
Problem 1**1 point**

$$0.25 \cdot 10^7 =$$

- a) 2 500 000 b) 25 00 000 c) 250 000 d) 250 000 000

Problem 2**1 point**

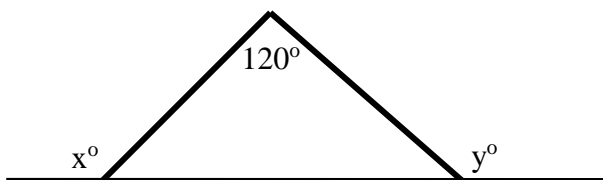
$2x^2 = y$, x is a natural number. Then

- a) $x > y$ b) $y > x$ c) $x = y$ d) can't tell

Problem 3**1 point**

If $y^{-2} + 2y^{-1} - 15 = 0$, which of the following could be the value of y ?

- a) $\frac{1}{3}$ b) $\frac{1}{5}$ c) -5 d) $-\frac{1}{3}$

Problem 4**1 point**

$$x + y =$$

- a) 220 b) 250 c) 300 d) 320

Problem 5

1 point

In the xy -plane, points R and S have coordinates $(-1,1)$ and $(5,-7)$, respectively. If the point P is the midpoint of line segment RS, what are the coordinates of point P?

- a) $(3,-3)$ b) $(1,-4)$ c) $(2,-4)$ d) $(2,-3)$

Problem 6

1 point

If 25 percent of an amount of money is \$500, then 30 percent of the same amount is

- a) 100 b) 750 c) 600 d) 1200

Problem 7

1 point

How many integers from 2 to 30, inclusive, are odd?

- a) 13 b) 15 c) 17 d) 14

Problem 8

1 point

If the lengths of two sides of a triangle are 4 and 10 respectively, which of the following could be the length of the third side of the triangle?

- a) 3 b) 13 c) 15 d) 5

Problem 9

1 point

If the vertices of a triangle have coordinates (1,2), (1,8), and (9,8), then the perimeter of the triangle is

- a) 24 b) 14 c) 10 d) 36

Problem 10

1 point

If $3a + 3b = 12$ and $2c + 2d = 16$, then the average (arithmetic mean) of a , b , c , and d is

- a) 2 b) 3 c) 4 d) 5

Problem 11

1 point

If $0 < xy < 1$, then which of the following CAN NOT be true?

- a) $x < -1$ and $y < -1$ b) $x < 1$ and $y > 0$ c) $x > 1$ and $y < 1$ d) $x > -1$ and $y < -1$

Problem 12

1 point

If $\log_2(5) < x < \log_2(65)$ and x is an integer, then x can have how many different values?

- a) Three b) Eight c) Five d) Four

Problem 13

1 point

If $a^2 - 2ab + b^2 = 16$ then $(a - b)^3$ can be

- a) 4 b) -16 c) -64 d) 48

Problem 14**1 point**

Which of the following is true for an arbitrary real number x ?

a) $x > \frac{1}{x}$

b) $\sqrt{x^2} = |x|$

c) $x^2 > x$

d) $\sqrt{x^2} = x$

Problem 15**Point 1**

The average (arithmetic mean) of a set of six numbers is 28. If certain two numbers are removed from the set, the average of the remaining numbers in the set is 20. Find the average of two removed numbers.

a) 24

b) 36

c) 44

d) 48

Problem 16**1 point**

If the sum of 5 consecutive integers is 60, what is the sum of the least and greatest of these 5 integers?

a) 14

b) 10

c) 24

d) 18

Problem 17**1 point**

In the rectangular coordinate plane, point A has coordinates $(-4, -4)$, point B has coordinates $(4, -4)$, point C has coordinates $(2, 2)$, and point D has coordinates $(-2, 2)$. What is the area of $ABCD$?

a) 48

b) 36

c) 24

d) 64

Problem 18

Point 1

A is 20 years older than B. Five years ago A was 3 times as old as B. What is A's present age?

- a) 33 b) 30 c) 25 d) 35

Problem 19

1 point

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

- a) 90% b) 60% c) 10% d) 1%

Problem 20

point 1

In arithmetic progression $a_1, a_2, a_3, \dots, a_n, \dots$ is given $a_1 + a_3 + a_5 + a_7 = 32$.
Find $a_2 + a_6$.

- a) 9 b) 36 c) 18 d) 16

Problem 21

Point 1

The number of degrees that the hour hand of a clock moves through between noon (that is 12:00) and 2:30 in the afternoon of the same day is

- a) 720 b) 180 c) 75 d) 60

Problem 22

Point 1

The distance from town A to town B is three miles. C is five miles from B . Which of the following CAN NOT be the distance from A to C ?

- a) 1 b) 7 c) 6 d) 2

Problem 23**1 point**

If x and y satisfy the system of equations $\begin{cases} 2x + 6y = 9 \\ 6x + 2y = 7 \end{cases}$, what is the value of $x + y$?

a) $\frac{3}{2}$

b) 2

c) $\frac{2}{3}$

d) 4

Problem 24**1 point**

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

a) $8\sqrt{2}$

b) 16

c) $32\sqrt{2}$

d) $16\sqrt{2}$

Problem 25**1 point**

How many diagonals has a pentagon?

a) 5

b) 4

c) 6

d) 10

Problem 26**2 points**

Suppose 500 students study in ISE, 200 boys and 300 girls. One hundred of them are masters and others bachelors. Among bachelors there are 270 girls. How many masters are among boys?

a) 40

b) 70

c) 60

d) 50

Problem 27

2 points

What is the area enclosed by the points (1,3), (2,5) and (3,7)?

- a) 5 b) 4.5 c) 3 d) 0

Problem 28

2 points

If $0 < xy < 1$, then which of the following CAN be true?

- a) $x < -1$ and $y > 0$ b) $x > 1$ and $y > 1$ c) $x > -1$ and $y < -1$ d) $x < -1$ and $y < -1$

Problem 29

2 point

How many 3-digit integers, greater than 100 are there in which the sum of the digits equals 4?

- a) Ten b) Eight c) Six d) Nine

Problem 30

2 points

How many integers from 1 to 100 are divisible by 6 but not by 4?

- a) 10 b) 8 c) 12 d) 6

Problem 31**2 points**

If x is 80% of y , then what percent of x is y ?

- a) 60% b) 120% c) 125% d) 150.5%

Problem 32**2 points**

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

- a) $\frac{m \cdot A + n \cdot B}{m+n}$ b) $A + B$ c) $\frac{A+B}{m+n}$ d) $\frac{m \cdot A + n \cdot B}{2}$

Problem 33**2 points**

$$\begin{array}{r} 8 \ A \\ + \\ \hline D \ 6 \ 3 \end{array}$$

In the following correctly worked addition sum, A , B , C and D represent different digits, and all the digits in the sum are different. What is the sum of A , B , C and D ?

- a) 22 b) 14 c) 18 d) 21

Problem 34**2 points**

What digit appears in the units place in the number 2^{122} ?

- a) 2 b) 4 c) 6 d) 8

Problem 35

2 points

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

- a) 3 b) 5 c) 8 d) 9

Problem 36

3 points

What is the probability that the randomly selected one integer from the set $1, 2, \dots, 98, 99, 100$ will be a perfect square or a perfect cube?

- a) 0.12 b) 0.14 c) 0.13 d) 0.1

Problem 37

3 points

In a class of 45 students, 30 are taking a mathematics course and 26 are taking a physics course. If 14 of these students are taking both courses, how many students are NOT taking either of these courses?

- a) 14 b) 4 c) 11 d) 3

Problem 38

3 points

The distance between two parallel lines a and b is 20 units. Point C is on the line a . How many points have equal distances from lines a and b and 10 units distance from the point C ?

- a) 2 b) 1 c) 4 d) infinitely many

Problem 39**3 points**

The expression $\frac{a+b+|b-a|}{2}$ equals to

a) $|a| + |b|$

b) the minimum
between a and b c) the maximum
between a and b

d) $\frac{|a|+|b|}{2}$

Problem 40**3 points**

Suppose $51 + 52 + \cdots + 99 + 100 = X$. Then the sum $101 + 102 + \cdots + 149 + 150$ will be

a) $2X+2500$

b) $X+5000$

c) $2X$

d) $X + 2500$