

(General Instructions):

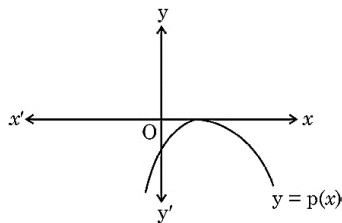
Read the following instructions carefully and follow them:

- (i) This question paper contains 38 questions. All questions are compulsory.
- (ii) This Question Paper is divided into FIVE Sections - Section A, B, C, D and E.
- (iii) In Section-A question number 1 to 18 are Multiple Choice Questions (MCQs) and question number 19&20 are Assertion-Reason based questions of 1 mark each.
- (iv) In Section-B question number 21 to 25 are Very Short-Answer-I (SA-I) type questions of 2 marks each.
- (v) In Section-C question number 26 to 31 are Short Answer-II (SA-II) type questions carrying 3 marks each.
- (vi) In Section-D question number 32 to 35 are Long Answer (LA) type questions carrying 5 marks each.
- (vii) In Section-E question number 36 to 38 are Case Study / Passage based integrated units of assessment questions carrying 4 marks each. Internal choice is provided in 2 marks question in each case-study.
- (viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section-B, 2 questions in Section-C, 2 questions in Section-D and 3 question in Section-E.
- (ix) Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.
- (x) Use of calculator is NOT allowed.

SECTION - A

(Multiple Choice Questions)

1. The graph of $y = p(x)$ is given, for a polynomial $p(x)$. The number of zeroes of $p(x)$ from the graph is



- (a) 3 (b) 1
(c) 2 (d) 0

2. The value of k for which the pair of equations $kx = y + 2$ and $6x = 2y + 3$ has infinitely many solutions,

- (a) is $k = 3$ (b) does not exist
(c) is $k = -3$ (d) is $k = 4$

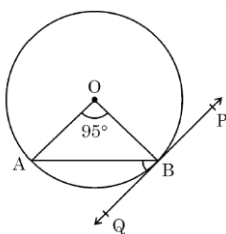
3. If $p - 1$, $p + 1$ and $2p + 3$ are in A.P., then the value of p is

- (a) -2 (b) 4
(c) 0 (d) 2

4. In what ratio, does x-axis divide the line segment joining the points $A(3, 6)$ and $B(-12, -3)$?

- (a) 1: 2 (b) 1: 4
(c) 4: 1 (d) 2: 1

5. In the given figure, PQ is tangent to the circle centred at O. If $\angle AOB = 95^\circ$, then the measure of $\angle ABQ$ will be



- (a) 47.5° (b) 42.5°
(c) 85° (d) 95°

6. If $2\tan A = 3$, then the value of $\frac{4\sin A + 3\cos A}{4\sin A - 3\cos A}$ is

- (a) $\frac{7}{\sqrt{13}}$ (b) $\frac{1}{\sqrt{13}}$
(c) 3 (d) does not exist

7. If α, β are the zeroes of a polynomial $p(x) = x^2 + x - 1$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ equals to
 (a) 1 (b) 2
 (c) -1 (d) $-\frac{1}{2}$
8. The least positive value of k , for which the quadratic equation $2x^2 + kx - 4 = 0$ has rational roots, is
 (a) $\pm 2\sqrt{2}$ (b) 2
 (c) ± 2 (d) $\sqrt{2}$
9. $\left[\frac{3}{4} \tan^2 30^\circ - \sec^2 45^\circ + \sin^2 60^\circ \right]$ is equal to
 (a) -1 (b) $\frac{5}{6}$
 (c) $-\frac{3}{2}$ (d) $\frac{1}{6}$
10. Curved surface area of a cylinder of height 5 cm is 94.2 cm^2 . Radius of the cylinder is (Take $\pi = 3.14$)
 (a) 2 cm (b) 3 cm
 (c) 2.9 cm (d) 6 cm
11. The distribution below gives the marks obtained by 80 students on a test:
- | Marks | Number of Students |
|--------------|--------------------|
| Less than 10 | 3 |
| Less than 20 | 12 |
| Less than 30 | 27 |
| Less than 40 | 57 |
| Less than 50 | 75 |
| Less than 60 | 80 |
- The modal class of this distribution is:
 (a) 10 – 20 (b) 20 – 30
 (c) 30 – 40 (d) 50 – 60
12. The curved surface area of a cone having height 24 cm and radius 7 cm, is
 (a) 528 cm^2 (b) 1056 cm^2
 (c) 550 cm^2 (d) 500 cm^2
13. The distance between the points $(0, 2\sqrt{5})$ and $(-2\sqrt{5}, 0)$ is
 (a) $2\sqrt{10}$ units (b) $4\sqrt{10}$ units
 (c) $2\sqrt{20}$ units (d) 0
14. Which of the following is a quadratic polynomial having zeroes $-\frac{2}{3}$ and $\frac{2}{3}$?
 (a) $4x^2 - 9$ (b) $\frac{4}{9}(9x^2 + 4)$
 (c) $x^2 + \frac{9}{4}$ (d) $5(9x^2 - 4)$
15. If the value of each observation of a statistical data is increased by 3, then the mean of the data
 (a) remains unchanged (b) increases by 3
 (c) increases by 6 (d) increases by $3n$
16. Probability of happening of an event is denoted by p and probability of non-happening of the event is denoted by q . Relation between p and q is
 (a) $p + q = 1$ (b) $p = 1, q = 1$
 (c) $p = q - 1$ (d) $p + q + 1 = 0$
17. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought?
 (a) 40 (b) 240
 (c) 480 (d) 750
18. In a group of 20 people, 5 can't swim. If one person is selected at random, then the probability that he/she can swim, is

- (a) $\frac{3}{4}$ (b) $\frac{1}{3}$
(c) 1 (d) $\frac{1}{4}$

In Question 19 and 20, an Assertion (A) statement is followed by a statement of Reason (R). Select the correct option out of the following :

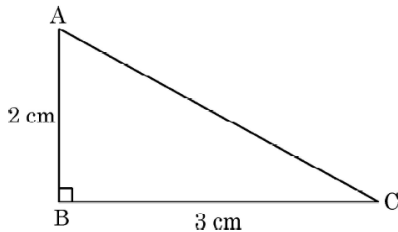
- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
(c) Assertion (A) is true but Reason (R) is false.
(d) Assertion (A) is false but Reason (R) is true.

19. **Assertion (A):** Point $P(0,2)$ is the point of intersection of y -axis with the line $3x + 2y = 4$.

Reason (R) : The distance of point $P(0,2)$ from x -axis is 2 units.

20. **Assertion (A):** The perimeter of $\triangle ABC$ is a rational number.

Reason (R): The sum of the squares of two rational numbers is always rational.



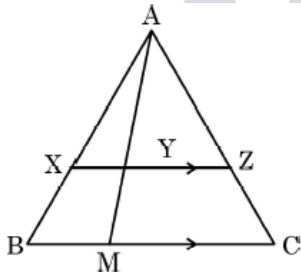
SECTION - B

21. (a) Solve the pair of equations $x = 3$ and $y = -4$ graphically.

OR

(b) Using graphical method, find whether following system of linear equations is consistent or not:
 $x = 0$ and $y = -7$

22. In the given figure, XZ is parallel to BC . $AZ = 3$ cm, $ZC = 2$ cm, $BM = 3$ cm and $MC = 5$ cm. Find the length of XY .



23. (a) If $\sin \theta + \cos \theta = \sqrt{3}$, then find the value of $\sin \theta \cdot \cos \theta$.

OR

(b) If $\sin \alpha = \frac{1}{\sqrt{2}}$ and $\cot \beta = \sqrt{3}$, then find the value of $\operatorname{cosec} \alpha + \operatorname{cosec} \beta$.

24. Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively.

25. A bag contains 4 red, 3 blue and 2 yellow balls. One ball is drawn at random from the bag. Find the probability that drawn ball is (i) red (ii) yellow.

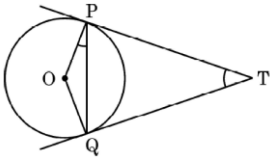
SECTION-C

26. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers.

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

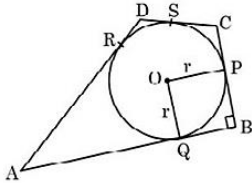
28. If $(-5, 3)$ and $(5, 3)$ are two vertices of an equilateral triangle, then find coordinates of the third vertex, given that origin lies inside the triangle. (Take $\sqrt{3} = 1.7$)

29. (a) Two tangents TP and TQ are drawn to a circle with centre O from an external point T . Prove that $\angle PTQ = 2\angle OPQ$.



OR

(b) In the given figure, a circle is inscribed in a quadrilateral ABCD in which $\angle B = 90^\circ$. If AD = 17 cm, AB = 20 cm and DS = 3 cm, then find the radius of the circle.

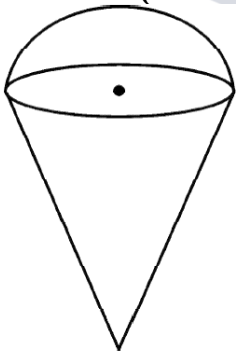


30. Prove that: $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \frac{1 + \sin \theta}{\cos \theta}$

31. (a) A room is in the form of cylinder surmounted by a hemi-spherical dome. The base radius of hemisphere is one-half the height of cylindrical part. Find total height of the room if it contains $\left(\frac{1408}{21}\right) \text{ m}^3$ of air. (Take $\pi = \frac{22}{7}$)

OR

(b) An empty cone is of radius 3 cm and height 12 cm. Ice-cream is filled in it so that lower part of the cone which is $\left(\frac{1}{6}\right)^{\text{th}}$ of the volume of the cone is unfilled but hemisphere is formed on the top. Find volume of the ice-cream. (Take $\pi = 3.14$)



SECTION-D

32. If a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, prove that the other two sides are divided in the same ratio.
33. (a) The angle of elevation of the top of a tower 24 m high from the foot of another tower in the same plane is 60° . The angle of elevation of the top of second tower from the foot of the first tower is 30° . Find the distance between two towers and the height of the other tower. Also, find the length of the wire attached to the tops of both the towers.

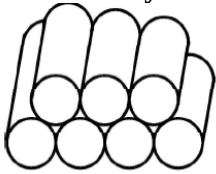
OR

- (b) A spherical balloon of radius r subtends an angle of 60° at the eye of an observer. If the angle of elevation of its centre is 45° from the same point, then prove that height of the centre of the balloon is $\sqrt{2}$ times its radius.
34. A chord of a circle of radius 14 cm subtends an angle of 60° at the centre. Find the area of the corresponding minor segment of the circle. Also find the area of the major segment of the circle.
35. (a) The ratio of the 11th term to 17th term of an A.P. is 3:4. Find the ratio of 5th term to 21st term of the same A.P. Also, find the ratio of the sum of first 5 terms to that of first 21 terms.

OR

(b) 250 logs are stacked in the following manner:

22 logs in the bottom row, 21 in the next row, 20 in the row next to it and so on (as shown by an example). In how many rows, are the 250 logs placed and how many logs are there in the top row?

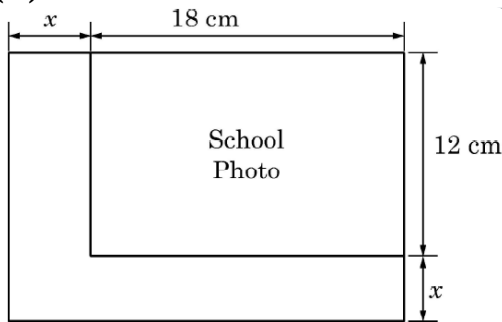


(Example)
SECTION-E
(Case Study)

36. While designing the school year book, a teacher asked the student that the length and width of a particular photo is increased by x units each to double the area of the photo. The original photo is 18 cm long and 12 cm wide.

Based on the above information, answer the following questions:

- Write an algebraic equation depicting the above information.
- Write the corresponding quadratic equation in standard form.
- What should be the new dimensions of the enlarged photo?



Can any rational value of x make the new area equal to 220 cm^2 ?

37. India meteorological department observes seasonal and annual rainfall every year in different sub-divisions of our country.



It helps them to compare and analyse the results. The table given below shows sub-division wise seasonal (monsoon) rainfall (mm) in 2018:

Rainfall (mm)	Number of Sub-divisions
200-400	2
400-600	4

600-800	7
800-1000	4
1000-1200	2
1200-1400	3
1400-1600	1
1600-1800	1

Based on the above information, answer the following questions:

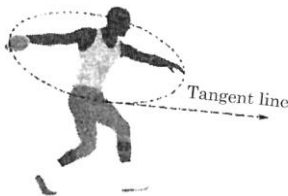
- (i) Write the modal class.
(ii) Find the median of the given data.

OR

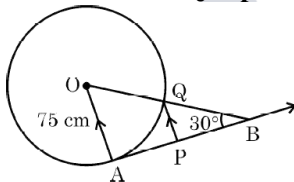
Find the mean rainfall in this season.

- (iii) If sub-division having at least 1000 mm rainfall during monsoon season, is considered good rainfall sub-division, then how many subdivisions had good rainfall ?

38. The discus throw is an event in which an athlete attempts to throw a discus. The athlete spins anti-clockwise around one and a half times through a circle, then releases the throw. When released, the discus travels along tangent to the circular spin orbit.



In the given figure, AB is one such tangent to a circle of radius 75 cm. Point O is centre of the circle and $\angle ABO = 30^\circ$. PQ is parallel to OA.



Based on above information:

- (a) find the length of AB.
(b) find the length of OB.
(c) find the length of AP.

OR

find the length of PQ.