

SECOND PRE BOARD EXAMINATION (2019-20)

CLASS: X

Subject: MATHEMATICS (STANDARD)

Date: 15.01.2020

Time allowed: 3 Hours.

Maximum Marks: 80

General instructions:

- (1) **All** questions are **compulsory**.
- (2) The question paper consists of **40** questions divided into four sections **A, B, C and D**.
- (3) 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 **3** marks each . Section **D** comprises of **6** questions of **4** marks each.
- (4) There is no overall choice in the paper. However, internal choice is 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.
- (5) Use of calculators is not permitted.
- (6) Please check that this question paper contains **10** printed pages only.

SECTION -A (20 x 1 = 20)

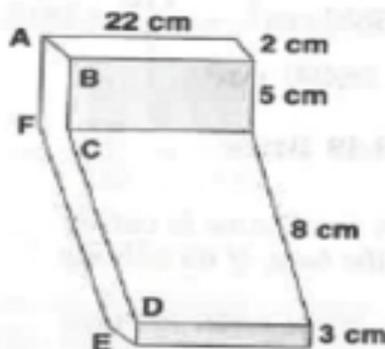
Q 1-10 are multiple choice questions. Select the most appropriate answer

1. A number $10x + y$ is multiplied by another number $10a + b$ and the result comes as $100p + 10q + r$, where $r = 2y$, $q = 2(x + y)$ and $p = 2x$; $x, y < 5$, $q \neq 0$. The value of $10a + b$ may be:
(A) 11 (B) 13
(C) 31 (D) 22
2. Find the smallest number that leaves a remainder of 4 on division by 5, 5 on division by 6, 6 on division by 7, 7 on division by 8 and 8 on division by 9?
(A) 2519 (B) 5039
(C) 1079 (D) 979
3. The mean of first ten prime numbers is
(A) 12.9 (B) 15
(C) 13.5 (D) 17
4. The value of k for which the pair of equations $3x + y = 1$ and $(2k-1)x + (k-1)y = 2k+1$ will have no solution is
(A) -2 (B) 2
(C) $-1/2$ (D) $1/2$
5. The value of the expression $[\operatorname{cosec}(75^\circ + \theta) - \sec(15^\circ - \theta) - \tan(55^\circ + \theta) + \cot(35^\circ - \theta)]$ is
(A) -1 (B) 0
(C) 1 (D) $\frac{3}{2}$
6. If $\sin\theta - \cos\theta = 0$, then the value of $(\sin^4\theta + \cos^4\theta)$ is
(A) 1 (B) $\frac{3}{4}$
(C) $\frac{1}{2}$ (D) $\frac{3}{2}$
7. If $\sin\theta + \cos\theta = \sqrt{3}$ then the value of $\tan\theta + \cot\theta$ is
(A) 1 (B) $\sqrt{3}$
(C) -1 (D) 0

8. In what ratio does the line $x - y - 2 = 0$ divide the line segment joining $(3, -1)$ and $(8, 9)$
- (A) 1:2 (B) 2:1
(C) 2:3 (D) 1:3
9. The area of a triangle whose coordinates are $A(3,0)$ $B(7,0)$ and $C(8,4)$ is
- (A) 14 sq. units (B) 28 sq. units
(C) 8 sq. units (D) 6 sq. units
10. A triangle is formed by the lines $x + y = 8$, X-axis and Y-axis. Find its centroid
- (A) $(8/3, 8/3)$ (B) $(8,8)$
(C) $(4,4)$ (D) $(0,0)$

(Q 11- Q 15) Fill in the blanks

11. In the figure, the shape of a solid copper piece (made of two pieces) with dimensions as shown. The face ABCDEFA has uniform cross section. Assume that the angles at A, B, C, D, E and F are right angles. The volume of the piece is _____

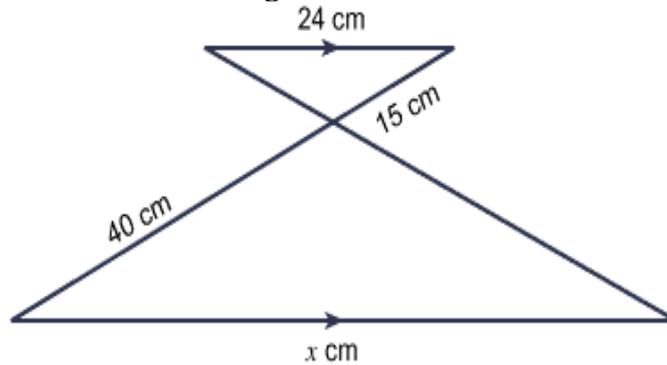


12. If $px^2 + 3x + q = 0$ has two roots $x = -1$ and $x = -2$, the value of $q - p$ is _____

OR

One zero of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3 , then find the value of k _____

13. Find the value of x in this diagram -----



14. If 4 times the 4th term of an A.P. is equal to 9 times the 9th term of the A.P., what is 13 times the 13th term of this A.P.? _____

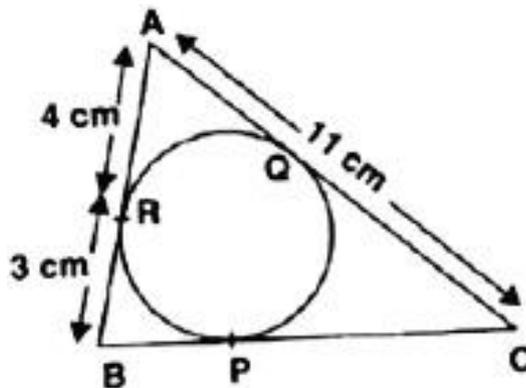
15. On rolling a die 2 times, the sum of 2 numbers that appear on the uppermost face is 8. The probability that the first throw of dice yields 4 is _____ .

(Q 16- Q 20) Answer the following

16. Which is the largest number that divides 70 and 125 to leave remainders 5 and 8 respectively ?

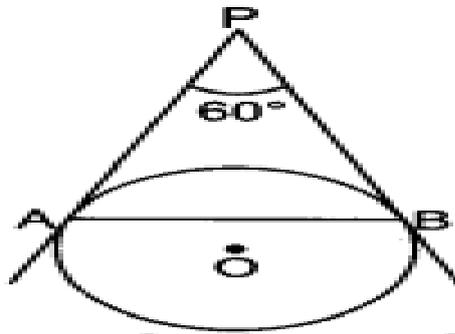
17. In a triangle ABC, P divides the sides AB such that $AP : PB = 1 : 2$, Q is a point on AC such that $PQ \parallel BC$. Find the ratio of the areas of ΔAPQ and trapezium BPQC.

18. In the figure, ΔABC is circumscribing a circle. Find the length of BC.



OR

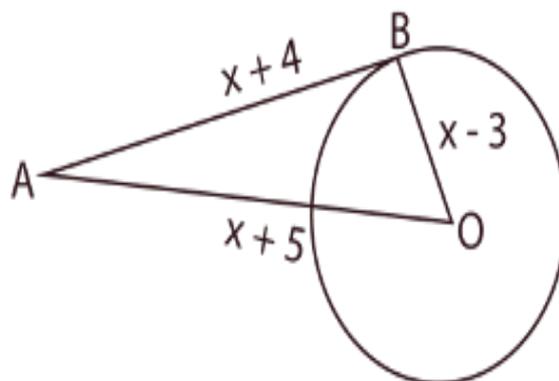
In the given figure, AP and BP are tangents to a circle with centre O such that $AP = 5$ cm and $\angle APB = 60^\circ$. Find the length of chord AB.



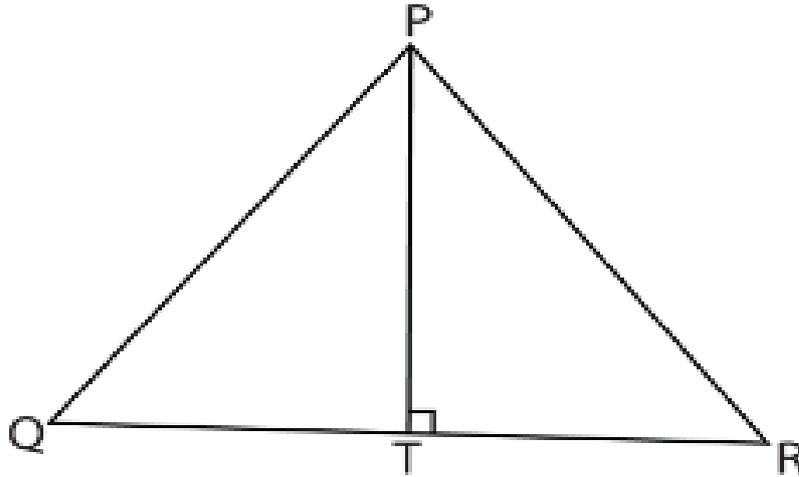
19. The first and the last terms of an AP are 10 and 361 respectively. If its common difference is 9 then find the number of terms of the progression.
20. Find k for which the sum & product of the roots of quadratic equation $kx^2 - 4x + 4k = 0$ are equal.

Section-B (6x2=12)

21. 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. How many books should he place in each stack for this purpose?
22. In the given figure find the lengths of AB, AO & BO



23. In ΔPQR , $PT \perp QR$ prove that $PQ^2 - PR^2 = QT^2 - TR^2$



OR

Find the altitude of an equilateral triangle of side 8 cm.

24. The shadow of a tower standing on a level plane is found to be 50 m longer when sun's elevation is 30° than when it is 60° . Find the height of the tower. Use $\sqrt{3} = 1.732$
25. A student says that, if you throw a die, it will show up 1 or not 1. Therefore, the probability of getting 1 and the probability of getting not 1, each is equal to $\frac{1}{2}$. Is this correct? Give reasons.

OR

An integer is chosen between 70 and 100. Find the probability that it is (a) a prime number (b) divisible by 7

26. A bucket is in the shape of a frustum of a cone and holds 28.490 liters of water. The radii of the top & bottom are 28 cm and 21 cm respectively. Find the height of the bucket.

Section - C (8 X 3 = 24)

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

OR

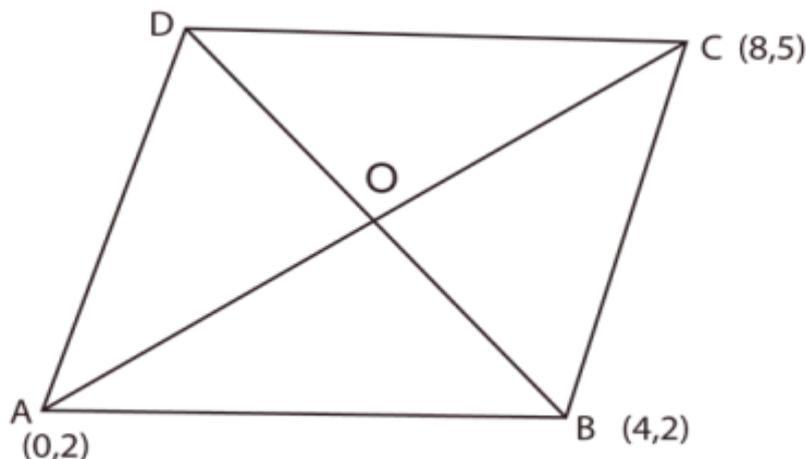
If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3 b$; a, b being prime numbers, then find the LCM (p, q) and HCF (p, q) and verify if $\text{HCF} \times \text{LCM} = p \times q$

28. The ratio of the 11th term to the 18th term of an AP is $2 : 3$. Find the ratio of the 5th term to the 21st term and also the ratio of the sum of the first five terms to the sum of the first 21 terms.
29. A train covered a distance at uniform speed. If the train is 10km/h faster, it would take 2 hours less than the scheduled time. And if the train is 10km/h slower, it would take 3 more hours. What is the distance covered by the train ?

OR

Susan invested certain amount of money in two schemes A and B, which offer Simple interest at the rate of 8% per annum and 9% per annum, respectively. She received ₹ 1860 as annual interest. However, had she interchanged the amount of investments in the two schemes, she would have received ₹ 20 more as annual interest. How much money did she invest in each scheme?

30. If the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are in A.P then find the zeroes of the given polynomial.
31. In the figure, ABCD is a parallelogram.
- (a) Write the co-ordinates of D.
 - (b) What is the height of this parallelogram?
 - (c) Find its area .



32. If $\sec A = x + \frac{1}{4x}$ then prove that $\sec A + \tan A = 2x$ or $\frac{1}{2x}$

OR

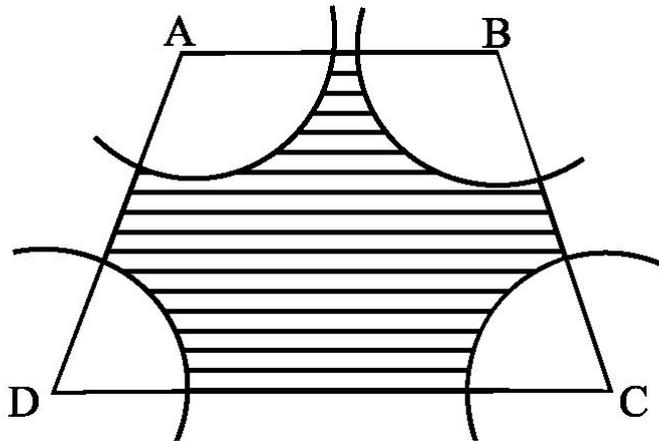
Find the value of

$$3(\sin\theta - \cos\theta)^4 + 6(\sin\theta + \cos\theta)^2 + 4(\sin^6\theta + \cos^6\theta)$$

33. The mean of the following frequency distribution is 62.8 and the sum of all frequencies is 50. Compute the missing frequencies f_1 and f_2 .

Marks	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	f_1	10	f_2	7	8

34. In the below figure, ABCD is a trapezium with $AB \parallel DC$, $AB = 18$ cm, $DC = 32$ cm and distance between AB and DC = 14 cm. If arcs of equal radii 7 cm with centres A, B, C and D have been drawn, then find the area of the shaded region of the figure.



Section-D (6x4=24)

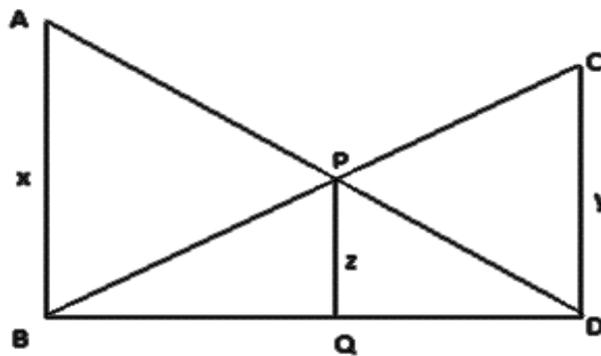
35. Construct a triangle ABC with $BC = 9$ cm, $\angle B = 60^\circ$ and $AB = 7$ cm. Construct another triangle whose sides are $\frac{3}{5}$ times the corresponding sides of ΔABC .

OR

Draw a line segment AB of length 9 cm. Taking A as center, draw a circle of radius 5 cm and taking B as center, draw another circle of radius 3 cm. Construct tangents to each circle from the center of the other circle.

36. In figure, $AB \parallel PQ \parallel CD$, $AB = x$ units, $CD = y$ units and $PQ = z$ units, prove that

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$$



37. A peacock is sitting on the top of a pillar which is 9 m high. From a point 27 m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal at what distance from the hole is the snake caught?

OR

Two cyclists move away from a town along two perpendicular paths at 20 mph and 40 mph respectively. The second cyclist starts the journey an hour later than the first one. Find the time taken for them to be 100 miles apart.

38. The lower window of a house is at a height of 2 m above the ground and its upper window is 4 m vertically above the lower window. At certain instant the angles of elevation of a balloon from these windows are observed to be 60° and 30° , respectively. Find the height of the balloon above the ground.

39. A metallic right circular cone 20 cm high and whose vertical angle is 60° is cut into two parts at the middle of its height by a plane parallel to its base. If the frustum so obtained be drawn into a wire of diameter $\frac{1}{16}$ cm find the length of the wire.

OR

A well of diameter 3 m is dug 14 m deep. The earth taken out of it has been spread evenly all around it in shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment.

40. For the following distribution, draw a 'more than type' ogive and from the graph, find median.

Marks obtained	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No Of students	2	5	10	23	20	22	3	5	10

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