University of East Sarajevo
Faculty of Technology, Zvornik

MATHEMATICS

COLLECTION OF ENTRANCE EXAM QUESTIONS

Zvornik, Faculty of Technology
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Preface

This collection of problems and multiple-choice questions in Mathematics is designed to assist candidates in preparing for the entrance examination at the Faculty of Technology, University of East Sarajevo.

It includes carefully selected problems from key areas of elementary and high school mathematics, aimed at reinforcing conceptual understanding and developing problem-solving skills.

Tasks

Instructions: Circle the correct answer.

1. The difference between the lengths of two adjacent sides of a rectangle is 4 cm, and the perimeter of the rectangle is 56 cm. Calculate the area of the circle circumscribed about the rectangle.
   Answers: A) $314\,\text{cm}^2$ B) $341\,\text{cm}^2$ C) $312\,\text{cm}^2$ D) $321\,\text{cm}^2$

2. Calculate the number a from the equation $4a + \frac{4}{5} = X$, given that X is a solution to the equation $(X+1)^2 - 5X = (X+3)(X-1)$.
   Answers: A) 1 B) 0 C) 2 D) -1

3. Simplify the algebraic expression $[0.2(10m - 15n) - 0.125(8m - 24n)]^2$.
   Answers: A) $2m^2$ B) m^2 C) $3m^2$ D) $-m^2$

4. A trapezoid has two parallel sides whose sum is 52 cm and their difference is 12 cm. Calculate the area of the trapezoid if the length of the leg is 10 cm.
   Answers: A) $207\,\text{cm}^2$ B) $220\,\text{cm}^2$ C) $208\,\text{cm}^2$ D) $280\,\text{cm}^2$

5. The total length of all edges of a cube is 48 cm. Calculate the surface area and volume of a cone whose base is inscribed in the base of the cube, and the top is at the intersection of the diagonals of the cube.
   Answers: A) $\frac{8}{3}\pi\,\text{cm}^3$ B) $\frac{3}{8}\pi\,\text{cm}^3$ C) $\frac{3}{7}\pi\,\text{cm}^3$ D) $\frac{7}{3}\pi\,\text{cm}^3$

6. If the side of a square is increased by 2 cm, the area of the square increases by 24 cm^2. Determine the original side length of the square.
   Answers: A) 4 cm B) 5 cm C) 6 cm D) 8 cm

7. A bridge pillar stands with one-third of its length in the ground, half in water, and 1.5 m above the water. What is the total length of the pillar?
   Answers: A) 9 m B) 8 m C) 7 m D) 10 m

8. Oil is flowing into a container at a rate of 4 cm^3 per second. How much oil will there be in the container after 10 seconds if there were initially 12 cm^3 of oil?
   Answers: A) 52 cm^3 B) 48 cm^3 C) 50 cm^3 D) 55 cm^3

9. Solve the equation: $1 - (0.04 - 2X) = 0.3$
   Answers: A) $x = 0.22$ B) $x = 0.22$ C) $x = -0.33$ D) $x = +0.33$

10. Out of 40 students, 36 successfully completed the school year. What is the percentage of success?
    Answers: A) 90% B) 85% C) 95% D) 86%

11. When drying some goods that weighed 4200 kg, the weight decreased by 147 kg. What percentage is that?
    Answers: A) 2.00% B) 3.60% C) 3.5% D) 2.5%

12. 8 kg of goods cost 3520 dinars. How much can you buy for 1100 dinars?
    Answers: A) 2.0 kg B) 2.5 kg C) 3.5 kg D) 4.5 kg

13. Calculate $\sqrt{0.0324}$, without using a calculator.
    Answers: A) 0.61 B) 0.16 C) 0.18 D) 0.81

14. Two interior angles of a triangle are $63°44'26''$ and $74°31'7''$. What is the measure of the third angle?
    Answers: A) $45°30'10''$ B) $214°44'25''$ C) $41°44'25''$ D) none of these

15. What is the volume of a cube whose square diagonal is 2.82 cm?
    Answers: A) $V = 10\,\text{cm}^3$ B) $V = 7\,\text{cm}^3$ C) $V = 8\,\text{cm}^3$ D) $V = 9\,\text{cm}^3$

16. The surface area of a sphere is $12.56\,\text{dm}^2$. What is the diameter of that sphere?
    Answers: A) 3 B) 1.5 C) 2 D) 2.5

17. Calculate the area of a right triangle if one leg is 8 cm and the other is 4 cm less than the hypotenuse.
    Answers: A) 28 cm² B) 22 cm² C) 30 cm² D) 24 cm²

18. Solve the equation:

$$2X - [2X - (2X - 4)] + 1 = 3X - \frac{X}{2} - \frac{5(X-1)}{3}$$

    Answers: A) $X = 4$ B) $X = 3$ C) $X = 2$ D) $X = -2$

19. The sum of two numbers is 45, and their ratio is 7:8. Find the two numbers.
    Answers: A) 24 and 21 B) 23 and 22 C) 25 and 20 D) 26 and 23

20. Tractors plowed $\frac{3}{16}$ of a field on the first day, $2\frac{2}{5}$ times more on the second day, and 87 hectares on the third day. Calculate the total area of the field.
    Answers: A) 200 ha B) 220 ha C) 230 ha D) 240 ha

21. Solve the system of equations

$$\frac{7X+5Y+2}{3}-\frac{4X+3Y+7}{4}=Y, \quad \frac{3X+7Y+4}{4}=\frac{5X+6Y+7}{5}$$

Answers: A) $X=\frac{151}{171}$ B) $X=\frac{171}{151}$ C) $X=17$ D) $X=15$

22. A ball of modeling clay has a radius of 6 cm. From this ball, a cone is made with the same base diameter. What is the height of the cone?
Answers: A) 20 cm B) 22 cm C) 24 cm D) 23 cm

23. The diagonals of a rhombus are $d_1=36$ cm and $d_2=29$ cm, and the height is 22 cm. Calculate the perimeter of the rhombus.
Answers: A) 94.8 cm B) 98.4 cm C) 93.4 cm D) 94.3 cm

24. A bicycle pump has a diameter of 2.8 cm and a piston stroke height of 35 cm. How many cm^3 of air enters the pump with each full stroke?
Answers: A) 214.5 cm^3 B) 215.4 cm^3 C) 251.4 cm^3 D) 241.4 cm^3

25. A company paid 3600 dinars for goods, which represents 4% of the value of the goods. What is the total cost of the goods?
Answers: A) 90,000 din B) 80,000 din C) 95,000 din D) 85,000 din

26. If 50 kg of soft flour yields 75 loaves of bread, how many loaves can be made from 80 kg of flour?
Answers: A) 125 B) 115 C) 120 D) 110

27. Before the war, a certain town had 27,500 inhabitants. After the war, the population increased by 12%. What is the population of the town after the war?
Answers: A) 30,800 B) 28,000 C) 30,000 D) 29,000

28. A school has three times more boys than girls, with a total of 160 students. How many boys and how many girls are there?
Answers: A) 120 and 40 B) 110 and 50 C) 130 and 30 D) 140 and 20

29. How many liters of water can be held by a sewer pipe with an internal diameter of 40 mm and a length of 6 m?
Answers: A) 753.60 l B) 735.60 l C) 760.50 l D) 756.30 l

30. In a circle with radius $r=50$ cm, two parallel chords of lengths 96 cm and 80 cm are drawn. What is the distance between them?
Answers: A) 42 cm B) 44 cm C) 46 cm D) 48 cm

31. Find the number whose 48% is equal to 144.
Answers: A) 2000 B) 2500 C) 3000 D) 3500

32. Solve the system of equations:

$$\begin{cases} -0.612 = 0.45x - 0.288y \\ -2.844 = 1.35x + 0.144y \end{cases}$$

Answers: A) $x = 1, y = 2$ B) $x = -2, y = -1$ C) $x = -1, y = -2$ D) $x = 1, y = -2$

33. Calculate:

$$\frac{8 \cdot 0.5^2 - 0.16 : 0.2}{4 : \frac{4}{5} + 5} + (1 - 2)^2 + 0.02$$

Answers: A) 5.24 B) 5.42 C) 4.35 D) 4.42

34. The square of the sum of three consecutive numbers is 36. If the second number is x, what are the numbers?
Answers: A) 1,2,3 B) 2,3,4 C) 3,4,5 D) 4,5,6

35. For which value of variable x does the algebraic expression

$$\frac{16}{4x + 15}$$

have the value 2?
Answers: A) $x = \frac{3}{4}$ B) $x = \frac{4}{3}$ C) $x = \frac{2}{3}$ D) $x = -\frac{7}{4}$

36. A triangle has sides $a = 12\,\text{cm}, b = 13\,\text{cm}, c = 14\,\text{cm}$ and is similar to a triangle with side $c = 8.4\,\text{cm}$. Find the other two sides of the triangle.
Answers: A) 7.2 and 7.8 B) 2.7 and 7.8 C) 3.2 and 8.2 D) 8.2 and 7.8

37. A merchant paid 24,000 dinars for fruit. He sold half of the fruit with a profit of 15%, one-third with a profit of 8%, and the rest at a loss of 6%. How much did he earn?
Answers: A) 2200 B) 2000 C) 2100 D) 2400

38. Five books cost 1250 dinars. How much must be paid for the entire class of 42 students, assuming a 30% discount is given?
Answers: A) 7030 B) 7050 C) 7350 D) 7530

39. If 12% of coffee mass is lost during roasting, how much raw coffee is needed to obtain 5 kg of roasted coffee?
Answers: A) 5.628 B) 5.682 C) 5.826 D) 5.286

40. A circle is inscribed around an isosceles triangle with a base of 4 cm and a vertex angle of 30°. Calculate the arc length above the leg.
    Answers: A) 12.5 cm B) 9.5 cm C) 10.5 cm D) 11.5 cm

Answers

1. a
2. b
3. b
4. c
5. a
6. b
7. a
8. a
9. c
10. a
11. c
12. b
13. c
14. c
15. c
16. c
17. d
18. a
19. a
20. d
21. a
22. c
23. a
24. b
25. a
26. c
27. a
28. a
29. a
30. b
31. c
32. b
33. a
34. a
35. d
36. a
37. a
38. c
39. b
40. c