

Directorate of Education, GNCT of Delhi

Practice Paper No. 2

Class – X (2020-21)

Mathematics

Max. Marks: 80

Duration: 3 hours

General Instructions:

1. This question paper contains 36 questions divided into two parts A and B. All the questions are compulsory.
2. Part A consists of two sections- I and II. Section I has 16 questions of 1 mark each and Section II has 4 case study-based questions. Each case-study based questions have 5 sub-parts of 1 mark each.
3. Part B consists of 16 questions— 6 questions of 2 marks, 7 questions of 3 marks and 3 questions of 5 marks each.
4. There is no overall choice. However internal choices are provided in 5 questions of 1 mark, 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks. You have to attempt only one of the alternatives in all such questions.
5. In case-study based questions, you have to attempt only four out of five sub-parts.
6. Use of calculator is not permitted.
7. Please write down the serial number of question before attempting it.

Part – A

Section – I

Question No 1 to 16 are of 1 mark each.

1. Find the largest number which on dividing 70 and 125 leaves remainders 5 and 8 respectively
OR
The decimal representation of $\frac{17}{(2^3 \times 5)}$ will terminate after how many places?
2. Does equation $x^2 + x - 5 = 0$ has distinct real roots?
OR
Show that the sum of roots of quadratic equation $-x^2 + 3x - 3 = 0$ is 3.
3. If one zero of quadratic polynomial $x^2 + 3x + k$ is 2, then find the value of k.
OR
Write the quadratic polynomial, the sum of whose zeroes is -5 and their product is 6.
4. In triangles $\triangle DEF$ and $\triangle PQR$, if $\angle D = \angle Q$ and $\angle R = \angle E$, then is it true that $\frac{DE}{PQ} = \frac{FE}{RP}$? Justify.
5. At one end A of diameter AB of a circle of radius 5 cm, tangent XAY is drawn to the circle. Find the length of the chord CD which is at a distance 8 cm from A and parallel to XY.
6. Find the area of a sector of angle p (in degrees) of a circle of radius R.

7. Find the value of b for which the roots of the equation $9x^2 - bx + 81$ will be equal.
 8. On comparing the ratios of the coefficients, find out whether the pair of linear equations $3x - 6y = 0$ and $9x + 10y - 20 = 0$ is consistent or inconsistent.
- OR
- What is the condition that the pair of linear equations $ax + by + c = 0$ and $Ax + By + C = 0$ is consistent?
9. Two lines are parallel. If the equation of one of these lines is $4x + 3y = 14$, then find the equation of the second line.
 10. If 7 times the 7th term of an A.P. is equal to 11 times its 11th term, then find its 18th term.
 11. The value of $(\tan 1^\circ \tan 2^\circ \dots \dots \dots \tan 88^\circ \tan 89^\circ)$ is _____.
 12. If the angle between two tangents drawn from an external point P to a circle of radius r and centre O is 60° , then find the length of OP .
 13. If $k + 1 = \sec^2 A (1 + \sin A)(1 - \sin A)$, then find the value of k .
 14. A cylinder, cone and a hemisphere have the same base and same height. Find the ratio of their volumes.
 15. A steel wire when bent in the form of a square encloses an area of 121cm^2 . If the same wire is bent in the form of a circle, then find the circumference of the circle.
 16. The probability expressed as a percentage of a particular occurrence can never be less than 0. Is it true or false? Justify.

OR

A dice is thrown once at random. What is the probability of getting a 6?

Section – II

Question number 17-20 are case-study based questions. Attempt any 4 sub parts from each question. Each sub part carries 1 mark.

17. Underground water sump is popular in India. It is usually used for large water sump storage and can be built cheaply using cement-like materials. Underground water sumps are typically chosen by people who want to save space. The water in the underground sump is not affected by extreme weather conditions. The underground sump maintains cool temperatures in both winter and summer.



A builder wants to build a sump to store water in an apartment. The volume of the rectangular sump will be modelled by $V(x) = x^3 + x^2 - 4x - 4$.

- (i) He planned in such a way that its base dimensions are $(x + 1)$ and $(x + 2)$. How much does he have to dig ?
 (a) $(x + 1)$ (b) $(x - 2)$ (c) $(x - 3)$ (d) $(x + 2)$
- (ii) If $x = 4$ meter, what is the volume of the sump?
 (a) 30 m^3 (b) 20 m^3 (c) 15 m^3 (d) 60 m^3
- (iii) If $x = 4$ and the builder wants to paint the entire inner portion (including roof) of the sump, what is the total area to be painted ?
 (a) 52 m^2 (b) 96 m^2 (c) 208 m^2 (d) 104 m^2
- (iv) If the cost of paint is 25 per square metre, what is the cost of painting ?
 (a) Rs 3900 (b) Rs 2600 (c) Rs 1300 (d) Rs 5200
- (v) What is the storage capacity of this sump ?
 (a) 3000 litre (b) 6000 litre (c) 60000 litre (d) 30000 litre

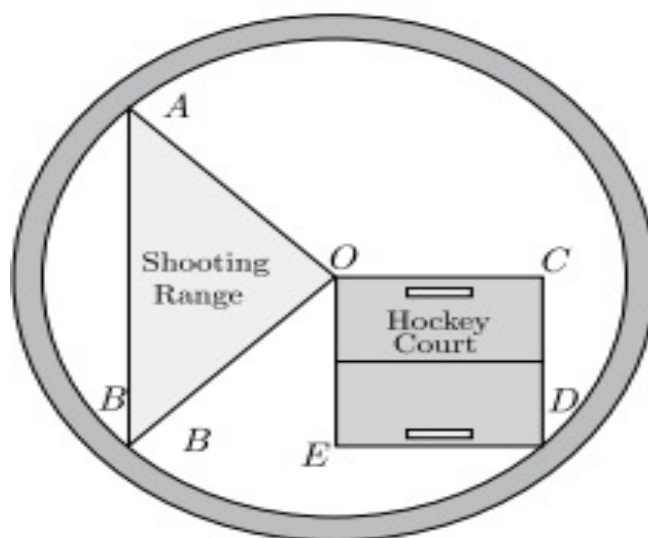
18. Data of height of class 10th students was collected and organized as the following frequency distribution table, observe the median class and modal class.

Height (in cm)	140 – 145	145– 150	150– 155	155– 160	160– 165	165– 170
Frequency	5	15	25	30	15	10

- (i) What is the upper limit of median class?
 (a) 150 cm (b) 160 cm (c) 155 cm (d) 165 cm
- (ii) What is the value of median height?
 (a) 145.67 cm (b) 157.67 cm (c) 155.83 cm (d) 159.67 cm
- (iii) What is the lower limit of modal class?
 (a) 150 cm (b) 160 cm (c) 155 cm (d) 165 cm
- (iv) What is the value of modal height?
 (a) 155.25 cm (b) 156.25 cm (c) 157.25 cm (d) 159.25 cm
- (v) What is the value of mean height?
 (a) 155.625 cm (b) 156.250 cm (c) 158.500 cm (d) 159.275 cm

19. Jawaharlal Nehru Stadium is a multi-purpose sports stadium and a very popular sports stadium of Delhi. It has a capacity to seat 60,000 people. The stadium is conducting the annual sports competition soon. The curator of the stadium is asked to figure out the dimensions for carving out some areas allotted for a hockey court and a shooting range,

as shown in the figure below.



The shapes of the hockey court and the shooting range are square and triangle respectively. Both of the courts have a common edge that touches the centre of stadium. The construction of the shooting range is such that the angle at centre is 90° . The radius of the stadium is 180 metres.

- (i) What is the area allotted to shooting range ?
 (a) $12,600 \text{ m}^2$ (b) $16,200 \text{ m}^2$ (c) $18,660 \text{ m}^2$ (d) $16,880 \text{ m}^2$
- (ii) What is the area allotted to hockey court ?
 (a) $16,200 \text{ m}^2$ (b) $22,000 \text{ m}^2$ (c) $20,000 \text{ m}^2$ (d) $16,880 \text{ m}^2$
- (iii) If the team of the curators managing the stadium likes to allot space for some more sports, how much area is available to them?
 (a) $76,980 \text{ m}^2$ (b) $95,806 \text{ m}^2$ (c) $60,040 \text{ m}^2$ (d) $69,336 \text{ m}^2$
- (iv) If the boundaries of the hockey court and shooting range are to be fenced, then what is the required length (in m) of the fence?
 (a) $400(2+5\sqrt{2})$ (b) $180(2+3\sqrt{2})$ (c) $180(2+5\sqrt{2})$ (d) $300(2+3\sqrt{2})$
- (v) If the cost of fencing is Rs 6 per metre, what is the total cost (in Rs) of fencing?
 (a) $1800(2+3\sqrt{2})$ (b) $1080(2+5\sqrt{2})$ (c) $1080(2+3\sqrt{2})$ (d) $2400(2+5\sqrt{2})$
20. Cards, on which numbers 1, 2, 3 100 are written (one number on one card and no number is repeated), put in a bag and are mixed thoroughly. A card is drawn at random from the bag.
- (i) What is the probability that the card taken out has an odd number ?
 (a) 0.25 (b) 0.49 (c) 0.50 (d) 0.51

- (ii) What is the probability that the card taken out has a two-digit odd number ?
 (a) 0.23 (b) 0.45 (c) 0.56 (d) 0.34
- (iii) What is the probability that the card taken out has an odd number which is multiple of 11?
 (a) 0.05 (b) 0.10 (c) 0.12 (d) 0.06
- (iv) What is the probability that the card taken out has an odd number which is not less than 70 ?
 (a) 0.13 (b) 0.14 (c) 0.12 (d) 0.15
- (v) What is the probability that the card taken out has an odd number which is not multiple of 11?
 (a) 0.25 (b) 0.50 (c) 0.40 (d) 0.45

Question No. 21 to 26 are Very Short Answer Type questions of 2 marks each.

21. Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 60° .
22. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.
23. Write all other trigonometric ratios in terms of $\sec A$.

OR

Evaluate : $\frac{\sin 30^\circ + \tan 45^\circ - \operatorname{cosec} 60^\circ}{\sec 30^\circ + \cos 60^\circ + \cot 45^\circ}$

24. Prove that $5 - \frac{3}{7\sqrt{3}}$ is an irrational number.

OR

On a morning walk, three persons step off together and their steps measure 40cm, 42 cm and 45cm respectively. At what minimum distance each should walk so that each can cover the same distance in complete steps.

25. The sum of squares of two consecutive positive integers is 145. Find the integers.
26. Show that the points A(0, 0), B(3, 0), C(4, 1) and D(1,1) form a parallelogram.

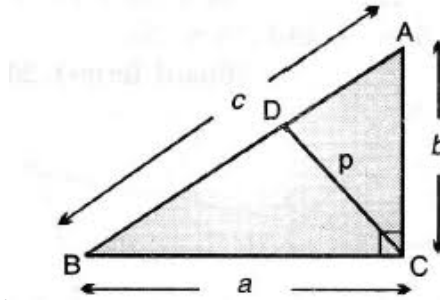
Question No. 27 to 33 are Short Answer Type questions of 3 marks each.

27. Books dealing with cleanliness have to be stacked up in such a way that all books are stored topic wise and the height of a stack is the same. The number of books on cleanliness of nails is 96, the number of books on cleanliness of face is 240 and the number of books on cleanliness of hands is 336. Assuming that the books are of the same thickness, determine the number of books in each stack.

28. Find the mean of children per family from the data given below.

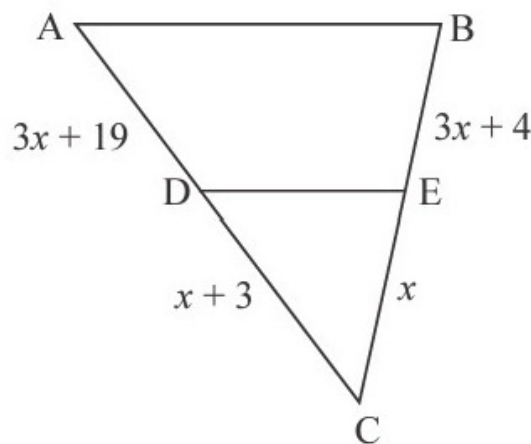
Number of candidates	0-1	1-2	2-3	3-4	4-5	5-6
Number of family	5	11	25	12	5	2

29. ABC is a right triangle, right angled at C. Let $BC=a$, $CA=b$, $AB=c$ and let p be the length of the perpendicular from C on AB. Show that $cp = ab$



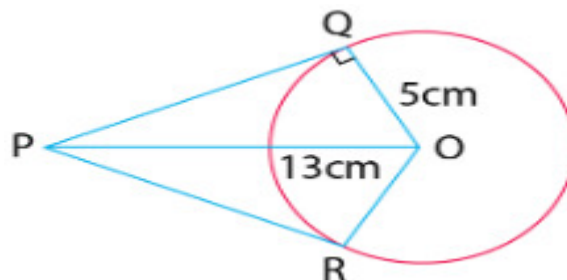
OR

State Thales theorem and hence find the value of x in the given figure, in which $DE \parallel AB$.



30. Write all the values of p for which the quadratic equation $x^2 + px + 16 = 0$ has equal roots. Also find roots of the equation so obtained.

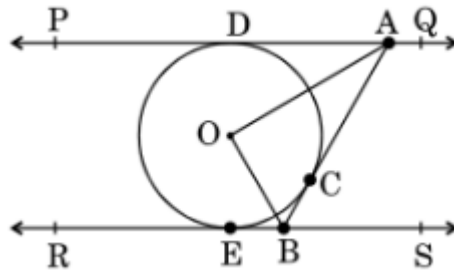
31. From a point P which is at a distance of 13cm from the centre O of a circle of radius 5cm, the pair of tangents PQ and PR to the circle are drawn. Find the area of the quadrilateral PROQ.



32. Prove that: $\sin\theta(1+\tan\theta) + \cos\theta(1+\cot\theta) = \sec\theta + \operatorname{cosec}\theta$
33. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

OR

In figure PQ and RS are two parallel tangents to a circle with Centre O and another tangent AB with the point of contact C intersecting PQ at A and RS at B. Prove that $\angle AOB$ is equal to 90° .

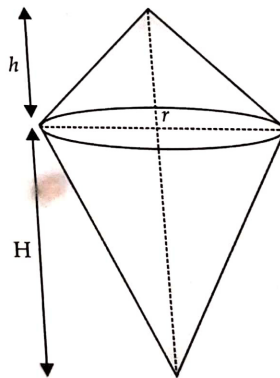


Question No. 34 to 36 are Long Answer Type questions of 5 marks each.

34. A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 20 cm and diameter of the cylinder is 7 cm. Find the total volume of the solid. (Use $\pi = \frac{22}{7}$)

OR

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



35. The angle of elevation of the top B of a tower AB from a point X on the ground is 60° . At a point Y, 40m vertically above X, the angle of elevation of the top of the tower is 45° . Find the height of the tower AB and distance XB.
36. A part of monthly hostel charges 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 3000 as hostel charges whereas Mansi who takes food for 25 days has to pay Rs 3500 as hostel charges. Find the fixed charges and the cost of food per day.