પુના International School
Shree Swaminarayan Gurukul, Zundal

Examination 2020 – 21					
Student Name				**Grade 10th**	**SET -1**
Date				**Subject**	**MATHEMATICS**
		Time		**Total 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 three sections- I and II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. 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

Section-I

Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.

1. If x y = 180 and HCF(x, y) = 3, then find the LCM (x, y).

OR

The decimal representation of $\frac{14587}{2^1 \text{ X } 5^4}$ will terminate after how many decimal places?

2. if the sum of the zeroes of the quadratic polynomial 3x2-kx+6 is 3, then find the value of k.

3. For what value of k, the pair of linear equations 3x + y = 3 and 6x + ky = 8 does not have a solution.

4. Find the distance of a point (x, y) from the origin.

5. Which term of the A.P. 27, 24, 21,.....is zero?

OR

In an Arithmetic Progression, if d = -4, n = 7,a_n = 4 ,then find a.

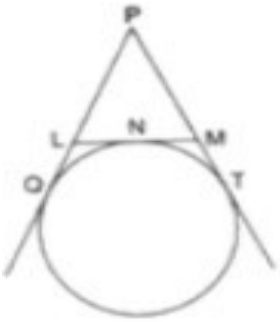
6. For what values of k, the equation $9x^2 + 6kx + 4 = 0$ has equal roots?

7. Find the roots of the equation $x^2 + 7x + 10 = 0$

OR

For what value(s) of 'a' quadratic equation $30ax^2 - 6x + 1 = 0$ has no real roots?

8. if PQ=28cm, then find the perimeter of ΔPLM



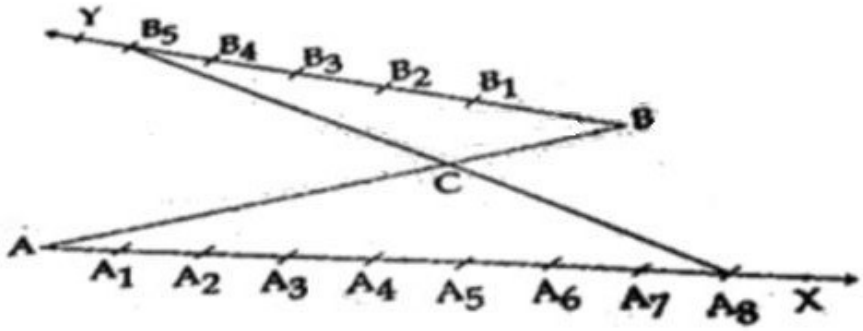
9. If two tangents are inclined at 60˚ are drawn to a circle of radius 3cm then find length of each tangent.

OR

PQ is a tangent to a circle with centre O at point P. If ΔOPQ is an isosceles triangle, then find ∠OQP.

10. In the ΔABC, D and E are points on side AB and AC respectively such that DE II BC. If AE = 2cm, AD = 3cm and BD = 4.5cm, then find CE.

11. In the figure, if B1, B2, B3,….. and A1,A2, A3,….. have been marked at equal distances. In what ratio C divides AB?



12. $Sin\ A + Cos\ B = 1$, $A = 30°$ and B is an acute angle, then find the value of B.

13. If $x = 2\sin^2\Theta$ and $y = 2\cos^2\Theta + 1$, then find $x + y$

14 Prove that $\sqrt{2}$ is irrational number

15. 12 solid spheres of the same radii are made by melting a solid metallic cylinder of base diameter 2cm and height 16cm. Find the diameter of the each sphere.

16. Find the probability of getting a doublet in a throw of a pair of dice.

OR

Find the probability of getting a black queen when a card is drawn at random from a well-shuffled pack of 52 cards

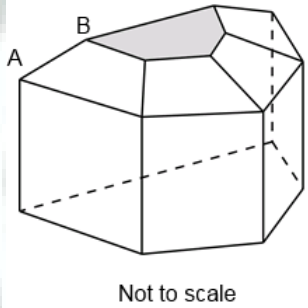
Section-II

Case study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark

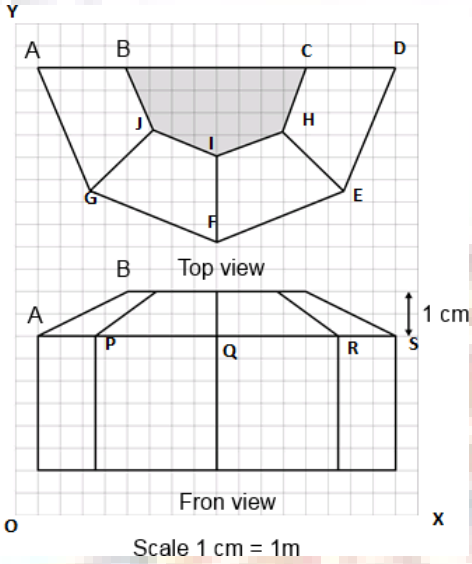
17. **Case Study based-1 SUN ROOM**

The diagrams show the plans for a sun room. It will be built onto the wall of a house. The four walls of the sunroom are square clear glass panels. The roof is made using

- Four clear glass panels, trapezium in shape, all the same size
- One tinted glass panel, half a regular octagon in shape



Not to scale



Scale 1 cm = 1m

(a). Refer to Top View Find the mid-point of the segment joining the points J(6, 17) and I (9,16)

.(i) (33/2,15/2) (ii) (3/2,1/2) (iii) (15/2,33/2) (iv) (1/2,3/2)

(b). Refer to Top View The distance of the point P from the y-axis is

(i) 4 (ii) 15 (iii) 19 (iv) 25

(c). Refer to Front View The distance between the points A and S is

(i) 4 (ii) 8 (iii) 16 (iv) 20

(d). Refer to Front View Find the co-ordinates of the point which divides the line segment joining the points A and B in the ratio 1:3internally

.(i) (8.5,2.0) (ii) (2.0,9.5) (iii) (3.0,7.5) (iv) (2.0,8.5)

(e). Refer to Front View If a point (x, y) is equidistant from the Q(9,8) and S(17,8),then

(i) x + y = 13 (ii) x – 13 = 0 (iii) y – 13 = 0 (iv) x – y = 13

18. MCQ (any four)

(a). The area of two similar triangles are 25 sq cm and 36 sq cm, if the median of the smaller Triangle is 10cm, then the median of the larger triangle

(A) 12 cm (B) 15cm (C) 10cm (D) 18cm

(b). The perimeters of two similar triangles are 40cm and 50cm. Then, the ratio of the areas Of the first and second triangles is

(A) 4:5 (B) 5:4 (C) 25:16 (D) 16:25

(c). How many tangents can be drawn to a circle at any point of it?

(A) 1 (B) 2 (C) 3 (D) none of these

(d). How many tangents can a circle have?

(A) Two (B) infinitely many (C) One (D) Zero

(e). Which of the following is the correct HCF of the 108 and 288?

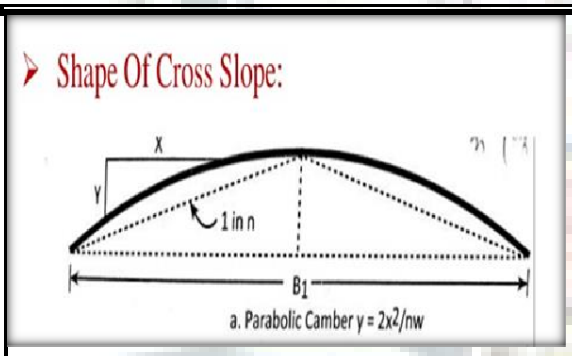
(A) 108 (B) 12 (C) 288 (D) 36

19.

Case Study Based- 3

Applications of Parabolas-Highway Overpasses/Underpasses

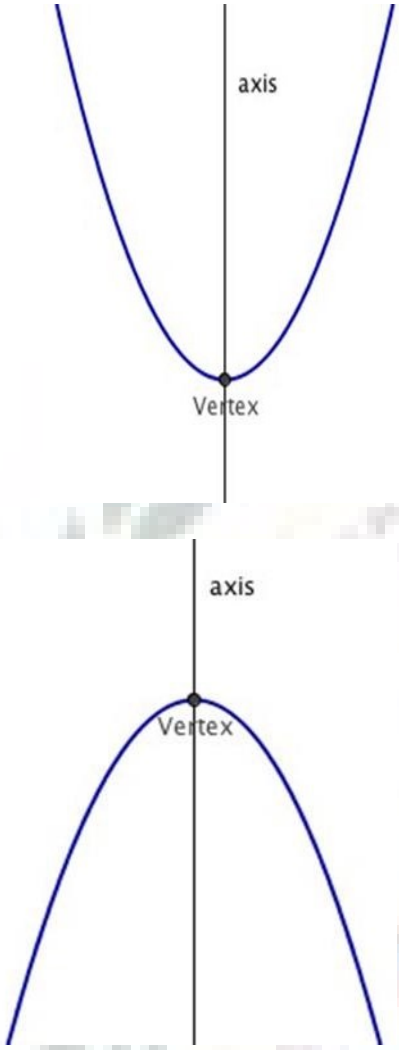
A highway underpass is parabolic in shape.



Parabola

A parabola is the graph that results from $\mathbf{p(x)=ax^2+bx+c}$ Parabolas are symmetric about a vertical line known as the ***Axis of Symmetry***. The Axis of Symmetry runs through the maximum or minimum point of the parabola which is called the

Vertex



(a). If the highway overpass is represented by $x^2–2x –8$. Then its zeroes are

(i) (2,-4) (ii) (4,-2) (iii) (-2,-2) (iv) (-4,-4)

(b). The highway overpass is represented graphically. Zeroes of a polynomial can be expressed graphically. Number of zeroes of polynomial is equal to number of points where the graph of polynomial

(i) Intersects x-axis (ii) Intersects y-axis

(iii) Intersects y-axis or x-axis (iv)None of the above

(c) . Graph of a quadratic polynomial is a

(i) straight line (ii) circle (iii) parabola (iv) ellipse

(d). The representation of Highway Underpass whose one zero is 6 and sum of the zeroes is 0, is

(i) $x^2 – 6x + 2$ (ii) $x^2 – 36$ (iii)$x^2 – 6$ (iv)$x^2 – 3$

(e). The number of zeroes that polynomial $f(x) = (x – 2)^2 + 4$ can have is:

(i)1 (ii) 2 (iii) 0 (iv) 3

20. **Case Study Based- 4**

100m RACE**.** A stopwatch was used to find the time that it took a group of students to run 100 m.

Time (in sec)	0 - 20	20 - 40	40 -- 60	60 - 80	80 – 100
No .of students	8	10	13	6	3

(a) Estimate the mean time taken by a student to finish the race.

(i) 54 (ii) 63 (iii) 43 (iv) 50

(b). What wiil be the upper limit of the modal class ?

(i). 20 (ii). 40 (iii) 60 (iv) 80

(c). The construction of cumulative frequency table is useful in determining the

(i) Mean (ii) Median (iii) Mode (iv) All of the above

(d). The sum of lower limits of median class and modal class is

(i) 60 (ii)100 (iii) 80 (iv) 140

(e). How many students finished the race within 1 minute?

(i) 18 (ii) 37 (iii) 31 (iv) 8

Part –B

All questions are compulsory. In case of internal choices, attempt any one.

21. Using Euclid's division algorithm, find the HCF of 405 and 2520

OR

Using prime factorization, find the HCF and LCM of 36 and 84

22. 3 bells ring at an interval of 4, 7 and 14 minutes. All three bell rang at 6 am, when the three balls will the ring together next?

23. Find the point on x-axis which is equidistant from the points (2,-2) and (-4, 2)

OR

P (-2, 5) and Q (3, 2) are two points. Find the co-ordinates of the point R on PQ such that PR=2QR

24. Find a quadratic polynomial whose zeroes are $5-3\sqrt{2}$ and $5+3\sqrt{2}$.

25. Draw a line segment AB of length 9cm. With A and B as centers, draw circles of radius 5cm and 3cm respectively. Construct tangents to each circle from the centre of the other circle.

26. 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.

(a) What is the probability that both beads are black?

(b) What is the probability of getting one black bead and one white bead?

27. Prove that $2-\sqrt{3}$ is irrational, given that $\sqrt{3}$ is irrational.

28. If one root of the quadratic equation $3x^2+px+4 = 0$ is 2/3, then find the value of p and the other root of the equation.

OR

The roots α and β of the quadratic equation $x^2-5x+ 3(k-1) = 0$ are such that $\alpha- \beta=1$. Find the value k.

29. If tan A=3/4, find the value of 1/sinA+1/cosA

OR

If $\sqrt{3}\ \sin\Theta - \cos\Theta = 0$ and $0^\circ < \Theta < 90^\circ$, find the value of Θ

30. The perimeters of two similar triangles are 25cm and 15cm respectively. If one side of the first triangle is 9cm, find the length of the corresponding side of the second triangle.

OR

In an equilateral triangle ABC, D is a point on side BC such that BD = 1/3 BC. Prove that $9\ AD^2 = 7\ AB^2$

31.

The median of the following data is 16. Find the missing frequencies a and b, if the total of the frequencies is 70.

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	12	a	12	15	b	6	6	4

32. The angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of the tower is 30^0. Find the height of the tower.

33. The mode of the following data is 67. Find the missing frequency x.

Class	40-50	50-60	60-70	70-80	80-90
Frequency	5	x	15	12	7

34. The two palm trees are of equal heights and are standing opposite each other on either side of the river, which is 80 m wide. From a point O between them on the river the angles of elevation of the top of the trees are 60° and 30°, respectively. Find the height of the trees and the distances of the point O from the trees.

OR

The angles of depression of the top and bottom of a building 50 meters high as observed from the top of a tower are 30° and 60° respectively. Find the height of the tower, and also the horizontal distance between the building and the tower.

35. Water is flowing through a cylindrical pipe of internal diameter 2cm, into a cylindrical tank of base radius 40 cm at the rate of 0.7m/sec. By how much will the water rise in the tank in half an hour?

36. The sum of the 4^{th} and 8^{th} terms of an AP is 24 and the sum of 6^{th} and 10^{th} terms is 44. Find the three terms of the AP