cm. [2]

**OR**

A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel.

## Section C

**Section C consists of 6 questions of 3 marks each.**

**26.** There is a circular path around a sports field. Sonia takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction, after how many minutes will they meet again at the starting point? [3]

**27.** Find two numbers whose sum is 27 and product is 182. [3]

**28.** If $\propto$ and $\beta$ are the zeroes of the polynomial $p(x) = 2x^2 + 5x + k$ satisfying the relation $\propto^2 + \beta^2 + \propto\beta = 21/4$, then find the value of k. [3]

**OR**

The monthly incomes of A and B are in the ratio 5 : 4 and their monthly expenditures are in the ratio 7 : 5. If each saves Rs. 3000 per month, then find the monthly income of each. [3]

**29.** Find the four angles of a cyclic quadrilateral ABCD in which $\angle A = (x + y + 10)°$, $\angle B = (y + 20)°$, $\angle C = (x + y - 30)°$ and $\angle D = (x + y)°$. [3]

**OR**

AX and DY are the altitudes of two similar triangles ABC and DEF.
Prove that AX : DY = AB : DE. [3]

**30.** If $\cos\theta = \frac{7}{25}$, find the values of all T-ratios of $\theta$. [3]

**31.** Two dice are thrown simultaneously. What is the probability that [3]

i. 5 will not come up on either of them?
ii. 5 will not come up on at least one?
iii. 5 will come up at both dice?

## Section D

**Section D consists of 4 questions of 5 marks each.**

**32.** A sailor can row a boat 8 km downstream and return to the start point in 1 hour 40 minutes. If the speed of the stream is 2 km/hr, then find the speed of the boat in still water. [5]

**OR**

Two pipes running together can fill a cistern in $3\frac{1}{13}$ minutes. If one pipe takes 3 minutes more than the other to fill it, then find the time in which each pipe would fill the cistern.

**33.** ABCD is a trapezium in which AB || DC and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{OC}{OD}$ [5]

**34.** From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest $cm^2$. [5]

**OR**

A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs. 500 per $m^2$.

**35.** The following distribution shows the daily pocket allowance of children of a locality. The mean pocket allowance is Rs.18. Find the missing frequency. [5]

| Daily pocket allowance (in Rs) | 11–13 | 13–15 | 15–17 | 17–19 | 19–21 | 21–23 | 23–25 |
|---|---|---|---|---|---|---|---|
| Number of workers | 7 | 6 | 9 | 13 | f | 5 | 4 |

## Section E
**Case study based questions are compulsory.**

**36.** Rakesh is much worried about his upcoming assessment on A.P. He was vigorously practicing for the exam but unable to solve some questions. One of these questions is as shown below. If the $3^{rd}$ and the $9^{th}$ terms of an A.P. are 4 and –8 respectively, then help Rakesh in solving the problem.

i. What is the common difference? [1]

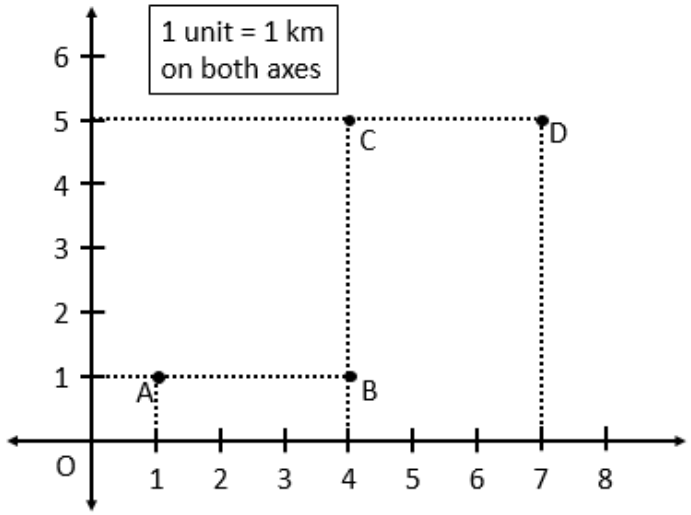
ii. What is the first term? [1]

iii. Which term of the A.P. is –160? [2]

**OR**

What is the $75^{th}$ term of the A.P.? [2]

**37.** Amey runs a grocery store that offers home delivery of fresh groceries to its customers. His store is located at location A as indicated in the graph below. Now, he receives regular orders from the families living in the colonies located at B, C and D. Now, using the data given, answer the following questions.




i. Find the shortest distance between locations A and C. [2]

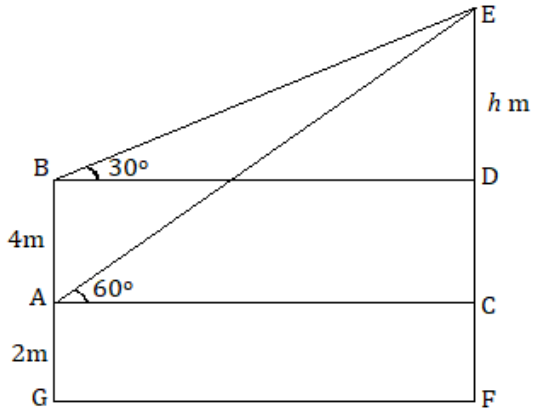
**OR**

Find the shortest distance between locations B and D. [2]

ii. Find the shortest distance between locations B and A. [1]

iii. Find the shortest distance between locations C and B. [1]

**38.** Reema's house has two windows. First is at the height of 2 m above the ground and the second is at the height of 4 m above the first window. Reema and her brother Rishabh are watching outside from the two windows at points A and B respectively. Now, the angles of elevation of an airplane from these windows are observed to be 60° and 30° as shown below.




Based on the above information, answer the following questions.

i. Who is more far from the airplane? [1]

ii. Find the length of BD in terms of h. [2]

**OR**

The value of h is ___. [2]

iii. Find the distance between the airplane and the ground. [1]