# MATHEMATICS

**CBSE SOLVED** · (With Answers) **SA - 2**  **SAMPLE PAPER**

## CLASS X

| Time Allowed : 3 Hours] | [Maximum Marks : 80 |
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**General Instructions :**

(i) All questions are compulsory.

(ii) The question paper consists of 34 questions divided into four sections A, B, C and D. Section A comprises of 10 questions of 1 mark each. Section B comprises of 8 questions of 2 marks each, Section C comprises of 10 questions of 3 marks each and Section D comprises of 6 questions of 4 marks each.

(iii) Question numbers 1 to 10 in Section A are multiple choice questions where you are to select one correct option out of the given four.

(iv) There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four marks each. You have to attempt only one of the alternatives in all such questions.

(v) Use of calculators is not permitted.

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## Section 'A'

Question numbers 1 to 10 are of one mark each.

**1.** Which term of an A.P. : 2, – 1, – 4, ........ is – 70 ?

(a) 15th        (b) 18th

(c) 25th        (d) 30th

**2.** The radii of two circles are 9 cm and 12 cm. The radius of a circle whose area is equal to the sum of the areas of the two circles is

(a) 15 cm        (b) 14 cm

(c) 13 cm        (d) 12 cm

**3.** If $2k - 1$, 7, $3k$ are three consecutive terms of an A.P., then $k$ is equal

(a) 4        (b) 3

(c) 2        (d) 1

**4.** The value of $k$ for which the equation $x^2 + 2(k + 1)x + k^2 = 0$ has equal roots is

(a) $\dfrac{1}{2}$        (b) $-1$

(c) 1        (d) $-\dfrac{1}{2}$

**5.** Two numbers $p$ and $q$ are such that the equation $px^2 + 3x + 2q = 0$ has $-6$ as the sum of roots and also as the product of roots, the values of $p$ and $q$ are

(a) $\dfrac{1}{2}$ and $-\dfrac{3}{2}$        (b) $\dfrac{1}{2}$ and $\dfrac{3}{2}$

(c) $\frac{3}{2}$ and $\frac{1}{2}$        (d) $\frac{3}{2}$ and $-\frac{1}{2}$

**6.** If the area of two circles are in the ratio 9 : 25, then the ratio between their circumferences is

(a) 3 : 5          (b) 5 : 3

(c) 4 : 5          (d) 5 : 4

**7.** A card is drawn from a pack of cards numbered 1 to 52. The probability that the number on the card is a prime number less than 30 is

(a) $\frac{5}{13}$        (b) $\frac{5}{26}$

(c) $\frac{2}{13}$        (d) $\frac{3}{13}$

**8.** If $A(1, 2)$ $B(4, 3)$ and $C(6, 6)$ are the three vertices of a parallelogram $ABCD$, then the coordinates of the fourth vertex are
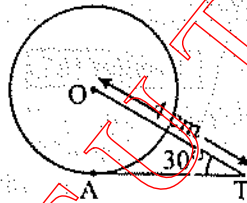
(a) (3, 5)          (b) (3, 4)

(c) (5, 3)          (d) (4, 3)

**9.** In figure, $AT$ is a tangent to the circle with centre $O$ such that $OT = 4$ cm and $\angle OTA = 30°$. Then $AT$ is equal to



(a) 4 cm          (b) 2 cm

(c) $2\sqrt{3}$ cm          (d) $4\sqrt{3}$ cm

**10.** The tops of two poles of height 16 m and 10 m are connected by a wire. If the wire makes an angle of 30° with the horizontal, then the length of the wire is :

(a) 26 m          (b) 10 m

(c) 12 m          (d) 16 m

## Section 'B'

*Question numbers 11 to 18 carry 2 marks each.*

**11.** Solve for $x$ : $9x^2 - 6ax + (a^2 - b^2) = 0$

**12.** A bag contains tickets, numbered 11, 12, 13 ....., 30. A ticket is taken out from the bag at random. Find the probability that the number on the drawn ticket

(i) is a multiple of 3.

(ii) is greater than 12 and a multiple of 4.

**13.** In what ratio does the point $P(2, -5)$ divides the line segment joining $A(-3, 5)$ and $B(4, -9)$ ?

*Or*

For what value of '$p$' the points $A(1, 5)$, $B(p, 1)$ and $C(4, 11)$ are collinear.

**14.** *PQRS* is a diameter of a circle of radius 6 cm. The lengths *PQ*, *QR* and *RS* are equal. Semicircles are drawn on *PQ* and *QS* as diameters, as shown in the figure. Find the perimeter of the shaded region.
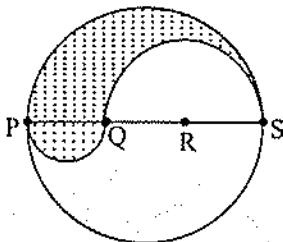


**15.** In the figure, a circle touches all the four sides of a quadrilateral *ABCD* whose sides *AB* = 8 cm, *BC* = 7 cm, and *CD* = 5 cm. Find *AD*.
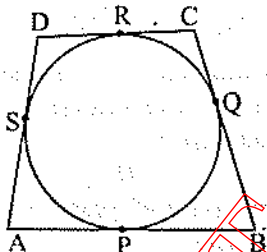


**16.** A spherical ball of diameter 21 cm is melted and recasted into cubes, each of side 1 cm. Find the number of cubes thus formed.

**17.** A measuring jar of internal diameter 10 cm is partially filled with water. Four equal spherical balls of diameter 2 cm each are dropped in it and they sink down in the water completely. What will be the change in level of water in the jar ?

**18.** The curved surface area of a right circular cone is 12320 cm². If the radius of its base is 56 cm find its height.

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**Section 'C'**

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*Question numbers 19 to 28 carry 3 marks each.*

**19.** A hemispherical bowl of internal diameter 30 cm contains some liquid. This liquid is to be filled into cylindrical shaped bottles each of diameter 5 cm and height 6 cm. Find the number of bottles necessary to empty the bowl.

**20.** A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 20 cm and radius of the base is 3.5 cm. Find the total surface area of the article.
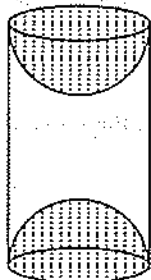
The area of an equilateral triangle is 17320.5 cm². With each vertex as centre, a circle is described with radius equal to half the length of the side of the triangle. Find the area of the shaded region.

[Use π = 3.14 and $\sqrt{3}$ = 1.73205]
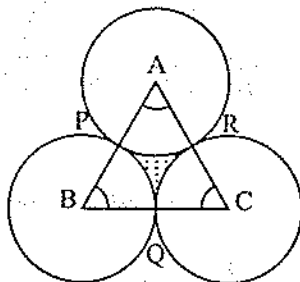


**21.** Find three numbers in A.P. whose sum is 15 and the product is 80.

**22.** There are three consecutive integers such that the square of the first increased by the product of the other two gives 154. What are the integers ?

*Or*

The sum of ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present ages.

**23.** Five cards – the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. One card is then picked up at random.

(*i*) What is the probability that the card is the queen ?

(*ii*) If the queen is drawn and put aside, what is the probability that the second card picked up is

(*a*) an ace ?                              (*b*) a queen ?

**24.** In two concentric circles, prove that all chords of the outer circle which touch the inner are of equal length.

*Or*

In figure, tangent segments PS and PT are drawn to a circle with centre O such that ∠SPT = 120°. Prove that OP = 2PS.
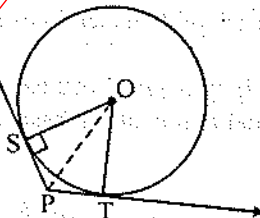


**25.** Draw a triangle with side BC = 6 cm, AB = 5 cm and ∠ABC = 60°. Construct a ΔAB'C' similar to ΔABC such that sides of ΔAB'C' are $\frac{3}{4}$ of the corresponding sides of ΔABC.

**26.** $PQ$ is a chord of length 16 cm of a circle of radius 10 cm. The tangents at $P$ and $Q$ intersects at a point $T$ (see figure). Find the length of $TP$.
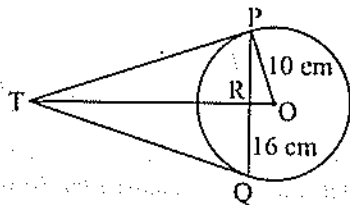


**27.** The line joining the points $(11, -7)$ and $(2, 11)$ is trisected at the points $P$ and $Q$ such that $P$ is nearer to $A$. If point $P$ also lies on the line $8x - 5y + k = 0$, find the value of $k$.

**28.** An aeroplane flying horizontally at a height of 1500 m above the ground is observed at a certain point on earth to subtend an angle of $60°$. After 15 seconds, its angle of elevation is observed to be $30°$. Calculate the speed of the aeroplane in km/h.

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**Section 'D'**

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*Question numbers 29 to 34 carry 4 marks each.*

**29.** A vertical pedestal stands on the ground and is surmounted by a vertical flag staff of height 5 m. At a point on the ground the angles of elevation of the bottom and the top of the flag staff are $30°$ and $60°$ respectively. Find the height of the pedestal.

**30.** Water is flowing at the rate of 7 metres per second through a circular pipe whose internal diameter is 2 cm into a cylindrical tank the radius of whose base is 40 cm. Determine the increase in the water level in 1/2 hour.

<div align="center">

*Or*

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A container made up of a metal sheet is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which will completely fill the container at the rate of ₹ 15 per litre and the cost of the metal sheet used, if it costs ₹ 5 per 100 cm². 

[Use $\pi = 3.14$]

**31.** $ABCD$ is a rectangle formed by joining the points $A(-1, -1)$, $B(-1, 4)$, $C(5, 4)$ and $D(5, -1)$. $P$, $Q$, $R$ and $S$ are the mid points of $AB$, $BC$, $CD$ and $DA$ respectively. Is the quadrilateral $PQRS$ a square, a rectangle or a rhombus ? Justify your answer.

**32.** In figure, the common tangent $AB$ and $CD$ to two circles with centres $O$ and $O'$ intersect at $E$. Prove that the points $O$, $E$, $O'$ are collinear.
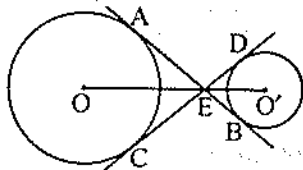


**33.** In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato, and the other potatoes are placed 3 m apart in a straight line. There are ten potatoes in the line (see figure). A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket,

runs back to pick up the next potato, runs to the bucket to drop it in the bucket, and she continues in the same way until all the potatoes are in the bucket. What is the total distance the competitor has to run ?
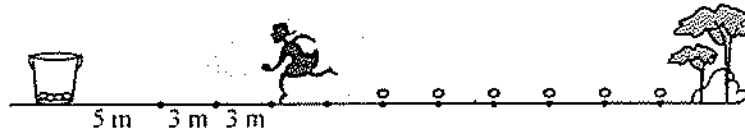


**34.** In a flight of 6000 km an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 400 km/hour and time increased by 30 minutes. Find the original duration of flight.

<p style="text-align:center">*Or*</p>

A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less than it would have 3 hours more to cover the same distance. Find the speed of the train.

<p style="text-align:center">**ANSWERS**</p>

<p style="text-align:center">Section 'A'</p>

1. (c)         2. (a)         3. (b)
4. (d)         5. (a)         6. (a)
7. (b)         8. (a)         9. (c)
10. (c)

<p style="text-align:center">Section 'B'</p>

11. $x = \dfrac{a+b}{3}$ or $x = \dfrac{a-b}{3}$     12. (i) $\dfrac{7}{20}$ (ii) $\dfrac{1}{5}$         13. 5 : 2 internally   *Or*  $p = -1$

14. Perimeter $= \dfrac{44}{7}$ cm     15. $AD = 6$ cm         16. Number of cubes $= 4851$

17. Change in level of water in the jar $= \dfrac{16}{75}$ cm         18. Height of the cone $= 42$ cm

<p style="text-align:center">Section 'C'</p>

19. Number of bottles $= 60$     20. Total surface area of the article $= 594$ cm$^2$ *Or* 1620.5 cm$^2$
21. The numbers are : 2, 5, 8  *or*  8, 5, 2
22. Three consecutive integers are 8, 9, 10
    *Or*  Present age of father $= 36$ years, Present age of son $= 9$ years

23. (i) $\dfrac{1}{5}$, (ii) (a) $\dfrac{1}{4}$, (b) 0

26. $TP = \dfrac{40}{3}$ cm         27. $k = -69$

28. Speed of the aeroplane $= 415.68$ km/h

<p style="text-align:center">Section 'D'</p>

29. Height of the pedestal $= 2.5$ m
30. 787.5 cm  *Or*  Cost of the milk $= ₹ 156.75$; Cost of the metal used $= ₹ 99.97$ (approx.)
31. $PQRS$ is a rhombus     33. 370 metres

34. Original duration of flight $= 2\dfrac{1}{2}$ hours  *Or*  40 km/h