

## KMF Math Sprint Practice - Section 3 Research

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Question: 1

The width of rectangle A is 9, and its area is 90.

The length of rectangle B is 12, and its area is 120.

**Quantity A**

The length of rectangle A

**Quantity B**

The width of rectangle B

- ☐ Quantity A is greater.
- ☐ Quantity B is greater.
- ☐ The two quantities are equal.
- ☐ The relationship cannot be determined from the information given.

Question: 2

$$\frac{6}{1.8} = \frac{z}{0.9}$$

**Quantity A**

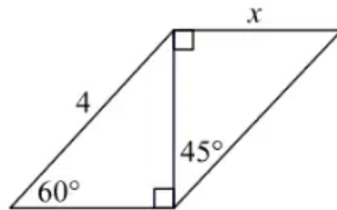
$z$

**Quantity B**

3.8

- ☐ Quantity A is greater.
- ☐ Quantity B is greater.
- ☐ The two quantities are equal.
- ☐ The relationship cannot be determined from the information given.

Question: 3



**Quantity A**

$x$

**Quantity B**

4

- ☐ Quantity A is greater.
- ☐ Quantity B is greater.
- ☐ The two quantities are equal.
- ☐ The relationship cannot be determined from the information given.

Question: 4

$$-1 \leq x \leq 1 \text{ and } -1 \leq y \leq 1$$

**Quantity A**

$$(x + y)^2$$

**Quantity B**

$$xy^2$$

- ☐ Quantity A is greater.
- ☐ Quantity B is greater.
- ☐ The two quantities are equal.
- ☐ The relationship cannot be determined from the information given.

Question: 5

The area of a certain floor is 150 square feet. (1 yard=3 feet)

**Quantity A**

The area of the floor, in square yards

**Quantity B**

30

- ☐ Quantity A is greater.
- ☐ Quantity B is greater.
- ☐ The two quantities are equal.
- ☐ The relationship cannot be determined from the information given.

Question: 6

List K consists of 20 consecutive odd integers, list L consists of 20 consecutive even integers, and list M consists of 20 consecutive multiples of 3. The least integer in L is 9 greater than the greatest integer in K, and the greatest integer in L is 10 greater than the least integer in M.

**Quantity A**

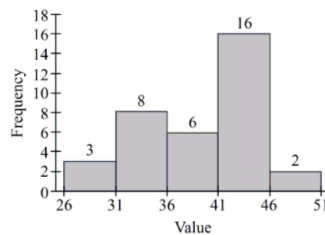
The range of the integers in K and L combined

**Quantity B**

The range of the integers in L and M combined

- ☐ Quantity A is greater.
- ☐ Quantity B is greater.
- ☐ The two quantities are equal.
- ☐ The relationship cannot be determined from the information given.

Question: 7



Data set D consists of 35 values, all of which are integers. The frequency distribution of the values in D is shown in the histogram, where each interval shown contains values that are greater than or equal to the left endpoint but less than the right endpoint.

**Quantity A**

The average (arithmetic mean) of the values in D

**Quantity B**

The median of the values in D

- ☐ Quantity A is greater.
- ☐ Quantity B is greater.
- ☐ The two quantities are equal.
- ☐ The relationship cannot be determined from the information given.

Question: 8

Jayden, Kenny and Laina are paid hourly wages at their jobs. Jayden's hourly wage is between \$8.00 and \$9.00, Kenny's hourly wage is \$5.00 less than 2 times Jayden's hourly wage, and Laina's hourly wage is \$1.00 more than Jayden's hourly wage. Which of the following shows Jayden, Kenny, and Laina listed in order according to their hourly wages, from least to greatest?

- ☐ Jayden, Kenny, Laina
- ☐ Jayden, Laina, Kenny
- ☐ Kenny, Jayden, Laina
- ☐ Kenny, Laina, Jayden
- ☐ Laina, Kenny, Jayden

Question: 9

An isosceles triangle has sides of length  $x$ ,  $2x$  and  $2x$ . If the area of the triangle is  $25\sqrt{15}$ , what is the value of  $x$ ?

- ☐  $\sqrt{15}$
- ☐  $2\sqrt{15}$
- ☐  $10\sqrt{15}$
- ☐ 5
- ☐ 10

Question: 10

If  $a$ ,  $b$  and  $c$  are integers such that  $0 < a < b < c < 2a$ , what is the greatest common factor of  $84^a$ ,  $126^b$ , and  $98^c$ ?

☐  $(2^a)(7^a)$

☐  $(2^b)(7^a)$

☐  $(2^b)(7^c)$

☐  $(2^a)(3^a)(7^a)$

☐  $(2^b)(3^b)(7^a)$

Question: 11

Let  $n$  be an integer greater than 30. When  $n$  is divided by 12, the remainder is 11. What is the remainder when  $(6n+1)$  is divided by 9?

☐ 0

☐ 1

☐ 3

☐ 4

☐ 7

Question: 12

$a_1, a_2, a_3, \dots, a_{150}$

The  $n_{th}$  term of the sequence shown is defined for each integer  $n$  from 1 to 150 as follows. If  $n$  is odd, then  $a_n = \frac{(n+1)}{2}$ , and if  $n$  is even, then  $a_n = (a_{n-1})^2$ . How many integers appear in the sequence twice?

☐ 8

☐ 9

☐ 10

☐ 11

☐ 12

Question: 13

Temperature  $C$  in degree Celsius and the corresponding temperature  $F$  in degrees Fahrenheit are related by the equation  $F = \frac{9}{5}C + 32$ . At a certain time at a weather station, the temperature in degrees Fahrenheit was equal to  $\frac{1}{5}$  of the temperature in degrees Celsius. What was the temperature in degrees Fahrenheit?

\_\_\_\_\_°F

Question: 14

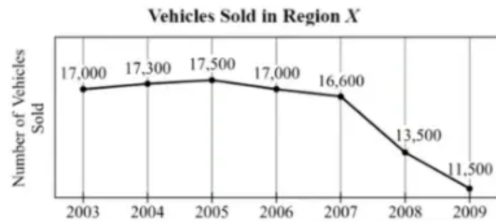


The total number of vehicles sold in Region X by companies other than A, B, C and D in 2009 was approximately how much less than that in 2006?

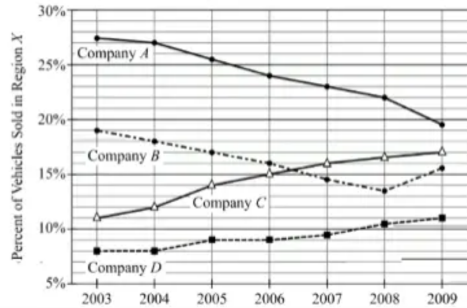
- ☐ 930
- ☐ 1380
- ☐ 1870
- ☐ 3640
- ☐ 5500

Question: 15

**Annual Vehicle Sales Data for Region X, 2003–2009**



**Market Share for Four Companies that Sold Vehicles in Region X**



For which of the last five years shown was the difference between the annual number of vehicles sold by Company C and the annual number of vehicles sold by Company D least?

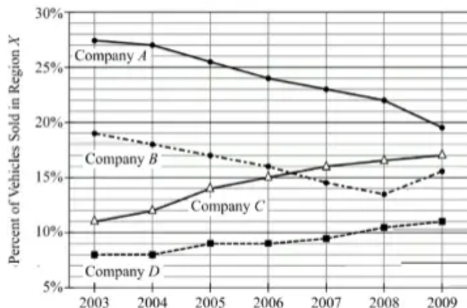
- ☐ 2005
- ☐ 2006
- ☐ 2007
- ☐ 2008
- ☐ 2009

Question: 16

**Annual Vehicle Sales Data for Region X, 2003–2009**



**Market Share for Four Companies that Sold Vehicles in Region X**



The increase in the number of vehicles sold in Region X from 2002 to 2003 was the same as that from 2003 to 2004. The decrease in the number of vehicles sold in Region X from 2009 to 2010 was the same as that from 2008 to 2009. For the years from 2002 to 2010, the median number of vehicles sold annually was approximately how much greater than the average (arithmetic mean) number of vehicles sold annually?

Give your answer to the nearest 100 vehicles.

Question: 17



Let  $S$  and  $T$  be two sets such that the ratio of the number of elements in  $S$  to the number of elements in  $T$  to the number of elements in the set  $S \cap T$  is 4 to 3 to 1. If the sum of the number of elements in  $S$  but not in  $T$  and the number of elements in  $T$  but not in  $S$  is 2520, what is the number of elements in  $S \cap T$ ?

### Question: 18

A pump delivered water to fill an empty swimming pool. The pump delivered the water at a constant rate of 450 liters per minute until the pool was  $\frac{1}{2}$  full. Then the pump became partially clogged and delivered the water at a slower constant rate until the pool was full. For the whole time during which the pump delivered water to fill the empty pool, its average rate was 360 liters per minute. What was the pump's slower constant rate, in liters per minute?

- ☐ 270
- ☐ 288
- ☐ 300
- ☐ 400
- ☐ 405

### Question: 19

A metalworker has two sheets of metal. The first sheet is in the shape of an equilateral parallelogram with two opposite angles of measure 60 degrees each. The second sheet is in the shape of a square. If the metalworker cuts out the largest possible circle from each sheet, then the areas of the two circles will be equal. What is the ratio of the area of the first sheet to the area of the second sheet?

- ☐ 1 to  $\sqrt{3}$
- ☐ 2 to  $\sqrt{3}$
- ☐ 4 to  $\sqrt{3}$
- ☐  $\sqrt{3}$  to 1
- ☐  $\sqrt{3}$  to 2

### Question: 20

The standard deviation of  $n$  numbers  $x_1, x_2, x_3, \dots, x_n$ , with mean  $\bar{x}$  is equal to  $\sqrt{\frac{S}{n}}$ , where  $S$  is the sum of the squared differences  $(x_i - \bar{x})^2$  for  $1 \leq i \leq n$ .

If the standard deviation of the 5 numbers  $20-2c$ ,  $20-c$ ,  $20$ ,  $20+c$ , and  $20+2c$  is greater than 6, which of the following could be the value of  $c$ ?

Indicate all such values.

☐ -7

☐ -5

☐ -3

☐ -1

☐ 1

☐ 3