



# D.A.V. PUBLIC SCHOOLS

## BIHAR ZONE

Half – Yearly Examination: 2023-2024

Class: X

Subject - MATHEMATICS

Time- 3Hrs

F.M.- 80

General Instructions:

- This question paper contains five sections, Section A to E.
- All questions are compulsory.
- Section A has 20 MCQ questions carrying 01 mark each.
- Section B has 5 questions carrying 02 marks each.
- Section C has 6 questions carrying 03 marks each.
- Section D has 4 question of carrying 05 mark.
- Section E has 3 case based integrated unit of assessments carrying 05 marks each.
- All questions are compulsory.

### SECTION – A

1. Which of the following is not a real number?

- a) 3
- b)  $\sqrt{5}$
- c)  $-2/3$
- d) i (imaginary unit)

2. What is the degree of the polynomial  $3x^2 + 4x + 1$ ?

- a) 2
- b) 1
- c) 3
- d) 4

3. The pair of linear equations  $2x + 3y = 8$  and  $4x - y = 7$  has how many solutions?

- a) One
- b) None
- c) Infinite
- d) Two

4. In a right triangle, which trigonometric ratio is equal to the length of the side opposite the angle  $\theta$  divided by the length of the hypotenuse?

P.T.O.



- a) Dependent  
c) Consistent with unique solution
- b) Inconsistent  
d) Inconsistent with no solution

12. The value of  $\cos(45^\circ)$  is:

- a) 1  
c)  $\sqrt{2}/2$
- b) 0  
d)  $1/\sqrt{2}$

13. What is the sum of the angles of a triangle?

- a)  $90^\circ$   
c)  $270^\circ$
- b)  $180^\circ$   
d)  $360^\circ$

14. The area of a sector with central angle  $60^\circ$  and radius 8 cm is:

- a)  $4\pi$  sq. cm  
c)  $8\pi$  sq. cm
- b)  $16\pi$  sq. cm  
d)  $32\pi$  sq. cm

15. A bag contains 5 red balls, 3 green balls, and 2 blue balls. What is the probability of drawing a blue ball?

- a)  $2/10$   
c)  $1/3$
- b)  $1/5$   
d)  $1/10$

16. The sum of the roots of the quadratic equation  $2x^2 + 5x + 3 = 0$  is:

- a)  $-5/2$   
c)  $-5$
- b)  $-3/2$   
d)  $-3$

17. Which of the following is a factor of the polynomial  $x^2 + 4x + 4$ ?

- a)  $(x + 2)$   
c)  $(x - 2)$
- b)  $(x + 1)$   
d)  $(x - 4)$





- a) Dependent  
b) Inconsistent  
c) Consistent with unique solution  
d) Inconsistent with no solution

12. The value of  $\cos(45^\circ)$  is:

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b) 0  
c)  $\sqrt{2}/2$   
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d)  $(x - 4)$



**Section – C**

26. If  $a = \sqrt{3} + \sqrt{5}$  and  $b = \sqrt{3} - \sqrt{5}$ , find the value of  $a^2 + b^2$ .

27. If  $\sin \theta = 3/5$  and  $\cos \theta = 4/5$ , find the value of  $\tan \theta$ .

**Or**

$$\cos^2 \theta - \sin^2 \theta = 1 - 2\sin^2 \theta.$$

28. A bag contains 4 red balls and 6 blue balls. Two balls are drawn at random without replacement.

Find the probability of drawing two blue balls.

29. The circumference of a circle is 22 cm. Find its area.

**Or**

A die is rolled once. What is the probability of getting an even number or a number greater than

4?

30. Solve the pair of linear equations:  $2x + 3y = 10$  and  $4x - y = 5$ .

31. Find the value of  $\tan 45^\circ + \cot 45^\circ$ .

**Section – D**

32. A company's revenue is modeled by the polynomial function  $R(x) = 3x^3 - 10x^2 + 15x - 8$ , where  $x$  represents the number of years since its inception. Find the number of years it will take for the revenue to reach a maximum, and calculate the maximum revenue.

33. A toy store sells two types of toys: cars and dolls. The storekeeper counted the total number of toys and the total price. She found that 15 cars and 5 dolls cost ₹870, while 10 cars and 10 dolls cost ₹1,000. Determine the individual cost of a car and a doll.

P.T.O.



34. A flagpole stands vertically on a level ground. A person standing at a distance of 50 meters from the base of the pole observes that the angle of elevation of the top of the flagpole is 30 degrees. Calculate the height of the flagpole.

Or

A ladder is leaning against a wall, forming an angle of 60 degrees with the ground. If the foot of the ladder is 3 meters away from the wall, find the length of the ladder.

35. In a bag, there are 5 red balls, 4 blue balls, and 3 green balls. If two balls are drawn at random, find the probability of drawing one red ball and one blue ball.

Or

The sum of two consecutive positive integers is 25. Find the integers using the method of solving quadratic equations.

### Section – E

36. The speed of a motor is 20 km/h. For covering the distance of 15 km the boat took 1 hour more



upstream than downstream.

Based on the above information answer the following questions:

- i. What is the speed of the current?



ii. What is the correct quadratic equation for the speed of the current?

a.  $X^2 + 30X - 400 = 0$

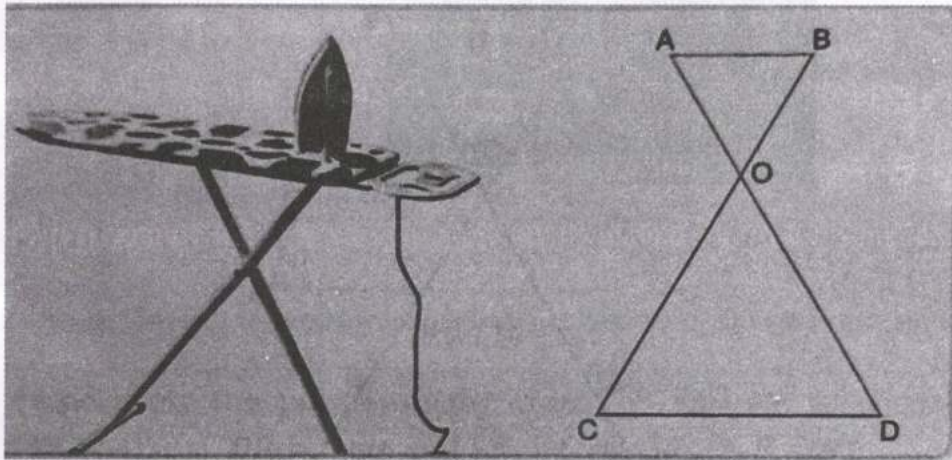
b.  $X^2 - 30X + 400 = 0$

c.  $X^2 + 30X + 400 = 0$

d.  $X^2 - 30X - 400 = 0$

iii. How much time boat took in downstream?

37. The legs of the iron table form two triangles as shown in the picture.



Based on the above information answer the following questions:

i. Which similarity criteria is applicable to prove the two triangles are similar?

ii. If  $AO = 30$  cm and  $OD = 45$  cm, then find  $\frac{\text{perimeter}(\triangle AOB)}{\text{perimeter}(\triangle COD)}$ .

38. A group of students of class X visited India gate on an education trip the teacher and students had interested in history as well. the narrate the India gate. Official name Delhi Memorial originally called All India War Memorial, monumental sand stone arch in new Delhi dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said

that India gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway) is about 138 feet (42 meters) in height.



- (i) If the altitude of the sun is at  $60^\circ$ . Then the height of the vertical tower that will cast a shadow of length 20 m is ?
- (ii) The ratio of the length of a Rod and its shadow is 1:1. The angle of elevation of the sun is?
- (iii) The angle formed by the line of sight with the horizontal when the object viewed is below the horizontal level is \_\_\_\_\_.

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