

ROLL NO:							

Candidate must write code on the title page of answer book

1. Please check this question paper contains 11 printed pages
2. Code number given in the right hand side of the question paper should be written on the title page of the answer book by the candidate.
3. Please check that this question paper contains 36 of questions
4. Please write down the serial number of question papers before attempting it
5. Fifteen minutes are allotted to read this question paper during this time student will read the question papers and will not write any answer during this time

**PRE BOARD EXAMINATION 2021
MATHEMATICS BASIC**

Time Allowed: 3.00Hrs.

Maximum Marks: 80

General Instructions:

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

Part – A:

1. It consists of two sections- I and II
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts.
An examinee is to attempt any 4 out of 5 sub-parts.

Part – B:

1. Question No 21 to 26 are Very short answer Type questions of 2 mark each,
2. Question No 27 to 33 are Short Answer Type questions of 3 marks each
3. Question No 34 to 36 are Long Answer Type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks

PART A

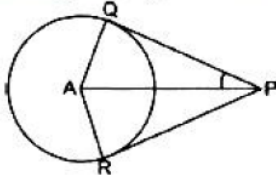
- 1 Show that 12^n cannot end with digit 0 or 5 for any natural number n.

OR

Without actually performing the long division, Check whether $\frac{64}{455}$ will have the terminating decimal expansion or non-terminating repeating decimal expansion.

- 2 Write the discriminant of the quadratic equation $x^2 + 4x + q = 0$
- 3 Does the pair of the linear equation have no solution? Justify your answer.
 $3x + y - 3 = 0, 2x + \frac{2}{3}y = 2$

- 4 In figure, PQ and PR are tangents to circle with centre A. If $\angle QPA = 27^\circ$, then find $\angle QAR$.



- 5 Find the Arithmetic Mean of $(a - b)$ and $(a + b)$.

OR

Find the 10th term of AP: 10.0,10.5,11.0,11.5,....

- 6 Find the Arithmetic Mean of 13 and 19.

- 7 If $(x^2 + y^2)(a^2 + b^2) = (ax + by)^2$. Prove that $\frac{x}{a} = \frac{y}{b}$.

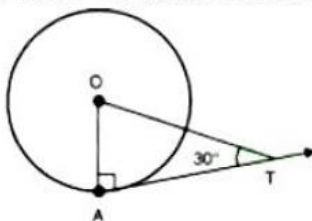
OR

State whether the following equation is quadratic equation in x?

$$2x^2 + \frac{5}{2}x - \sqrt{3} = 0$$

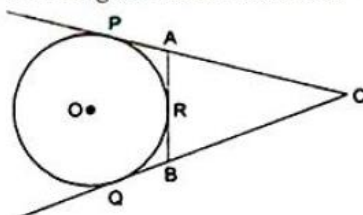
- 8 What is the distance between two parallel tangents of a circle of radius 4 cm?

- 9 In given figure, if AT is a tangent to the circle with centre O, such that $OT = 4$ cm and $\angle OTA = 30^\circ$, then find the length of AT (in cm).

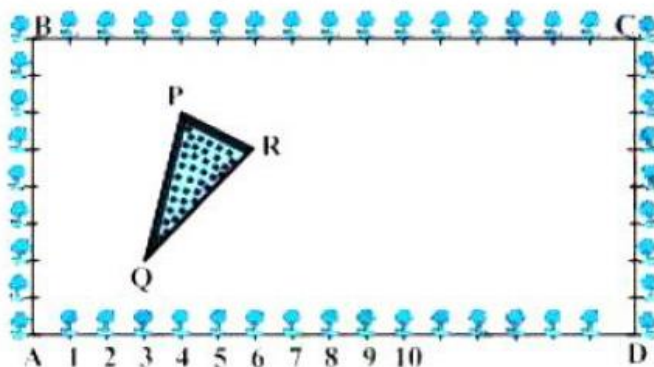


OR

In figure, CP and CQ are tangents to a circle with centre O. ARB is another tangent touching the circle at R. If $CP = 11$ cm, and $BC = 7$ cm, then find the length of BR.



- 10 A ladder is placed in such a way that its foot is at a distance of 5 m from a wall and its tip reaches a window 12 m above the ground. Determine the length of the ladder.
- 11 Find the 21st term of the A.P: $-4\frac{1}{2}, -3, -1\frac{1}{2}, \dots$
- 12 Evaluate: $\sin^2 30^\circ \cos^2 45^\circ + 4 \tan^2 30^\circ + \frac{1}{2} \sin^2 90^\circ - 2 \cos^2 90^\circ + \frac{1}{24} \cos^2 0^\circ$.
- 13 Prove that : $\cos^2 \theta (1 + \tan^2 \theta) = 1$.
- 14 If the lateral surface area of a cylinder is 94.2 cm^2 and its height is 5 cm, then find radius of its base.
- 15 For what value of k will $k+9, 2k-1,$ and $2k+7$ are consecutive terms of an AP.
- 16 A number is chosen at random from the numbers - 3, - 2, - 1, 0, 1, 2, 3. What will be the probability that the square of this number is less than or equal to 1?
- 17 The Class X students of a secondary school in Krishinagar have been allotted a rectangular plot of land for their gardening activity. Sapling of Gulmohar is planted on the boundary of the plot at a distance of 1m from each other. There is a triangular grassy lawn inside the plot as shown in Fig. The students have to sow seeds of flowering plants on the remaining area of the plot.

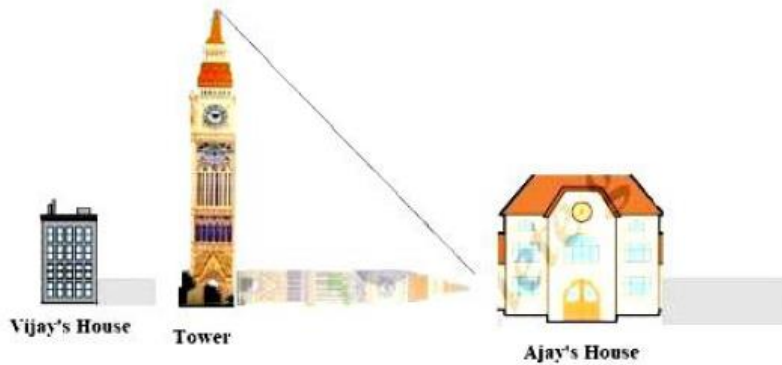


- i. Considering A as the origin, what are the coordinates of A?
- (0, 1)
 - (1, 0)
 - (0, 0)
 - (-1, -1)
- ii. What are the coordinates of P?
- (4, 6)
 - (6, 4)
 - (4, 5)
 - (5, 4)

What are the coordinators of R

- a. (6, 5)
- b. (5, 6)
- c. (6, 0)
- d. (7, 4)

18

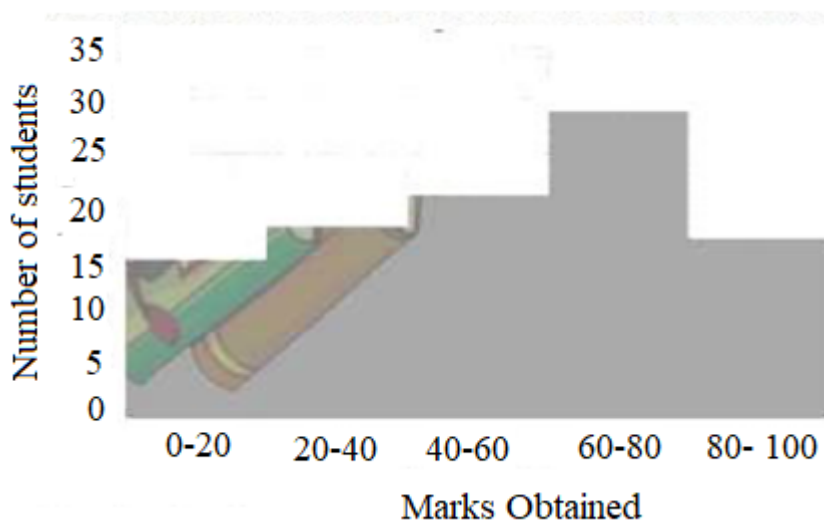


Vijay is trying to find the average height of a tower near his house. He is using the properties of similar triangles. The height of Vijay's house is 20 m when Vijay's house casts a shadow 10 m long on the ground. At the same time, the tower casts a shadow 50 m long on the ground. At the same time, the house of Ajay casts 20 m shadow on the ground.

- i. What is the height of the tower?
 - a. 20 m
 - b. 50 m
 - c. 100 m
 - d. 200 m
- ii. What will be the length of the shadow of the tower when Vijay's house casts a shadow of 12 m?
 - a. 75 m
 - b. 50 m
 - c. 45 m
 - d. 60 m
- iii. What is the height of Ajay's house?
 - a. 30 m
 - b. 40 m
 - c. 50 m
 - d. 20 m

- iv. When the tower cast shadow of 40 m, Same time what will be the length of the shadow of Ajay's house?
 - a. 16 m
 - b. 32 m
 - c. 20 m
 - d. 8 m
- v. When the tower cast shadow of 40 m, Same time what will be the length of the shadow of Vijay's house?
 - a. 15 m
 - b. 32 m
 - c. 16 m
 - d. 8 m

19 Recently the half-yearly examination was conducted in DAV public school. The mathematics teacher maintains a record of the marks of 100 students. On the basis of the recorded data of the marks obtained in Mathematics, the histogram is given below:



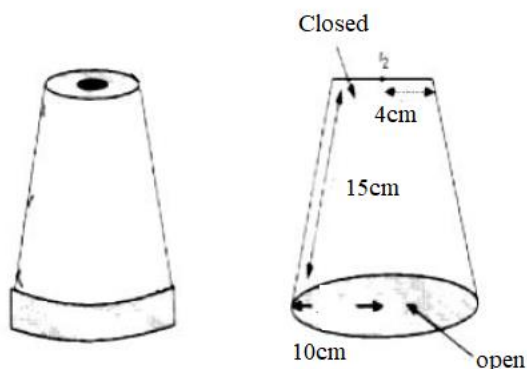
On the basis of the above histogram, answer the following questions:

- i. Identify the modal class from the given graph.
 - a. 80 - 100
 - b. 20 - 40
 - c. 60 - 80
 - d. 40 - 60

- ii. Find the mode of the distribution of marks obtained by the students in an examination.
 - a. 78
 - b. 68
 - c. 48
 - d. 58
- iii. Given the mean of the above distribution is 53, using empirical relationship estimate the value of its median.
 - a. 78
 - b. 68
 - c. 48
 - d. 58
- iv. The construction of the cumulative frequency table is useful in determining the
 - a. Median
 - b. Mean
 - c. Mode
 - d. All of these
- v. What will be the upper limit of the modal class?
 - a. 100
 - b. 80
 - c. 40
 - d. 60

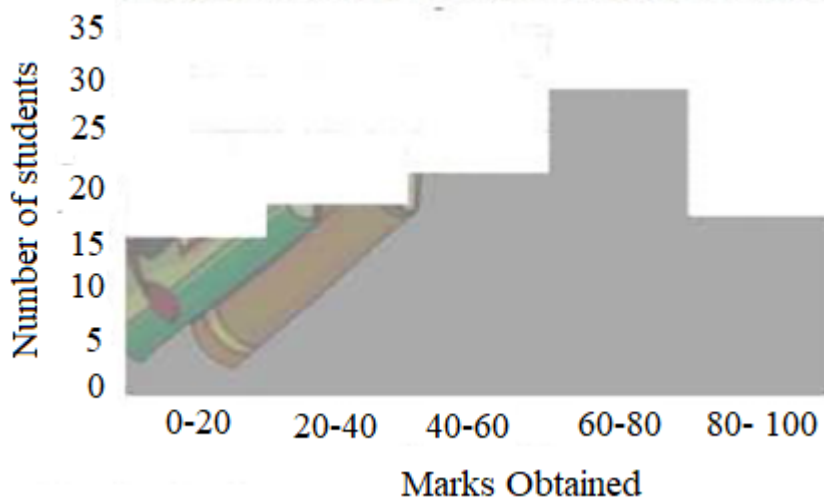
20 During the battle of Turks against the Rajputs of India, the Turk soldiers wore a costume with a metallic shield-like knee pads, buckler (elbow shield) and cap to save themselves from injuries. The headgear cap (a fez) used by these soldiers is shaped like the frustum of a cone with its radius on the open side 10 cm, and radius at the upper base as 4 cm and its slant height as 15 cm.

21



- iv. When the tower cast shadow of 40 m, Same time what will be the length of the shadow of Ajay's house?
 - a. 16 m
 - b. 32 m
 - c. 20 m
 - d. 8 m
- v. When the tower cast shadow of 40 m, Same time what will be the length of the shadow of Vijay's house?
 - a. 15 m
 - b. 32 m
 - c. 16 m
 - d. 8 m

19 Recently the half-yearly examination was conducted in DAV public school. The mathematics teacher maintains a record of the marks of 100 students. On the basis of the recorded data of the marks obtained in Mathematics, the histogram is given below:

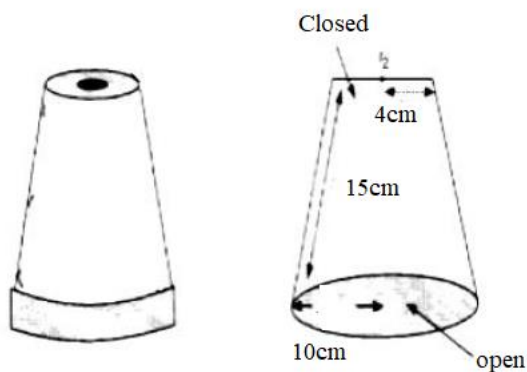


On the basis of the above histogram, answer the following questions:

- i. Identify the modal class from the given graph.
 - a. 80 - 100
 - b. 20 - 40
 - c. 60 - 80
 - d. 40 - 60

- ii. Find the mode of the distribution of marks obtained by the students in an examination.
 - a. 78
 - b. 68
 - c. 48
 - d. 58
- iii. Given the mean of the above distribution is 53, using empirical relationship estimate the value of its median.
 - a. 78
 - b. 68
 - c. 48
 - d. 58
- iv. The construction of the cumulative frequency table is useful in determining the
 - a. Median
 - b. Mean
 - c. Mode
 - d. All of these
- v. What will be the upper limit of the modal class?
 - a. 100
 - b. 80
 - c. 40
 - d. 60

20 During the battle of Turks against the Rajputs of India, the Turk soldiers wore a costume with a metallic shield-like knee pads, buckler (elbow shield) and cap to save themselves from injuries. The headgear cap (a fez) used by these soldiers is shaped like the frustum of a cone with its radius on the open side 10 cm, and radius at the upper base as 4 cm and its slant height as 15 cm.



By using the above information, find the following:

- i. The curved surface area of the cap is:
 - a. 650 cm^2
 - b. 660 cm^2
 - c. 606 cm^2
 - d. 666 cm^2

- ii. Area of the closed base is:
 - a. 55.285
 - b. 50.285
 - c. 52.285
 - d. 56.285

- iii. The area of the material used for making it.
 - a. 701.28 cm^2
 - b. 720.28 cm^2
 - c. 710.28 cm^2
 - d. 717.28 cm^2

- iv. During the conversion of a solid from one shape to another the volume of the new shape will:
 - a. increase
 - b. remain unaltered
 - c. double
 - d. decrease

- v. The formula to find the volume of the frustum of a cone is:
 - a. $\frac{2}{3} \pi h (r_1^2 + r_2^2 + r_1 r_2)$
 - b. $\frac{1}{3} \pi h (r_1^2 + r_2^2)$
 - c. $\frac{1}{3} \pi h (r_1^3 + r_2^3 + r_1 r_2)$
 - d. $\frac{1}{3} \pi h (r_1^2 + r_2^2 + r_1 r_2)$

PART B

- 21 The decimal expansion of the rational number $\frac{79}{2^3 \times 5^4}$ will terminate after how many places of decimal?
- 22 Find the third vertex of a triangle, if two of its vertices are at (-3, 1) and (0, -2) and the centroid is at the origin.

OR

If P (2, 1), Q (4, 2), R(5, 4) and S(3, 3) are vertices of a quadrilateral, find the area of the quadrilateral PQRS.

- 23 Find the zeroes of the quadratic polynomial given as: $x^2 + 7x + 10$, and also verify the relationship between the zeroes and the coefficients.
- 24 Draw a circle of radius 3 cm. Take a point P outside the circle at a distance of 5.8 cm from its centre. Draw tangents from P to the circle.
- 25 If $\sin(A + B) = \sin A \cos B + \cos A \sin B$ and $\cos(A - B) = \cos A \cos B + \sin A \sin B$, find the values of
 i. $\sin 75^\circ$
 ii. $\cos 15^\circ$

OR

Prove that: $(\sin^8 \theta - \cos^8 \theta) = (\sin^2 \theta - \cos^2 \theta) (1 - 2\sin^2 \theta \cos^2 \theta)$

- 26 A point P is 25 cm away from the centre of a circle and the length of tangent drawn from P to the circle is 24 cm. Find the radius of the circle.
- 27 Prove that $\sqrt{2}$ is an irrational number.
- 28 Solve: $x^2 + 5x - (a^2 + a - 6) = 0$

OR

The numerator of a fraction is one less than its denominator. If three is added to each of the numerator and denominator, the fraction is increased by $\frac{3}{28}$. Find the fraction.

- 29 If α and β are the zeros of the quadratic polynomial $f(x) = kx^2 + 4x + 4$ such that $\alpha^2 + \beta^2 = 24$, find the values of k.
- 30 E is a point on side AD produced of a parallelogram ABCD and BE intersects CD at F. Prove that $\triangle ABE \sim \triangle CFB$.

OR

ABCD is a trapezium in which $AB \parallel DC$. P and Q are points on sides AD and BC such that $PQ \parallel AB$. If PD = 18, BQ = 35 and QC = 15, find AD.

- 31 Two dice are thrown at the same time. Find the probability of getting:
- same number on both dice
 - sum of two numbers appearing on both the dice is 8.
- 32 As observed from the top of a 150 m tall light house, the angles of depression of two ships approaching it are 30° and 45° . If one ship is directly behind the other, find the distance between the two ships.
- 33 Find the mean of the following frequency distribution:

Class interval	0-6	6-12	12-18	18-24	24-30
Frequency	6	8	10	9	7

- 34 Find the area of a rhombus each side of which measures 20 cm and one of whose diagonals is 24 cm.
- 35 On selling a tea set at 5% loss and a lemon set at 15% gain, a crockery seller gains ₹ 7. If he sells the tea set at 5% gain and the lemon set at 10% gain, he gains ₹ 13. Find the actual price of each of the tea set and the lemon set.
- 36 A vertical tower stands on a horizontal plane and is surmounted by a flag-staff of height 7 m. From a point on the plane, the angle of elevation of the bottom of the flagstaff is 30° and that of the top of the flag-staff is 45° . Find the height of the tower.