

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

If the product of 6 integers is negative, at most how many of the integers can be negative?

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

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

If  $\frac{x}{y}$  is an integer, which of the following statements is always true?

- a) both  $x$  and  $y$  are integers              b) either  $x$  or  $y$  is negative              c)  $x = ny$  where  $n$  is an integer              d)  $\frac{y}{x}$  is an integer

**Problem 3****1 point**

If  $(x-1)^4 = (x-2)^4$ , then  $x =$

- a)  $\frac{-5}{8}$                       b)  $\frac{3}{2}$                       c)  $\frac{4}{2}$                       d)  $\frac{2}{3}$

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

Which of the following is NOT a solution of the inequality  $x^2 > 3x - 2$ ?

- a) 0.3                      b) 2.5                      c) 2.7                      d) 1.8

**Problem 5****1 point**

6 people meet for a business lunch. Each person shakes hands once with each other person present. How many handshakes take place?

- a) 30                      b) 21                      c) 18                      d) 15

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

$$(\sqrt{2} - \sqrt{3})^2 =$$

- a)  $5 - 2\sqrt{6}$                       b)  $5 - \sqrt{6}$                       c)  $1 - 2\sqrt{6}$                       d)  $1 - \sqrt{2}$

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

$$2^{30} + 2^{30} + 2^{30} + 2^{30} =$$

a)  $8^{30}$

b)  $2^{32}$

c)  $2^{30}$

d)  $2^{26}$

**Problem 8****1 point**

$$3 \cdot 10^4 + 2 \cdot 10^2 + 4 \cdot 10 =$$

a) 302400

b) 3240

c) 3240

d) 30240

**Problem 9****1 point** $\sqrt{5}$  percent of  $5\sqrt{5}$  is

a) 0.05

b) 0.25

c) 0.5

d) 2.5

**Problem 10****1 point**

If the steps below are followed in order, what would be the resulting expression?

- (1) add  $5y$  to  $2x$
- (2) multiply the sum by 3
- (3) subtract  $x + y$  from the product

- a)  $5x + 16y$                       b)  $5x + 14y$                       c)  $5x + 5y$                       d)  $3x + 12y$

**Problem 11****3 points**

Suppose  $x < x^3 < x^2$ . Which of the following COULD be a value for  $x$ ?

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

**Problem 12****1 points**

$(3x + 2)(2x - 5) = ax^2 + kx + n$ . What is the value of  $a - k + n$ ?

- a) 5    b) 9    c) 11    d) 7

**Problem 13****2 points**

$(3x + 2)(2x - 5) = ax^2 + kx + n$ . What is the value of  $a - n + k$ ?

- a) 5                      b) 9                      c) 7                      d) 11

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

If  $x^2 - y^2 = 55$  and  $x - y = 11$ , then  $y =$

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

**Problem 15****1 point**

$x$  and  $y$  are integers.  $x + y < 11$ , and  $x > 6$ . What is the smallest possible value of  $x - y$ ?

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

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

If  $x$  and  $y$  are integers, and  $3x + 2y = 13$ , which of the following CAN be the value of  $y$ ?

- a) 2                                  b) 1                                  c) 3                                  d) 0

**Problem 17****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)  $2n - 1 > 0$

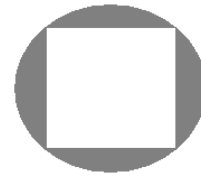
**Problem 18****1 point**

$3x + y = 19$ , and  $x + 3y = 1$ . Find the value of  $2x + 2y$

- a) 18                                  b) 11                                  c) 5                                  d) 10

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

In the accompanying diagram, a square is inscribed in a circle with radius 4. What is the area of the shaded region?

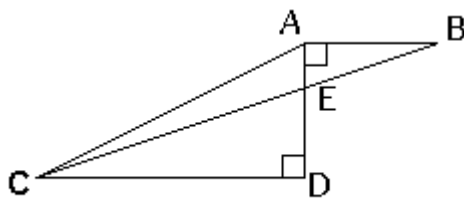


a)  $16\pi - 32$

b)  $16\pi - 16$

c)  $64\pi - 8$

d)  $16\pi$

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

In the figure above  $AD = 4$ ,  $AB = 3$  and  $CD = 9$ . What is the area of triangle AEC ?

a) 13.5

b) 9

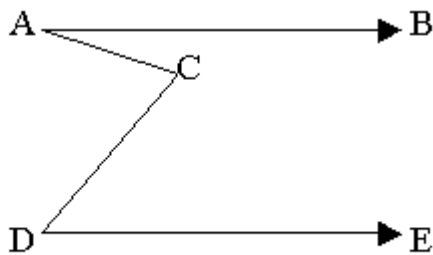
c) 4.5

d) 3

**Problem 21****1 point**

A rectangle with sides 3 and 4 is inscribed in circle. What is the circumference of the circle?

- a)  $3\pi$                       b)  $5\pi$                       c)  $4\pi$                       d)  $10\pi$

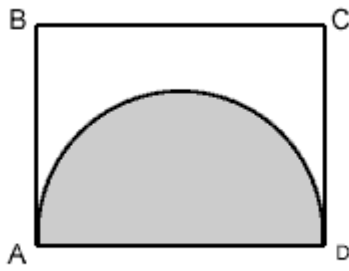
**Problem 22****1 point**

*(figure not to scale)*

AB and DE are parallel. Angle  $BAC = 30^\circ$ , angle  $CDE = 50^\circ$ . What is the measure of angle  $ACD$  ?

- a) cannot be determined from the information      b) 70                      c) 80                      d) 90

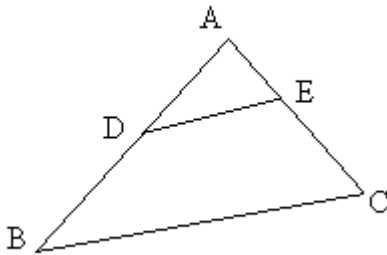


**Problem 23****2 point**

(figure not to scale)

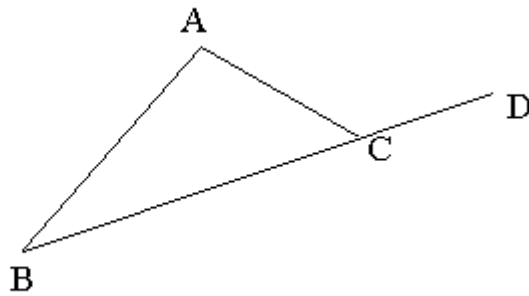
Rectangle ABCD has a perimeter of 26. The half circle with diameter AD has an area of  $8\pi$ . What is the perimeter of the part of the figure that is not shaded?

- a)  $18 + 4\pi$                       b)  $18 + 8\pi$                       c)  $14 + 4\pi$                       d)  $14 + 2\pi$

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

In triangle ABC,  $AD = DB$ ,  $DE$  is parallel to  $BC$ , and the area of triangle ABC is 40. What is the area of triangle ADE?

- a) 10                      b) 15                      c) 20                      d) it cannot be determined from the information given

**Problem 25****1 point***(figure not to scale)*

BCD is a line segment and Angle  $BCA = \frac{1}{4}$  Angle  $CAB$  ; Angle  $ACD = ?$

- a) 100                      b) 120                      c) it cannot be determined from the information given                      d) 60

**Problem 26****3 points**

Courier charges for packages to a certain destination are 65 cents for the first 250 grams and 10 cents for each additional 100 grams or part thereof. What COULD BE the weight in grams of a package for which the charge is \$1.55 ?

- a) 1155                      b) 1145                      c) 1040                      d) 950

**Problem 27****2 points**

A	B
2	5
3	10
4	17
5	26

Which of the following describes the relationship between A and B as shown in the pairs of numbers in the table above?

a)  $B = A + 4$

b)  $B = 2A + 1$

c)  $B = 3A - 1$

d)  $B = A^2 + 1$

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

For how many integer values of  $n$  will the value of the expression  $4n + 7$  be an integer greater than 1 and less than 200?

a) 48

b) 49

c) 50

d) 51

**Problem 29****3 points**

$n$  and  $p$  are integers greater than 1, while  $5n$  is the square of some integer and  $75np$  is the cube of some other integer. The smallest value for  $n + p$  is

- a) 14                      b) 18                      c) 20                      d) 30

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

$$\begin{array}{r}
 5 \ A \\
 + \\
 \phantom{5} \ B \ C \\
 \hline
 D \ 4 \ 3
 \end{array}$$

A, B, C and D represent different digits, and all the digits in the above sum are different. What is  $A + B + C + D$ ?

- a) 23                      b) 22                      c) 18                      d) 16

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

In a class of 78 students 41 are taking French, 22 are taking German. Of the students taking French or German, 9 are taking both courses. How many students are not enrolled in either course?

- a) 6                                      b) 15                                      c) 24                                      d) 33

**Problem 32****3 points**

In a sports club with 30 members, 17 play badminton and 19 play tennis and 2 do not play either. How many members play both badminton and tennis?

- a) 7                                      b) 8                                      c) 10                                      d) 11

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

$\clubsuit n$  denotes the number obtained when  $n$  is rounded to the nearest tenth. For example  $\clubsuit 4.31 = 4.3$ .  
Then  $\clubsuit 0.089 - \clubsuit 1.135 =$

- a) 1.05                                      b) 1.04                                      c) -1.05                                      d) -1.0

**Problem 34****2 points**

If  $y \boxtimes x = y^{2^x}$  for all positive integers, then  $(3 \boxtimes 4) \boxtimes 2 =$

- a)  $3^{16}$                       b)  $3^{32}$                       c)  $2^{32}$                       d)  $3^{24}$

**Problem 35****2 points**

If the operation  $x * y$  is defined by  $x * y = (x + y)^2 - (x - y)^2$ , then  $\sqrt{5} * \sqrt{5} =$

- a) 5                              b) 15                              c) 20                              d) 10

**Problem 36****3 points**

If  $n = pqrs$ , where  $p, q, r$  and  $s$  are four different positive prime numbers, how many different positive divisors does  $n$  have, including 1 and  $n$ ?

- a) 9                              b) 12                              c) 8                              d) 16

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

Student solves problems 74 to 125 inclusive in a Math exercise. How many problems does he solve?

- a) 53                      b) 52                      c) 51                      d) 50

**Problem 38****2 points**

If  $p$  and  $q$  are positive integers and  $q > p$ , how many integers are larger than  $2p$  and smaller than  $p+q+1$ ?

- a)  $q-2p$                       b)  $q-p+1$                       c)  $q-p$                       d)  $q-p-1$

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

The first term in a sequence is 1 and the second term is 5. From the third term on each term is the average (arithmetic mean) of all preceding terms. What is the 25th term in the sequence?

- a) 3                      b) 5                      c) 2.5                      d) 25

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**Problem 40****1 point**

Which of the following CANNOT be the product of two integers that have a sum of 5?

- a) 0                      b) -14                      c) 6                      d) -4