

CLASS X (2019-20)
MATHEMATICS STANDARD(041)
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.
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SECTION A

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

- Q1. 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
- Q2. 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) $x = 4y + 1$
- Q3. 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) $\frac{1}{2}$
- Q4. 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
- Q5. It is given that $\Delta ABC \sim \Delta PQR$ with $\frac{BC}{QR} = \frac{1}{3}$. Then $\frac{\text{ar}(\Delta PRQ)}{\text{ar}(\Delta BCA)}$ is equal to [1]
(a) 9 (b) 3
(c) $\frac{1}{3}$ (d) $\frac{1}{9}$
- Q6. 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
- Q7. $(\cos^4 A - \sin^4 A)$ is equal to [1]
(a) $1 - 2\cos^2 A$ (b) $2\sin^2 A - 1$
(c) $\sin^2 A - \cos^2 A$ (d) $2\cos^2 A - 1$
- Q8. 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

- Q9. 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
- Q10. 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%

(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 $\alpha + \beta = -b/.....$ and $\alpha\beta = c/.....$ [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. Find the positive root of $\sqrt{3x^2 + 6} = 9$. [1]
- Q17. The diameter of a wheel is 1.26 m. What the distance covered in 500 revolutions. [1]
- Q18. 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.

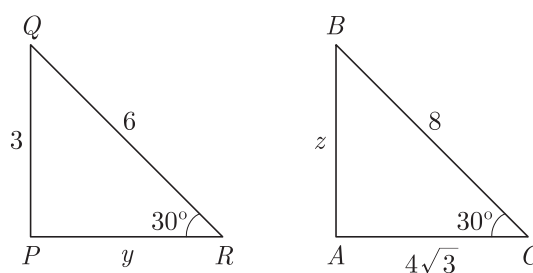
- Q19. If the median of a series exceeds the mean by 3, find by what number the mode exceeds its mean? [1]
- Q20. 20 tickets, on which numbers 1 to 20 are written, are mixed thoroughly and then a ticket is drawn at random out of them. Find the probability that the number on the drawn ticket is a multiple 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. In the given figure, $\triangle ABC \sim \triangle PQR$. Find the value of $y + z$. [2]

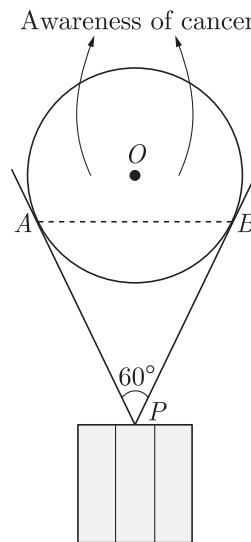


- Q23. If the point $P(x, y)$ is equidistant from the points $Q(a + b, b - a)$ and $R(a - b, a + b)$, then prove that $bx = ay$. [2]

OR

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

- Q24. 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. [2]

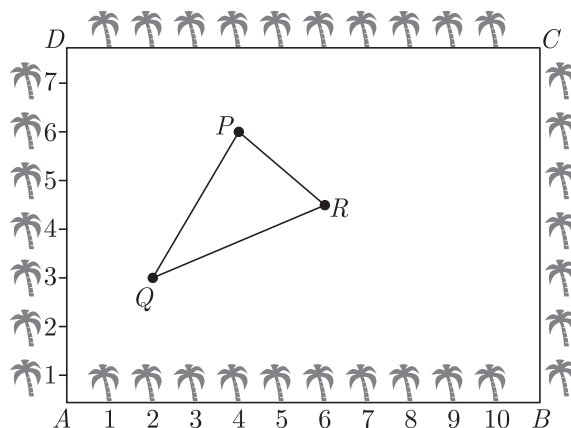


- What is the length of AB ?
 - If the perpendicular distance from the centre of the circle to the chord AB is 3 cm, then find the radius of the circle.
- Q25. Find the mean of the data using an empirical formula when it is given that mode is 50.5 and median in 45.5. [2]

OR

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

- Q26. The Class XII students of a senior secondary school in Kishangarh have been allotted a rectangular plot of land for this gardening activity as shown in figure [2]



Sapling of Neem tree are planted on the boundary at a distance of 1 m from each other. There is a triangular grassy lawn in the plot as shown in above figure.

The students are to sow seeds of flowering plants on the remaining area of the plot.

Then, taking A as origin, find the area of the triangle in this case.

SECTION C

- Q27. 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.

- Q28. Solve using cross multiplication method: [3]

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

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

- Q29. 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). [3]

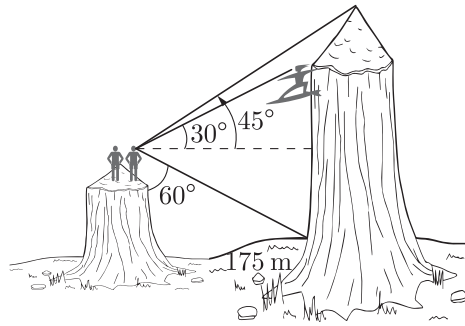
OR

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

- Q30. 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]

- Q31. A local Outdoors Club has just hiked to the south rim of a large canyon, when they spot a climber attempting to scale the taller northern face. Knowing the distance between the sheer walls of the northern and southern faces of the canyon is approximately 175m, they attempt to compute the distance remaining for the climbers to reach the top of the northern rim. Using a homemade transit, they sight an angle of depression of 60° to the bottom of the north face, and angles of elevation of 30° and 45° to the climbers and top of the northern rim respectively.

- (a) How high is the southern rim of the canyon?
 (b) How high is the northern rim?
 (c) How much farther until the climber reaches the top? [3]



- Q32. 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]

OR

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

- Q33. Construct a ΔABC 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 ΔABC . [3]

- Q34. Hari, standing on the top of a building, sees the top of a tower at an angle of elevation of 50° and the foot of the tower at an angle of depression of 20° . Hari is 1.6 metre tall and the height of the building on which he is standing is 9.2 metres. [3]

- (a) Draw a rough sketch according to the given information.
 (b) How far is the tower from the building?
 (c) Calculate the height of the tower.

$$[\sin 20^\circ = 0.34, \cos 20^\circ = 0.94, \tan 20^\circ = 0.36]$$

$$\sin 50^\circ = 0.77, \cos 50^\circ = 0.64, \tan 50^\circ = 1.19]$$

SECTION D

- Q35. 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.

- Q36. Solve for $x : \left(\frac{2x}{x-5}\right)^2 + \left(\frac{2x}{x-5}\right) - 24 = 0, x \neq 5$ [4]

- Q37. 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

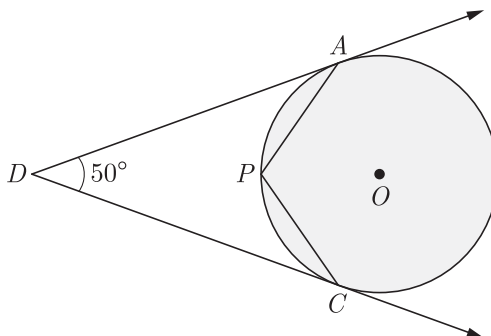
Prove that the area of a triangle with vertices $(t, t - 2)$, $(t + 2, t + 2)$ and $(t + 3)$ is independent of t .

- Q38. 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 $\sqrt{3} = 1.732$)

- Q39. 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]



- 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 STANDARD(041)
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 4 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.
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SECTION A

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

- Q1. 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
- Q2. 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
- Q3. 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
- 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. 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
- Q6. 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
- Q7. 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°
- Q8. If a regular hexagon is inscribed in a circle of radius r , then its perimeter is [1]
(a) $3r$ (b) $6r$
(c) $9r$ (d) $12r$
- Q9. 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

- Q10. 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

(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]

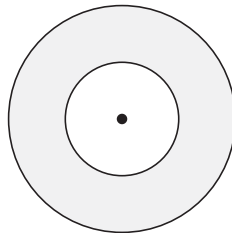
OR

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

- 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. If one root of the quadratic equation $6x^2 - x - k = 0$ is $\frac{2}{3}$, then find the value of k . [1]
 Q17. 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]



- Q18. 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.

- 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. In $\triangle ABC$, $AD \perp BC$, such that $AD^2 = BD \times CD$. Prove that $\triangle ABC$ is right angled at A . [2]
 Q23. Prove that the point $(3, 0)$, $(6, 4)$ and $(-1, 3)$ are the vertices of a right angled isosceles triangle. [2]

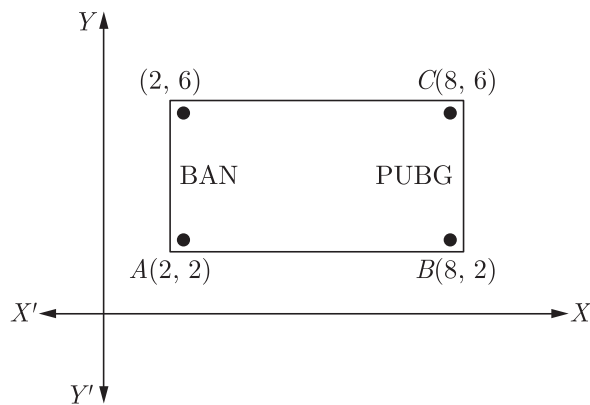
OR

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

- Q24. One tends to become lazy. Also, starting at your mobile screen for long hours can affect you 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]



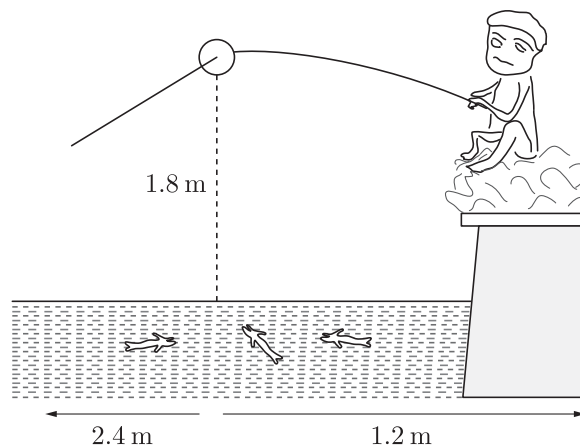
- (i) Find the area of the board.
 (ii) If cost of 1 cm^2 of board is ₹8, then find the cost of board.

- Q25. 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.

- Q26. 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?

SECTION C

- Q27. 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 $\alpha^{-1} + \beta^{-1} + \gamma^{-1}$.

- Q28. 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]

- Q29. 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.

- Q30. $\triangle ABC$ 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]

- Q38. 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 $x : y$.

- Q39. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle. [4]

- 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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CLASS X (2019-20)
MATHEMATICS STANDARD(041)
SAMPLE PAPER-3

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

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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. (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
- Q2. 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
- Q3. 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) $2 \leq k \leq -2$
- 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. 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
- Q6. 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
- Q7. 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°
- Q8. 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) $x^2 + r^2 = y^2$

Q9. 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

Q10. 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

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

Q11. If p is a prime number and it divides a^2 then it also divides, where a is a positive integer. [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. Area of a circle is [1]

Q14. The volume and surface area of a sphere are numerically equal, then the radius of sphere is units. [1]

Q15. Someone is asked to make a number from 1 to 100. The probability that it is a prime is [1]

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

Q16. Find the value (s) of k if the quadratic equation $3x^2 - k\sqrt{3}x + 4 = 0$ has real roots. [1]

Q17. 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]

Q18. Volume and surface area of a solid hemisphere are numerically 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.

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]

$$2x - y = 2$$

$$x + 3y = 15$$

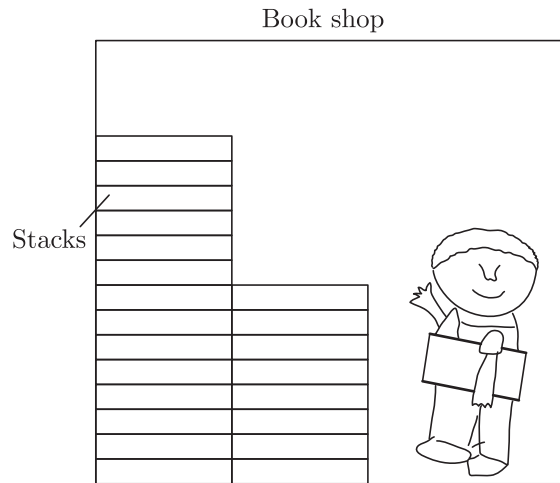
Q22. Let $\Delta ABC \sim \Delta DEF$. if $ar(\Delta ABC) = 100 \text{ cm}^2$, $ar(\Delta DEF) = 196 \text{ cm}^2$ and $DE = 7$, then find AB . [2]

Q23. 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?

Q24. 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?

- Q25. 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.

- Q26. Rajesh starts walking from his house to office. Instead of going to the office directly, he goes to a mall first, from there to his wife's office and then reaches the office. What is the extra distance travelled by Rajesh in reaching his office? Assume that all distance covered are in straight lines, if the house is situated at (2,4), mall at (5,8), wife's office at (13,14) and office at (13,26) and coordinates are in kilometre. [2]

SECTION C

- Q27. 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 $x^2 + 2x$.

- Q28. Solve for x and y : [3]

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

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

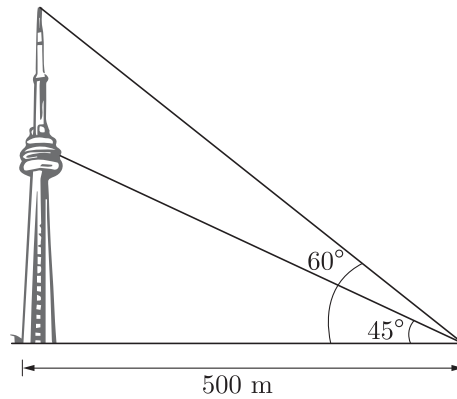
- Q29. For what value of n , are the n^{th} terms of two A.Ps 63, 65, 67, ... and 3, 10, 17, equal? [3]

OR

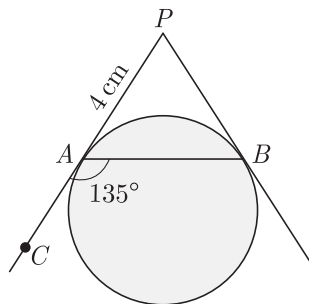
In an A.P., if the 12^{th} term is -13 and the sum of its first four terms is 24, find the sum of its first ten terms.

- Q30. ABC is a triangle, PQ is the line segment intersecting AB in P and AC in Q such that $PQ \parallel BC$ and divides $\triangle ABC$ into two parts, equal in area, find $BP:AB$, [3]

- Q31. The tallest free-standing tower in the world is the CN Tower in Toronto, Canada. The tower includes a rotating restaurant high above the ground. From a distance of 500 m the angle of elevation to the pinnacle of the tower is 60° . The angle of elevation to the restaurant from the same vantage point is 45° . How tall is the CN Tower? How far below the pinnacle of the tower is the restaurant located? [3]



- Q32. 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

$$\angle PTO = \angle OPQ$$

- Q33. 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]
- Q34. A boy, standing on the top of a tower 20 meter height, saw the top of a building at an elevation of 50° and its base at a depression of 30° . [3]
- Draw a rough figure according to the given data.
 - Find the distance between the tower and the building.
 - Find the distance from the top of the tower to the base of the building.
- [use $\sin 50^\circ = 0.77$, $\cos 50^\circ = 0.64$, $\tan 50^\circ = 1.2$, $\sqrt{3} = 1.7$]

SECTION D

- Q35. 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.

- Q36. 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]
- Q37. 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

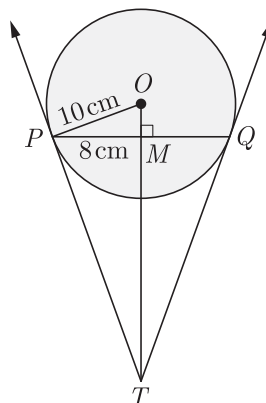
The base QR of an equilateral triangle PQR lies on x-axis. The co-ordinates of point Q are $(-4, 0)$ and the origin is the mid-point of the base. find the co-ordinates of the point P and R .

- Q38. 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.

- Q39. 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]



- 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 STANDARD(041)
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 4 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

- Q1. 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
- Q2. 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
- Q3. 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
- Q4. 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) $mq = \sqrt{np}$
- Q5. 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
- Q6. 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) $x^2 q^2 - y^2 p^2 = p^2 q^2$
- Q7. 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.
- Q8. 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

- Q9. 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

- Q10. 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) $\frac{2}{5}$

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

- Q11. L.C.M. of 96 and 404 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]

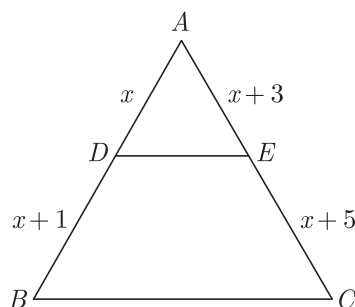
OR

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

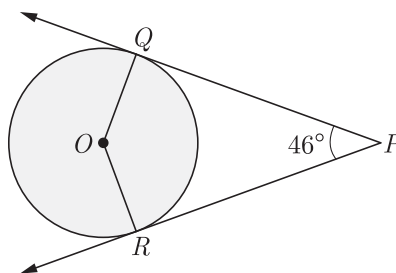
- Q13. In a right triangle ABC , right angled at B , if $\tan A = 1$, $\sin A \cos A = \dots\dots\dots$ [1]
 Q14. If the area of a circle is 154 cm^2 , then its circumference is [1]
 Q15. If the volume of a cube is 64 cm^3 , then its surface area is [1]

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

- Q16. In $\triangle ABC$, $DE \parallel BC$, find the value of x . [1]



- Q17. If PQ and PR are two tangents to a circle with center O . If $\angle QPR = 46^\circ$ then find $\angle QOR$. [1]

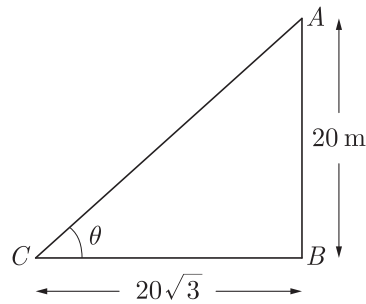


- Q18. To divide a line segment AB in the ratio $5:7$, first AX is drawn, so that $\angle BAX$ is an acute angle and then at equal distance, points are marked on the ray AX , find the minimum number of these points. [1]

OR

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?

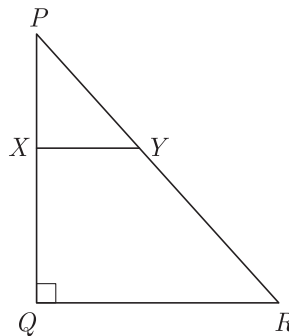
- Q19. In figure, a tower AB is 20 m high and BC , its shadow on the ground, is $20\sqrt{3} \text{ m}$ long. find the Sun's altitude. [1]



- 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. 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]
- Q23. 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]

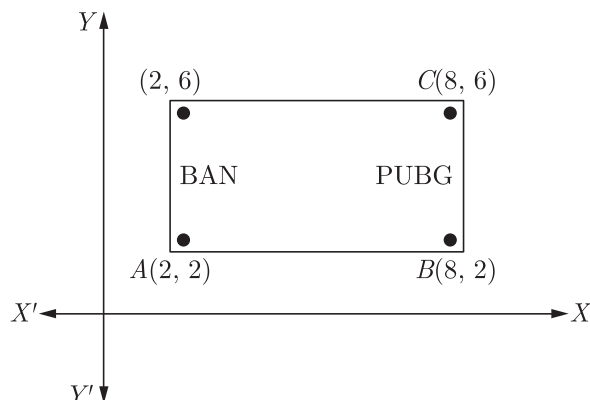


OR

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

- Q24. 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 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]
- Q25. 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 ?

- Q26. Milk in a container, which is in the form of frustum of a cone of height 30 cm and the radii of whose lower and upper circular ends are 20 cm and 40 cm respectively, is to be distributed in a camp for flood victims. If this milk is available at the rate of ₹35 per litre and 880 litre of milk is needed daily for a camp, find how many such containers of milk are needed for a camp and what cost will it put on the donor agency for this. What value is indicated through this by the donor agency? [2]

SECTION C

- Q27. If one of the zeros 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.

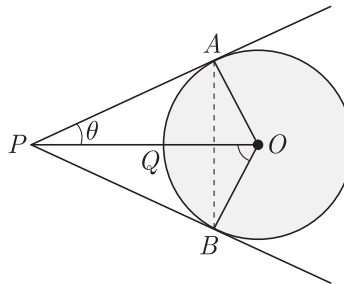
- Q28. The tenth term of an A.P., is -37 and the sum of its first six terms is -27 . Find the sum of its first eight terms. [3]

- Q29. The vertices of $\triangle ABC$ 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

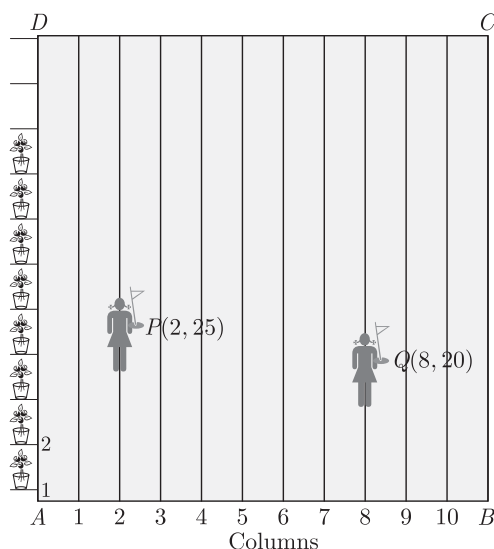
Find the ratio in which the point $P(m, 6)$ divides the line segment joining the points $A(-4, 3)$ and $B(2, 8)$. Also find the value of m .

- Q30. In the given figure, OP is equal to the diameter of a circle with center O and PA and PB are tangents. Prove that $\triangle ABP$ is an equilateral triangle. [3]



- Q31. To conduct Sport Day activities, in your rectangular shaped school ground $ABCD$, lines have been drawn with chalk powder 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 $\frac{1}{4}$ th the distance AD in the 2nd line and posts a green flag. Preet runs $\frac{1}{5}$ th the distance AD on the 8th 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?

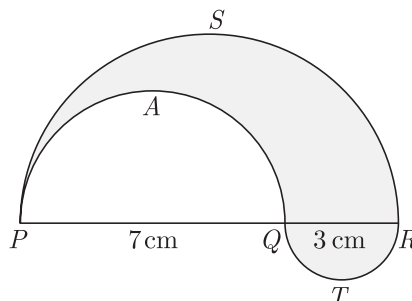


- Q32. An aeroplane, when flying at a height of 4000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. (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 $\sqrt{3} = 1.73$)

- Q33. 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]



- Q34. In class 10 A, there are 20 boys and 20 girls. In 10 B, there are 15 boys and 25 girls. One student is to be selected from each class.
 (i) What is the probability of both being girls?
 (ii) What is the probability of both being boys?
 (iii) What is the probability of one boy and one girl?

SECTION D

- Q35. Prove that $n^2 - n$ is divisible by 2 for every positive integer n . [4]

OR

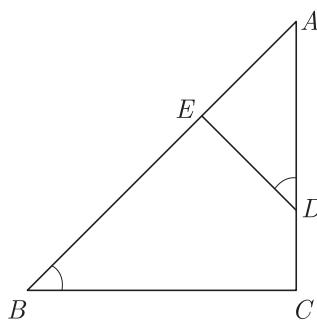
If d is the HCF of 30 and 72, find the value of x and y satisfying $d = 30x + 72y$.

- Q36. 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]
- Q37. 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

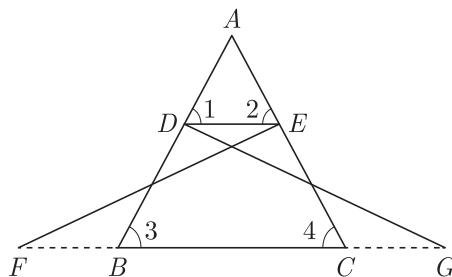
The perimeter of a right triangle is 60 cm. Its hypotenuse is 25 cm. Find the area of the triangle.

- Q38. 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 $\triangle ADE \cong \triangle ABC$.



Q39. If $\cos \theta + \sin \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$, prove that $q(p^2 - 1) = 2p$ [4]

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 STANDARD(041)
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 4 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 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
- Q2. 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
- Q3. 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
- Q4. 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) $a = c$
- Q5. 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
- Q6. If $f(x) = \cos^2 x + \sec^2 x$, then $f(x)$ [1]
(a) ≥ 1 (b) ≤ 1
(c) ≥ 2 (d) ≤ 2
- Q7. 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
- Q8. 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

- Q9. 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

- Q10. 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) $\frac{4}{5}$

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

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

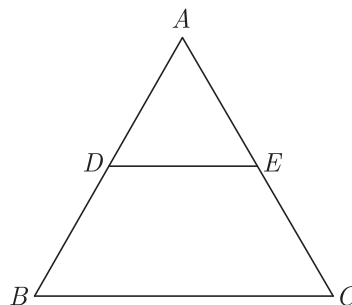
OR

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

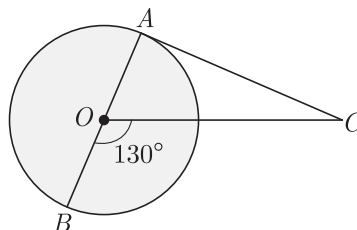
- Q13. In $\triangle ABC$, right-angled at B , $AB = 24$ cm, $BC = 7$ cm. $\sin A =$ [1]
 Q14. Length of an arc of a sector of a circle with radius r and angle with degree measure θ is [1]
 Q15. The volume of a cube with diagonal d is [1]

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

- Q16. In given figure $DE \parallel BC$. If $AD = 3$ cm, $DB = 4$ cm and $AE = 6$ cm, then find EC . [1]



- Q17. 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 $\angle BOC = 130^\circ$, the find $\angle ACO$. [1]



- Q18. A ladder 15 m 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.

- 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. 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]
- Q23. 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.

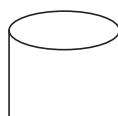
- Q24. A hemisphere and a cone both have same diameter. These two metal solids are joined by putting their bases together. The height of the cone is equal to the diameter of the sphere. This solid is melted and recast into a sphere of a diameter equal to one third of the diameter of the hemisphere. [2]
- (a) If radius of the hemisphere is r , find the volume of the combined solid.
- (b) Find the number of spheres.

- Q25. 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

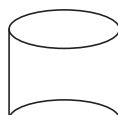
A cone of height 24 cm and radius of base 6 cm is made up of clay. If we reshape it into a sphere, find the radius of sphere.

- Q26. 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]



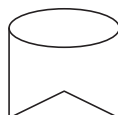
Type A

— 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. Find the volume of glass of type A and which glass has the minimum capacity.

SECTION C

- Q27. 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.

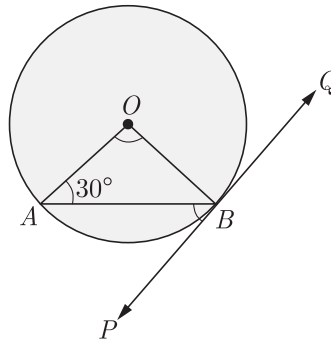
- Q28. If 7th term of an A.P. is $\frac{1}{9}$ and 9th term is $\frac{1}{7}$, find 63rd term. [3]

- Q29. 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

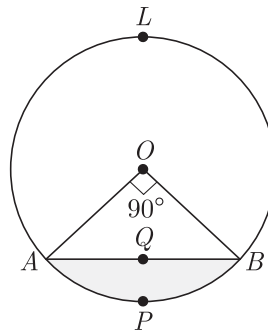
If the distance of $P(x, y)$ from $A(6, 2)$ and $B(-2, 6)$ are equal, prove that $y = 2x$.

- Q30. 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]



- Q31. 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 ?

- Q32. 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 $\pi = \frac{22}{7}$.

- Q33. 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]
- Q34. A man travels from home to town and back in a motor cycle. He travels to home from town at a speed which is 20 kilometer/hour more than his journey to the town from home. The average speed of his total journey was 48 kilometre/hour. [3]
 (a) If the distance from home to town is 5 kilometre, find his total journey time.
 (b) By taking the speed of his journey from home to town as x , form a second degree equations.

SECTION D

- Q35. 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 ?

- Q36. 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]
- Q37. 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.

- Q38. 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.

- Q39. 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]

- 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
	$N = 100$

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CLASS X (2019-20)
MATHEMATICS STANDARD(041)
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 4 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. Which of the following will have a terminating decimal expansion? [1]
(a) $\frac{77}{210}$ (b) $\frac{23}{30}$
(c) $\frac{125}{441}$ (d) $\frac{23}{8}$
- Q2. 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
- Q3. 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
- Q4. 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
- Q5. 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
- Q6. 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) $3/2$
- Q7. 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
- Q8. 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

- Q9. 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

- Q10. 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

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

- Q11. An algorithm which is used to find HCF of two positive numbers 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. In ΔPQR , right-angled at Q , $PR + QR = 25 \text{ cm}$ and $PQ = 5 \text{ cm}$. The value of $\tan P$ is [1]
 Q14. The region enclosed by an arc and a chord is called the of the circle. [1]
 Q15. The total surface area of a solid hemisphere having radius r is [1]

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

- Q16. If ratio of corresponding sides of two similar triangles is $5 : 6$, then find ratio of their areas. [1]
 Q17. 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]
 Q18. A pole casts a shadow of length $2\sqrt{3} \text{ m}$ on the ground, when the Sun's elevation is 60° . Find the height of the pole. [1]

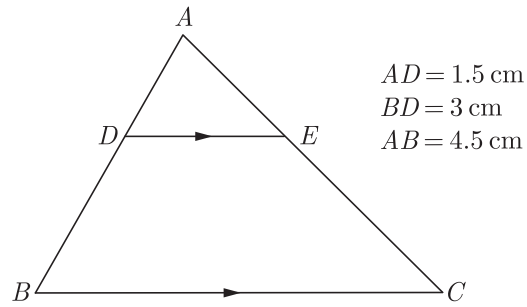
OR

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.

- 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. Prove that the point $(3, 0)$, $(6, 4)$ and $(-1, 3)$ are the vertices of a right angled isosceles triangle. [2]
 Q23. In the given figure, $DE \parallel BC$. If $AD = 1.5 \text{ cm}$ $BD = 2AD$, 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.

- Q24. 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.

- Q25. 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.

- Q26. 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]

SECTION C

- Q27. 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.

- Q28. Determine an A.P. whose third term is 9 and when fifth term is subtracted from 8^{th} term, we get 6. [3]

- Q29. 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.

- Q30. *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]

- Q31. 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. [3]

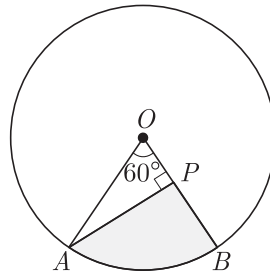
(a) Draw a rough figure and mark the measurements.

(b) Find the height of the tree.

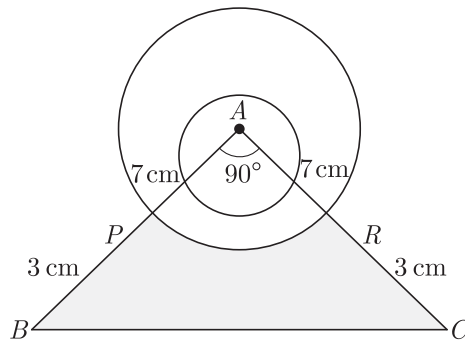
(c) Find the width of the river.

$$[\tan 70^\circ = 2.75; \tan 55^\circ = 1.43]$$

- Q32. 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 $\pi = \frac{22}{7}$.



- Q33. 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]
- Q34. From the top of a tower of height 50 cm, the angles of depression of the top and bottom of a pole are 30° and 45° respectively find:
 (i) How far the pole is from the bottom of a tower?
 (ii) The height of the pole (Use $\sqrt{3} = 1.732$) [3]

SECTION D

- Q35. Solve for x and y : [4]

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

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

OR

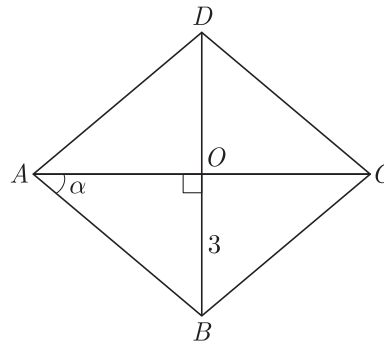
A two digit number is obtained by either multiplying the sum of digits by 8 and then subtracting 5 or by multiplying the difference of digits by 16 and adding 3. Find the number.

- Q36. 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]
- Q37. 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.

- Q38. $ABCD$ 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.

Q39. 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]

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 STANDARD(041)
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 4 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 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
- Q2. 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) $x^2 - 1$
- Q3. 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
- Q4. 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) $b = -4, c = 3$
- Q5. 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
- Q6. 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) $3:2, y = 2$
- Q7. 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
- Q8. 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
- Q9. 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

- Q10. 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) $\frac{1}{4}$

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

- Q11. The ratio of the areas of two similar triangles is equal to the square of the ratio of their [1]
 Q12. 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 .

- Q13. If $\tan A = \frac{4}{3}$ then $\sin A$ [1]
 Q14. A line that intersects a circle in one point only is called [1]
 Q15. 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]

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

- Q16. 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]
 Q17. What is the perimeter of the sector with radius 10.5 cm and sector angle 60° . [1]
 Q18. 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.

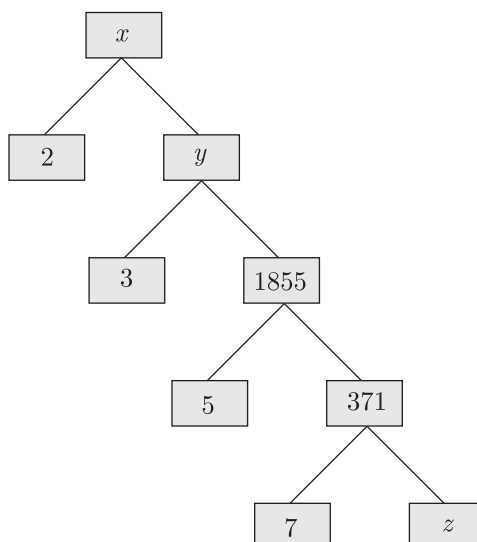
- Q19. Find the following frequency distribution, find the median class : [1]

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]

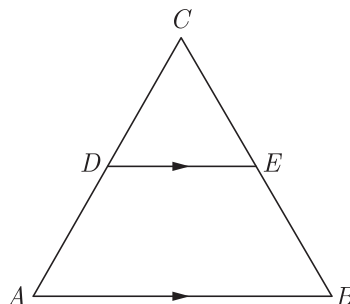


Q22. If $x = -\frac{1}{2}$, is a solution of the quadratic equation $3x^2 + 2kx - 3 = 0$, find the value of k . [2]

Q23. 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 $DE \parallel AB$.



Q24. 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?

Q25. 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.

Q26. 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]

SECTION C

Q27. 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?

Q28. Solve for x : [3]

$$\frac{x+1}{x-1} + \frac{x-2}{x+2} = 4 - \frac{2x+3}{x-2}; x \neq 1, -2, 2$$

Q29. 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 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).

Q30. Prove that the tangents drawn at the ends of a diameter of a circle are parallel. [3]

Q31. 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.

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

Q32. 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 $\sqrt{2} = 1.414$]

Q33. 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]

Q34. From a solid wooden sphere with 13 centimetres radius, a cone with 18 centimetres height and maximum base is made. [3]

- Taking the base radius of the cone as r . draw a rough figure.
- Calculate the radius of the cone.
- What is the volume of the cone?

SECTION D

Q35. 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]

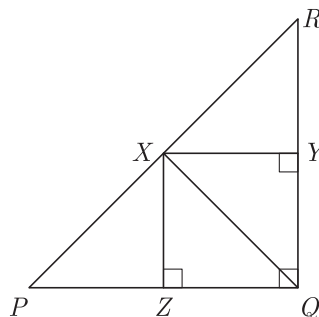
OR

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

Q36. Solve the following pair of equations : [4]

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

Q37. 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

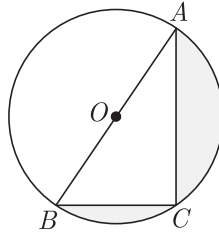
If the area of two similar triangles are equal, prove that they are congruent.

Q38. Evaluate : [4]
 $\tan^2 30^\circ \sin 30^\circ + \cos 60^\circ \sin^2 90^\circ \tan^2 60^\circ - 2 \tan 45^\circ \cos^2 0^\circ \sin 90^\circ$

OR

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

- Q39. Find the coordinates of the point which divide the line segment joining $A(2, -3)$ and $B(-4, -6)$ into three equal parts. [4]
- 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 STANDARD(041)
SAMPLE PAPER-8

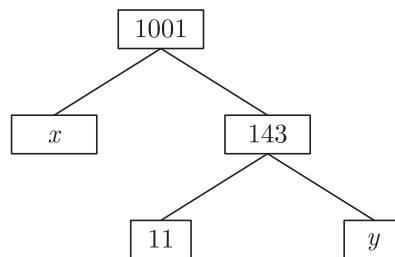
Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
- (ii) The questions paper consists of 40 questions divided into 4 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 values of x and y is the given figure are [1]



- (a) 7, 13 (b) 13, 7
(c) 9, 12 (d) 12, 9
- Q2. 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
- Q3. 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
- Q4. 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
- Q5. 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
- Q6. 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)
- Q7. 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
(c) 8 m

- (b) 14 m
(d) 15 m

Q8. 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) $\frac{4}{3}\pi(R^3 - r^3)$

Q9. 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) $\frac{\sum_{i=1}^n y_i f_i}{\sum_{i=1}^n f_i}$

Q10. 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

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

Q11. Two polygons of the same number of sides are similar, if all the corresponding angles are [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

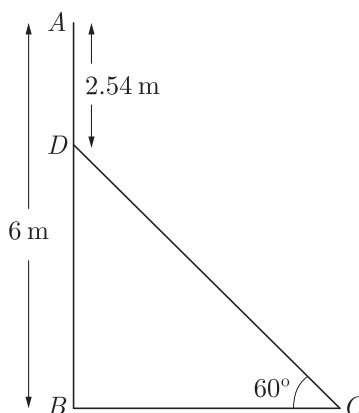
Q13. The value of $\sin A$ or $\cos A$ never exceeds [1]

Q14. Tangent is perpendicular to the through the point of contact. [1]

Q15. Two circles are drawn with same centre then the circle have bigger radius. [1]

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

Q16. 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]



Q17. If the circumferences of two concentric circles forming a ring are 88 cm and 66 cm respectively. Find the width of the ring. [1]

Q18. 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.

- 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.

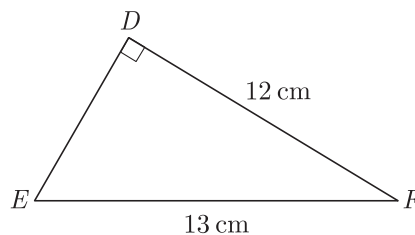
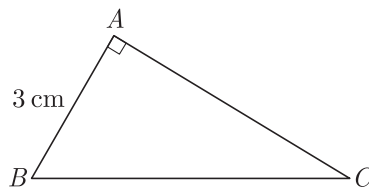
- Q20. A card is drawn at random from a well shuffled pack of 52 cards. Find the probability of getting neither a red card nor a queen. [1]

SECTION B

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

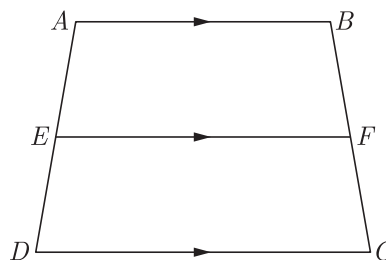
- Q22. Find the roots of the quadratic equation $\sqrt{3}x^2 - 2x - \sqrt{3}$. [2]

- Q23. 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 $\frac{AE}{ED} = \frac{BF}{FC}$



- Q24. 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?

- Q25. 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
20-30	x_2	18
30-40	5	x_3
40-50	x_4	30

- Q26. 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]

SECTION C

- Q27. 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?

- Q28. Solve for x : $\frac{1}{x} + \frac{2}{2x-3} = \frac{1}{x-2}$, $x \neq 0, \frac{2}{3}, 2$. [3]

- Q29. 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.

- Q30. 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]

- Q31. 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?

- Q32. 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 $\sqrt{3} = 1.73$)

- Q33. 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]

- Q34. A circular sheet of radius 18 centimetre is divided into 9 equal sectors. [3]

- (a) Find the measure of the central angle of a sector.
(b) Find the slant height of a cone which can be made by a sector.
(c) Find the lateral surface area of the cone thus formed.

SECTION D

- Q35. 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 $-\sqrt{\frac{5}{3}}$

- Q36. 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 $9x = 2y + 7$

Q37. 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 $\triangle ABC \sim \triangle PQR$.

Q38. 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 $\angle C$.

Q39. 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]

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 STANDARD(041)
SAMPLE PAPER-9

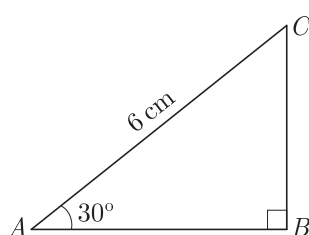
Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) All questions are compulsory.
- (ii) The questions paper consists of 40 questions divided into 4 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. 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
- Q2. 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
- Q3. 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
- Q4. $(x^2 + 1)^2 - x^2 = 0$ has [1]
 (a) four real roots (b) two real roots
 (c) no real roots (d) one real root
- 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. 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
- Q7. 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

Q8. 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) $\frac{10}{3} \pi \text{ m}^3$

Q9. 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

Q10. 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) $\frac{3}{5}$

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

Q11. 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]

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. Triangle in which we study trigonometric ratios is called [1]

Q14. The common point of a tangent to a circle and the circle is called [1]

Q15. Only two can be drawn to a circle from an external point. [1]

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

Q16. 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]

Q17. 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]

Q18. 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 ?

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

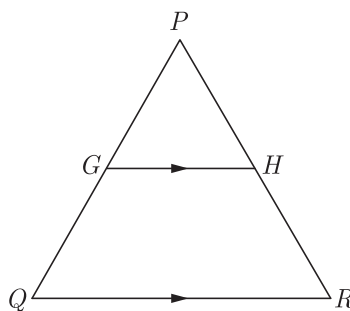
Q20. A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant. [1]

SECTION B

Q21. Using Euclid's algorithm, find the HCF of 240 and 228. [2]

Q22. Solve for x : $x^2 - (\sqrt{3} + 1)x + \sqrt{3} = 0$ [2]

- Q23. 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 .

- Q24. 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 ?

- Q25. 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

- Q26. 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]

SECTION C

- Q27. 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.

- Q28. Solve for x : $\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} = \frac{2}{3}; x \neq 1, 2, 3$ [3]

- Q29. 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^{rd}) to the product of means (2^{nd} and 3^{rd}) is 5:6.

- Q30. Two tangents TP and TQ are drawn to a circle with centre O from an external point T . Prove that
 $\angle PTO = \angle OPQ$ [3]

- Q31. 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?

- Q32. 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 $\sqrt{3} = 1.73$)

Q33. 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 ?

Q34. Hari, standing on the top of a building, sees the top of a tower at an angle of elevation of 50° and the foot of the tower at an angle of depression of 20° . Hari is 1.6 metre tall and the height of the building on which he is standing is 9.2 metres. [3]

(a) Draw a rough sketch according to the given information.

(b) How far is the tower from the building?

(c) Calculate the height of the tower.

[$\sin 20^\circ = 0.34$, $\cos 20^\circ = 0.94$, $\tan 20^\circ = 0.36$

$\sin 50^\circ = 0.77$, $\cos 50^\circ = 0.64$, $\tan 50^\circ = 1.19$]

SECTION D

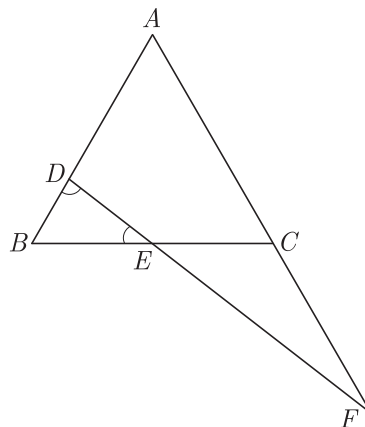
Q35. Show that 3 is a zero of the polynomial $2x^2 - x^2 - 13x - 6$. Hence find all the zeroes of this polynomial. [4]

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.

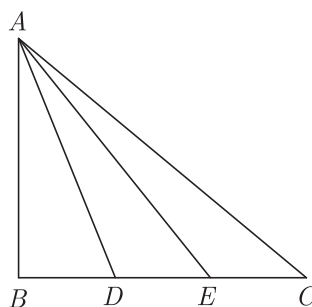
Q36. A train covered a certain distance at a uniform speed. If the train would have been 10 km/hr scheduled time. And, if the train were slower by 10 km/hr, it would have taken 3 hr more than the scheduled time. Find the distance covered by the train. [4]

Q37. 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 $8AE^2 = 3AC^2 + 5AD^2$.



Q38. Evaluate : [4]

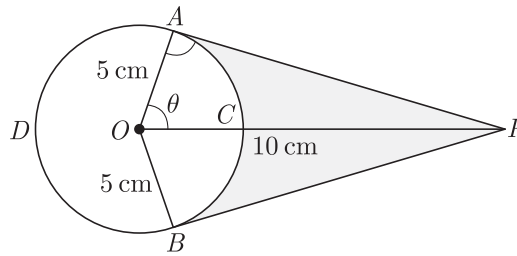
$$\sin^2 30^\circ \cos^2 45^\circ + 4 \tan^2 30^\circ + \frac{1}{2} \sin 90^\circ - 2 \cos^2 90^\circ + \frac{1}{24}$$

OR

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

Q39. 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]

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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CLASS X (2019-20)
MATHEMATICS STANDARD(041)
SAMPLE PAPER-10

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

- (i) All questions are compulsory.
 - (ii) The questions paper consists of 40 questions divided into 4 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 least number which is a perfect square and is divisible by each of 16, 20 and 24 is [1]
(a) 240 (b) 1600
(c) 2400 (d) 3600
- Q2. 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
- Q3. x and y are 2 different digits. If the sum of the two digit numbers formed by using both the digits is a perfect square, then value of $x + y$ is [1]
(a) 10 (b) 11
(c) 12 (d) 13
- Q4. The real roots of the equation $x^{2/3} + x^{1/3} - 2 = 0$ are [1]
(a) 1, 8 (b) -1, -8
(c) -1, 8 (d) 1, -8
- Q5. In an AP, if $a = 3.5$, $d = 0$ and $n = 101$, then a_n will be [1]
(a) 0 (b) 3.5
(c) 103.5 (d) 104.5
- Q6. If the area of the triangle formed by the points $(x, 2x)$, $(-2, 6)$ and $(3, 1)$ is 5 sq units, then x equals [1]
(a) $2/3$ (b) $3/5$
(c) 3 (d) 5
- Q7. The ratio of the length of a rod and its shadow is $1 : \sqrt{3}$ then the angle of elevation of the sun is [1]
(a) 90° (b) 45°
(c) 30° (d) 75°
- Q8. A sphere is melted and half of the melted liquid is used to form 11 identical cubes, whereas the remaining half is used to form 7 identical smaller spheres. The ratio of the side of the cube to the radius of the new small sphere is [1]
(a) $\left(\frac{4}{3}\right)^{1/3}$ (b) $\left(\frac{8}{3}\right)^{1/3}$
(c) $(3)^{1/3}$ (d) 2
- Q9. If the mean of the observation $x, x + 3, x + 5, x + 7$ and $x + 10$ is 9, the mean of the last three observation is [1]

(a) $10\frac{1}{3}$

(b) $10\frac{2}{3}$

(c) $11\frac{1}{3}$

(d) $11\frac{2}{3}$

Q10. If in a lottery, there are 5 prizes and 20 blanks, then the probability of getting a prize is [1]

(a) $\frac{2}{5}$

(b) $\frac{4}{5}$

(c) $\frac{1}{5}$

(d) 1

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

Q11. Two figures having the same shape and size are said to be [1]

Q12. Points (3, 2), (− 2, − 3) and (2, 3) form a triangle. [1]

OR

The distance of the point (x_1, y_1) from the origin is

Q13. $\sin^2\theta + \sin^2(90^\circ - \theta) = \dots\dots\dots$ [1]

Q14. The tangent to a circle is to the radius through the point of contact. [1]

Q15. A curve made by moving one point at a fixed distance from another is called [1]

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

Q16. If the angles of elevation of the top of a tower from two points distant a and b ($a > b$) from its foot and in the same straight line from it are respectively 30° and 60° , then find the height of the tower. [1]

Q17. The diameter of a wheel is 1.26 m. What the distance covered in 500 revolutions. [1]

Q18. The slant height of a bucket is 26 cm. The diameter of upper and lower circular ends are 36 cm and 16 cm. Find the height of the bucket. [1]

OR

A cylinder and a cone have base radii 5 cm and 3 cm respectively and their respective heights are 4 cm and 8 cm. Find the ratio of their volumes.

Q19. Consider the following distribution : [1]

Marks Obtained	0 or more	10 or more	20 or more	30 or more	40 or more	50 or more
Number of students	63	58	55	51	48	42

(i) Calculate the frequency of the class 30 - 40.

(ii) Calculate the class mark of the class 10 - 25.

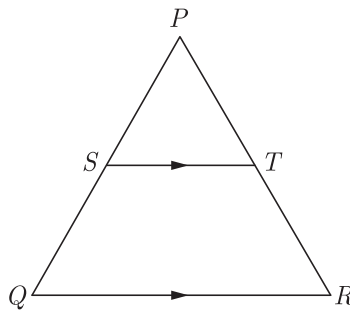
Q20. A bag contains cards numbered from 1 to 25. A card is drawn at random from the bag. Find the probability that number is divisible by both 2 and 3. [1]

SECTION B

Q21. Given that $HCF(306, 1314) = 18$. Find $LCM(306, 1314)$ [2]

Q22. If one root of the quadratic equation $6x^2 - x - k = 0$ is $\frac{2}{3}$, then find the value of k . [2]

Q23. In the given figure, in a triangle PQR , $ST \parallel QR$ and $\frac{PS}{SQ} = \frac{3}{5}$ and $PR = 28$ cm, find PT . [2]



OR

$ABCD$ is a trapezium in which $AB \parallel CD$ and its diagonals intersect each other at the point O . Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

- Q24. There are 60 students in a class among which 30 are boys. In another class there are 50 students among which 25 of them are boys. If one from each class is selected, [2]

- (a) What is the probability of both being girls ?
 (b) What is the probability of having atleast one girl?

- Q25. Find the mean of the following distribution : [2]

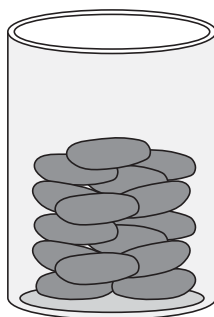
Class interval	0-6	6-12	12-18	18-24	24-30
Frequency	5	4	1	6	4

OR

Find the mode of the following distribution :

Classes	25-30	30-35	35-40	40-45	45-50	50-55
Frequency	25	34	50	42	38	14

- Q26. A gulab jamun, contains sugar syrup upto about 30% of its volume. Find approximately how much syrup would be found in 45 gulab jamuns, each shaped like a cylinder with two hemispherical ends with length 5 cm and diameter 2.8 cm. [2]



SECTION C

- Q27. Find the HCF and LCM of 510 and 92 and verify that $\text{HCF} \times \text{LCM} = \text{Product of two given numbers}$. [3]

OR

Show that any positive odd integer is of the form $6q + 1$, $6q + 3$ or $6q + 5$, where q is some integer.

- Q28. Solve for x : $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$ [3]

- Q29. The sum of n terms of an A.P. is $3n^2 + 5n$. Find the A.P. Hence find its 15^{th} term. [3]

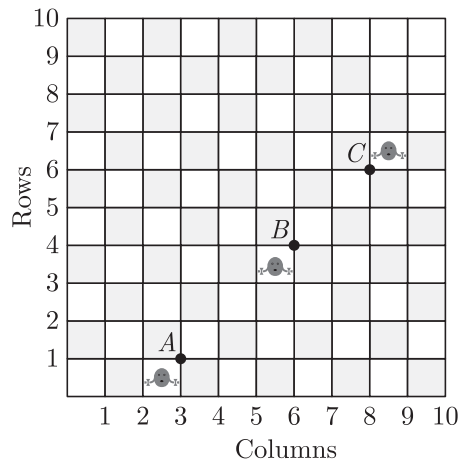
OR

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).

- Q30. 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 . [3]

- Q31. 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. [3]

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



- Q32. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 45° . If the tower is 30 m high, find the height of the building. [3]

OR

A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of hill as 30° . Find the distance of the hill from the ship and the height of the hill.

- Q33. A hemispherical bowl of internal diameter 36 cm contains liquid is filled into 72 cylindrical bottles of diameter 6 cm. Find the height of the each bottle, if 10% liquid is wasted in this transfer. [3]
- Q34. A boy, 1.4 metre tall standing at the edge of a river bank sees the top of a tree on the edge of the other bank at an elevation of 55° . Standing back by 3 metre, he sees it at elevation of 45° . [3]
 (a) Draw a rough figure showing these facts.
 (b) How wide is the river and how tall is the tree ? [$\sin 55^\circ = 0.8192$, $\cos 55^\circ = 0.5736$, $\tan 55^\circ = 1.4281$]

SECTION D

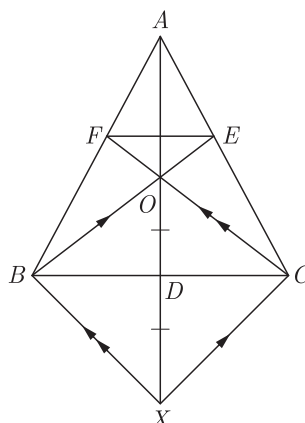
- Q35. Obtain all other zeroes of the polynomial $x^4 + 6x^3 + x^2 - 24x - 20$, if two of its zeroes are $+2$ and -5 . [4]

OR

Obtain all other zeroes of the polynomial $4x^4 + x^3 - 72x^2 - 18x$, if two of its zeroes are $3\sqrt{2}$ and $-3\sqrt{2}$.

- Q36. A and B are two points 150 km apart on a highway. Two cars start A and B at the same time. If they move in the same direction they meet in 15 hours. But if they move in the opposite direction, they meet in 1 hours. Find their speeds. [4]
- Q37. In $\triangle ABC$, AD is a median and O is any point on AD. BO and CO on producing meet AC and AB at E and F respectively. Now AD is produced to X such that $OD = DX$ as shown in figure. [4]
 Prove that :

- (1) $EF \parallel BC$
 (2) $AO : AX = AF : AB$



OR

Let ABC be a triangle D and E be two points on side AB such that $AD = BE$. If $DP \parallel BC$ and $EQ \parallel AC$, then prove that $PQ \parallel AB$.

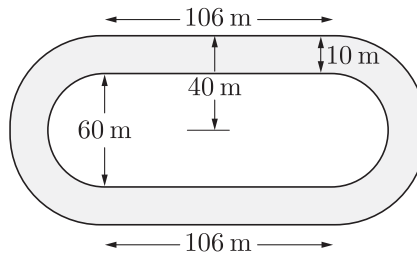
- Q38. When is an equation called 'an identity'. Prove the trigonometric identity $1 + \tan^2 A = \sec^2 A$. [4]

OR

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 .

- Q39. Find the values of k for which the points $A(k + 1, 2k)$, $B(3k, 2k + 3)$ and $C(5k - 1, 5k)$ are collinear. [4]

- Q40. Figure depicts a racing track whose left and right ends are semi-circular. The distance between the two inner parallel line segments is 60 m and they are each 106 m long. If the track is 10 m wide everywhere, find the area of the track. [4]



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