COLLEGE READINESS INITIATIVE

Test 1:Math-No Calculator

1

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

A) 2

B) 4

C) 9

D) 10

Video Explanation-Question 1

Answer: D

$$\frac{x-1}{3} = k$$

$$3k = x - 1$$

$$k = 3$$

$$3(3) + 1 = x$$

$$x = 9 + 1 = 10$$

$$x = 10$$

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Heart of Algebra

2

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

A) $-1 + 12i$

B) $-1 - 6i$

C) $15 + 12i$

D) $15 - 6i$

Video Explanation-Question 2

Answer: A

$$(7 + 3i) + (-8 + 9i)$$

$$= (-1 + 12i)$$

$$-1 + 12i$$

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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) $4m + 5p$

Video Explanation-Question 3

Answer: C

$$\textit{Total Number of Texts} =$$

"*Number of Text Per Hour*" X "*Number of Hours*"

Armand's Texts= 5 hours * m texts per hour=5m

Tyrone's Texts= 4 hours * p texts per hour=4p

$$5m + 4p$$

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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.	**Video Explanation-Question 4** Answer: B Set d=0, then P=108 that means that she starts the week with 108 phones to fix. Written by Liam Mulcahy Heart of Algebra

5 $(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2)$ 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) $2x^2y + 8xy^2 - 6y^2$	**Video Explanation-Question 5** Answer: C $(x^2y - 3y^2 + 5xy^2) - (x^2y + 3xy^2 - 3y^2)$ $(x^2y - 3y^2 + 5xy^2) + (-x^2y - 3xy^2 + 3y^2)$ $x^2y + x^2y - 3y^2 + 3y^2 + 5xy^2 - 3xy^2$ Combine like Terms $2x^2y + 2xy^2$ Written by Liam Mulcahy Passport to Advanced Math

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

Video Explanation-Question 6

Answer: A

Since a is in terms of years each year a will increase by 1 causing h to increase by 3(a)

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

Video Explanation-Question 7

Answer: B

$$m = \frac{\left(\frac{r}{1200}\right)\left(1+\frac{r}{1200}\right)^{N}}{\left(1+\frac{r}{1200}\right)^{N}-1}P$$

$$m = \frac{\left(\frac{r}{1200}\right)\left(1+\frac{r}{1200}\right)^{N}}{\left(1+\frac{r}{1200}\right)^{N}-1}P$$

$$m\,\frac{\left(1+\frac{r}{1200}\right)^{N}-1}{\left(\frac{r}{1200}\right)\left(1+\frac{r}{1200}\right)^{N}} = P$$

Can treat large numerator and denominator as a single variable and multiply across.

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8

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

A) 0

B) 1

C) 2

D) 4

Video Explanation-Question 8

Answer: C

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

$\frac{a}{b} = \frac{2}{1}$ $\frac{b}{a} = \frac{1}{2}$ and $\frac{1}{2} \times 4 = 2$

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9

$$3x + 4y = -23$$
$$2y - x = -19$$

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

A) $(-5, -2)$

B) $(3, -8)$

C) $(4, -6)$

D) $(9, -6)$

Video Explanation-Question 9

Answer: B

$$3x + 4y = -23$$
$$-x + 2y = -19$$

$$3x + 4y = -23$$
$$(-x + 2y) * 3 = (-19) * 3$$

$$10y = -80$$

$$y = -8$$

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10

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

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

Video Explanation-Question 10

Answer: A

We realize that g(4) = g(-4) because of the x^2

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11

$$b = 2.35 + 0.25x$$

$$c = 1.75 + 0.40x$$

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

Video Explanation-Question 11

Answer: D

$$b = 2.35 + 0.25x$$

$$c = 1.75 + 0.40x$$

$$2.35 + 0.25x = 1.75 + 0.40x$$

$$0.6 = 0.15x$$

$$x = 4$$

$$b = 2.35 + 0.25(4)$$

$$b = 3.35$$

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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?

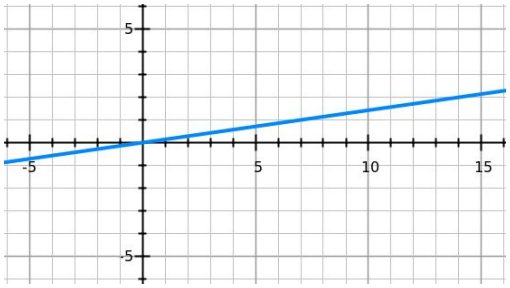
A) $(0, 7)$
B) $(1, 7)$
C) $(7, 7)$
D) $(14, 2)$

Video Explanation-Question 12

Answer: D

Rise 1 Go Over 7

Points include (0,0), (7,1), **(14,2)**



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13

If $x > 3$, which of the following is equivalent to $\dfrac{1}{\dfrac{1}{x+2}+\dfrac{1}{x+3}}$?

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

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

C) $2x+5$

D) x^2+5x+6

Answer: B

Video Explanation-Question 13

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

$$\frac{1}{\frac{(x+3)+(x+2)}{(x+2)(x+3)}}$$

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

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

$\dfrac{(x^2+5x+6)}{2x+5}$

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14

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

A) 2^{12}

B) 4^4

C) 8^2

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

Video Explanation-Question 14

Answer: A

$3x - y = 12 \qquad 3x = y + 12$

$x = \frac{y}{3} + 4$

$8 = 2^3$

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

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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

Video Explanation-Question 15

Answer: D

FOIL (First, Outer, Inner, Last)

$$(ax+2)(bx+7)$$

$$First + Outer + Inner + Last$$

$$(ax)(bx) + 7(ax) + 2(bx) + 2(7)$$

$$abx^2 + 7ax + 2bx + 14$$

$$abx^2 + (7a+2b)x + 14$$

We know that (a x b) = 15 and (a+b) =8

So either {a=5, b=3} or {a=3, b=5}

Taking both of these cases

$(5x+2)(3x+7)$ $(15x^2+35x)+(6x+14)$ $15x^2+41x+14$	$(3x+2)(5x+7)$ $(15x^2+21x)+(10x+14)$ $15x^2+31x+14$

c = 31 or c = 41

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16

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

Video Explanation-Question 16

Answer: 2

$$t^2 - 4 = 0$$

$$t^2 = 4$$

$$t = \sqrt{4} = 2$$

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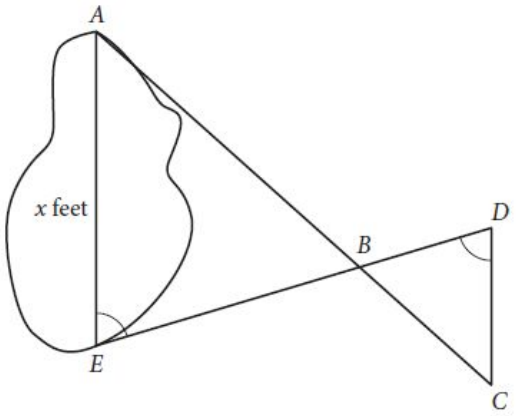
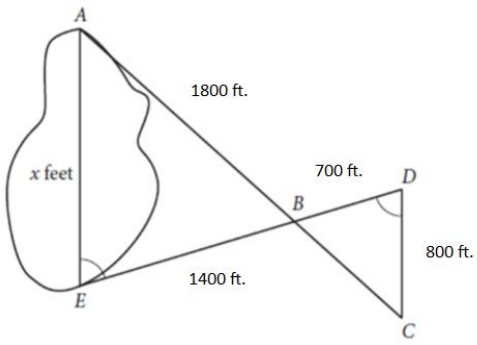
17



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 ?

Video Explanation-Question 17

Answer: 1600



Angle ABE and Angle DBC, are equivalent.
Angle D and Angle E are equivalent.
Segments BE and BD are proportional.

These three characteristics indicate that the two triangles are similar through Angle Side Angle (ASA)

.

So if BE is twice length of BD, then x is twice the length of DC. 2 * 800= 1600

18

$$x + y = -9$$
$$x + 2y = -25$$

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

Video Explanation-Question 18

Answer: 7

$$x + y = -9$$
$$x + 2y = -25$$

$$-2(x + y) = -2(-9) \rightarrow -2x - 2y = 19$$
$$x + 2y = -25 \qquad\quad x + 2y = -25$$

Now Add the two equations

$$-x = -7$$

$$x = 7$$

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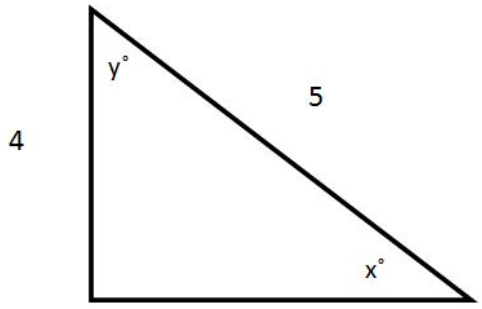
19

In a right triangle, one angle measures $x°$, where $\sin x° = \frac{4}{5}$. What is $\cos(90° - x°)$?

Video Explanation-Question 19

Answer: 4/5 or 0.8



Y=90-x cos(90-x)= cos (y) because of SOH CAH TOA we know the proportions of the lengths.

$$sinx = \frac{Opposite}{Hypotenuse}$$

$$cosx = \frac{Adjacent}{Hypotenuse}$$

$$\cos y = \frac{4}{5}$$

20

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

Video Explanation-Question 20

Answer: 100

$$a = 5\sqrt{2}$$

$$2a = \sqrt{2x}$$

$$2a = 5 * 2\sqrt{2} = 10\sqrt{2} = \sqrt{2 * 100}$$

X=100

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