



COMMON PRE-BOARD EXAMINATION 2022-23 MATHEMATICS (STANDARD) - 041



Class: X
Date: 15/01/2023

Max. Marks: 80
Max. Time: 3 hours

General Instructions:

1. This Question Paper has 5 Sections A - E.
2. Section **A** has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
3. Section **B** has 5 questions carrying 02 marks each.
4. Section **C** has 6 questions carrying 03 marks each.
5. Section **D** has 4 questions carrying 05 marks each.
6. Section **E** has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Qs of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$, wherever required if not stated.

SECTION – A

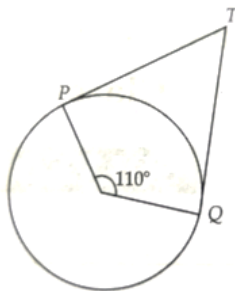
Section A consists of 20 questions of 1 mark each.

1. If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$; x, y are prime numbers, then HCF (a, b) is: 1
(a) xy (b) xy^2 (c) x^3y^3 (d) x^2y^2
2. The smallest natural number by which 1200 should be multiplied, so that the square root of the product is a rational number is: 1
(a) 3 (b) 5 (c) 2 (d) 1
3. If the product of zeroes of the polynomial $f(x) = x^2 - 8x + k$ is 20, then the value of k is: 1
(a) 20 (b) 30 (c) 40 (d) 60
4. If a pair of linear equations is consistent, then the lines will be: 1
(a) Parallel (b) Always coincident
(c) Intersecting or coincident (d) Never intersecting
5. If the n^{th} term of an A.P. -1, 4, 9, 14.... is 129. Find the value of n . 1
(a) 25 (b) 27 (c) 22 (d) 29

6. It is given that, $\Delta ABC \sim \Delta DFE$, $\angle A = 30^\circ$, $\angle C = 50^\circ$, $AB = 5$ cm, $AC = 8$ cm and $DF = 7.5$ cm. Then, the true statement is: 1
- (a) $DE = 12$ cm, $\angle F = 50^\circ$ (b) $DE = 12$ cm, $\angle F = 100^\circ$
 (c) $EF = 12$ cm, $\angle D = 100^\circ$ (d) $EF = 12$ cm, $\angle D = 30^\circ$

7. If in two triangles DEF and PQR, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following is not true? 1
- (a) $\frac{EF}{PR} = \frac{DF}{PQ}$ (b) $\frac{DE}{DF} = \frac{FE}{RP}$ (c) $\frac{DE}{QR} = \frac{DF}{PQ}$ (d) $\frac{EF}{RP} = \frac{DE}{QR}$

8. In the given figure, if TP and TQ are the two tangents to a circle with center O such that $\angle POQ = 110^\circ$, then $\angle PTQ$ is equal to 1



- (a) 60° (b) 70° (c) 80° (d) 90°
9. The center of a circle whose end points of a diameter are $(-6, 3)$ and $(6, 4)$ is: 1
- (a) $(8, -1)$ (b) $(4, 7)$ (c) $(0, \frac{7}{2})$ (d) $(4, \frac{7}{2})$

10. The point which divides the line segment joining the points $(7, -6)$ and $(3, 4)$ in ratio 1:2 internally lies in the: 1
- (a) I quadrant (b) II quadrant (c) III quadrant (d) IV quadrant

11. Given that, $\sin \alpha = \frac{1}{2}$ and $\cos \beta = \frac{1}{2}$, then the value of $(\alpha + \beta)$ is: 1
- (a) 0° (b) 30° (c) 60° (d) 90°

12. If $\cot \theta = \frac{1}{\sqrt{3}}$, the value of $\sec^2 \theta + \operatorname{cosec}^2 \theta$ is 1
- (a) 1 (b) $\frac{40}{9}$ (c) $\frac{38}{9}$ (d) $5\frac{1}{3}$

13. The angle of depression of a car, standing on the ground, from the top of a 75 m high tower, is 30° . The distance of the car from the base of the tower (in m.) is: 1
- (a) $25\sqrt{3}$ (b) $50\sqrt{3}$ (c) $75\sqrt{3}$ (d) 150

14. The area of a quadrant of a circle where the circumference of the circle is 176 m, is: 1
- (a) 2464 m^2 (b) 1232 m^2 (c) 616 m^2 (d) 308 m^2

15. A medicine capsule is in the shape of a cylinder of diameter 0.5 cm with two hemispheres stuck to each of its ends. The length of the entire capsule is 2 cm. The capacity of the capsule is: 1
- (a) 0.36 cm^3 (b) 0.35 cm^3 (c) 0.34 cm^3 (d) 0.33 cm^3

16. For the following distribution:

1

Marks	No. of students
Below 10	3
Below 20	12
Below 30	27
Below 40	57
Below 50	75
Below 60	80

The modal class is:

- (a) 10 – 20 (b) 20 – 30 (c) 30 – 40 (d) 50 – 60

17. For the following distribution:

1

Class	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
Frequency	10	15	12	20	9

The sum of lower limits of median class and modal class is:

- (a) 15 (b) 25 (c) 30 (d) 35

18. A die is rolled twice. The probability that 5 will not come up either time is

1

- (a) $\frac{11}{36}$ (b) $\frac{1}{3}$ (c) $\frac{13}{36}$ (d) $\frac{25}{36}$

19. **DIRECTION:** In question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. 1

Choose the correct option

Statement A (Assertion): The smallest number which is divisible by both 306 and 657; is 22338.

Statement R (Reason): The HCF of 306 and 657 is 9.

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

20. **Statement A (Assertion):** In a right circular cone, the cross-section made by a plane parallel to the base is a circle. 1

Statement R (Reason): If the volume and the surface area of a solid hemisphere are numerically equal, then the diameter of the hemisphere is 9 units.

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

- (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.

SECTION – B

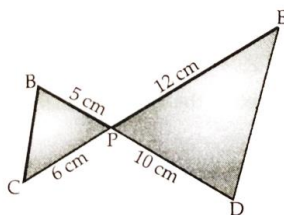
Section B consists of 5 questions of 2 marks each.

21. Solve the following quadratic equation for x : $4x^2 - 4a^2x + (a^4 - b^4) = 0$ 2

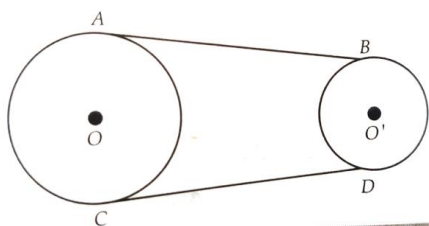
OR

Solve for x : $\sqrt{2x + 9} + x = 13$

22. In the figure given below, BD and CE intersect each other at point P. Is $\triangle PBC \sim \triangle PDE$? Why? 2



23. In the figure, AB and CD are common tangents to two circles of unequal radii. Prove that $AB = CD$. 2



24. Evaluate: $\frac{\sin 90^\circ}{\cos 45^\circ} + \frac{1}{\operatorname{cosec} 30^\circ}$. 2

OR

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

25. Find the area of the sector of a circle of radius 6 cm whose central angle is 30° (take $\pi = 3.14$). 2

SECTION - C

Section C consists of 6 questions of 3 marks each.

26. Prove that $\sqrt{5}$ is an irrational number. 3

27. If one of the zeroes of a polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the value of k . 3

28. Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the squares of the other two by 60. Find the numbers. 3

OR

Solve the following quadratic equation for x : $x^2 + \left(\frac{a}{a+b} + \frac{a+b}{a}\right)x + 1 = 0$.

29. Prove that the parallelogram circumscribing a circle is a rhombus. 3

OR

If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R, respectively, Prove that $AQ = \frac{1}{2} (BC + CA + AB)$.

30. Prove that: $\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \frac{1 + \cos \theta}{\sin \theta}$. 3

31. A box contains cards, numbers 1 to 90. A card is drawn at random from the box. Find the probability that the selected card bears a: 3

- (i) Two-digit number
- (ii) Perfect square number

SECTION - D

Section D consists of 4 questions of 5 marks each.

32. If the ratio of the 11th term of an A.P. to its 18th term is 2 : 3, find the ratio of the sum of the first five terms to the sum of its first 10 terms. 5

OR

A thief runs with a uniform speed of 100 m/minute. After one minute a policeman runs after, the thief to catch him. He goes with a speed of 100m/minute in the first minute and increases his speed by 10m/minute every succeeding minute. After how many minute the policeman will catch the thief.

33. Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio. 5

Using the above theorem prove that a line through the point of intersection of the diagonals and parallel to the base of the trapezium divides the nonparallel sides in the same ratio.

34. A vessel full of water is in the form of an inverted cone of height 8 cm and the radius of its top, which is open, is 5 cm. When 100 spherical lead balls are dropped into vessel. Then one-fourth of the water flows out of the vessel. Find the radius of a spherical ball. 5

OR

A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius on its circular face. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

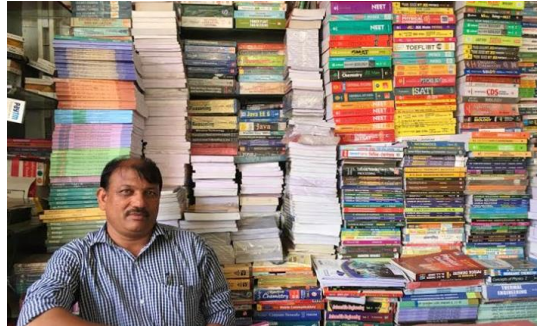
35. If the median of the following frequency distribution is 32.5. Find the values of f_1 and f_2 . 5

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	Total
Frequency	f_1	5	9	12	f_2	3	2	40

SECTION – E

Case study based questions are compulsory.

36. A bookstore shopkeeper gives books on rent for reading. He has a variety of books in his store related to fiction, stories and quizzes, etc. He takes a fixed charge for the first two days and an additional charge for the subsequent day. Amruta paid ₹ 22 for a book kept for 6 days; While Radhika paid ₹ 16 for keeping the books for 4 days.



Assume that the fixed charge be ₹ x and additional charge (per day) be ₹ y .

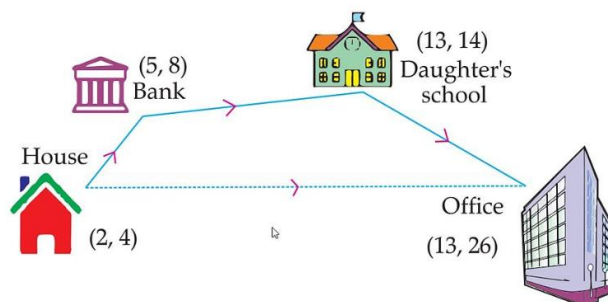
Based on the above information, answer the following questions:

- (1) Frame the algebraic equation for Radhika. 1
- (2) Frame the algebraic equation for Amruta. 1
- (3) What are the additional charge for each subsequent day for a book? 2

OR

What is the total amount paid by both, if both of them have kept the book for 2 more days?

37. Ayush starts walking from his house to office. Instead of going to the office directly, he goes to a bank first, from there to his daughter's school and then reaches the office. (Assume that all distances covered are in straight lines). If the house is situated at $(2, 4)$, bank at $(5, 8)$, school at $(13, 14)$ and office at $(13, 26)$ and coordinates are in km.



- (1) What is the distance between house and bank? 1
 - (2) What is the distance between Daughter's school and bank? 1
 - (3) What is the total distance travelled by Ayush to reach the office? 2
38. Read the following and answer the following questions:
An electrician has to repair an electric fault on a pole of height 5 m. He needs to reach a point 1.3 m below the top of the pole to undertake the repair work (see figure).



- | | |
|---|---|
| (1) How far is he from the ground? | 1 |
| (2) What should be the length of the ladder, when inclined at an angle of 60° to the horizontal? | 1 |
| (3) How far from the foot of the pole should he place the foot of the ladder? | 2 |

OR

If the horizontal angle is changed to 30° , then what should be the length of the ladder?
