**Problem 1** **point 1**

If the difference of two integers is 43 and the difference of their squares is 43, then the bigger integer is

a) 19 b) 20 c) 22 d) 21

**Problem 2** **point 1**

If $n = 6 \cdot 17$, then which of the following is divisible by $n$?

a) 78 b) 85 c) 136 d) 204

**Problem 3** **3 points**

If $n_1 + n_2 + \cdots + n_k = 55$ and all $n_i$-s are distinct natural numbers, what is the greatest possible value of $k$?

a) 10 b) 12 c) 13 d) 9

**Problem 4** **1 point**

How many odd integers $n$ satisfy the condition $3 \leq n \leq 30$?

a) 14 b) 15 c) 16 d) 17

**Problem 5** **3 points**

How many positive 4-digit integers satisfy the following condition: the first digit (thousands, on the left) is even and the last digit (units, on the right) is odd?

a) 2000 b) 2500 c) 1500 d) 5000

**Problem 6** **1 point**

What is the slope of the line whose equation is $6x - 4y = 16$?

a) $\frac{2}{3}$ b) $-\frac{2}{3}$ c) $\frac{3}{2}$ d) $-\frac{3}{2}$

**Problem 7** **1 point**

What is the perimeter of the triangle $A, B, C$ whose vertices have coordinates $A = (9,12), \quad B = (1,6), \quad C = (9,0)$?

a) 32 b) 14 c) 22 d) 36

**Problem 8** **1 points**

Find the area of the quadrilateral $ABCD$ whose vertices have coordinates $A = (-4,0), \quad B = (0,4), \quad C = (4,0), \quad D = (0,-4)$.

a) 8 b) 16 c) 24 d) 32

**Problem 9** **1 point**

If a line passes through the points $(0,-5)$ and $(7,-7)$, then its slope is

a) $-\frac{2}{7}$ b) $-\frac{12}{7}$ c) $-\frac{7}{2}$ d) $\frac{2}{7}$

**Problem 10** **2 points**

Find the length of the diagonal of the rectangular $ABCD$ whose three vertices have coordinates

$$A=(-2,2), \quad B=(1,6), \quad C=(-2,6).$$

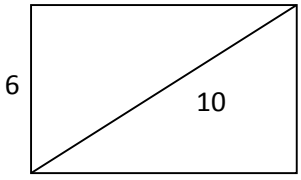
a) 8 b) 6 c) 10 d) 5

**Problem 11** **1 point**

A square is inscribed in a circle. If the area of the circle is $16\pi$, what is the perimeter of the square?

a) $8\sqrt{2}$ b) $16\sqrt{2}$ c) $32\sqrt{2}$ d) 16

**Problem 12** **point 1**




What is the area of the rectangle shown above?

a) 24 b) 64 c) 48 d) 38

**Problem 13** **1 point**

If the volume of a cub is 216, then the perimeter of the square base is

a) 9 b) 36 c) 28 d) 24

**Problem 14** **1 point**

How many diagonals has a pentagon?

a) 3 b) 5 c) 2 d) 10

**Problem 15** **3 points**

Consider the points A = (-1,0), B = (1,0), C = (1,1) in the plane. For how many different points D in this plane are A, B, C, D the vertices of a parallelogram?

a) Two b) Three c) Four d) Five

**Problem 16** **point 1**

If $8x + 5x + 2x + 4x = 114$, then $6x - 6 =$

a) 12 b) 24 c) 30 d) 47

**Problem 17** **point 1**

If $\sqrt{6} \leq x \leq \sqrt{36}$ and $x$ is an integer, then how many different values can $x$ have?

a) Three b) Four c) Five d) Six

**Problem 18** **1 point**

$(2^{10} - 2^9) : (2^8 - 2^7) =$

a) $2^4$ b) $2^3$ c) $2^1$ d) $2^2$

**Problem 19** **1 point**

Which of the following is NOT a solution of the inequality $3x - 3 > -5x + 13$?

a) 1.8 b) 2.5 c) 2.7 d) 3.0

**Problem 20** **2 points**

If $log_3 5 < n < log_3 65$ and $n$ is an integer, then how many different values can $n$ have?

a) One b) Two c) Three d) Four

**Problem 21** **2 points**

If $F(1) = 60$ and $F(n) = F(n-1) - 1$ for all integers $n > 1$, then F(21) =

a) 42 b) 41 c) 39 d) 40

**Problem 22** **point 1**

The price of certain good increased by $8, then decreased by $15, and increased by $9. If the price before the changes was x, which of the following is the price after the changes?

a) x – 4 b) x - 2 c) x + 2 d) x + 4

**Problem 23** **2 points**

If $n$ is the product of three different positive prime numbers, how many different positive divisors does $n$ have, excluding 1 and n?

a) 3 b) 5 c) 8 d) 6

**Problem 24** **1 point**

Which set can represent the lengths of the sides of a triangle?

a) {3,4,8} b) {3,4,7} c) {3,4,5} d) {3,4,1}

**Problem 25** **3 points**

In a class of 42 students, 30 are taking a mathematics course and 26 are taking a physics course. How many students are taking both courses if it is known that each student attends at last one of these courses ?

a) 3 b) 56 c) 11 d) 14

**Problem 26** **2 points**

What percent of integers between 10 and 99, inclusive, have different digits?

a) 90% b) 80% c) 99% d) 81%

**Problem 27** **1 point**

Which of the following is equal to one half of 0.01 percent?

a) 0.00005 b) 0.000005 c) 0.0005 d) 0.0025

**Problem 28** **1 point**

If 14 percent of an amount of money is $420, then 20 percent of the same amount is

a) 448 b) 294 c) 600 d) 800

**Problem 29** **2 points**

If x is 25 percent more than *y*, then *y* is what percent less than *x*?

a) 10% b) 20% c) 15% d) $12\frac{1}{2}\%$

**Problem 30** **2 points**

If x is 20 percent less than *y*, then *y* is what percent more than *x*?

a) 20% b) 25% c) 40% d) 50%

**Problem 31** **2 points**

One integer is randomly selected from the integers from 11 to 30, inclusive. What is the probability that the selected integer will be even or divisible by 3?

a) 0.65 b) 0.3 c) 0.6 d) 0.5

**Problem 32** **2 points**

There is a sequence consisting of 15 numbers. The average (arithmetic mean) of first 10 numbers is 75, and the average of last 5 numbers is 30. What is the average of all 15 numbers?

a) 60 b) 100 c) $\frac{100}{15}$ d) 75

**Problem 33** **1 point**

For which of the following lists of numbers is the median bigger than the average (arithmetic mean)?

a) 4,4,7 b) 5,1,2,7,6 c) 10,11,1,2,3 d) 7,9,1,5,3

**Problem 34** **1 point**

If $4a + 4b = 14$ and $2c + 2d = 10$, then the average (arithmetic mean) of $a$, $b$, $c$, and $d$ is

a) 1.5 b) 2.125 c) 3 d) 4.25

**Problem 35** **3 points**

The average (arithmetic mean) of $m$ numbers is $X$, and the average of $n$ numbers is $Y$. What is average of all $(m+n)$ numbers?

a) $\frac{x+y}{2}$ b) $x+y$ c) $\frac{X+Y}{m+n}$ d) $\frac{m \cdot X + n \cdot Y}{m+n}$

**Problem 36** **1 point**

Which of the following CANNOT be the product of two integers that have a sum of 6?

a) 0 b) -16 c) 8 d) -8

**Problem 37** **1 point**

If n > 0 , which of the following MUST be true?

a) $n^2 > 1$ b) $n - n^2 < 0$ c) $2n^3 > 0$ d) $2n - 1 > 0$

**Problem 38** **1 point**

If $n$ is a number, which of the following must be true for any $n$?

a) $n > \frac{1}{n}$ b) $n^2 > n$ c) $\sqrt{n^2} = |n|$ d) $\sqrt{n^2} = n$

**Problem 39** **2 points**

If F and G are integers, with F < G, which of the following must be true?

a) $F^2 < G^2$ b) $F^3 < G^3$ c) $|F| < G$ d) $|F| < |G|$

**Problem 40** **2 points**

The sum of the integers from 51 to 100 is 3 775. What is the sum of the integers from 101 to 150?

a) 7 550 b) 5 250 c) 6 275 d) 6 050