



# COMMON PRE-BOARD EXAMINATION :2022-23

## Class-X Subject: MATHEMATICS(STANDARD)-041



**Max.Marks: 80**

Timings: 3 Hours

Date: 15/3/2023

### **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 Questions 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 ( each question carries 1 mark)

1. If  $\sin A + \sin^2 A = 1$ , then value of  $\cos^2 A + \cos^4 A$  is :  
a) 1   b) -1   c) -2   d) 3
2. Two identical solid cubes of side k units are joined end to end. What is the volume, in cubic units, of the resulting cuboid?  
a)  $2k^3$    b)  $3k^3$    c)  $4k^3$    d)  $6k^3$
3. The probability of getting a doublet in a throw a pair of dice is :  
a)  $\frac{1}{3}$    b)  $\frac{1}{4}$    c)  $\frac{1}{5}$    d)  $\frac{1}{6}$
4. If  $HCF(x, y) = 3$  and  $xy = 180$ , then  $LCM(x, y)$  is :  
a) 540   b) 180   c) 60   d) 50
5. If  $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$  ( $\theta \neq 90^\circ$ ) then the value of  $\tan \theta$  is:  
a)  $\sqrt{2} - 1$    b)  $\sqrt{2} + 1$    c)  $\sqrt{2}$    d) 1
6. The distance of the point P ( 8 , 5 ) from the x- axis is:  
a) 8   b) 5   c) 13   d) 3

7. The perimeter of a quadrant of a circle of diameter 7 cm is:
- a) 6.5 cm   b) 8.5cm   C) 12.5cm   D) 14 cm
8. If  $88x + 36y = -92$  and  $36x + 88y = -404$ , then  $x + y$  is :
- a) -4   b) 4   c) 2   d) 6
9.  $\frac{\sin\theta}{1+\cos\theta}$  is equal to:
- a)  $1 + \cos \theta$    b)  $1 - \cos\theta$    c)  $\frac{1-\cos\theta}{\sin\theta}$    d)  $\frac{1+\cos\theta}{\sin\theta}$
10. If 5 is a zero of the quadratic polynomial  $p(x) = x^2 - kx - 15$ , then the value of k is:
- a) 2   b) -2   c) 4   d) -4
11. The Quadratic equation  $2x^2 - \sqrt{5}x + 1 = 0$  has
- a) 2 distinct real roots   b) 2 equal real roots   c) no real root   d) more than 2 real roots
12. Rohit is 6 feet tall. At an instant, his shadow is 5feet long. At the same instant, the shadow of a pole is 30 feet long. How tall is the pole?
- A) 12 feet   b) 24 feet   c) 30 feet   d) 36 feet
13. In triangles ABC and DEF,  $\angle B = \angle E$ ,  $\angle F = \angle C$  and  $AB = 3 DE$ . Then the two triangles are
- a) congruent but not similar   b) similar but not congruent   c) neither congruent nor similar  
d) congruent as well as similar
14. If the mean of a data is 27 and mode is 45, then median is
- a) 30   b) 27   c) 32   d) 33
15.  $\sum f_i = 18$  and  $\sum f_i x_i = 2p + 24$  and mean of the distribution is 2, then p is equal to
- a) 3   b) 4   c) 8   d) 6
16. The length of the tangent drawn from a point 8cm away from the centre of a circle of radius 6cm is:
- a) 10 cm   b) 5 cm   c)  $\sqrt{7}$  cm   d)  $2\sqrt{7}$  cm.
17. Savitha has a lamp placed at the centre of her square yard, each side measuring 20m. The light of lamp covers a circle of radius 10m on the yard. What area of the yard is not lit by the lamp?
- a)  $20 - 10\pi$  sq.m   b)  $400 - 10\pi$ sq.m   c)  $(400 - 100\pi)$ sq.m   d)  $(40 - 10\pi)$ sq.m



18. Which of these is a rational number?

- (a)  $5\pi$  (b)  $5\sqrt{5}$  (c) 3.466666..... d) 0.34521065.....

DIRECTION : In the question numbers 19 and 20, a statement of Assertion ( A ) is followed by a statement of Reason ( R ). choose the correct option.

- a) Both A and R are true and R is the correct explanation for A.  
 b) Both A and R are true and R is not the correct explanation for A.  
 c) A is true but R is false.  
 d) A is false but R is true

19. Assertion ( A ) :  $\sqrt{3} + \sqrt{5}$  is an irrational number

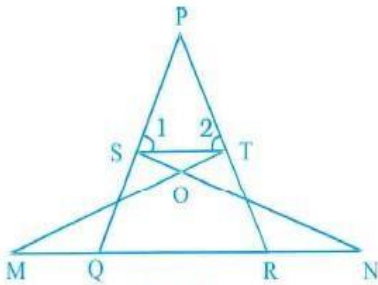
Reason ( R ) : sum of a rational and an irrational number is always irrational

20. Assertion (A) :  $\sin^2 67^\circ + \cos^2 67^\circ = 1$

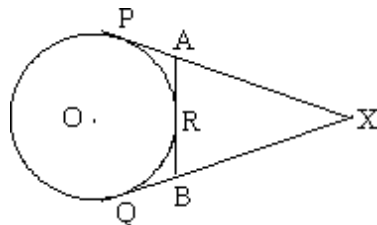
Reason(R : For any value of  $\theta$   $\sin^2\theta + \cos^2\theta = 1$

SECTION -B( each question carry 2 marks)

21. In the Figure,if  $\angle 1 = \angle 2$  and  $\Delta NSQ \cong \Delta MTR$ , then prove that  $\Delta PTS \sim \Delta PRQ$ .



22. In the adjoining figure, XP and XQ are two tangents to a circle with centre O from a point X outside the circle. ARB is tangent to the circle at R. Prove that  $XA + AR = XB + BR$ .



23. If  $12 \tan\theta = 5$  find  $\sin \theta$  and  $\cos \theta$

OR

If  $\cot A = \frac{4}{3}$ , find  $\sin A + \cos A$

24. Find the area of the sector of a circle with radius 4 cm and of angle  $30^\circ$ . Find the area of the corresponding major sector also ( use  $\pi = 3.14$ )

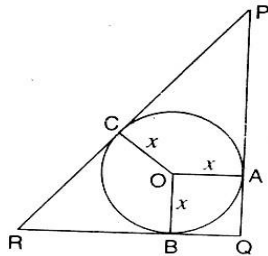
OR

The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 minutes when the car is travelling at a speed of 66 km per hour.

25. Find the ratio in which the y axis divides the line segment joining the points A ( 6 , -4) and B ( -2 , -7). Find the coordinates of the point of intersection.

SECTION -C( each question carry 3 marks)

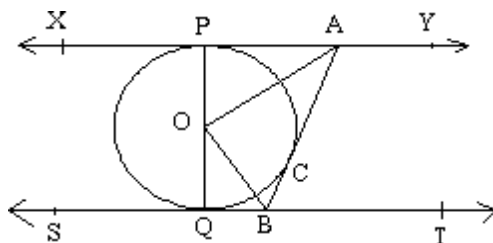
26. In the given figure PQR is a right angled triangle, right angled at Q with PQ=12cm and QR=5cm



A circle with centre O and radius x is inscribed in  $\Delta PQR$ . Find the value of x

OR

In the adjoining figure, XY and ST are two parallel tangents to a circle with centre O and another Tangent AB with point of contact C is intersecting XY at A and ST at B. Prove that  $\angle AOB = 90^\circ$



27. Prove that  $\sqrt{2}$  is irrational and hence show that  $3 + \sqrt{2}$  is irrational.

28. Prove that  $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$
29. Find the zeroes of the quadratic polynomial  $6x^2 - 3 - 7x$  and verify the relationship between the zeroes and the coefficients.
30. Find the coordinates of points of trisection of the line segment joining the points A (4, -1) and B (-2, -3)
31. Three different coins are tossed together. Find the probability of getting  
 (a) Exactly two heads (b) at least two heads (c) at most two heads  
 OR  
 Two dice are thrown at the same time. Find the probability that the sum of two numbers appearing on the top of two dice is i) 8 ii) at least 8

**SECTION -D( each question carry 5 marks)**

32. The median of the following data is 28.5. Find the missing frequencies x and y, if the total Frequency is 60

classes	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
frequency	5	x	20	15	y	5

OR

A survey regarding the heights of 51 girls of class X of a school was conducted and the following data was obtained. Find the median height.

HEIGHT (IN CM)	NUMBER OF GIRLS
Less than 140	4
Less than 145	11
Less than 150	29
Less than 155	40
Less than 160	46
Less than 165	51

33. Rs 9000 were equally divided among a certain number of persons. Had there been 20 more persons, each would have got Rs 160 less. Find the original number of persons.

OR

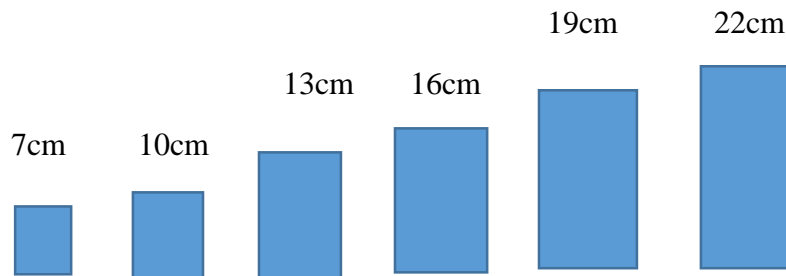
Seven years ago Varun's age was five times the square of Swati's age. Three years hence, Swati's age will be two fifth of Varun's age. Find their present ages

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

35. A gulab jamun contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 gulab jamuns each shaped like a cylinder with two hemispherical ends with length 5cm and diameter 2.8 cm.

### SECTION -E

36. A mathematics teacher of a school has taken his children to a science centre to visit the science and maths exhibition. When the students were visiting different stalls, one student, Rani, observed that some rectangular bars are arranged in ascending order as shown below. In the meantime, her teacher reached at the stall and asked some questions to Rani and the other students to verify whether the pattern is in AP or not? Just by observing the pattern shown below Rani and her friends answered . The bars are of length 7cm, 10cm, 13cm....



**Based on your understanding of the above case study, answer the questions below:**

- i) The difference between the heights of two consecutive bars is \_\_\_\_\_  
a) 2cm      b)3cm      c)7cm      d)cm      ( 1)
- ii) Which bar will have the height 34 cm from left?  
a) 10      b)12      c)13      d)14      (1)
- iii) If there are 30 bars, then height of 7<sup>th</sup> bar from the end is \_\_\_\_\_  
a) 78 cm      b)25 cm      c)76 cm      d) None of the above      (2)

37. A helicopter that is at a height, 1000 feet over an island spots a swimmer who needs to be rescued from the nearby river. Using a distant land mark, the pilot of the helicopter determines the angle of depression of the swimmer as 60degrees.

**Based on your understanding of the above case study, answer the questions below:**

i) As the angle of depression increases what will be the effect?

- a) The helicopter gets further from the island.
- b) The helicopter gets closer to the island. ( 1 )
- c) The swimmer gets closer to the island.
- d) The swimmer gets further from the island.

ii) How does the swimmer's distance from island changes as the angle of depression is halved from  $60^{\circ}$  to  $30^{\circ}$ ?

- a) The swimmer's distance decreases to less than a quarter of his starting distance.
- b) The swimmer's distance from the island doubles
- c) The swimmer's distance from the island increases three times. ( 2 )
- d) The swimmer's distance from the island is halved.

iii) For which angle of depression both the helicopter and swimmer will be at same distance?

- a)  $30^{\circ}$
- b)  $45^{\circ}$
- c)  $60^{\circ}$
- d)  $90^{\circ}$  ( 1 )

38. Teachers and students of class X of a school had gone to Mysore for study tour. After visiting different places of Mysore, lastly, they visited bird's sanctuary and deer park. Rohan is a clever boy and keen observer. He put the question to his friends " How many birds are there and how many deer are there (at particular time) in the park" Rahul's friend, Nishith gave the correct answer as follows:  
"Total animals have 1000 eyes and 1400 legs"

**Based on your understanding of the above case study, answer all the questions below:**

i) If  $x$  and  $y$  be the number of birds and deer respectively, what is the equation of total number of eyes?

- a)  $x + y = 1000$
- b)  $x + y = 500$
- c)  $x - y = 1000$
- d)  $x - y = 500$  (1)

ii) What is the equation of total number of legs?

- a)  $2x + y = 70$
- b)  $x + 2y = 500$
- c)  $x + 2y = 700$
- d)  $2x - y = 500$  (1)

iii) How many birds are there in the park?

- a) 1000
- b) 5000
- c) 300
- d) 200 (2)