

Glossary

English	Русский	O'zbek
Arithmetic Mean	Среднее арифметическое	O'rtacha qiymat
Area	Площадь	Yuza
Circumference	Окружность	Aylana uzunligi
Common Factor	Общий делитель	Umumiy bo'luvchi
Cross Multiplication	Перекрестное умножение	Kesishgan ko'paytirish
Decimal	Десятичная дробь	O'nlik kasr
Digit	Цифра	Raqam
Difference	Разность	Ayirma
Equation	Уравнение	Tenglama
Expression	Выражение	Ifoda
Exponentiation	Возведение в степень	Darajaga ko'tarish
Factorization	Факторизация	Faktorlashtirish
Fraction	Дробь	Kasr
GCD (Greatest Common Divisor)	Наибольший общий делитель (НОД)	EKUB (Eng katta umumiy bo'luvchi)
Inequality	Неравенство	Tengsizlik
Integer	Целое число	Butun son
Median	Медиана	Median
Multiplication	Умножение	Ko'paytirish
Percentage	Процент	Foiz
Perimeter	Периметр	Perimetr
Probability	Вероятность	Ehtimollik
Proportion	Пропорция	Proporsiya
Ratio	Отношение	Nisbat
Rectangle	Прямоугольник	To'rtburchak
Root (of an equation)	Корень уравнения	Tenglamaning ildizi
Simplification	Упрощение	Soddalashtirish
Solution	Решение	Yechim
Square Root	Квадратный корень	Kvadrat ildiz
Sum	Сумма	Yig'indi
Triangle	Треугольник	Uchburchak
Triangular Number	Треугольное число	Uchburchak son
Variable	Переменная	O'zgaruvchi

Grade 8

1. Calculate:

$$4^{16} * 4^{26} : (4^3)^{13}$$

- A) 4
- B) 16
- C) 32
- D) 64
- E) 128

2. Factorize:

$$12ab^2 - 4a^2b^2$$

- A) $3ab^2(4 - a)$
- B) $4ab^2(3 - a)$
- C) $4ab(3b^2 - a)$
- D) $4a(3ab^2 - b^2)$
- E) $3b^2(4b - a)$

3. Simplify the expression:

$$3x(3x^2 + 1) - (x - 3)(x + 3) - 9(x^3 + 1)$$

- A) $-x^2 + 3x$
- B) $x^2 + 3x + 18$
- C) $x^2 + 3x$
- D) $-x^2 - 3x$
- E) $-x + 3$

4. For what value of x does the expression

$$\frac{x + 7}{x - 4}$$

become undefined?

- A) -7
- B) -4
- C) 0
- D) 4
- E) 7

5. Expand the expression:

$$(5a - 2)^2$$

- A) $25a^2 - 4$
- B) $25a^2 - 10a + 4$
- C) $5a^2 + 10a - 4$
- D) $25a^2 - 20a + 4$
- E) $5a^2 - 20a + 4$

6. Compute the value of:

$$\sqrt{900 \cdot 2.25}$$

- A) 450
- B) 4
- C) 0
- D) 45
- E) 4.5

7. Solve the equation:

$$x^2 + 7x + 8.$$

Indicate the larger root.

- A) 6
- B) 7
- C) 8
- D) 9
- E) 10

8. Between which two integers does $\sqrt{200}$ lie?

- A) 13 и 14
- B) 14 и 15
- C) 15 и 16
- D) 16 и 17
- E) 17 и 18

9. Find the x -coordinate of the intersection of the graph of

$$y = 3x + 12$$

with the x -axis

- A) -3
- B) -4
- C) -6
- D) 3
- E) 4

10. Simplify the fraction:

$$\frac{48x^6y^2}{40x^3y^4}$$

- A) $\frac{12y^2}{10x^3}$
- B) $\frac{24x^3}{20y^3}$
- C) $\frac{6x^3}{5y^2}$
- D) $\frac{12x^6}{10y^2}$
- E) $\frac{10y^3}{10x^3}$

11. The number a is five times greater than b , and $\text{GCD}(a, b) = 3$. Find the sum of a and b .

- A) 9
- B) 18
- C) 20
- D) 12
- E) 15

12. Compute the sum:

$$10.2 + 11.2 + 12.2 + \cdots + 99.2 + 100.2$$

- A) 5050
- B) 5013
- C) 1000
- D) 5023.2
- E) 5051.2

13. Choose a digit to replace $*$ so that the number $9*5*$ is divisible by both 9 and 2.

- A) 9252
- B) 9858
- C) 9454
- D) 9656
- E) 9050

14. For what value of x does the expression

$$x^2 + 2020x - 2020^2$$

attain its minimum value??

- A) $x = 0$
- B) $x = -2020$
- C) $x = 2020$
- D) $x = -1010$
- E) $x = 1010$

15. A turtle says: "I have lived 44 years, 44 months, 44 weeks, 44 days, and 44 hours."
How many full years has the turtle lived?

- A) 46
- B) 47
- C) 48
- D) 49
- E) 50

16. When writing all natural numbers in ascending order, skipping perfect squares, the sequence looks like:
2, 3, 5, 6, 7, 8, 10, 11,

What number appears at the 2020th position?

- A) 2064
- B) 2065
- C) 2066
- D) 2067
- E) 2068

17. Find the number of integer negative solutions for the inequality:

$$\frac{3x - 2}{21} - \frac{5x + 8}{14} > -3\frac{2}{3} - x$$

- A) 4
- B) 6
- C) 5
- D) 2
- E) 3

18. Compute the value of the expression:

$$\frac{2^{21} \cdot 27^3 + 15 \cdot 4^{10} \cdot 9^4}{6^9 \cdot 2^{10} + 12^{10}}$$

- A) 1
- B) 2
- C) 8
- D) 0.25
- E) 0.5

19. Find the four-digit number that is 83 times greater than the sum of its digits.

- A) 1494
- B) 9441
- C) 9411
- D) 8383
- E) 3838

20. In a math exam, the average score of students who prepared was 90 points, and the average score of those who did not prepare was 40 points.

If the overall class average was 85, what percentage of students prepared for the exam? (Scores are out of 100.)

- A) 96
- B) 94
- C) 100
- D) 80
- E) 90

21. Compute the product:

$$\left(1 + \frac{1}{2}\right)\left(1 + \frac{1}{3}\right)\left(1 + \frac{1}{4}\right) \dots \left(1 + \frac{1}{99}\right)$$

- A) 50
- B) $\frac{50}{100}$
- C) 100
- D) $\frac{99}{100}$
- E) $\frac{100}{101}$

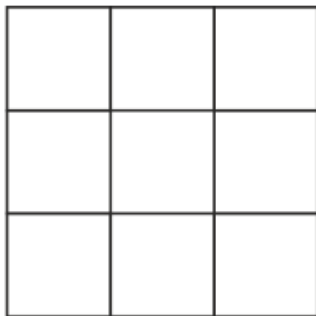
22. Find the last digit of the number

$$\underbrace{2 \cdot 2 \cdot \dots \cdot 2}_{2025 \text{ раз}} - 2021$$

- A) 1
- B) 2
- C) 3
- D) 4
- E) 5

23. The sum of the areas of all 14 squares in the diagram below is 136 cm^2 .

Find the total perimeter of these 14 squares.



- A) 144
- B) 148
- C) 152
- D) 156
- E) 160

24. Find the sum of the roots of the equation:

$$(x + 1)^{x^2 - 16} = 1$$

- A) 4
- B) 2
- C) -2
- D) -4
- E) 0

25. A date is called "good" if none of its digits repeat.

For example, April 23, 1789, is "good" because in 23/04/1789 all digits are unique, but February 6, 2017, is not because 0 and 2 are repeated in 06/02/2017.

How many such dates were there between 1900 and 1999?

- A) 365
- B) 50
- C) 300
- D) 360
- E) 60

26. Find all values of parameter a for which the equation:

$$x^2 - (2a + 1)x + a^2 - a = 0$$

has **exactly one root**.

- A) $a = 0$
- B) $a = -\frac{1}{2}$
- C) $a = 1$
- D) $a = \frac{1}{2}$
- E) $a = -\frac{1}{8}$

27. On graph paper, a trapezoid is given where the bases are 6 and 2, and the sides are 5 and 5. Find its area.

- A) $S = 4\sqrt{21}$
- B) $S = 2\sqrt{21} + 10$
- C) $S = \sqrt{21} + 5$
- D) $S = 2\sqrt{21}$
- E) $S = \sqrt{21}$

28. The numbers from 1 to 100 are written on the board.

Two players take turns erasing a number and then writing the sum of the two remaining numbers. The game ends when only one number remains. What is that number?

- A) 5000
- B) 5050
- C) 5100
- D) 5150
- E) 5200

29. A three-digit number N becomes 99 greater when its digits are reversed. Find N .

- A) 103
- B) 112
- C) 102
- D) 135
- E) 120

30. For what values of a and b does the inequality hold?

$$\frac{a^2 + b^2}{2} \geq \sqrt{ab}$$

- A) Always for any $a, b > 0$
- B) Only if $a = b$
- C) Only if $a > b$
- D) Never
- E) Only if a, b are integers