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

If  $\frac{5^{-1} \cdot 5^5}{5^4} = 5^y$ , which is the value of  $y$ ?

a) 0

b) 1

c) 2

d) 3

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

If pencils cost \$0.25 each, at most how many pencils can be purchased for  $n$  dollars, where  $n$  is an integer?

a)  $\frac{n}{25}$ b)  $\frac{n}{4}$ c)  $4n$ d)  $\frac{25n}{4}$ 

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

If  $x$  increased by 50 percent is equal to 20, then  $x =$

a)  $\frac{40}{3}$ b)  $\frac{20}{3}$ 

c) 10

d)  $\frac{3}{4}$

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

If  $x=2y$  and  $y=2z/3$ , what is the value of  $z$  in terms of  $x$ ?

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

b)  $\frac{3x}{4}$

c)  $\frac{4x}{3}$

d)  $\frac{3x}{2}$

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

If  $x$  is positive and  $6-x^2 = \frac{15}{16}$ , then  $\sqrt{x} =$

a)  $\frac{81}{6}$

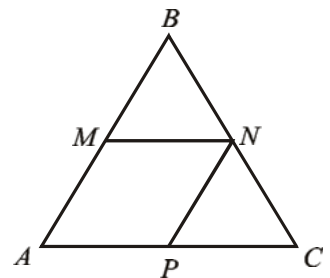
b)  $\frac{9}{10}$

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

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

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

In the figure M, N, P are midpoints ( $AP=PC$ ,  $CN=NB$ ,  $AM=MB$ ) on the respective sides of equilateral triangle ABC ( $AB=BC=AC$ ). If the perimeter of triangle ABC is 24, what is the perimeter of parallelogram AMNPQ?



a) 16

b) 32

c) 48

d) 64

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**Problem 7****1 point**If  $3x=(x-2)(x+2)$ , then  $x$  could be

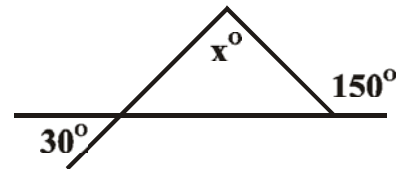
a) 2

b) 1

c) -1

d) -4

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**Problem 8****1 point**In the figure right,  $x=$ 

a) 30

b) 80

c) 120

d) 130

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**Problem 9****1 point**If the vertices of a triangle have rectangular coordinates  $(0,0)$ ,  $(8,0)$ , and  $(8,6)$ , respectively, then the perimeter of the triangle is

a) 10

b) 14

c) 24

d) 36

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

Which of the following sums is greater than 1?

a)  $\frac{1}{2} + \frac{1}{3}$

b)  $\frac{7}{8} + \frac{3}{30}$

c)  $\frac{15}{16} + \frac{2}{40}$

d)  $\frac{35}{102} + \frac{2}{3}$

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**Problem 11****1 point**If  $x=a^5$  and  $y=a^6$ ,  $a \neq 0$ , which of the following is equivalent to  $a^{13}$ ?

a)  $xy$

b)  $x^2y$

c)  $x^3/y$

d)  $y^3/x$

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**Problem 12****1 point**If  $\sqrt{7} < x < \sqrt{37}$  and  $x$  is an integer, then  $x$  can have how many different values?

a) Three

b) Four

c) Five

d) Eight

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

The average (arithmetic mean) of five numbers is 88. Four of the numbers are 92, 89, 91, 84. What is the fifth number?

- a) 82                      b) 84                      c) 86                      d) 89

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

The measure of two angles of a parallelogram differ by 52 degrees. The number of degrees in the smaller angle is

- a) 38                      b) 52                      c) 64                      d) 76

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

For every positive integer  $n$  greater than 1,  $n!$  ( $n$  factorial) is defined as the product of the first  $n$  positive integers. For example,  $4! = 1 \cdot 2 \cdot 3 \cdot 4 = 24$ .

What is the value of  $\frac{12!}{10!}$ ?

- a) 2                      b) 66                      c) 121                      d) 132

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

Which of the following numbers is greatest?

a)  $-0.125$

b)  $-0.0125$

c)  $-0.223$

d)  $-0.0225$

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**Problem 17****1 point**If  $(x - 1)^2 = (x - 2)^2$ , then  $x =$ 

a)  $-\frac{5}{8}$

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

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

d)  $\frac{5}{2}$

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**Problem 18****1 point**If  $m$  is an integer, for what value of  $m$  is  $3^m < 100 < 3^{m+1}$ ?

a) 1

b) 2

c) 3

d) 4



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**Problem 22****2 points**

If  $x$  is the sum of seven consecutive odd integers beginning with 3 and  $y$  is the sum of seven consecutive odd integers beginning with 5, then  $y-x$  equals

- a) 7                      b) 8                      c) 12                      d) 14

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

If  $x$  is  $11\frac{1}{9}$  percent more than  $y$ , then  $y$  is what percent less than  $x$ ?

- a) 9%                      b) 10%                      c)  $11\frac{1}{9}\%$                       d)  $12\frac{1}{2}\%$

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**Problem 24****2 points**

The vertices of square  $S$  have coordinates  $(-1,-2)$ ,  $(-1,1)$ ,  $(2,1)$ , and  $(2,-2)$ , respectively. What are the coordinates of the point where the diagonals of  $S$  intersect?

- a)  $\left(\frac{1}{2}, \frac{1}{2}\right)$                       b)  $\left(\frac{1}{2}, -\frac{1}{2}\right)$                       c)  $\left(\frac{3}{2}, \frac{1}{2}\right)$                       d)  $\left(-\frac{1}{2}, \frac{1}{2}\right)$

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**Problem 25****2 points**

Which of the following numbers is NOT the sum of three consecutive odd integers?

- a) 75                      b) 123                      c) 297                      d) 313

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

Which of the following pairs of numbers has an average (arithmetic mean) of 2?

- a)  $2 - \sqrt{2}$  and  $4 - \sqrt{2}$       b)  $\frac{1}{0.5}$  and  $\frac{2.4}{1.6}$       c)  $\sqrt{5}$  and  $\sqrt{3}$       d)  $\frac{3}{2}$  and  $\frac{5}{2}$

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

If  $x$  is 1, 2, or 3 and  $y$  is either 2 or 4, then the product  $xy$  can have how many different possible values?

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

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**Problem 28****2 points**

If the radius of a circular region were decreased by 20 percent, the area of the circular region would decrease by what percent?

- a) 16%                      b) 20%                      c) 36%                      d) 44%

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

If  $n^3$  is 180 greater than  $n^2$ , then  $n =$

- a) 9                      b) 8                      c) 7                      d) 6

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

What percent of integers between 200 and 999, inclusive, end with digits "03"?

- a) 1%                      b) 2%                      c) 3%                      d) 4%

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

If  $p$  and  $r$  are prime numbers, which of the following must also be prime?

- a)  $p + r$                       b)  $pr + 1$                       c)  $p^2 + r^2$                       d) none of above

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

The average (arithmetic mean) number of students in 3 economics classes at a certain college is 24. If the total number of students in 2 of the classes combined is 38, how many students are in the remaining class?

- a) 19                      b) 24                      c) 31                      d) 34

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**Problem 33****2 points**

The five numbers are ordered from least to greatest  $3 < 7 < 9 < 14 < x$ . If the average (arithmetic mean) is 2 greater than the median, what is the value of  $x$ ?

- a) 22                      b) 20                      c) 17                      d) 16

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

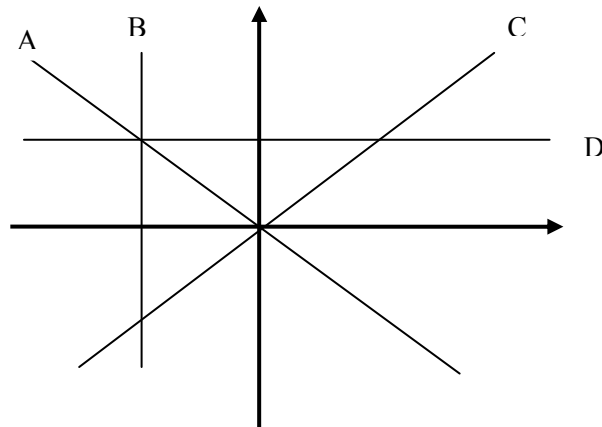
If  $\frac{5^4 - 1}{n}$  is an integer and  $n$  is an integer, then  $n$  could be each of the following EXCEPT

- a) 6                      b) 13                      c) 25                      d) 26

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

For what point  $(x,y)$  on the graph of  $y=0.5x-1$  does the  $x$  - coordinate equal the  $y$  -coordinate?

- a)  $(-2,-2)$               b)  $\left(\frac{1}{2}, \frac{1}{2}\right)$               c)  $\left(1, -\frac{1}{2}\right)$               d)  $(2,2)$

**Problem 36****2 points**

Which of the lines A, B, C, D in the figure above contains only points  $(x, y)$  with  $x=y$ ?

- a) A                      b) B                      c) C                      d) D

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**Problem 37****2 points**

What is the least (smallest) integer value of  $n$  such that  $\frac{1}{2^n} < 0.001$ ?

- a) 10                      b) 11                      c) 500                      d) there is no such least value.

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

If  $a$ ,  $b$ ,  $c$ , and  $d$  are consecutive integers such that  $a < b < c < d$ , then in terms of  $a$ , the sum  $a + b + d =$

- a)  $a + 4$                       b)  $2a + 3$                       c)  $3a + 3$                       d)  $3a + 4$

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

In a rectangular coordinate system, the set of all points  $(x, y)$  such that  $-2 < x < 2$  and  $-2 < y < 2$  is

- a) two perpendicular line segments      b) two parallel line segments      c) a square region      d) a triangular region

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

If  $x + y = x$ , what is the value of  $y$ ?

- a) -1                      b) 0                      c) 2                      d) It cannot be determined from the information given.