

CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-1

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
- (ii) The questions paper consists of 40 questions divided into four 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 choices have 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

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. The points (7, 2) and (− 1, 0) lie on a line [1]
 (a) $7y = 3x - 7$ (b) $4y = x + 1$
 (c) $y = 7x + 7$ (d) $x = 4y + 1$
- Q2. If $\frac{1}{2}$ is a root of the equation $x^2 + kx - \frac{5}{4} = 0$, then the value of k is [1]
 (a) 2 (b) −2
 (c) $\frac{1}{4}$ (d) $\frac{1}{2}$
- Q3. To divide a line segment AB in the ratio 3 : 4, we draw a ray AX , so that $\angle BAX$ is an acute angle and then mark the points on ray AX at equal distances such that the minimum number of these points is [1]
 (a) 3 (b) 4
 (c) 7 (d) 10
- Q4. If p_1 and p_2 are two odd prime numbers such that $p_1 > p_2$, then $p_1^2 - p_2^2$ is [1]
 (a) an even number (b) an odd number
 (c) an odd prime number (d) a prime number
- Q5. If the n th term of an A.P. is given by $a_n = 5n - 3$, then the sum of first 10 terms is [1]
 (a) 225 (b) 245
 (c) 255 (d) 270
- Q6. Two chords AB and CD of a circle intersect at E such that $AE = 2.4$ cm, $BE = 3.2$ cm and $CE = 1.6$ cm. The length of DE is [1]
 (a) 1.6 cm (b) 3.2 cm
 (c) 4.8 cm (d) 6.4 cm
- Q7. If the radius of the sphere is increased by 100%, the volume of the corresponding sphere is increased by [1]
 (a) 200% (b) 500%
 (c) 700% (d) 800%
- Q8. It is given that $\triangle ABC \sim \triangle PQR$ with $\frac{BC}{QR} = \frac{1}{3}$. Then $\frac{\ar(\triangle PRQ)}{\ar(\triangle BCA)}$ is equal to [1]

(a) 9

(b) 3

(c) $\frac{1}{3}$

(d) $\frac{1}{9}$

Q9. Ratio in which the line $3x + 4y = 7$ divides the line segment joining the points (1, 2) and (− 2, 1) is [1]

(a) 3 : 5

(b) 4 : 6

(c) 4 : 9

(d) None of these

Q10. $(\cos^4 A - \sin^4 A)$ is equal to [1]

(a) $1 - 2\cos^2 A$

(b) $2\sin^2 A - 1$

(c) $\sin^2 A - \cos^2 A$

(d) $2\cos^2 A - 1$

(Q.11-Q.15) Fill in the blanks.

Q11. H.C.F. of 6, 72 and 120 is [1]

Q12. If α and β are the zeroes of the quadratic polynomial $ax^2 + bx + c$, then $\alpha + \beta = -b/\dots\dots\dots$ and $\alpha\beta = c/\dots\dots\dots$ [1]

OR

Degree of remainder is always than degree of divisor.

Q13. Length of arc of a sector angle 45° of circle of radius 14cm is [1]

Q14. The length of the diagonal of a cube that can be inscribed in a sphere of radius 7.5 cm is [1]

Q15. A dice is thrown once, the probability of getting a prime number is [1]

(Q.16-Q.20) Answer the following

Q16. A rectangular sheet paper $40 \text{ cm} \times 22 \text{ cm}$ is rolled to form a hollow cylinder of height 40 cm. Find the radius of the cylinder. [1]

OR

A cylinder, a cone and a hemisphere have same base and same height. Find the ratio of their volumes.

Q17. Find the positive root of $\sqrt{3x^2 + 6} = 9$. [1]

Q18. The diameter of a wheel is 1.26 m. What the distance covered in 500 revolutions. [1]

Q19. If the median of a series exceeds the mean by 3, find by what number the mode exceeds its mean? [1]

Q20. 20 tickets, on which numbers 1 to 20 are written, are mixed thoroughly and then a ticket is drawn at random out of them. Find the probability that the number on the drawn ticket is a multiple of 3 or 7. [1]

SECTION B

Q21. Solve the following pair of linear equations by cross multiplication method: [2]

$$x + 2y = 2$$

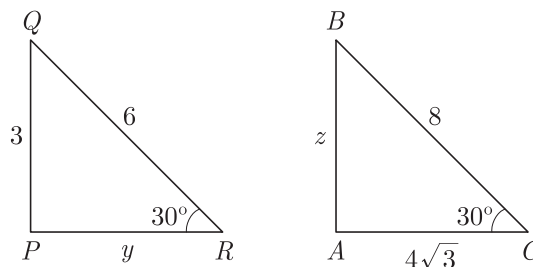
$$x - 3y = 7$$

Q22. If the point $P(x, y)$ is equidistant from the points $Q(a + b, b - a)$ and $R(a - b, a + b)$, then prove that $bx = ay$. [2]

OR

Show that the points $A(0, 1)$, $B(2, 3)$ and $C(3, 4)$ are collinear.

Q23. In the given figure, $\Delta ABC \sim \Delta PQR$. Find the value of $y + z$. [2]



- Q24. Find the mean of the data using an empirical formula when it is given that mode is 50.5 and median in 45.5. [2]

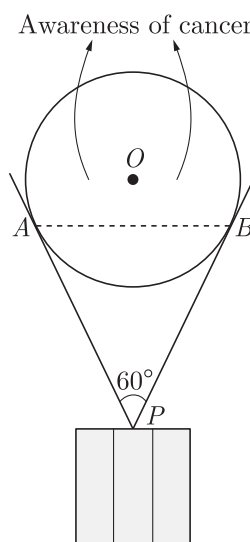
OR

A bag contains 6 red and 5 blue balls. Find the probability that the ball drawn is not red.

- Q25. Two circular pieces of equal radii and maximum areas, touching each other are cut out from a rectangular cardboard of dimensions $14 \text{ cm} \times 7 \text{ cm}$. find the area of the remaining cardboard. (Use $\pi = \frac{22}{7}$) [2]

- Q26. Read the following passage and answer the questions that follows:

As a part of a campaign, a huge balloon with message of “AWARENESS OF CANCER” was displayed from the terrace of a tall building. It was held by string of length 8 m each, which inclined at an angle of 60° at the point, where it was tied as shown in the figure.



- What is the length of AB ?
- If the perpendicular distance from the centre of the circle to the chord AB is 3 cm, then find the radius of the circle. [2]

SECTION C

- Q27. Solve using cross multiplication method: [3]

$$5x + 4y - 4 = 0$$

$$x - 12y - 20 = 0$$

- Q28. Quadratic polynomial $2x^2 - 3x + 1$ has zeroes as α and β . Now form a quadratic polynomial whose zeroes are 3α and 3β . [3]

OR

If α and β are the zeroes of a quadratic polynomial such that $\alpha + \beta = 24$ and $\alpha - \beta = 8$. Find the quadratic polynomial having α and β as its zeroes.

- Q29. In a trapezium $ABCD$, diagonals AC and BD intersect at O and $AB = 3DC$, then find ratio of areas of triangles COD and AOB . [3]

- Q30. Find the 20^{th} term of an A.P. whose 3^{rd} term is 7 and the seventh term exceeds three times the 3^{rd} term by 2. Also find its

n^{th} term (a_n).

[3]

OR

In an A.P. the sum of first n terms is $\frac{3n^2}{2} + \frac{13n}{2}$. Find the 25^{th} term.

- Q31. ABC is a triangle. A circle touches sides AB and AC produced and side BC at X , Y and Z respectively. Show that $AX = \frac{1}{2}$ perimeter of $\triangle ABC$. [3]

OR

In $\triangle ABD$, $AB = AC$. If the interior circle of $\triangle ABC$ touches the sides AB , BC and CA at D , E and F respectively. Prove that E bisects BC .

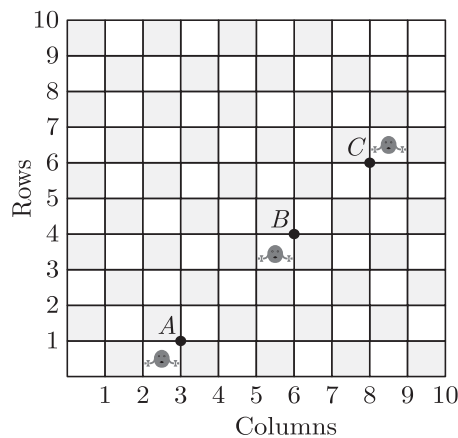
- Q32. Construct a $\triangle ABC$ in which $AB = 4$ cm, $BC = 5$ cm and $AC = 6$ cm. Then construct another triangle whose sides are $\frac{2}{3}$ times the corresponding sides of $\triangle ABC$. [3]

- Q33. Read the following passage and answer the questions that follows:

Given figure shows the arrangement of desks in a classroom. Ashima, Bharti and Camella are seated at $A(3, 1)$, $B(6, 4)$ and $C(8, 6)$ respectively.

- Do you think are seated in a line? Give reasons for your answer.
- Which mathematical concept is used in the above problem?

[3]



- Q34. Half the perimeter of a rectangular garden, whose length is 4 m more than its width, is 36 m. Find the dimensions of garden. [3]

SECTION D

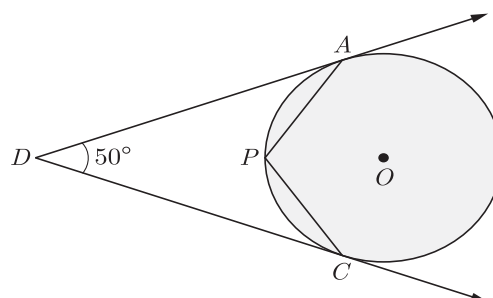
- Q35. Solve for x : $\left(\frac{2x}{x-5}\right)^2 + \left(\frac{2x}{x-5}\right) - 24 = 0, x \neq 5$ [4]

- Q36. For any positive integer n , prove that $n^3 - n$ is divisible by 6. [4]

OR

Prove that $\sqrt{3}$ is an irrational number. Hence, show that $7 + 2\sqrt{3}$ is also an irrational number.

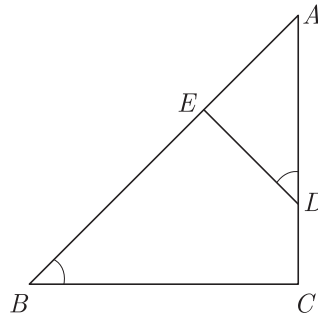
- Q37. In the given figure, O is the centre of the circle. Determine $\angle APC$, if DA and DC are tangents and $\angle ADC = 50^\circ$. [4]



- Q38. The base BC of an equilateral triangle ABC lies on y-axis. The co-ordinates of point C are $(0,3)$. The origin is the mid-point of the base. Find the co-ordinates of the point A and B . Also find the co-ordinates of another point D such that $BACD$ is a rhombus. [4]

OR

In $\triangle ABC$, if $\angle ADE = \angle B$, then prove that $\triangle ADE \sim \triangle ABC$. Also, if $AD = 7.6$ cm, $AE = 7.2$ cm, $BE = 4.2$ cm and $BC = 8.4$ cm, then find DE .



- Q39. From the top of tower, 100 m high, a man observes two cars on the opposite sides of the tower with the angles of depression 30° & 45° respectively. Find the distance between the cars. (Use $\sqrt{3} = 1.73$) [4]

OR

From the top of a 7 m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45° . Find the height of the tower. (Use $\sqrt{3} = 1.732$)

- Q40. The following distribution gives the weights of 60 students of a class. Find the mean and mode weights of the students. [4]

Weight (in kg)	40-44	44-48	48-52	52-56	56-60	60-64	64-68	68-72
Number of students	4	6	10	14	10	8	6	2

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CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-2

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
 - (ii) The questions paper consists of 40 questions divided into four 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 choices have 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

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. Ratio of lateral surface areas of two cylinders with equal height is [1]
(a) $1 : 2$ (b) $H : h$
(c) $R : r$ (d) None of these
- Q2. The sides of a triangle (in cm) are given below. In which case, the construction of triangle is not possible. [1]
(a) 8, 7, 3 (b) 8, 6, 4
(c) 8, 4, 4 (d) 7, 6, 5
- Q3. If a regular hexagon is inscribed in a circle of radius r , then its perimeter is [1]
(a) $3r$ (b) $6r$
(c) $9r$ (d) $12r$
- Q4. A can do a piece of work in 24 days. If B is 60% more efficient than A , then the number of days required by B to do the twice as large as the earlier work is [1]
(a) 24 (b) 36
(c) 15 (d) 30
- Q5. An AP starts with a positive fraction and every alternate term is an integer. If the sum of the first 11 terms is 33, then the fourth term is [1]
(a) 2 (b) 3
(c) 5 (d) 6
- Q6. The number $3^{13} - 3^{10}$ is divisible by [1]
(a) 2 and 3 (b) 3 and 10
(c) 2, 3 and 10 (d) 2, 3 and 13
- Q7. If the points $A(4, 3)$ and $B(x, 5)$ are on the circle with centre $O(2, 3)$, then the value of x is [1]
(a) 0 (b) 1
(c) 2 (d) 3
- Q8. Value (s) of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is/are [1]
(a) 0 (b) 4
(c) 8 (d) 0, 8

- Q9. The areas of two similar triangles ABC and PQR are in the ratio 9 : 16. If $BC = 4.5$ cm, then the length of QR is [1]
(a) 4 cm (b) 4.5 cm
(c) 3 cm (d) 6 cm
- Q10. If $\sec 5A = \operatorname{cosec}(A + 30^\circ)$, where $5A$ is an acute angle, then the value of A is [1]
(a) 15° (b) 5°
(c) 20° (d) 10°

(Q.11-Q.15) Fill in the blanks.

- Q11. Numbers having non-terminating, non-repeating decimal expansion are known as [1]
- Q12. A quadratic polynomial can have at most 2 zeroes and a cubic polynomial can have at most zeroes. [1]

OR

If α, β, γ are the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d = 0$, then $\alpha + \beta + \gamma = \frac{-b}{\dots\dots\dots}$

- Q13. If radius of a circle is 14 cm the area of the circle is [1]
- Q14. If the heights of two cylinders are equal and their radii are in the ratio of 7 : 5, then the ratio of their volumes is [1]
- Q15. If $P(E) = 0.05$, the probability of 'not E ' is [1]

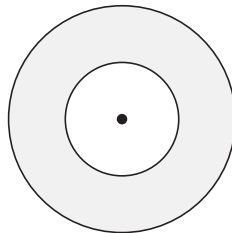
(Q.16-Q.20) Answer the following

- Q16. What is the ratio of the total surface area of the solid hemisphere to the square of its radius. [1]

OR

If the area of three adjacent faces of a cuboid are X, Y , and Z respectively, then find the volume of cuboid.

- Q17. If one root of the quadratic equation $6x^2 - x - k = 0$ is $\frac{2}{3}$, then find the value of k . [1]
- Q18. Two coins of diameter 2 cm and 4 cm respectively are kept one over the other as shown in the figure, find the area of the shaded ring shaped region in square cm. [1]



- Q19. Find median of the data, using an empirical relation when it is given that Mode = 12.4 and Mean = 10.5. [1]
- Q20. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes. Find the probability that the arrow will point at any factor of 8 ? [1]

SECTION B

- Q21. In the figure given below, $ABCD$ is a rectangle. Find the values of x and y . [2]
- Q22. Prove that the point $(3, 0)$, $(6, 4)$ and $(-1, 3)$ are the vertices of a right angled isosceles triangle. [2]

OR

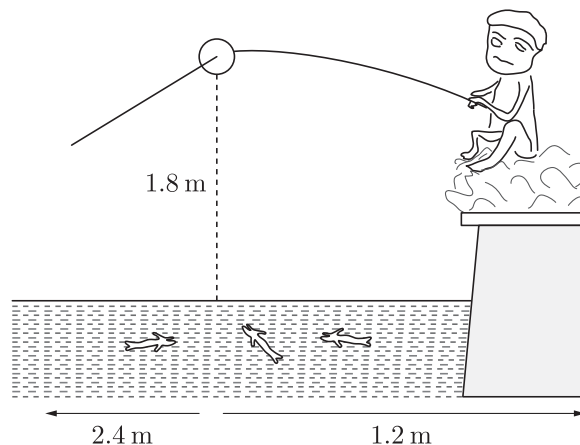
Find the relation between x and y , if the point $A(x, y)$, $B(-5, 7)$ and $C(-4, 5)$ are collinear.

- Q23. In ΔABC , $AD \perp BC$, such that $AD^2 = BD \times CD$. Prove that ΔABC is right angled at A . [2]
- Q24. The mean and median of 100 observation are 50 and 52 respectively. The value of the largest observation is 100. It was later found that it is 110. Find the true mean and median. [2]

OR

There are 30 cards of the same size in a bag in which the numbers 1 to 30 are written. One card is taken out of the bag at random. Find the probability that the number on the selected card is not divisible by 3.

- Q25. Pawan is fly fishing in a stream as shown in the figure. The tip of her fishing rod is 1.8 m above the surface of the water and the fly at the end of the string rests on the water 3.6 m away and 2.4 m from a point directly under the tip of the rod. [2]

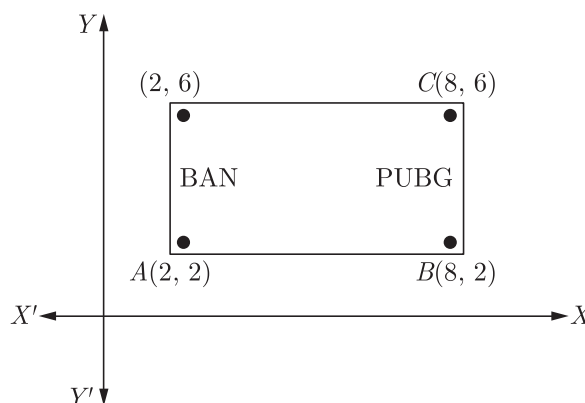


Assuming that her string (from the tip of her rod to the fly) is taut, how much string does she have out?

- Q26. Read the following passage and answer the questions that follows:

One tends to become lazy. Also, starting at your mobile screen for long hours can affect your eyesight and give you headaches. Those who are addicted to playing PUBG can get easily stressed out or face anxiety issues in public due to lack of social interaction.

To raise social awareness about ill effects of playing PUBG, a school decided to start “BAN PUBG: campaign, students are asked to prepare campaign board in the shape of rectangle (as shown in the figure). [2]



- (i) Find the area of the board.
(ii) If cost of 1 cm^2 of board is ₹8, then find the cost of board.

SECTION C

- Q27. A part of monthly hostel charge is fixed and the remaining depends on the number of days one has taken food in the mess. When Swati takes food for 20 days, she has to pay Rs. 3,000 as hostel charges whereas Mansi who takes food for 25 days Rs. 3,500 as hostel charges. Find the fixed charges and the cost of food per day. [3]
- Q28. If α and β are the zeroes of the polynomial $6y^2 - 7y + 2$, find a quadratic polynomial whose zeroes are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$. [3]

OR

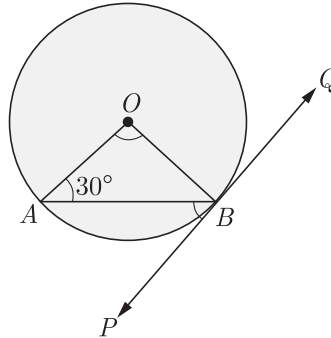
If α, β and γ are zeroes of the polynomial $6x^3 + 3x^2 - 5x + 1$, then find the value of $\alpha^{-1} + \beta^{-1} + \gamma^{-1}$.

- Q29. ΔABC is right angled at C . If p is the length of the perpendicular from C to AB and a, b, c are the lengths of the sides opposite $\angle A, \angle B$ and $\angle C$ respectively, then prove that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$. [3]
- Q30. Divide 56 in four parts in A.P. such that the ratio of the product of their extremes (1^{st} and 4^{th}) to the product of means (2^{nd} and 3^{rd}) is 5:6. [3]

OR

If the sum of the first n terms of an A.P. is $\frac{1}{2}[3n^2 + 7n]$, then find its n^{th} term. Hence write its 20^{th} term.

- Q31. In the figure, PQ is a tangent to a circle with center O . If $\angle OAB = 30^\circ$, find $\angle ABP$ and $\angle AOB$. [3]



OR

A circle is inscribed in a ΔABC , with sides AC, AB and BC as 8 cm, 10 cm and 12 cm respectively. Find the length of AD, BE and CF .

- Q32. Construct a triangle similar to a given equilateral ΔPQR with side 5cm such that each of its side is $\frac{6}{7}$ of the corresponding sides of ΔPQR . [3]
- Q33. Read the following passage and answer the questions that follows:
 From her elevated observation post 300 m away, a naturalist spots a troop of baboons high up in a tree. Using the small transit attached to her telescope, she finds the angle of depression to the bottom of this tree is 30° , while the angle of elevation to the top of the tree is 60° . The angle of elevation to the troop of baboons is 45° . Use this information to find (a) the height of the observation post, (b) the height of the baboons' tree, and (c) the height of the baboons above ground. [3]
- Q34. Given the linear equation $2x + 3y - 8 = 0$, write another linear equation in two variables such that the geometrical representation of the pair so formed is :
 (a) intersecting lines
 (b) parallel lines
 (c) coincident lines. [3]

SECTION D

- Q35. Find x in terms of a, b and c : [4]

$$\frac{a}{x-a} + \frac{b}{x-b} = \frac{2c}{x-c}, x \neq a, b, c$$
- Q36. Find HCF of 81 and 237 and express it as a linear combination of 81 and 237 i.e. $\text{HCF}(81, 237) = 81x + 237y$ for some x and y . [4]

OR

Show that there is no positive integer n , for which $\sqrt{n-1} + \sqrt{n+1}$ is rational.

- Q37. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle. [4]
- Q38. If $P(-5, -3), Q(-4, -6), R(2, -3)$ and $S(1, 2)$ are the vertices of a quadrilateral $PQRS$, find its area. [4]

OR

If $P(9a - 2, -b)$ divides the line segment joining $A(3a + 1, -3)$ and $B(8x, 5)$ in the ratio 3:1. Find the values of a and b .

- Q39. The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60° . From a point Y 40 m vertically above X , the angle of elevation of the top Q of tower is 45° . Find the height of the PQ and the distance PX . (Use $\sqrt{3} = 1.73$) [4]

OR

The tops of two towers of height x and y , standing on level ground, subtend angles of 30° and 60° respectively at the centre of the line joining their feet, then find $x : y$.

- Q40. On the sports day of a school, 300 students participated. Their ages are given in the following distribution :

Age (in years)	5-7	7-9	9-11	11-13	13-15	15-17	17-19
Number of students	67	33	41	95	36	13	15

Find the mean and mode of the data.

[4]

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SAMPLE PAPER-3

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 - (v) Use of calculators is not permitted.
-

SECTION A

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. Ratio of volumes of two cylinders with equal height is [1]
(a) $H : h$ (b) $R : r$
(c) $R^2 : r^2$ (d) None of these
- Q2. Which of the following statement is false? [1]
(a) All isosceles triangles are similar.
(b) All quadrilateral triangles are similar.
(c) All circles are similar.
(d) None of the above
- Q3. C is the mid-point of PQ , if P is $(4, x)$, C is $(y, -1)$ and Q is $(-2, 4)$, then x and y respectively are [1]
(a) -6 and 1 (b) -6 and 2
(c) 6 and -1 (d) 6 and -2
- Q4. An equation of the circle with centre at $(0, 0)$ and radius r is [1]
(a) $x^2 + y^2 = r^2$ (b) $x^2 - y^2 = r^2$
(c) $x - y = r$ (d) $x^2 + r^2 = y^2$
- Q5. The ratio of the sides of the triangle to be constructed with the corresponding sides of the given triangle is known as [1]
(a) scale factors (b) length factor
(c) side factor (d) K -factor
- Q6. (i) The L.C.M. of x and 18 is 36 .
(ii) The H.C.F. of x and 18 is 2 .
What is the number x ? [1]
(a) 1 (b) 2
(c) 3 (d) 4
- Q7. The linear factors of the quadratic equation $x^2 + kx + 1 = 0$ are [1]
(a) $k \geq 2$ (b) $k \leq 2$
(c) $k \geq -2$ (d) $2 \leq k \leq -2$
- Q8. In a number of two digits, unit's digit is twice the tens digit. If 36 be added to the number, the digits are reversed. The number is [1]

- (a) 36 (b) 63
(c) 48 (d) 84

Q9. An AP starts with a positive fraction and every alternate term is an integer. If the sum of the first 11 terms is 33, then the fourth term is [1]

- (a) 2 (b) 3
(c) 5 (d) 6

Q10. If $\tan 2A = \cot(A - 18^\circ)$, where $2A$ is an acute angle, then the value of A is [1]

- (a) 12° (b) 18°
(c) 36° (d) 48°

(Q.11-Q.15) Fill in the blanks.

Q11. Area of a circle is [1]

Q12. equation is valid for all values of its variables. [1]

OR

The highest power of a variable in a polynomial is called its

Q13. Someone is asked to make a number from 1 to 100. The probability that it is a prime is [1]

Q14. If p is a prime number and it divides a^2 then it also divides, where a is a positive integer. [1]

Q15. The volume and surface area of a sphere are numerically equal, then the radius of sphere is units. [1]

(Q.16-Q.20) Answer the following

Q16. Volume and surface area of a solid hemisphere are equal. What is the diameter of hemisphere ? [1]

OR

Find the number of solid sphere of diameter 6 cm can be made by melting a solid metallic cylinder of height 45 cm and diameter 4 cm.

Q17. Find the value (s) of k if the quadratic equation $3x^2 - k\sqrt{3}x + 4 = 0$ has real roots. [1]

Q18. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find area of minor segment. (Use $\pi = 3.14$) [1]

Q19. What is abscissa of the point of intersection of the “Less than type” and of the “More than type” cumulative frequency curve of a grouped data ? [1]

Q20. A dice is thrown once. Find the probability of getting a prime number. [1]

SECTION B

Q21. Solve the following system of linear equations by substitution method: [2]

$$\begin{aligned} 2x - y &= 2 \\ x + 3y &= 15 \end{aligned}$$

Q22. If $A(5, 2)$, $B(2, -2)$ and $C(-2, t)$ are the vertices of a right angled triangle with $\angle B = 90^\circ$, then find the value of t . [2]

OR

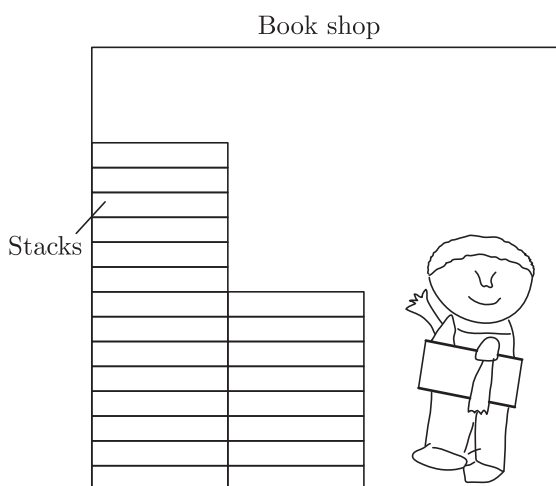
For what values of k are the points $(8, 1)$, $(3, -2k)$ and $(k, -5)$ collinear?

- Q23. Let $\Delta ABC \sim \Delta DEF$. if $ar(\Delta ABC) = 100 \text{ cm}^2$, $ar(\Delta DEF) = 196 \text{ cm}^2$ and $DE = 7$, then find AB . [2]
- Q24. Write the relationship connecting three measures of central tendencies. Hence find the median of the give data if mode is 24.5 and mean is 29.75. [2]

OR

A bag contains cards bearing numbers from 11 to 30. A card is taken out from the bag at random. Find the probability that the selected card has multiple of 5 on it.

- Q25. In what ratio does the point $P(-4, 6)$ divides the line segment joining the points $A(-6, 10)$ and $B(3, -8)$? [2]
- Q26. Read the following passage and answer the question that follows.
A book seller has 420 science stream books and 130 Arts stream books. He wants to stack them in such a way that each stack has the same number and they take up the least area of the surface. [2]



- (i) What is the maximum number of books that can be placed in each stack for this purpose?
(ii) Which mathematical concept is used to solve the problems?

SECTION C

- Q27. Solve for x and y : [3]

$$\frac{x}{2} + \frac{2y}{3} = -1$$

$$x - \frac{y}{3} = 3$$

- Q28. Find the zeroes of the quadratic polynomial $x^2 - 2\sqrt{2}x$ and verify the relationship between the zeroes and the coefficients. [3]

OR

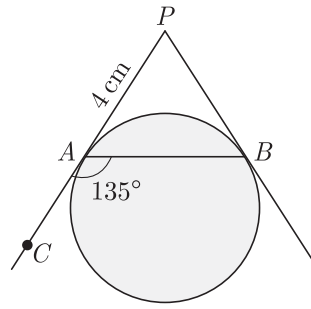
What should be added to $x^3 + 5x^2 + 7x + 3$ so that it is completely divisible by $x^2 + 2x$.

- Q29. ABC is a triangle, PQ is the line segment intersecting AB in P and AC in Q such that $PQ \parallel BC$ and divides ΔABC into two parts, equal in area, find $BP:AB$, [3]
- Q30. For what value of n , are the n^{th} terms of two A.Ps 63, 65, 67, ... and 3, 10, 17, equal? [3]

OR

In an A.P., if the 12^{th} term is -13 and the sum of its first four terms is 24, find the sum of its first ten terms.

- Q31. In the given figure, PA and PB are tangents to a circle from an external point P such that $PA = 4\text{cm}$ and $\angle BAC = 135^\circ$. Find the length of chord AB . [3]

**OR**

Two tangents TP and TQ are drawn to a circle with centre O from an external point T . Prove that

$$\angle PTO = \angle OPQ$$

- Q32. Construct an isosceles triangle whose base is 7.5 cm and altitude 3.5 cm then another triangle whose sides are $\frac{4}{7}$ times the corresponding sides of the isosceles triangle. [3]

- Q33. Read the following passage and answer the question that follows.

Roja, Renu and Reena are three friends. They decided to sweep a circular park near their homes. They divided the park into three parts by two equal chords AB and AC for convenience. [3]

- (i) Prove that the centre of the park lies on the angle bisector of $\angle BAC$.
 (ii) Which mathematical concept is used in the above problem?

- Q34. Determine the values of m and n so that the following system of linear equation have infinite number of solutions : [3]

$$(2m - 1)x + 3y - 5 = 0$$

$$3x + (n - 1)y - 2 = 0$$

SECTION D

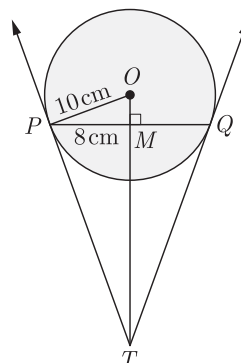
- Q35. The denominator of a fraction is two more than its numerator. If the sum of the fraction and its reciprocal is $\frac{34}{15}$, find the fraction. [4]

- Q36. Show that the square of any positive integer is of the forms $4m$ or $4m + 1$, where m is any integer. [4]

OR

Express the HCF/LCM of 48 and 18 as a linear combination.

- Q37. In figure, PQ , is a chord of length 16 cm, of a circle of radius 10 cm. the tangents at P and Q intersect at a point T . Find the length of TP . [4]



- Q38. Find the values of k so that the area of the triangle with vertices $(k + 1, 1)$, $(4, -3)$ and $(7, -k)$ is 6 sq. units. [4]

OR

The base QR of an equilateral triangle PQR lies on x-axis. The co-ordinates of point Q are $(-4, 0)$ and the origin is the mid-point of the base. find the co-ordinates of the point P and R .

- Q39. The angle of elevation of a cloud from a point 120 m above a lake is 30° and the angle of depression of its reflection in the lake is 60° . Find the height of the cloud. [4]

OR

The angle of depression of two ships from an aeroplane flying at the height of 7500 m are 30° and 45° . if both the ships are in the same that one ship is exactly behind the other, find the distance between the ships.

Q40. Monthly expenditures on milk in 100 families of a housing society are given in the following frequency distribution : [4]

Monthly expenditure (in Rs.)	0- 175	175-350	350-525	525-700	700-875	875-1050	1050-1125
Number of families	10	14	15	21	28	7	5

Find the mode and median for the distribution.

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CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-4

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
 - (ii) The questions paper consists of 40 questions divided into four 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 choices have 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

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. Out of one digit prime numbers, one number is selected at random. The probability of selecting an even number is [1]
(a) $\frac{1}{2}$ (b) $\frac{1}{4}$
(c) $\frac{4}{9}$ (d) $\frac{2}{5}$
- Q2. If the equation $(m^2 + n^2)x^2 - 2(mp + nq)x + p^2 + q^2 = 0$ has equal roots, then [1]
(a) $mp = nq$ (b) $mq = np$
(c) $mn = pq$ (d) $mq = \sqrt{np}$
- Q3. If $x = p \sec \theta$ and $y = q \tan \theta$, then [1]
(a) $x^2 - y^2 = p^2 q^2$ (b) $x^2 q^2 - y^2 p^2 = pq$
(c) $x^2 q^2 - y^2 p^2 = \frac{1}{p^2 q^2}$ (d) $x^2 q^2 - y^2 p^2 = p^2 q^2$
- Q4. The value of x, for which the polynomials $x^2 - 1$ and $x^2 - 2x + 1$ vanish simultaneously, is [1]
(a) 2 (b) -2
(c) -1 (d) 1
- Q5. The base radii of a cone and a cylinder are equal. If their curved surface areas are also equal, then the ratio of the slant height of the cone to the height of the cylinder is [1]
(a) 2 : 1 (b) 1 : 2
(c) 1 : 3 (d) 3 : 1
- Q6. For finding the popular size of ready-made garments, which central tendency is used? [1]
(a) Mean (b) Median
(c) Mode (d) Both Mean and Mode
- Q7. If n is an even natural number, then the largest natural number by which $n(n+1)(n+2)$ is divisible, is [1]
(a) 6 (b) 8
(c) 12 (d) 24
- Q8. If the common difference of an AP is 5, then what is $a_{18} - a_{13}$? [1]
(a) 5 (b) 20
(c) 25 (d) 30

- Q9. X 's salary is half that of Y 's. If X got a 50% rise in his salary and Y got 25% rise in his salary, then the percentage increase in combined salaries of both is [1]
- (a) 30 (b) $33\frac{1}{3}$
(c) $37\frac{1}{2}$ (d) 75

- Q10. The area of a circular ring formed by two concentric circles whose radii are 5.7 cm and 4.3 cm respectively is (Take $\pi = 3.1416$) [1]
- (a) 43.98 sq. cm. (b) 53.67 sq. cm.
(c) 47.24 sq. cm. (d) 38.54 sq. cm.

(Q.11-Q.15) Fill in the blanks.

- Q11. If the volume of a cube is 64 cm^3 , then its surface area is [1]
- Q12. $(1, 2)$, $(4, y)$, $(x, 6)$ and $(3, 5)$ are the vertices of a parallelogram taken in order, then the value of x and y are [1]

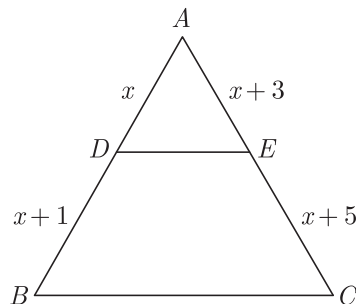
OR

If $x - y = 2$ then point (x, y) is equidistant from $(7, 1)$ and (.....)

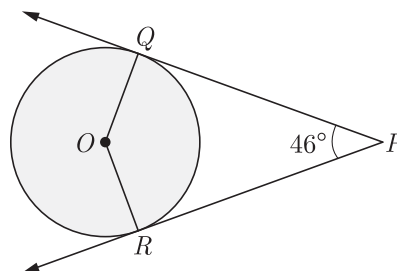
- Q13. L.C.M. of 96 and 404 is [1]
- Q14. In a right triangle ABC , right angled at B , if $\tan A = 1$, $\sin A \cos A = \dots\dots\dots$ [1]
- Q15. If the area of a circle is 154 cm^2 , then its circumference is [1]

(Q.16-Q.20) Answer the following

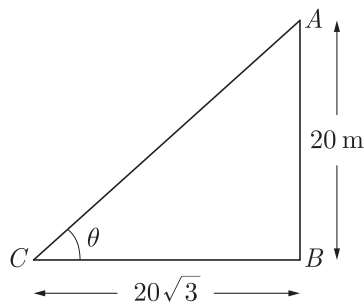
- Q16. To divide a line segment AB in the ratio 5:7, first AX is drawn, so that $\angle BAX$ is an acute angle and then at equal distance, points are marked on the ray AX , find the minimum number of these points. [1]
- Q17. In $\triangle ABC$, $DE \parallel BC$, find the value of x . [1]



- Q18. If PQ and PR are two tangents to a circle with center O . If $\angle QPR = 46^\circ$ then find $\angle QOR$. [1]



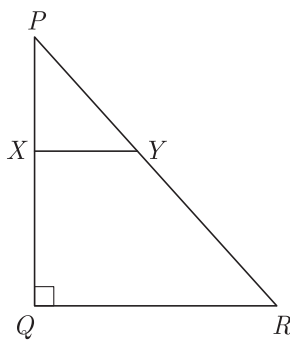
- Q19. In figure, a tower AB is 20 m high and BC , its shadow on the ground, is $20\sqrt{3}$ m long. find the Sun's altitude. [1]



- Q20. The radius of sphere is r cm. It is divided into two equal parts. Find the whole surface of two parts. [1]

SECTION B

- Q21. Is the system of linear equations $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$ consistent? Justify your answer. [2]
- Q22. In the given figure, PQR is a triangle right angled at Q and $XY \parallel QR$. If $PQ = 6$ cm, $PY = 4$ cm and $PX : XQ = 1 : 2$. Calculate the length of PR and QR . [2]



OR

In an equilateral triangle ABC , AD is drawn perpendicular to BC meeting BC in D . Prove that $AD^2 = 3BD^2$.

- Q23. Find the ratio in which the point $(-3, k)$ divides the line segment joining the points $(-5, -4)$ and $(-2, 3)$. Also find the value of k . [2]
- Q24. Find the number of plates, 1.5 cm in diameter and 0.2 cm thick, that can be fitted completely inside a right circular of height 10 cm and diameter 4.5 cm. [2]

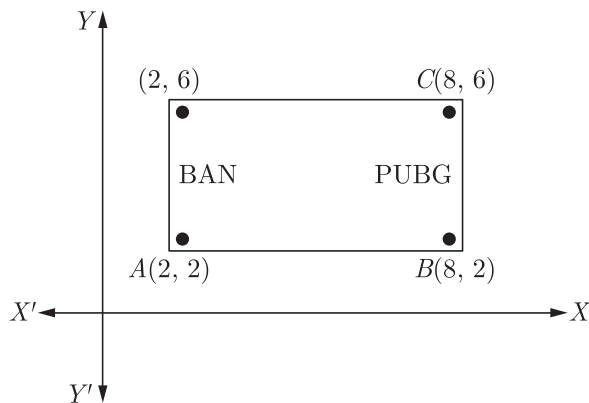
OR

A sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel ?

- Q25. A sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel ? [2]
- Q26. Read the following passage and the question that follows:

One tends to become lazy. Also, staring at your mobile screen for long hours can affect your eyesight and give you headaches. Those who are addicted to playing PUBG can get easily stressed out or face anxiety issues in public due to lack of social interaction.

To raise social awareness about ill effects of playing PUBG, a school decided to start “BAN PUBG” campaign, students are asked to prepare campaign board in the shape of rectangle (as shown in the figure).



- (i) Find the area of the board.
 (ii) If cost of 1 cm^2 of board is ₹8, then find the cost of board.

[2]

SECTION C

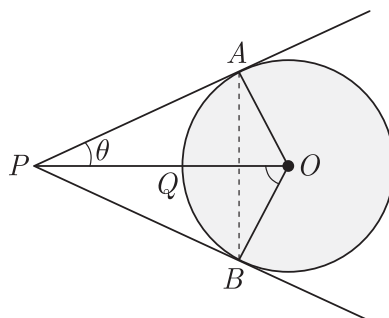
- Q27. The tenth term of an A.P., is -37 and the sum of its first six terms is -27 . Find the sum of its first eight terms. [3]

- Q28. If one the zero of a polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the value of k . [3]

OR

Show that $\frac{1}{2}$ and $-\frac{3}{2}$ are the zeroes of the polynomial $4x^2 + 4x - 3$ and verify relationship between zeroes and coefficients of the polynomial.

- Q29. In the given figure, OP is equal to the diameter of a circle with center O and PA and PB are tangents. Prove that ABP is an equilateral triangle. [3]



- Q30. The vertices of ΔABC are $A(6, -2)$, $B(0, -6)$ and $C(4, 8)$. Find the co-ordinates of mid-points of AB , BC and AC . [3]

OR

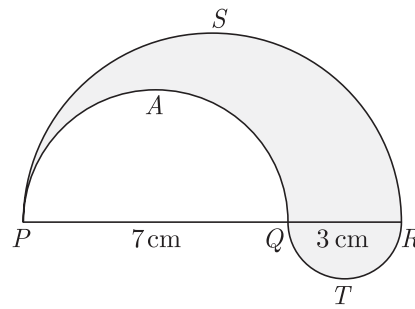
Find the ratio in which the point $p(m, 6)$ divides the line segment joining the points $A(-4, 3)$ and $B(2, 8)$. Also find the value of m .

- Q31. An aeroplane, when flying at a height of 4000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. (Use $\sqrt{3} = 1.73$) [3]

OR

Two men on either side of a 75 m high building and in line with base of building observe the angles of elevation of the top of the building as 30° and 60° . find the distance between the two men. (Use $\sqrt{3} = 1.73$)

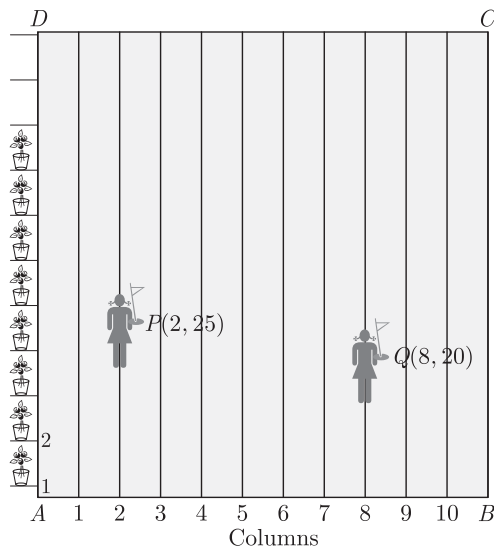
- Q32. In the fig., PSR , RTQ and PAQ are three semi-circles of diameters 10 cm , 3 cm and 7 cm region. Use $\pi = \frac{22}{7}$. [3]



Q33. Read the following passage and the question that follows:

To conduct Sport Day activities, in your rectangular shaped school ground $ABCD$, lines have been draw with chalk power at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along AD , as shown in figure. Niharika runs $\frac{1}{4}^{\text{th}}$ the distance AD in the 2nd line and posts a green flag. Preet runs $\frac{1}{5}^{\text{th}}$ the distance AD on the eight line and posts a red flag. [3]

- What is the distance between both the flags?
- If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?
- Which mathematical concept is used in the above problem?



Q34. A solid right-circular cone of height 60 cm and radius 30 cm is dropped in a right-circular cylinder full of water of height 180 cm and radius 60 cm. Find the volume of water left in the cylinder in cubic metre. Use $\pi = \frac{22}{7}$ [3]

SECTION D

Q35. For Uttarakhand flood victims two sections A and B of class contributed Rs. 1,500. If the contribution of X-A was Rs. 100 less than that of X-B, find graphically the amounts contributed by both the sections. [4]

Q36. Prove that $n^2 - n$ is divisible by 2 for every positive integer n . [4]

OR

If d is the HCF of 30 and 72, find the value of x and y satisfying $d = 30x + 72y$.

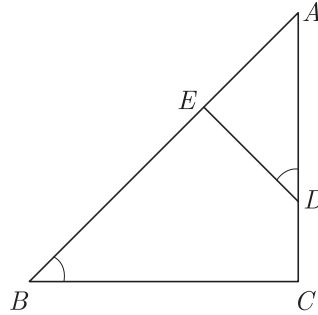
Q37. If $\cos \theta + \sin \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$, prove that $q(p^2 - 1) = 2p$ [4]

Q38. Two pipes running together can fill a tank in $11\frac{1}{9}$ minutes. If one pipe takes 5 minutes more than the other to fill the tank, find the time in which each pipe would fill the tank separately. [4]

OR

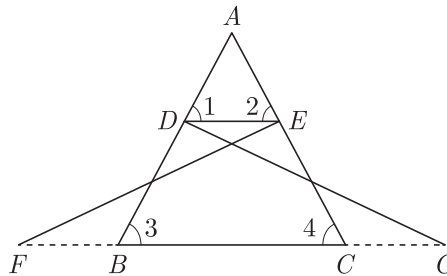
The perimeter of a right triangle is 60 cm. Its hypotenuse is 25 cm. Find the area of the triangle.

- Q39. In $\triangle ABC$, if $\angle ADE = \angle B$, then prove that $\triangle ADE \sim \triangle ABC$. Also, if $AD = 7.6$ cm, $AE = 7.2$ cm, $BE = 4.2$ cm and $BC = 8.4$ cm, then find DE . [4]



OR

In the following figure, $\triangle FEC \cong \triangle GBD$ and $\angle 1 = \angle 2$. Prove that $\triangle ADE \cong \triangle ABC$.



- Q40. Find the value of x and y , if the median for the following data is 31. [4]

Classes	0- 10	10- 20	20- 30	30- 40	40- 50	50- 60	Total
Frequency	5	x	6	y	6	5	40

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CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-5

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
 - (ii) The questions paper consists of 40 questions divided into four 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 choices have 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

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. If the difference of mode and median of a data is 24, then the difference of median and mean is [1]
(a) 12 (b) 24
(c) 08 (d) 36
- Q2. A slab of ice 8 inches in length, 11 inches in breadth, and 2 inches thick was melted and re-solidified in the form of a rod of 8 inches diameter. The length of such a rod, in inches, is nearest to [1]
(a) 3 (b) 3.5
(c) 4 (d) 4.5
- Q3. If $f(x) = \cos^2 x + \sec^2 x$, then $f(x)$ [1]
(a) ≥ 1 (b) ≤ 1
(c) ≥ 2 (d) ≤ 2
- Q4. The 2 digit number which becomes (5/6)th of itself when its digits are reversed. The difference in the digits of the number being 1, then the two digits number is [1]
(a) 45 (b) 54
(c) 36 (d) None of these
- Q5. If α and β are zeroes and the quadratic polynomial $f(x) = x^2 - x - 4$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ is [1]
(a) $\frac{15}{4}$ (b) $-\frac{15}{4}$
(c) 4 (d) 15
- Q6. Two positive numbers have their HCF as 12 and their product as 6336. The number of pairs possible for the numbers, is [1]
(a) 2 (b) 3
(c) 4 (d) 5
- Q7. If one root of the quadratic equation $ax^2 + bx + c = 0$ is the reciprocal of the other, then [1]
(a) $b = c$ (b) $a = b$
(c) $ac = 1$ (d) $a = c$

- Q8. If the common difference of an AP is 5, then what is $a_{18} - a_{13}$? [1]
(a) 5 (b) 20
(c) 25 (d) 30
- Q9. A bag contains 3 red and 2 blue marbles. If a marble is drawn at random, then the probability of drawing a blue marble is: [1]
(a) $\frac{1}{5}$ (b) $\frac{2}{5}$
(c) $\frac{3}{5}$ (d) $\frac{4}{5}$
- Q10. A sector is cut from a circular sheet of radius 100 cm, the angle of the sector being 240° . If another circle of the area same as the sector is formed, then radius of the new circle is [1]
(a) 79.5 cm (b) 81.5 cm
(c) 83.4 cm (d) 88.5 cm

(Q.11-Q.15) Fill in the blanks.

- Q11. The volume of a cube with diagonal d is [1]
- Q12. If $a = bq + r$, least value of r is [1]
- Q13. Area of a rhombus if its vertices are $(3, 0)$, $(4, 5)$, $(-1, 4)$ and $(-2, -1)$ taken in order is [1]

OR

Points $(3, 2)$, $(-2, -3)$ and $(2, 3)$ form a triangle.

- Q14. In $\triangle ABC$, right-angled at B , $AB = 24$ cm, $BC = 7$ cm. $\sin A =$ [1]
- Q15. Length of an arc of a sector of a circle with radius r and angle with degree measure θ is [1]

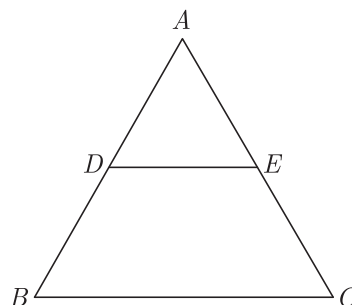
(Q.16-Q.20) Answer the following

- Q16. A ladder 15m long leans against a wall making an angle of 60° with the wall. Find the height of the point where the ladder touches the wall. [1]

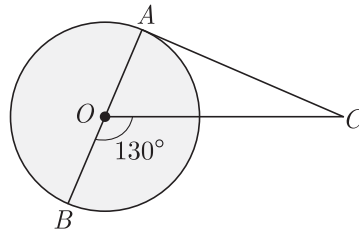
OR

An observer, 1.7 m tall, is $20\sqrt{3}$ m away from a tower. The angle of elevation from the eye of observer to the top of tower is 30° . Find the height of tower.

- Q17. In given figure $DE \parallel BC$. If $AD = 3$ cm, $DB = 4$ cm and $AE = 6$ cm, then find EC . [1]



- Q18. In the given figure, AOB is a diameter of the circle with centre O and AC is a tangent to the circle at A . If $\angle BOC = 130^\circ$, then find $\angle ACO$. [1]



Q19. To divide a line segment AB in the ratio 2:5, a ray AX is drawn such that $\angle BAX$ is acute. Then points are marked at equal intervals on AX. What is the minimum number of these points ? [1]

Q20. What is the volume of a right circular cylinder of base radius 7 cm and height 10 cm ? (Use $\pi = \frac{22}{7}$) [1]

SECTION B

Q21. For what value of k , the pair of linear equations $kx - 4y = 3$, $6x - 12y = 9$ has an infinite number of solutions ? [2]

Q22. Find the altitude of an equilateral triangle when each of its side is 'a' cm. [2]

OR

In an equilateral triangle of side $3\sqrt{3}$ cm find the length of the altitude.

Q23. The x-coordinate of a point P is twice its y-coordinate. If P is equidistant from $Q(2, -5)$ and $R(-3, 6)$, find the co-ordinates of P. [2]

Q24. A sphere of maximum volume is cut out from a solid hemisphere of radius 6 cm. Find the volume of the cut out sphere. [2]

OR

A cone of height 24 cm and radius of base 6 cm is made up of clay. If we reshape it into a sphere, find the radius of sphere.

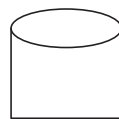
Q25. A hemisphere and a cone both have same diameter. These two metal solids are joined by putting their bases together. The height of the cone is equal to the diameter of the sphere. This solid is melted and recast into a sphere of a diameter equal to one third of the diameter of the hemisphere. [2]

(a) If radius of the hemisphere is r , find the volume of the combined solid.

(b) Find the number of spheres.

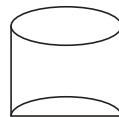
Q26. Read the following passage and the question that follows:

Ramesh, a juice seller has set up his juice shop. He has three types of glasses of inner diameter 5 cm to serve the customers. The height of the glasses is 10 cm. (Use $\pi = 3.14$). [2]



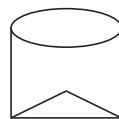
Type A

— A glass with a plane bottom



Type B

— A glass with hemispherical raised bottom



Type C

— A glass with conical raised bottom of height 1.5 cm.

He decided to serve the customer in "A" type of glasses.

(i) Find the volume of glass of type A.

(ii) and which glass has the minimum capacity.

SECTION C

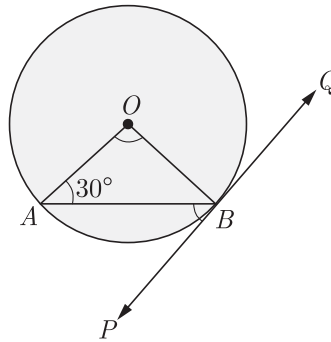
Q27. If 7th term of an A.P. is $\frac{1}{9}$ and 9th term is $\frac{1}{7}$, find 63rd term. [3]

Q28. Verify whether 2, 3 and $\frac{1}{2}$ are the zeroes of the polynomial $p(x) = 2x^3 - 11x^2 + 17x - 6$. [3]

OR

Find the zeroes of the quadratic polynomial $5x^2 + 8x - 4$ and verify the relationship between the zeroes and the coefficients of the polynomial.

Q29. In the figure, PQ is a tangent to a circle with center O . If $\angle OAB = 30^\circ$, find $\angle ABP$ and $\angle AOB$. [3]

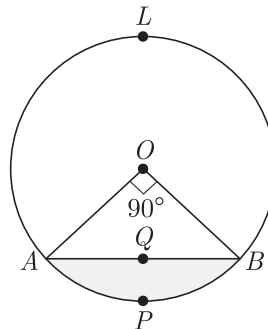


Q30. If the co-ordinates of points A and B are $(-2, -2)$ and $(2, -4)$ respectively, find the co-ordinates of P such that $AP = \frac{3}{7}AB$, where P lies on the line segment AB . [3]

OR

If the distance of $P(x, y)$ from $A(6, 2)$ and $B(-2, 6)$ are equal, prove that $y = 2x$.

Q31. In the given figure, a chord AB of the circle with centre O and radius 10 cm, that subtends a right angle at the centre of the circle. Find the area of the minor segment $AQBP$. Hence find the area of major segment $A \angle LBQA$. (Use $\pi = 3.14$) [3]



OR

Find the area of minor segment of a circle of radius 14 cm, when its centre angle is 60° . Also find the area of corresponding major segment. Use $\pi = \frac{22}{7}$.

Q32. An electric pole is 10 m high. A steel wire tied to top of the pole is affixed at a point on the ground to keep the pole up right. If the wire makes an angle of 45° with the horizontal through the foot of the pole, find the length of the wire. [Use $\sqrt{2} = 1.414$] [3]

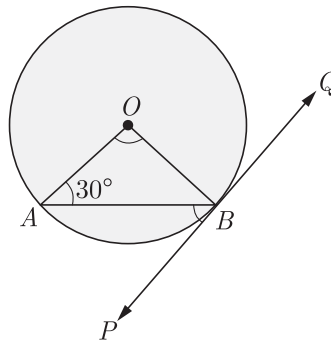
Q33. Read the following passage and the question that follows:

Rachel, an engineering student, was asked to make a model shaped like a cylinder with two cones attached at its two ends by using a thin aluminium sheet. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm. [3]

(i) Find the volume of air contained in the model that Rachel made. (Assume the outer and inner dimensions of the model to be nearly the same).

(ii) Which mathematical concept is used in the above problem ?

- Q34. In the figure, PQ is a tangent to a circle with center O . If $\angle OAB = 30^\circ$, find $\angle ABP$ and $\angle AOB$. [3]



SECTION D

- Q35. Find HCF and LCM of 378, 180 and 420 by prime factorization method. Is $\text{HCF} \times \text{LCM}$ of these numbers equal to the product of the given three numbers? [4]

- Q36. 4 chairs and 3 tables cost Rs 2100 and 5 chairs and 2 tables cost Rs 1750. Find the cost of none chair and one table separately. [4]

OR

If a bag containing red and white balls, half the number of white balls is equal to one-third the number of red balls. Thrice the total number of balls exceeds seven times the number of white balls by 6. How many balls of each colour does the bag contain ?

- Q37. Evaluate : $\frac{\cos 65^\circ}{\sin 25^\circ} - \frac{\tan 20^\circ}{\cot 70^\circ} - \sin 90^\circ + \tan 5^\circ \tan 35^\circ \tan 60^\circ \tan 55^\circ \tan 85^\circ$. [4]

- Q38. The time taken by a person to cover 150 km was $2\frac{1}{2}$ hours more than the time taken in the return journey. If he returned at a speed of 10 km/hour more than the speed while going, find the speed per hour in each direction. [4]

OR

A motorboat whose speed in still water is 18 km/h, takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

- Q39. In the right triangle, B is a point on AC such that $AB + AD = BC + CD$. If $AB = x$, $BC = h$ and $CD = d$, then find x (in term of h and d). [4]

OR

Prove that ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

- Q40. The median of the following data is 525. Find the values of x and y if the total frequency is 100. [4]

Class Interval	Frequency
0-100	2
100-200	5
200-300	x
300-400	12
400-500	17
500-600	20
600-700	y
700-800	9
800-900	7
900-1000	4
	$N = 100$

CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-6

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
- (ii) The questions paper consists of 40 questions divided into four 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 choices have 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

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. Two coins are tossed simultaneously. The probability of getting at most one head is [1]
(a) $\frac{1}{4}$ (b) $\frac{1}{2}$
(c) $\frac{3}{4}$ (d) 1
- Q2. If the perimeter of one face of a cube is 20 cm, then its surface area is [1]
(a) 120 cm^2 (b) 150 cm^2
(c) 125 cm^2 (d) 400 cm^2
- Q3. Which of the following will have a terminating decimal expansion? [1]
(a) $\frac{77}{210}$ (b) $\frac{23}{30}$
(c) $\frac{125}{441}$ (d) $\frac{23}{8}$
- Q4. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta$ and $x \sin \theta = y \cos \theta$, then $x^2 + y^2$ is equal to [1]
(a) 0 (b) $1/2$
(c) 1 (d) $3/2$
- Q5. One of the two students, while solving a quadratic equation in x , copied the constant term incorrectly and got the roots 3 and 2. The other copied the constant term and coefficient of x^2 correctly as -6 and 1 respectively. The correct roots are [1]
(a) 3, -2 (b) $-3, 2$
(c) $-6, -1$ (d) 6, -1
- Q6. A motor boat takes 2 hours to travel a distance 9 km. down the current and it takes 6 hours to travel the same distance against the current. The speed of the boat in still water and that of the current (in km/hour) respectively are [1]
(a) 3, 1.5 (b) 3, 2
(c) 3.5, 2.5 (d) 3, 1
- Q7. Five distinct positive integers are in an arithmetic progression with a positive common difference. If their sum is 10020, then the smallest possible value of the last term is [1]
(a) 2002 (b) 2004
(c) 2006 (d) 2007

- Q8. The value of the polynomial $x^8 - x^5 + x^2 - x + 1$ is [1]
(a) positive for all the real numbers (b) negative for all the real numbers
(c) 0 (d) depends on value of x

- Q9. If the area of a semi-circular field is 15400 sq m, then perimeter of the field is: [1]
(a) $160\sqrt{2}$ m (b) $260\sqrt{2}$ m
(c) $360\sqrt{2}$ m (d) $460\sqrt{2}$ m

- Q10. The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observation of the set is increased by 2, then the median of the new set [1]
(a) Is increased by 2
(b) Is decreased by 2
(c) Is two times the original median
(d) Remains the same as that of the original set

(Q.11-Q.15) Fill in the blanks.

- Q11. The total surface area of a solid hemisphere having radius r is [1]

- Q12. The fourth vertex D of a parallelogram $ABCD$ whose three vertices are $A(-2, 5)$, $B(6, 9)$ and $C(8, 5)$ is [1]

OR

$(5, -2)$, $(6, 4)$ and $(7, -2)$ are the vertices of an triangle.

- Q13. The region enclosed by an arc and a chord is called the of the circle. [1]

- Q14. In ΔPQR , right-angled at Q , $PR + QR = 25$ cm and $PQ = 5$ cm. The value of $\tan P$ is [1]

- Q15. An algorithm which is used to find HCF of two positive numbers is [1]

(Q.16-Q.20) Answer the following

- Q16. A pole casts a shadow of length $2\sqrt{3}$ m on the ground, when the Sun's elevation is 60° . Find the height of the pole. [1]

OR

An observer 1.5 m tall is 28.5 m away from a tower 30 m high. Find the angle of elevation of the top of the tower from his eye.

- Q17. If ratio of corresponding sides of two similar triangles is $5:6$, then find ratio of their areas. [1]

- Q18. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of larger circle (in cm) which touches the smaller circle. [1]

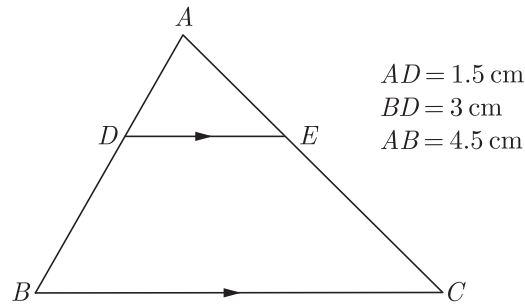
- Q19. A line Segment AB is divided at point P such that $\frac{PB}{AB} = \frac{3}{7}$, then find the ratio $AP : PB$. [1]

- Q20. If the radius of the base of a right circular cylinder is halved, keeping the height same, find the ratio of the volume of the reduced cylinder to that of original cylinder. [1]

SECTION B

- Q21. For what value of ' k ', the system of equations $kx + 3y = 1$, $12x + ky = 2$ has no solution. [2]

- Q22. In the given figure, $DE \parallel BC$. If $AD = 1.5$ cm $BD = 2AD$, then find $\frac{ar(\Delta ADE)}{ar(\text{trapezium } BCED)}$ [2]

**OR**

In an equilateral triangle of side 24 cm, find the length of the altitude.

Q23. Prove that the point $(3,0)$, $(6,4)$ and $(-1,3)$ are the vertices of a right angled isosceles triangle. [2]

Q24. A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have? Find the surface area of the solid. [2]

OR

A metallic solid sphere of radius 4.2 cm is melted and recast into the shape of a solid cylinder of radius 6 cm. Find the height of the cylinder.

Q25. There are two covers A and B each containing paper slips with natural numbers from 1 to 7 written on them. One slip is drawn from each cover. Using them, a two digit number is formed with a number from A in the units place and the number from B in the tens place. How many such two digit numbers can be formed? What is the probability that a two digit number so formed is even? [2]

Q26. Read the following passage and the question that follows:

The radius and height of a wax made cylinder are 6 cm and 12 cm respectively. A cone of same base radius and height has been made from this cylinder by cutting out. [2]

(a) Find the volume of cone

(b) How many candles with 1 cm radius and 12 cm height can be made using the remaining wax.

SECTION C

Q27. Determine an A.P. whose third term is 9 and when fifth term is subtracted from 8^{th} term, we get 6. [3]

Q28. If the sum and product of the zeroes of the polynomial $ax^2 - 5x + c$ are equal to 10 each, find the value of ' a ' and ' c '. [3]

OR

If α and β are the zeroes of a quadratic polynomial such that $\alpha + \beta = 0$ and $\alpha - \beta = 8$. Find the quadratic polynomial having α and β as its zeroes.

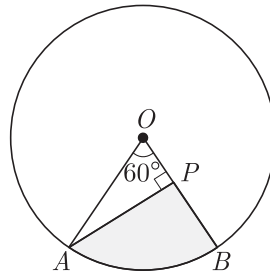
Q29. ABC is a triangle. A circle touches sides AB and AC produced and side BC at X , Y and Z respectively. Show that $AX = \frac{1}{2}$ perimeter of ΔABC . [3]

Q30. Find the co-ordinate of a point P on the line segment joining $A(1,2)$ and $B(6,7)$ such that $AP = \frac{2}{5}AB$ [3]

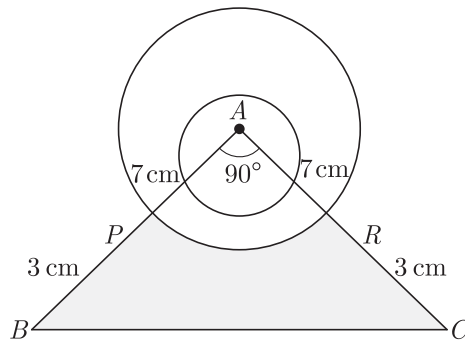
OR

Find the ratio in which the line segment joining the points $A(3, -3)$ and $B(-2, 7)$ is divided by x-axis. Also find the co-ordinates of point of division.

Q31. In the given figure, AOB is a sector of angle 60° of a circle with centre O and radius 17 cm. If $AP \perp OB$ and $AP = 15$ cm, find the area of the shaded region. [3]

**OR**

A memento is made as shown in the figure. Its base $PBCR$ is silver plate from the Front side. Find the area which is silver plated. Use $\pi = \frac{22}{7}$.



Q32. A 7m long flagstaff is fixed on the top of a tower standing on the horizontal plane. From point on the ground, the angles of elevation of the top and bottom of the flagstaff are 60° and 45° respectively. Find the height of the tower correct to one place of decimal. (Use $\sqrt{3} = 1.73$) [3]

Q33. Read the following passage and the question that follows:

One sees the top of a tree on the bank of a river at an elevation of 70° from the other bank. Stepping 20 metres back, he sees the top of the tree at an elevation of 55° . Height of the person is 1.4 metres.

(a) Draw a rough figure and mark the measurements.

(b) Find the height of the tree.

(c) Find the width of the river. [$\tan 70^\circ = 2.75$; $\tan 55^\circ = 1.43$] [3]

Q34. Find the area of the rhombus of vertices $(3,0)$, $(4,5)$, $(-1,4)$ and $(-2,-1)$ taken in order. [3]

SECTION D

Q35. Find the HCF of 256 and 36 using Euclid's Division Algorithm. Also, find their LCM and verify that $\text{HCF} \times \text{LCM} = \text{Product of the two numbers}$. [4]

Q36. Solve for x and y :

$$2x - y + 3 = 0$$

$$3x - 5y + 1 = 0$$

OR

A two digit number is obtained by either multiplying the sum of digits by 8 and then subtracting 5 or by multiplying the difference of digits by 16 and adding 3. Find the number.

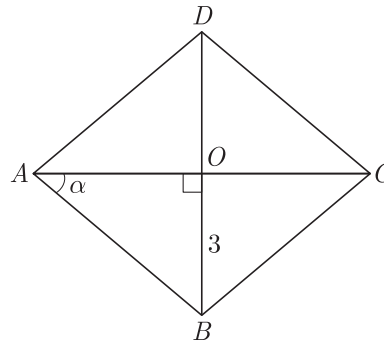
Q37. In an acute angled triangle ABC , if $\sin(A + B - C) = \frac{1}{2}$ and $\cos(B + C - A) = \frac{1}{\sqrt{2}}$, find $\angle A$, $\angle B$ and $\angle C$. [4]

Q38. The denominator of a fraction is two more than its numerator. If the sum of the fraction and its reciprocal is $\frac{34}{15}$, find the fraction. [4]

OR

A motor boat whose speed is 24 km/h in still water takes 1 hour more to go 32 km upstream than to return downstream to the same spot. Find the speed of the stream.

- Q39. $ABCD$ is a rhombus whose diagonal AC makes an angle α with AB . If $\cos \alpha = \frac{2}{3}$ and $OB = 3$ cm, find the length of its diagonals AC and BD . [4]



OR

Vertical angles of two isosceles triangles are equal. If their areas are in the ratio $16 : 25$, then find the ratio of their altitudes drawn from vertex to the opposite side.

- Q40. Find the median of the following data :

Class Interval	0- 20	20-40	40-60	60-80	80-100	100-120	120-140
Frequency	6	8	10	12	6	5	3

How can we find the median graphically ?

[4]

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CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-7

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
 - (ii) The questions paper consists of 40 questions divided into four 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 choices have 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

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. The probability of getting a number greater than 2 in throwing a dice is [1]
(a) $\frac{2}{3}$ (b) $\frac{1}{3}$
(c) $\frac{4}{3}$ (d) $\frac{1}{4}$
- Q2. In a frequency distribution, the mid value of a class is 10 and the width of the class is 6. The lower limit of the class is [1]
(a) 6 (b) 7
(c) 8 (d) 12
- Q3. Ratio of volumes of two cones with same radii is [1]
(a) $h_1 : h_2$ (b) $s_1 : s_2$
(c) $r_1 : r_2$ (d) None of these
- Q4. The value of $(12)^{3^x} + (18)^{3^x}$, $x \in N$, end with the digit. [1]
(a) 2 (b) 8
(c) 0 (d) Cannot be determined
- Q5. At present ages of a father and his son are in the ratio 7 : 3, and they will be in the ratio 2 : 1 after 10 years. Then the present age of father (in years) is [1]
(a) 42 (b) 56
(c) 70 (d) 77
- Q6. What is the common difference of four terms in A.P. such that the ratio of the product of the first fourth term to that of the second and third term is 2 : 3 and the sum of all four terms is 20? [1]
(a) 3 (b) 1
(c) 4 (d) 2
- Q7. Each root of $x^2 - bx + c = 0$ is decreased by 2. The resulting equation is $x^2 - 2x + 1 = 0$, then [1]
(a) $b = 6, c = 9$ (b) $b = 3, c = 5$
(c) $b = 2, c = -1$ (d) $b = -4, c = 3$
- Q8. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial $g(x)$, the quotient and remainder were $x - 2$ and $-2x + 4$ respectively, then $g(x)$ is equal to [1]
(a) $x^2 + x + 1$ (b) $x^2 + 1$
(c) $x^2 - x + 1$ (d) $x^2 - 1$

- Q9. The ratio in which the point $(2, y)$ divides the join of $(-4, 3)$ and $(6, 3)$. The value of y is [1]
 (a) $2:3, y = 3$ (b) $3:2, y = 4$
 (c) $3:2, y = 3$ (d) $3:2, y = 2$
- Q10. If the angle of depression of an object from a 75 m high tower is 30° , then the distance of the object from the tower is [1]
 (a) $25\sqrt{3}$ m (b) $50\sqrt{3}$ m
 (c) $75\sqrt{3}$ m (d) 150 m

(Q.11-Q.15) Fill in the blanks.

- Q11. If $\tan A = 4/3$ then $\sin A$ [1]
- Q12. A line that intersects a circle in one point only is called [1]
- Q13. Point $(-4, 6)$ divide the line segment joining the points $A(-6, 10)$ and $B(3, -8)$ in the ratio [1]

OR

All the points equidistant from two given points A and B lie on the of the line segment AB .

- Q14. Two points on a line segment are marked such that the three parts they make are equal then we say that the two points the line segment. [1]
- Q15. The ratio of the areas of two similar triangles is equal to the square of the ratio of their [1]

(Q.16-Q.20) Answer the following

- Q16. Two cubes each of volume 8 cm^3 are joined end to end, then what is the surface area of resulting cuboid. [1]

OR

A solid metallic object is shaped like a double cone as shown in figure. Radius of base of both cones is same but their heights are different. If this cone is immersed in water, find the quantity of water it will displace.

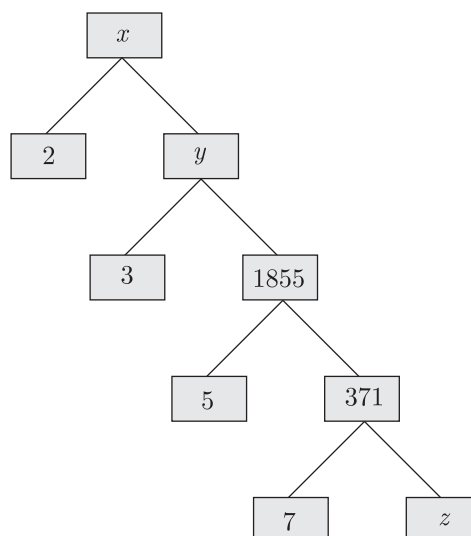
- Q17. If the length of the ladder placed against a wall is twice the distance between the foot of the ladder and the wall. Find the angle made by the ladder with the horizontal. [1]
- Q18. What is the perimeter of the sector with radius 10.5 cm and sector angle 60° . [1]
- Q19. Find the following frequency distribution, find the median class : [1]

Cost of living index	1400-1500	1550-1700	1700-1850	1850-2000
Number of weeks	8	15	21	8

- Q20. Out of 200 bulbs in a box, 12 bulbs are defective. One bulb is taken out at random from the box. What is the probability that the drawn bulb is not defective? [1]

SECTION B

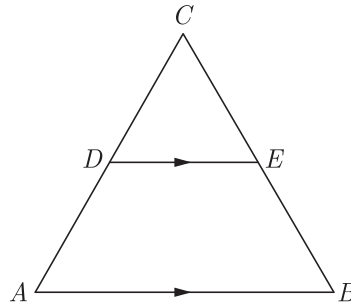
- Q21. Complete the following factor tree and find the composite number x [2]



- Q22. The sides AB and AC and the perimeter P_1 of $\triangle ABC$ are respectively three times the corresponding sides DE and DF and the parameter P_2 of $\triangle DEF$. Are the two triangles similar? If yes, find $\frac{ar(\triangle ABC)}{ar(\triangle DEF)}$ [2]

OR

In the given figure, $\angle A = \angle B$ and $AD = BE$. Show that $DE \parallel AB$.



- Q23. If $x = -\frac{1}{2}$, is a solution of the quadratic equation $3x^2 + 2kx - 3 = 0$, find the value of k . [2]
- Q24. The data regarding marks obtained by 48 students of a class in a class test is given below. Calculate the modal marks of students. [2]

Marks obtained	0-5	5- 10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Number of students	1	0	2	0	0	10	25	7	2	1

OR

The following table gives the life time in days of 100 bulbs :

Life time in days	Less than 50	Less than 100	Less than 150	Less than 200	Less than 250	Less than 300
Number of Bulbs	8	23	55	81	93	100

Change the above distribution as frequency distribution.

- Q25. The angle of elevation of the top of a chimney from the foot of a tower is 60° and the angle of depression of the foot of the chimney from the top of the tower is 30° . If the height of tower is 40 m, find the height of smoke emitting chimney. According to pollution control norms, the minimum height of a smoke emitting chimney should be 100 m. What value is discussed in this problem? [2]
- Q26. Read the following passage and the question that follows:
Two slips of paper marked 5 and 10 are put in a box and three slips marked 1, 3, 5 are in another. One slip from each box is drawn. [2]
(a) What is the probability that both show odd number?
(b) What is the probability of getting one odd number and one even number?

SECTION C

- Q27. Solve for x : $\frac{x+1}{x-1} + \frac{x-2}{x+2} = 4 - \frac{2x+3}{x-2}$; $x \neq 1, -2, 2$ [3]
- Q28. Find the HCF of 180, 252 and 324 by Euclid's Division algorithm. [3]

OR

144 cartons of Coke cans and 90 cartons of Pepsi cans are to be stacked in a canteen. If each stack is of the same height and if it equal contain cartons of the same drink, what would be the greatest number of cartons each stack would have?

- Q29. Prove that the tangents drawn at the ends of a diameter of a circle are parallel. [3]

- Q30. The ninth term of an A.P. is equal to seven times the second term and twelfth term exceeds five times the third term by 2. Find the first term and the common difference. [3]

OR

Find the 20th term of an A.P. whose 3rd term is 7 and the seventh term exceeds three times the 3rd term by 2. Also find its n^{th} term (a_n).

- Q31. The angles of depression of the top and bottom of a 50 m high building from the top of a tower are 45° and 60° respectively. Find the height of the tower and the horizontal distance between the tower and the building. (Use $\sqrt{3} = 1.73$) [3]

OR

An electric pole is 10 m high. A steel wire tied to top of the pole is affixed at a point on the ground to keep the pole up right. If the wire makes an angle of 45° with the horizontal through the foot of the pole, find the length of the wire. [Use $\sqrt{2} = 1.414$]

- Q32. The sum of the radius of base and height of a solid right circular cylinder is 37 cm. If the total surface area of the solid cylinder is 1628 sq. cm, find the volume of the cylinder. $\pi = \frac{22}{7}$ [3]

- Q33. Read the following, understand the mathematical idea expressed in it answer the questions that follow:

1,4,9,16, are the square of the counting numbers. The remainders got by dividing the square numbers with natural numbers have a cyclic property. For example, the remainders on dividing these numbers by 4 are tabulated here. [3]

Number	1	4	9	16	25	-	-	-
Remainder	1	0	1	0	1	-	-	-

On dividing by 4 perfect squares leave only 0 and 1 as remainders. From this we can conclude that an arithmetic sequence whose terms leaves remainder 2 on dividing by 4 do not have a perfect square.

- (a) Which are the possible remainders on dividing any number with 4?
 (b) Which are the numbers we would not get on dividing a perfect square by 4?
 (c) What is the remainder that leaves on dividing the terms of the arithmetic sequence 2,5,8,11, by 4?

- Q34. Find the area of the triangle PQR with $Q(3,2)$ and mid-points of the sides through Q being $(2, -1)$ and $(1,2)$. [3]

SECTION D

- Q35. Solve the following pair of equations : [4]

$$\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2 \text{ and } \frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1$$

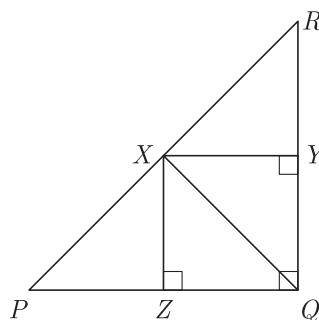
- Q36. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by $(x^2 - 2x + k)$, the remainder comes out to be $x + a$, find k and a . [4]

OR

Obtain all other zeroes of the polynomial $9x^4 - 6x^3 - 35x^2 + 24x - 4$, if two of its zeroes are 2 and -2 .

- Q37. Find the coordinates of the point which divide the line segment joining $A(2, -3)$ and $B(-4, -6)$ into three equal parts. [4]

- Q38. ΔPQR is right angled at Q , $QX \perp PR$, $XY \perp RQ$ and $XZ \perp PQ$ are drawn. Prove that $XZ^2 = PZ \times ZQ$. [4]



OR

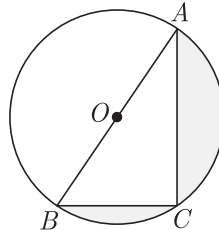
If the area of two similar triangles are equal, prove that they are congruent.

Q39. Evaluate : $\tan^2 30^\circ \sin 30^\circ + \cos 60^\circ \sin^2 90^\circ \tan^2 60^\circ - 2 \tan 45^\circ \cos^2 0^\circ \sin 90^\circ$ [4]

OR

If $\sqrt{3} \cot^2 \theta - 4 \cot \theta + \sqrt{3} = 0$, then find the value of $\cot^2 \theta + \tan^2 \theta$.

Q40. In the figure, O is the centre of circle such that diameter $AB = 13$ cm and $AC = 12$ cm. BC is joined. Find the area of the shaded region. ($\pi = 3.14$) [4]



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CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-8

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
- (ii) The questions paper consists of 40 questions divided into four 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 choices have 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

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. A single letter is selected at random from the word "PROBABILITY". The probability that the selected letter is a vowel is [1]

- (a) $\frac{2}{11}$ (b) $\frac{3}{11}$
 (c) $\frac{4}{11}$ (d) 0

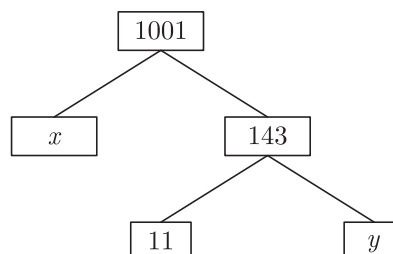
- Q2. The mean of discrete observations y_1, y_2, \dots, y_n is given by [1]

- (a) $\frac{\sum_{i=1}^n y_i}{n}$ (b) $\frac{\sum_{i=1}^n y_i}{\sum_{i=1}^n i}$
 (c) $\frac{\sum_{i=1}^n y_i f_i}{n}$ (d) $\frac{\sum_{i=1}^n y_i f_i}{\sum_{i=1}^n f_i}$

- Q3. Volume of a spherical shell is given by [1]

- (a) $4\pi(R^2 - r^2)$ (b) $\pi(R^3 - r^3)$
 (c) $4\pi(R^3 - r^3)$ (d) $\frac{4}{3}\pi(R^3 - r^3)$

- Q4. The values of x and y is the given figure are [1]



- (a) 7, 13 (b) 13, 7
 (c) 9, 12 (d) 12, 9

- Q5. If the sum of the zeroes of the polynomial $f(x) = 2x^3 - 3kx^2 + 4x - 5$ is 6, then the value of k is [1]

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

- Q6. If $3x + 4y : x + 2y = 9 : 4$, then $3x + 5y : 3x - y$ is equal to [1]
 (a) 4 : 1 (b) 1 : 4
 (c) 7 : 1 (d) 1 : 7
- Q7. The quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$ has [1]
 (a) two distinct real roots (b) two equal real roots
 (c) no real roots (d) more than 2 real roots
- Q8. There are 60 terms in an A.P. of which the first term is 8 and the last term is 185. The 31st term is [1]
 (a) 56 (b) 94
 (c) 85 (d) 98
- Q9. The height of a tree, if it casts a shadow 15 m long on the level of ground, when the angle of elevation of the sun is 45° , is [1]
 (a) 10 m (b) 14 m
 (c) 8 m (d) 15 m
- Q10. The point on the X -axis which is equidistant from the points $A(-2, 3)$ and $B(5, 4)$ is [1]
 (a) (0, 2) (b) (2, 0)
 (c) (3, 0) (d) $(-2, 0)$

(Q.11-Q.15) Fill in the blanks.

- Q11. The value of $\sin A$ or $\cos A$ never exceeds [1]
- Q12. Points $(1, 5)$, $(2, 3)$ and $(-2, -11)$ are [1]

OR

The value of the expression $\sqrt{x^2 + y^2}$ is the distance of the point $P(x, y)$ from the

- Q13. Tangent is perpendicular to the through the point of contact. [1]
- Q14. Two circles are drawn with same centre then the circle has bigger radius. [1]
- Q15. Two polygons of the same number of sides are similar, if all the corresponding angles are [1]

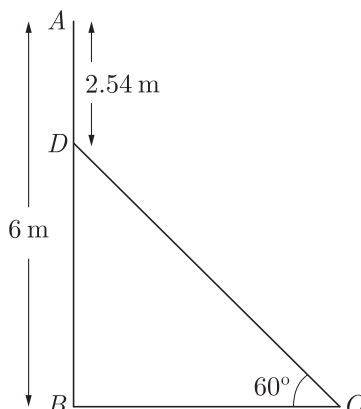
(Q.16-Q.20) Answer the following

- Q16. Volume of two spheres are in the ratio $64 : 27$, find the ratio of their surface areas. [1]

OR

Find the volume (in cm^3) of the largest right circular cone that can be cut off from a cube of edge 4.2 cm.

- Q17. In the given figure, AB is a 6 m high pole and DC is a ladder inclined at an angle of 60° to the horizontal and reaches up to point D of pole. If $AD = 2.54$ m, find the length of ladder. (use $\sqrt{3} = 1.73$) [1]



Q18. If the circumferences of two concentric circles forming a ring are 88 cm and 66 cm respectively. Find the width of the ring. [1]

Q19. Following distribution gives cumulative frequencies of 'more than type' : [1]

Marks obtained	Marks obtained 5	More than of equal to 10	More than or equal to 15	More than of equal to 20
Number of student (cumulative frequency)	30	23	8	2

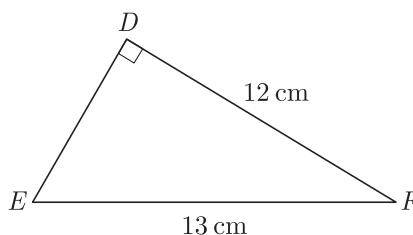
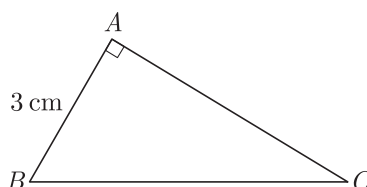
Change the above data to a continuous grouped frequency distribution.

Q20. A card is drawn at random from a well shuffled pack of 52 cards. Find the probability of getting neither a red card nor a queen. [1]

SECTION B

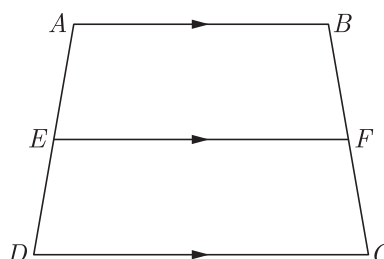
Q21. Find the HCF and LCM of 90 and 144 by the method of prime factorization. [2]

Q22. Given $\Delta ABC \sim \Delta DEF$, find $\frac{\Delta ABC}{\Delta DEF}$ [2]



OR

In the given figure, if $ABCD$ is a trapezium in which $AB \parallel CD \parallel EF$, then prove that $\frac{AE}{ED} = \frac{BF}{FC}$



Q23. Find the roots of the quadratic equation $\sqrt{3}x^2 - 2x - \sqrt{3}$. [2]

Q24. Find the value of λ , if the mode of the following data is 20 :
15, 20, 25, 18, 13, 15, 25, 15, 18, 17, 20, 25, 20, λ , 18. [2]

OR

Find the unknown values in the following table :

Class Interval	Frequency	Cumulative Frequency
0-10	5	5
10-20	7	x_1

Class Interval	Frequency	Cumulative Frequency
20-30	x_2	18
30-40	5	x_3
40-50	x_4	30

Q25. Two ships are approaching a light-house from opposite directions. The angle of depression of two ships from top of the light-house are 30° and 45° . If the distance between two ships is 100 m, find the height of light-house. [2]

Q26. Read the following passage and the question that follows:

There are two small boxes A and B . In A , there are 9 white beads and 8 black beads. In B , there are 7 white and 8 black beads. We want to take a bead from a box. [2]

(a) What is the probability of getting a white bead from a box?

(b) A white bead and a black bead are added to box B and then a bead is taken from it. What is the probability of getting a white bead from it ?

SECTION C

Q27. Solve for x : $\frac{1}{x} + \frac{2}{2x-3} = \frac{1}{x-2}$, $x \neq 0, \frac{2}{3}, 2$. [3]

Q28. Use Euclid division lemma to show that the square of any positive integer cannot be of the form $5m+2$ or $5m+3$ for some integer m . [3]

OR

Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together?

Q29. In $\triangle ABD$, $AB = AC$. If the interior circle of $\triangle ABC$ touches the sides AB, BC and CA at D, E and F respectively. Prove that E bisects BC . [3]

Q30. Determine an A.P. whose third term is 9 and when fifth term is subtracted from 8^{th} term, we get 6. [3]

OR

If 7^{th} term of an A.P. is $\frac{1}{9}$ and 9^{th} term is $\frac{1}{7}$, find 63^{rd} term.

Q31. An aeroplane, when flying at a height of 4000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. (Use $\sqrt{3} = 1.73$) [3]

OR

Two men on either side of a 75 m high building and in line with base of building observe the angles of elevation of the top of the building as 30° and 60° . find the distance between the two men. (Use $\sqrt{3} = 1.73$)

Q32. A tent is in the shape of cylinder surmounted by a conical top of same diameter. If the height and diameter of cylindrical part are 2.1 m and 3 m respectively and the slant height of conical part is 2.8 m, find the cost of canvas needed to make the tent if the canvas is available at the rate of Rs.500 per square meter. Use $\pi = \frac{22}{7}$ [3]

Q33. Read the following passage and the question that follows:

Roja, Renu and Reena are three friends. They decided to sweep a circular park near their homes. They divided the park into three parts by two equal chords AB and AC for convenience. [3]

(i) Prove that the centre of the park lies on the angle bisector of $\angle BAC$.

(ii) Which mathematical concept is used in the above problem?

Q34. 504 cones, each of diameter 3.5 cm and height 3 cm, are melted and recast into a metallic sphere. Find the diameter of the sphere and hence find its surface area. Use $\pi = \frac{22}{7}$ [3]

SECTION D

- Q35. Solve the following pairs of linear equations by elimination method. [4]
- (a) $x + y = 5$ and $2x - 3y = 4$
(b) $3x + 4y = 10$ and $2x - 2y = 2$
(c) $3x - 5y - 4 = 0$ and $9x = 2y + 7$

- Q36. Find the other zeroes of the polynomial $x^4 - 5x^3 + 2x^2 + 10x - 8$ if it is given that two zeroes are $-\sqrt{2}$ and $\sqrt{2}$. [4]

OR

Find all the zeros of the polynomial $3x^4 + 6x^3 - 2x^2 - 10x - 5$ if two of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$

- Q37. Find the area of a quadrilateral $ABCD$, the co-ordinates of whose vertices are $A(-3, 2)$, $B(5, 4)$, $C(7, -6)$ and $D(-5, -4)$. [4]

- Q38. In $\triangle ABC$, the mid-points of sides BC , CA and AB are D , E and F respectively. Find ratio of $ar(\triangle DEF)$ to $ar(\triangle ABC)$. [4]

OR

In $\triangle ABC$, AD is the median to BC and in $\triangle PQR$, PM is the median to QR . If $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM}$. Prove that $\triangle ABC \sim \triangle PQR$. Prove that $\triangle ABC \sim \triangle PQR$.

- Q39. Given that $\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$, find the values of $\tan 75^\circ$ and $\tan 90^\circ$ by taking suitable values of A and B . [4]

OR

In an acute angled triangle ABC , if $\sin(A + B - C) = \frac{1}{2}$ and $\cos(B + C - A) = \frac{1}{\sqrt{2}}$, find $\angle A$, $\angle B$ and $\angle C$.

- Q40. Four equal circles are described at the four corners of a square so that each touches two of the others. The shaded area enclosed between the circle is $\frac{24}{7}$ cm². Find the radius of each circle. [4]

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CLASS X (2019-20)
MATHEMATICS BASIC(241)
SAMPLE PAPER-9

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
- (ii) The questions paper consists of 40 questions divided into four 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 choices have 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.

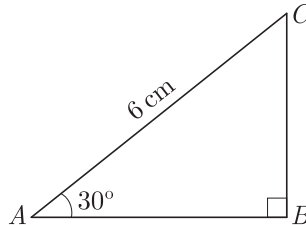
SECTION A

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

- Q1. A three digit number is to be formed using the digits 3, 4, 7, 8 and 2 without repetition. The probability that it is an odd number is [1]
(a) $\frac{2}{5}$ (b) $\frac{1}{5}$
(c) $\frac{4}{5}$ (d) $\frac{3}{5}$
- Q2. If the coordinates of the point of intersection of less than ogive and more than ogive is (13.5,20), then the value of median is [1]
(a) 13.5 (b) 20
(c) 33.5 (d) 7.5
- Q3. The volume of a largest sphere that can be cut from cylindrical log of wood of base radius 1 m and height 4 m, is [1]
(a) $\frac{16}{3} \pi \text{ m}^3$ (b) $\frac{8}{3} \pi \text{ m}^3$
(c) $\frac{4}{3} \pi \text{ m}^3$ (d) $\frac{10}{3} \pi \text{ m}^3$
- Q4. An AP starts with a positive fraction and every alternate term is an integer. If the sum of the first 11 terms is 33, then the fourth term is [1]
(a) 2 (b) 3
(c) 5 (d) 6
- Q5. If the sum of the zeroes of the polynomial $f(x) = 2x^3 - 3kx^2 + 4x - 5$ is 6, then the value of k is [1]
(a) 2 (b) -2
(c) 4 (d) -4
- Q6. Which of the following rational number have non-terminating repeating decimal expansion? [1]
(a) $\frac{31}{3125}$ (b) $\frac{71}{512}$
(c) $\frac{23}{200}$ (d) None of these
- Q7. A fraction becomes 4 when 1 is added to both the numerator and denominator and it becomes 7 when 1 is subtracted from both the numerator and denominator. The numerator of the given fraction is [1]
(a) 2 (b) 3
(c) 5 (d) 15

- Q8. $(x^2 + 1)^2 - x^2 = 0$ has [1]
 (a) four real roots (b) two real roots
 (c) no real roots (d) one real root
- Q9. C is the mid-point of PQ , if P is $(4, x)$, C is $(y, -1)$ and Q is $(-2, 4)$, then x and y respectively are [1]
 (a) -6 and 1 (b) -6 and 2
 (c) 6 and -1 (d) 6 and -2

- Q10. In the adjoining figure, the length of BC is [1]



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

(Q.11-Q.15) Fill in the blanks.

- Q11. Only two can be drawn to a circle from an external point. [1]
- Q12. Point on the X -axis which is equidistant from $(2, -5)$ and $(-2, 9)$ is [1]
- OR**
- Relation between x and y if the points (x, y) , $(1, 2)$ and $(7, 0)$ are collinear is [1]
- Q13. The common point of a tangent to a circle and the circle is called [1]
- Q14. Triangle in which we study trigonometric ratios is called [1]
- Q15. theorem states that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. [1]

(Q.16-Q.20) Answer the following

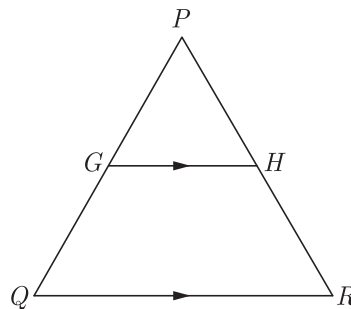
- Q16. 12 solid spheres of the same size are made by melting a solid metallic cone of base radius 1 cm and height of 48 cm. Find the radius of each sphere. [1]
- OR**
- Three cubes of iron whose edges are 3 cm, 4 cm and 5 cm respectively are melted and formed into a single cube, what will be the edge of the new cube formed ?
- Q17. A ladder, leaning against a wall, makes an angle of 60° with the horizontal. If the foot of the ladder is 2.5 m away from the wall, find the length of the ladder. [1]
- Q18. The diameter of two circle with centre A and B are 16 cm and 30 cm respectively. If area of another circle with centre C is equal to the sum of areas of these two circles, then find the circumference of the circle with centre C . [1]
- Q19. In the following frequency distribution, find the median class. [1]

Height (in cm)	104-145	145-150	150-155	155-160	160-165	165-170
Frequency	5	15	25	30	15	10

- Q20. A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant. [1]

SECTION B

- Q21. Using Euclid's algorithm, find the HCF of 240 and 228. [2]
- Q22. In the given figure, G is the mid-point of the side PQ of $\triangle PQR$ and $GH \parallel QR$. Prove that H is the mid-point of the side PR or the triangle PQR . [2]



OR

In a rectangle $ABCD$, E is a point on AB such that $AE = \frac{2}{3}AB$. If $AB = 6$ km and $AD = 3$ km, then find DE .

- Q23. Solve for x : $x^2 - (\sqrt{3} + 1)x + \sqrt{3} = 0$ [2]
- Q24. The mean and median of 100 observation are 50 and 52 respectively. The value of the largest observation is 100. It was later found that it is 110. Find the true mean and median. [2]

OR

Find the sum of the lower limit of the median class and the upper limit of the modal class :

Classes	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	1	3	5	9	7	3

- Q25. Due to sudden floods, some welfare associations jointly requested the government to get 100 tents fixed immediately and offered to contribute 50% of the cost. If the lower part of each tent is of the form of a cylinder of diameter 4.2 m and height 4 m with the conical upper part of same diameter but of height 2.8 m and the canvas to be used cost ₹ 100 per sq.m, find the amount, the associations will have to pay. [Use $\pi = \frac{22}{7}$] [2]
- Q26. Read the following passage and answer the questions that follows:
A box contains 8 black beads and 12 white beads. Another box contains 9 black beads and 6 white beads. One bead from each box is taken. [2]
- (a) What is the probability that both beads are black?
- (b) What is the probability of getting one black bead and one white bead ?

SECTION C

- Q27. Solve for : [3]
- $$x \frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} = \frac{2}{3}; x \neq 1, 2, 3$$
- Q28. Find the HCF, by Euclid's division algorithm of the numbers 92690, 7378 and 7161. [3]

OR

Find HCF and LCM of 16 and 36 by prime factorization and check your answer.

- Q29. Two tangents TP and TQ are drawn to a circle with centre O from an external point T . Prove that [3]
- $$\angle PTO = \angle OPQ$$
- Q30. The sum of n terms of an A.P. is $3n^2 + 5n$. Find the A.P. Hence find its 15^{th} term. [3]

OR

Divide 56 in four parts in A.P. such that the ratio of the product of their extremes (1^{st} and 4^{th}) to the product of means (2^{nd} and 3^{rd}) is 5:6.

- Q31. A 7 m long flagstaff is fixed on the top of a tower standing on the horizontal plane. From point on the ground, the angles of elevation of the top and bottom of the flagstaff are 60° and 45° respectively. Find the height of the tower correct to one place of decimal. (Use $\sqrt{3} = 1.73$) [3]

OR

An aeroplane, when flying at a height of 4000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. (Use $\sqrt{3} = 1.73$)

- Q32. A solid sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged into water, by how much will the level of water rise in the cylindrical vessel ? [3]

- Q33. Read the following passage and answer the questions that follows:

Three Students Priyanka, Sania and David are Protesting against killing innocent animals for commercial purposes in a circular park of radius 20 m. They are standing at equal distance on its boundary by holding banners in their hands. [3]

- (i) Find the distance between each of them?
(ii) Which mathematical concept is used in it?

- Q34. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta$ and $x \sin \theta = y \cos \theta$, Prove that $x^2 + y^2 = 1$. [3]

SECTION D

- Q35. A train covered a certain distance at a uniform speed. If the train would have been 10 km/hr scheduled time. And, if the train were slower by 10 km/hr, it would have taken 3 hr more than the scheduled time. Find the distance covered by the train. [4]

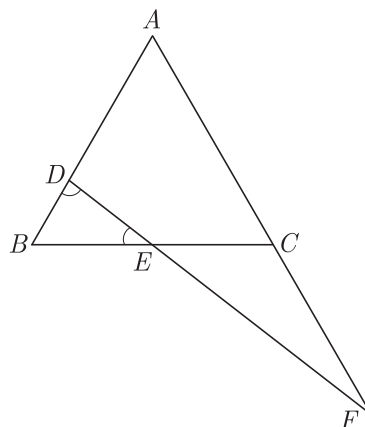
- Q36. Show that 3 is a zero of the polynomial $2x^2 - x^2 - 13x - 6$. Hence find all the zeroes of this polynomial. [4]

OR

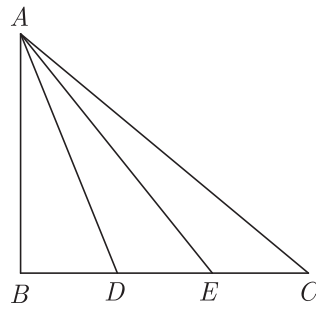
Given that $x - \sqrt{5}$ is a factor of the polynomial $x^3 - 3\sqrt{5}x^2 - 5x + 15\sqrt{5}$, find all the zeroes of the polynomial.

- Q37. If $A(-4, 8)$, $B(-3, -4)$, $C(0, -5)$ and $D(5, 6)$ are the vertices of a quadrilateral $ABCD$, find its area. [4]

- Q38. In the figure, $\angle BED = \angle BDE$ and E is the mid-point of BC . Prove that $\frac{AF}{CF} = \frac{AD}{BE}$. [4]

**OR**

In the given figure, D and E trisect BC . Prove that $8AE^2 = 3AC^2 + 5AD^2$.



Q39. Evaluate : [4]

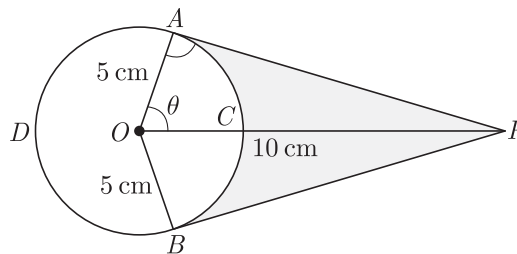
$$\sin^2 30^\circ \cos^2 45^\circ + 4 \tan^2 30^\circ + \frac{1}{2} \sin 90^\circ - 2 \cos^2 90^\circ + \frac{1}{24}$$

OR

Prove that : $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \tan \theta + \cot \theta$.

Q40. An elastic belt is placed around the rim of a pulley of radius 5 cm. From one point C on the belt elastic belt is pulled directly away from the centre O of the pulley until it is at P , 10 cm from the point O . Find the length of the belt that is still in contact with the pulley. Also find the shaded area.

(Use $\pi = 3.14$ and $\sqrt{3} = 1.73$) [4]



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