



Start 6:13  
Done at 6:27, checking

1

If  $\frac{x-1}{3} = k$  and  $k = 3$ , what is the value of  $x$ ?

- A) 2
- B) 4
- C) 9
- D) 10

$$\begin{aligned} \frac{x-1}{3} &= 3 \\ \Rightarrow x-1 &= 9 \\ x &= 10 \end{aligned}$$

2

For  $i = \sqrt{-1}$ , what is the sum  $(7 + 3i) + (-8 + 9i)$ ?

- A)  $-1 + 12i$
- B)  $-1 - 6i$
- C)  $15 + 12i$
- D)  $15 - 6i$

$$\begin{aligned} (7-8) + (3+9)i \\ = -1 + 12i \end{aligned}$$

3

On Saturday afternoon, Armand sent  $m$  text messages each hour for 5 hours, and Tyrone sent  $p$  text messages each hour for 4 hours. Which of the following represents the total number of messages sent by Armand and Tyrone on Saturday afternoon?

- A)  $9mp$
- B)  $20mp$
- C)  $5m + 4p$
- D)  $4m + 5p$

$$5m + 4p$$

4

Kathy is a repair technician for a phone company. Each week, she receives a batch of phones that need repairs. The number of phones that she has left to fix at the end of each day can be estimated with the equation  $P = 108 - 23d$ , where  $P$  is the number of phones left and  $d$  is the number of days she has worked that week. What is the meaning of the value 108 in this equation?

- A) Kathy will complete the repairs within 108 days.
- B) Kathy starts each week with 108 phones to fix.
- C) Kathy repairs phones at a rate of 108 per hour.
- D) Kathy repairs phones at a rate of 108 per day.



5

$$(x^2y - 3y^2 + 5xy^2) + (x^2y + 3xy^2 + 8y^2)$$

Which of the following is equivalent to the expression above?

- A)  $4x^2y^2$   
 B)  $8xy^2 - 6y^2$   
 C)  $2x^2y + 2xy^2$   
 D)  $2x^2y + 8xy^2 - 6y^2$

$$2x^2y + 0 + 2xy^2$$

6

$$h = 3a + 28.6$$

A pediatrician uses the model above to estimate the height  $h$  of a boy, in inches, in terms of the boy's age  $a$ , in years, between the ages of 2 and 5. Based on the model, what is the estimated increase, in inches, of a boy's height each year?

- A) 3  
 B) 5.7  
 C) 9.5  
 D) 14.3

7

$$m = \frac{\left(\frac{r}{1,200}\right) \left(1 - \frac{r}{1,200}\right)^N}{\left(1 - \frac{r}{1,200}\right)^N - 1} P$$

The formula above gives the monthly payment  $m$  needed to pay off a loan of  $P$  dollars at  $r$  percent annual interest over  $N$  months. Which of the following gives  $P$  in terms of  $m$ ,  $r$ , and  $N$ ?

A)  $P = \frac{\left(\frac{r}{1,200}\right) \left(1 + \frac{r}{1,200}\right)^N}{\left(1 + \frac{r}{1,200}\right)^N - 1} m$

B)  $P = \frac{\left(1 + \frac{r}{1,200}\right)^N - 1}{\left(\frac{r}{1,200}\right) \left(1 + \frac{r}{1,200}\right)^N} m$

C)  $P = \left(\frac{r}{1,200}\right) m$

D)  $P = \left(\frac{1,200}{r}\right) m$



8 If  $\frac{a}{b} = 2$ , what is the value of  $\frac{4b}{a}$ ?

- A) 0  
B) 1  
C) 2  
D) 4

$$\frac{a}{b} = 2$$

$$\frac{b}{a} = \frac{1}{2}$$

$$\frac{4b}{a} = 2$$

9 What is the solution  $(x, y)$  to the system of equations above?

- A)  $(-5, -2)$   
B)  $(3, -8)$   
C)  $(4, -6)$   
D)  $(9, -6)$

$$\begin{aligned} 3x + 4y &= -23 \\ -2(2y - x) &= -19 \end{aligned}$$

$$\begin{aligned} 9 - 32 &= -23 \\ -16 - 3 &= -19 \end{aligned}$$

$$\begin{aligned} 3x + 4y &= -23 \\ +2x - 4y &= 38 \\ \hline 5x &= 15 \\ x &= 3 \\ 9 + 4y &= -23 \\ 4y &= -32 \\ y &= -8 \end{aligned}$$

$$g(x) = ax^2 + 24$$

10 For the function  $g$  defined above,  $a$  is a constant and  $g(4) = 8$ . What is the value of  $g(-4)$ ?

- A) 8  
B) 0  
C) -1  
D) -8

$$g(-4) = g(4) = 8$$

(even fn)

$$b = 2.35 + 0.25x$$

$$c = 1.75 + 0.40x$$

11 In the equations above,  $b$  and  $c$  represent the price per pound, in dollars, of beef and chicken, respectively,  $x$  weeks after July 1 during last summer. What was the price per pound of beef when it was equal to the price per pound of chicken?

- A) \$2.60  
B) \$2.85  
C) \$2.95  
D) \$3.35

$$\begin{aligned} 2.35 + 0.25x &= 1.75 + 0.40x \\ 0.60 &= 0.15x \\ x &= 4 \end{aligned}$$

$$\begin{aligned} b &= 3.35 \\ c &= 1.75 + 1.6 = 3.35 \end{aligned}$$

12

A line in the  $xy$ -plane passes through the origin and has a slope of  $\frac{1}{7}$ . Which of the following points lies on the line?

- A)  $(0, 7)$   
B)  $(1, 7)$   
C)  $(7, 7)$   
D)  $(14, 2)$

$$y = \frac{1}{7}x + 0$$

$$\begin{aligned} x &= 14 \\ y &= \frac{1}{7} \cdot 14 = 2 \end{aligned}$$



13

If  $x > 3$ , which of the following is equivalent

to  $\frac{1}{\frac{1}{x+2} + \frac{1}{x+3}}$  ?

A)  $\frac{2x+5}{x^2+5x+6}$

B)  $\frac{x^2+5x+6}{2x+5}$

C)  $2x+5$

D)  $x^2+5x+6$

$$\frac{(x+2)(x+3)}{x+3 + x+2} = \frac{x^2+5x+6}{2x+5}$$

14

If  $3x - y = 12$ , what is the value of  $\frac{8^x}{2^y}$  ?

A)  $2^{12}$

B)  $4^4$

C)  $8^2$

D) The value cannot be determined from the information given.

Check:  $\frac{8^x}{2^y} = \frac{8^x}{2^{3x-12}} = \frac{(2^3)^x}{(2^3)^{3x-12}} = (2^3)^{x-(3x-12)} = (2^3)^{-2x+12} = (2^3)^4 = 2^{12}$

15

If  $(ax+2)(bx+7) = 15x^2 + cx + 14$  for all values of  $x$ , and  $a+b=8$ , what are the two possible values for  $c$  ?

A) 3 and 5

B) 6 and 35

C) 10 and 21

D) 31 and 41

$$\begin{aligned} & abx^2 + 7ax + 2bx + 14 \\ &= abx^2 + (7a+2b)x + 14 \\ &= 15x^2 + cx + 14 \end{aligned}$$

$$\begin{aligned} \Rightarrow ab &= 15 \Rightarrow b = \frac{15}{a} \\ 7a+2b &= c \\ a+b &= 8 \end{aligned}$$

$$a + \frac{15}{a} = 8$$

$$a^2 + 15 = 8a$$

$$a^2 - 8a + 15 = 0$$

$$(a-3)(a-5) = 0$$

$$a = 3 \text{ or } a = 5$$

If  $a=3$ ,

$$c = 7 \cdot 3 + 2 \cdot \frac{15}{3} = 21 + 10 = 31$$

If  $a=5$ ,

$$c = 7 \cdot 5 + 2 \cdot \frac{15}{5} = 35 + 6 = 41$$



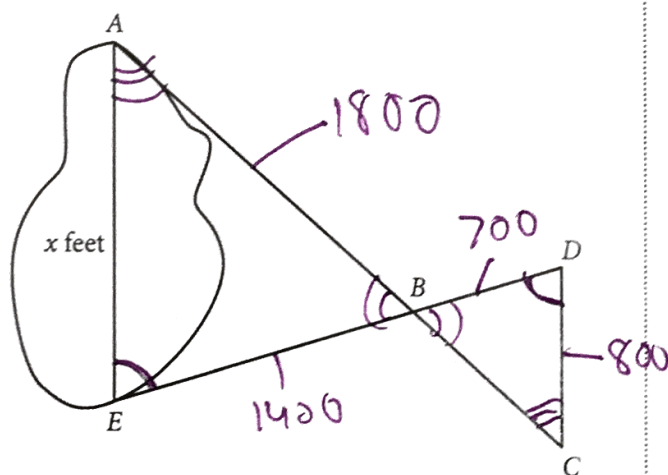
16

If  $t > 0$  and  $t^2 - 4 = 0$ , what is the value of  $t$ ?

$$t^2 = 4 \Rightarrow t = \pm 2$$

$$\boxed{t = 2}$$

17



Similar!

A summer camp counselor wants to find a length,  $x$ , in feet, across a lake as represented in the sketch above. The lengths represented by  $AB$ ,  $EB$ ,  $BD$ , and  $CD$  on the sketch were determined to be 1800 feet, 1400 feet, 700 feet, and 800 feet, respectively. Segments  $AC$  and  $DE$  intersect at  $B$ , and  $\angle AEB$  and  $\angle CDB$  have the same measure. What is the value of  $x$ ?

$$\frac{700}{1400} = \frac{800}{x} \Rightarrow \boxed{x = 1600}$$

**STOP**

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.

18

$$\begin{aligned} 7 - 16 &= -9 \checkmark \\ x + y &= -9 \\ 7 - 32 &= -25 \checkmark \\ x + 2y &= -25 \end{aligned}$$

$$\begin{aligned} x + y &= -9 \\ -x - 2y &= 25 \\ \hline -y &= 16 \\ y &= -16 \end{aligned}$$

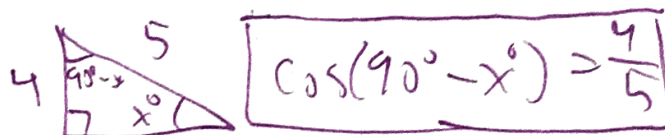
$$\begin{aligned} x + (-16) &= -9 \\ x &= 7 \end{aligned}$$

According to the system of equations above, what is the value of  $x$ ?

19

In a right triangle, one angle measures  $x^\circ$ , where

$\sin x^\circ = \frac{4}{5}$ . What is  $\cos(90^\circ - x^\circ)$ ?



$$\boxed{\cos(90^\circ - x^\circ) = \frac{4}{5}}$$

20

If  $a = 5\sqrt{2}$  and  $2a = \sqrt{2x}$ , what is the value of  $x$ ?

$$\begin{aligned} 2 \cdot 5 \cdot \sqrt{2} &= \sqrt{2} \cdot \sqrt{x} \\ 10 &= \sqrt{x} \\ \boxed{x} &= 100 \end{aligned}$$