

I will work out all of the problems
and write calculator instructions
that could help you.

VIRGINIA STANDARDS OF LEARNING

TEST ITEM SET

Algebra I

2009 Mathematics Standards of Learning

Released Spring 2015

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SAMPLE A

What is the solution to $3(2x-1) = 3$?

A $x = \frac{1}{3}$

B $x = \frac{2}{3}$

C $x = 1$

D $x = 5$

$$\begin{array}{r} 6x - 3 = 3 \\ +3 \quad +3 \\ \hline 6x = 6 \\ \underline{6} \quad \underline{6} \\ x = 1 \end{array}$$

In the calculator

$y =$
 $y_1 = 3(2x-1)$

$y_2 = 3$

Graph

2nd

Trace

5

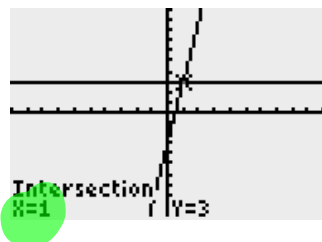
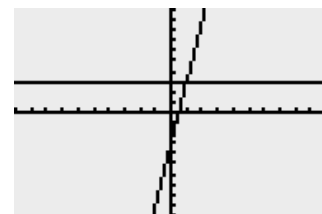
enter

enter

enter

```

Plot1 Plot2 Plot3
Y1=3(2X-1)
Y2=3
Y3=
Y4=
Y5=
Y6=
Y7=
    
```



Directions: Type your answer in the box. Your answer must be in the form of a fraction in simplest form. Use "/" for the fraction bar.

SAMPLE B

What is the value of $\frac{3}{x+2}$ when $x = 4$?

Your answer must be in the form of a fraction in simplest form.

① Always read the gray directions banner, it tells you how to answer the problem

$\frac{1}{2}$

$$\frac{3}{x+2} \Rightarrow \frac{3}{4+2} = \frac{3}{6} = \frac{1}{2}$$

↑
must reduce fraction

reduce fraction or decimal to fraction

→ Math enter enter

Which expression represents four less than half a number, n ?

A $4 - \frac{1}{2}n$

B $\frac{1}{2}n - 4$

C $\frac{1}{2}(4 - n)$

D $\frac{1}{2}(n - 4)$

$\frac{1}{2}n - 4$

remember "less than"
and "more than"
mean you will
flip the sides of
the operation

Which of the following binomials is a factor of $x^2 - x - 6$?

A $x-1$

B $x-2$

C $x-3$

D $x-6$

$$x^2 - x - 6$$

$$(x+2)(x-3)$$

$$Ax^2 + bx + c$$

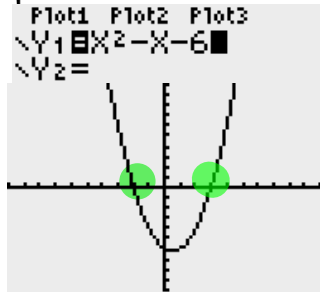
Multiply to Make "c"
and add to Make "b"

$$\frac{-b}{2a} = \frac{-(-1)}{2(1)} = \frac{1}{2}$$

$$1 \frac{1}{2} - 6 = -5$$

$$2 \frac{1}{2} - 3 = -1$$

calculator help



$$y = x^2 - x - 6$$

graph

(look at x-intercepts which are the solutions)

* Solutions are the Opposite of factors *

$\{-2, 3\}$ are the x-intercepts
so factors are $(x+2)(x-3)$

Directions: Click on all the correct answers.

Always read the banner!

Identify each expression that is in simplest radical form.

Try to simplify each radical expression.
 If it can be simplified it is not the answer
 If it can not be simplified it is the answer

$x\sqrt{50y}$	$\sqrt{64\sqrt{x}}$	$7x^2y\sqrt{2xy}$	$\sqrt{12x^3y^4}$
---------------	---------------------	-------------------	-------------------

$$x\sqrt{50y}$$

$$x \cdot \sqrt{25} \cdot \sqrt{y}$$

$$x \cdot \sqrt{25} \cdot 2 \cdot \sqrt{y}$$

$$x \cdot \sqrt{25} \cdot \sqrt{2} \cdot \sqrt{y}$$

$$x \cdot 5 \cdot \sqrt{2} \cdot \sqrt{y}$$

$$5x\sqrt{2y}$$

Since we were able to simplify this radical it was not in simplest form

$$64\sqrt{x}$$

- Can not take the square root of a variable to the exponent of 1

- This is in simplest form so we will select it as one of our answers and check the others

$$7x^2y\sqrt{2xy}$$

- The integer 2 does not contain any perfect squares so it is simplified

- Can not take the square root of a variable with an exponent of 1
 - This is in simplest form so we will select it as one of our answers and check the others

$$\sqrt{12x^3y^4}$$

$$\sqrt{4} \cdot \sqrt{3} \cdot \sqrt{y^4}$$

$$\sqrt{4} \cdot 3 \cdot x^{\frac{3}{2}} \cdot y^{\frac{4}{2}}$$

$$\sqrt{4} \cdot \sqrt{3} \cdot x^{\frac{3}{2}} \cdot y^2$$

$$2\sqrt{3} \cdot x^{\frac{3}{2}} \cdot y^2$$

Since we were able to simplify this radical it was not in simplest form

Which expression is equivalent to $\frac{1}{6}(30x - 24y) - \frac{1}{8}(32x - 16y)$?

1. Distribute
2. Combine like terms

$$5x - 4y - 4x + 2y$$

$$x - 2y$$

A $x - 6y$

B $x - 2y$

C $2x - 4y$

D $9x - 6y$

```
(1/6)(30x-24y)+(-1/8)(32x-16y)
2
```

Calculator

We will use the store function button STO →, do not use 1, 0, 13 as values for the variables

2 → X
3 → Y (Alpha 1)
Then type equation into calculator and press enter.

Write down decimal
Then type in answer choices and match

Answer A

```
x-6y
-16
```

Answer B

```
x-2y
2
```

Answer C

```
2x-4y
4
```

Answer D

```
9x-6y
18
```

Which is equivalent to $\sqrt[3]{48}$ in simplest form?

A $2\sqrt[3]{6}$

B $6\sqrt[3]{2}$

C 16

D 24

$\sqrt[3]{48}$
 $\sqrt[3]{8} \cdot \sqrt[3]{6}$
 $2\sqrt[3]{6}$

Calculator

$y =$
 $y_1 = 48/x^3$

2nd
graph

look for the smallest
whole number in the
y column

Plot1	Plot2	Plot3
$\sqrt[3]{Y_1} = 48/X^3$		
$\sqrt[3]{Y_2} =$		
$\sqrt[3]{Y_3} =$		
$\sqrt[3]{Y_4} =$	X	Y1
$\sqrt[3]{Y_5} =$	0	ERROR
$\sqrt[3]{Y_6} =$	1	48
$\sqrt[3]{Y_7} =$	2	6
	3	1.7778
	4	.75
	5	.384
	6	.22222
	X=0	

What is the value of $\sqrt{128}$ in simplest radical form?

A $8\sqrt{2}$

B $64\sqrt{2}$

C $4\sqrt{8}$

D $16\sqrt{8}$

$$\sqrt{128}$$

$$\sqrt{64 \cdot 2}$$

$$8\sqrt{2}$$

$y =$
 $y_1 = 128/x^2$
 2nd
 graph

look for the smallest
 whole number in the
 y column

Plot1	Plot2	Plot3
$Y_1 = 128/X^2$		
$Y_2 =$		
$Y_3 =$		
$Y_4 =$		
$Y_5 =$	X	Y1
$Y_6 =$	0	ERROR
$Y_7 =$	1	128
	2	32
	3	14.222
	4	8
	5	5.12
	6	3.5556
	X	Y1
	7	2.6122
	8	2
	9	1.5802
	10	1.28
	11	1.0579
	12	.88889
	13	.7574
	X=13	

Which polynomial is equivalent to this expression if $n \neq -1$?

A $2n-3$

B $3-2n$

C $3-2n^2$

D $4-2n^2$

$$y = \frac{3+n-2n^2}{1+n}$$

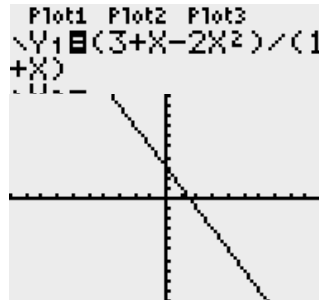
graph

$y_2 =$ answer choices 1 at a time

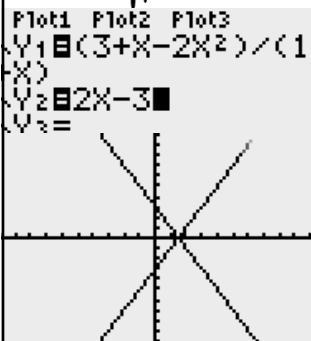
graph

Must graph the exact same

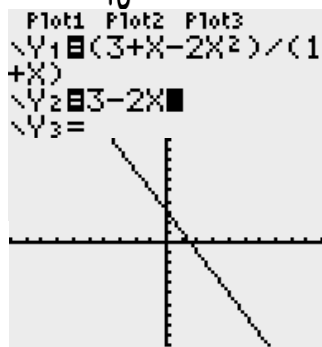
line



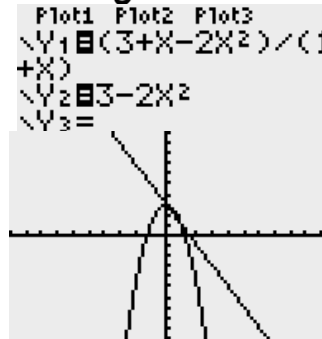
Try answer choice "A"



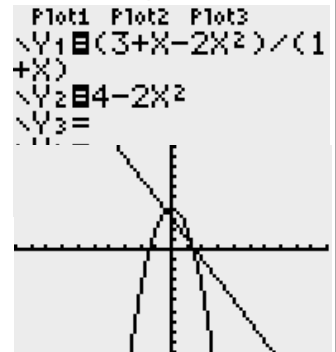
Try answer choice "B"



Try answer choice "C"



Try answer choice "D"



Which is a factor of $2n^2 - 5n - 42$?

- A $2n - 7$
- B $2n - 6$
- C $n - 7$
- D $n - 6$

multiply

$$n^2 - 5n - 84$$

$$(n+7)(n-12)$$

$$(n+7)(n-6)$$

$$(2n+7)(n-6)$$

$$\begin{array}{l} -84 \\ 1, -84 = -83 \\ 2, -42 = -40 \\ 3, -28 = -25 \\ 4, -21 = -17 \\ 6, -14 = -8 \\ 7, -12 = -5 \end{array}$$

$Y = 2x^2 - 5x - 42$
graph

$Y_2 =$ answer choices 1 at a time
graph

Must go through an x-intercept
of original function

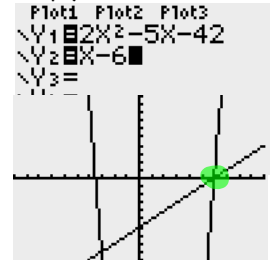
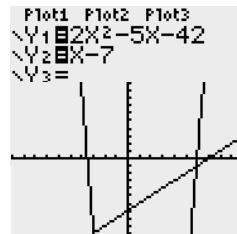
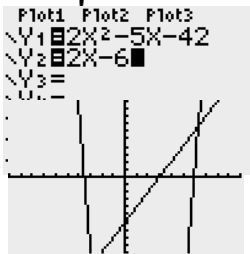
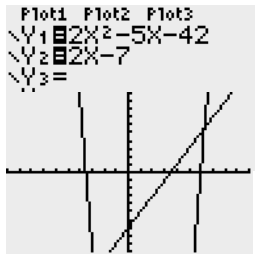


Answer A

Answer B

Answer C

Answer D



Which of the following is equivalent to $\frac{a^{12}b^2}{a^3b^6}$?

A $\frac{a^9}{b^4}$

B $\frac{b^4}{a^9}$

C $\frac{a^4}{b^3}$

D a^9b^4

$$\frac{\cancel{a}^{\cancel{11}}\cancel{a}^{\cancel{1}}\cancel{b}^{\cancel{4}}\cancel{b}^{\cancel{2}}}{\cancel{a}^{\cancel{3}}\cancel{b}^{\cancel{6}}}$$

$$\frac{a^9}{b^4}$$

When dividing like bases subtract exponents
 Answer goes back where the largest exponent was.

$$a^{12-3} = a^9$$

$$b^{2-6} = b^{-4}$$

Calculator

We will use the store function button STO →, do not use 1, 0, 13 as values for the variables

2 → A (Alpha Math)
 3 → B (Alpha Apps)

Then type equation into calculator and press enter.

Write down decimal

Then type in answer choices and match

```
2→A
3→B
(A^12B^2)/(A^3B^6)
6.320987654
```

Answer A

```
A^9/B^4
6.320987654
```

Answer B

```
B^4/A^9
.158203125
```

Answer C

```
A^4/B^3
.5925925926
```

Answer D

```
A^9B^4
41472
```

What is the value of this expression when $n = -15$?

$$-2|n+6|$$

- A -42
- B -18
- C 18
- D 42

Calculator

$$-2 \text{ abs}(-15+6)$$

enter

```
-2abs(-15+6) -18
```

to get absolute value in
the calculator
Math
→ Num
1
enter

Which graph best represents the equation $4x + 5y = -20$?

$$\frac{-4x}{5} = \frac{-4x - 20}{5}$$

$$y = -\frac{4}{5}x - 4$$

$$m = -\frac{4}{5}$$

$$b = (0, -4)$$

→ Solve for "y"

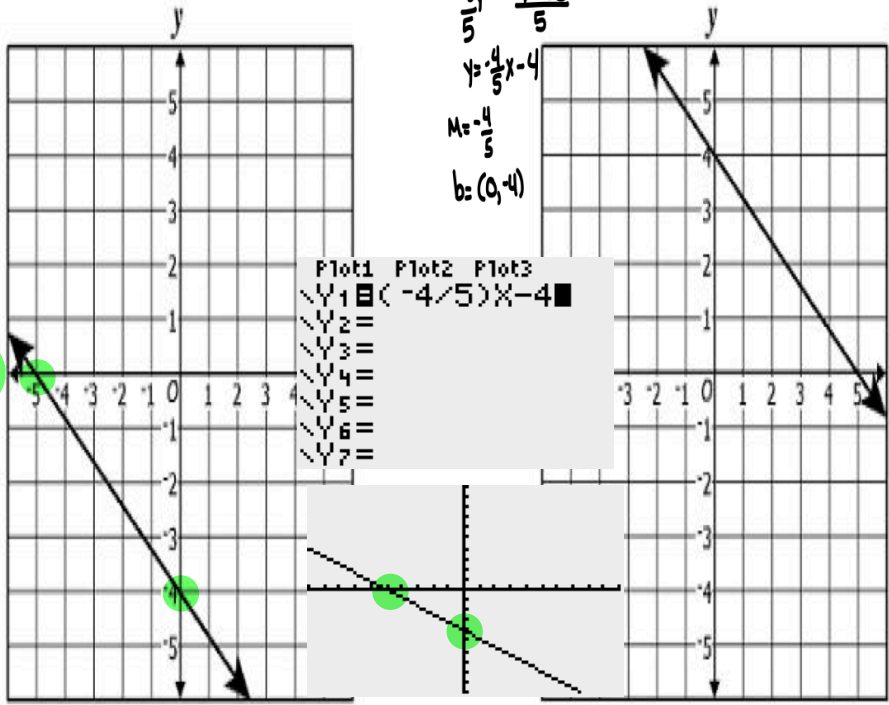
- put in calc

- match graphs

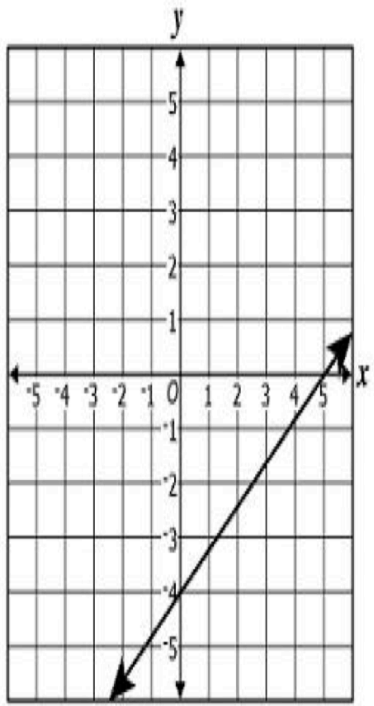
$$y = -\frac{4}{5}x - 4$$

graph

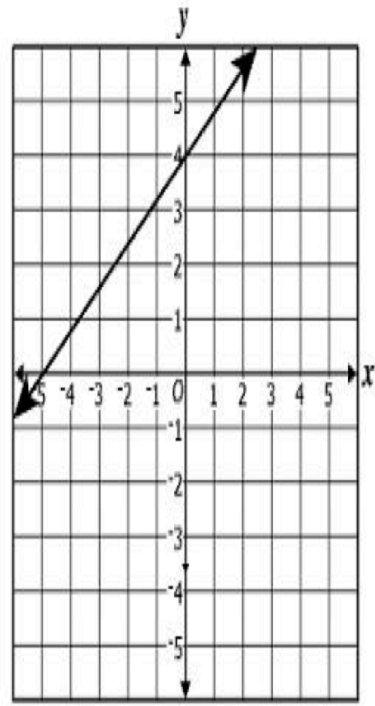
A



B



D



A formula to find the angle measures of an isosceles triangle is shown.

$$180 = 2x + y$$

Which equation can be used to find x ?

A $x = \frac{180 - y}{2}$

B $x = \frac{180 + y}{2}$

C $x = 90 - y$

D $x = 90 + y$

$$\begin{array}{r} 180 = 2x + y \\ -y \quad -y \\ \hline 180 - y = \frac{2x}{2} \\ \frac{180 - y}{2} = x \end{array}$$

There are many ways to solve this problem
I will show you 4

Which equation represents the line that passes through the points $(-4, 4)$ and $(8, -2)$?

A $y = -2x + 14$

B $y = -2x - 4$

C $y = -\frac{1}{2}x + 2$

D $y = -\frac{1}{2}x - 2$

① $M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 4}{8 - (-4)} = \frac{-6}{12} = -\frac{1}{2}$

$y - y_1 = m(x - x_1)$

$y - 4 = -\frac{1}{2}(x - (-4))$

$y - 4 = -\frac{1}{2}(x + 4)$

$y - 4 = -\frac{1}{2}x - 2$
+4 +4

 $y = -\frac{1}{2}x + 2$

③ Stat
1
 $X_1 = L_1$
 $Y_1 = L_2$
Stat
→ Calc
4
Enter

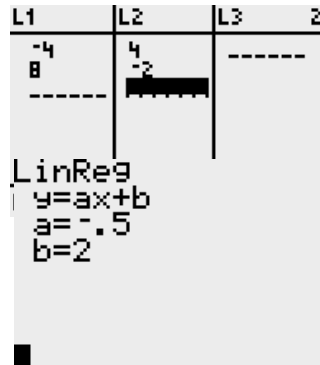
④ $y =$
 $y_1 =$ answer choice 1 data time
2nd graph
check for BOTH points in list

$a =$ slope

$b =$ y -intercept

$y = -\frac{1}{2}x + 2$

② Plug in points 1 at a time into each answer choice
BOTH points must make the equation true



Plug point into BOTH inequalities, Must make BOTH true

For which system of inequalities is $(-3, 1)$ a solution?

○ A $\begin{cases} x+y < -2 \\ 2x-3y < -9 \end{cases}$ $\begin{matrix} -3+1 < -2 \\ -2 < -2 \end{matrix}$ X

○ B $\begin{cases} x+y < -2 \\ 2x-3y \leq -9 \end{cases}$ $\begin{matrix} -3+1 < -2 \\ -2 < -2 \end{matrix}$ X

○ C $\begin{cases} x+y \leq -2 \\ 2x-3y < -9 \end{cases}$ $\begin{matrix} -3+1 \leq -2 \\ -2 \leq -2 \end{matrix}$ ✓ $\begin{matrix} 2(-3)-3(1) < -9 \\ -6-3 < -9 \\ -9 < -9 \end{matrix}$ X

○ D $\begin{cases} x+y \leq -2 \\ 2x-3y \leq -9 \end{cases}$ $\begin{matrix} -3+1 \leq -2 \\ -2 \leq -2 \end{matrix}$ ✓ $\begin{matrix} 2(-3)-3(1) \leq -9 \\ -6-3 \leq -9 \\ -9 \leq -9 \end{matrix}$ ✓

Plug points into system 1 at a time. Point must make BOTH equations

What is the solution to this system of equations?

(x, y)

$$\begin{cases} 2x + 4y = 22 \\ 7x + y = 12 \end{cases}$$

New Calculator
Apps
8
2
Next

true

xy
 A (3, 4)

B (2, -2)

C (1, 5)

D (-1, 6)

Answer A

$$\begin{aligned} 2(3) + 4(4) &= 22 \\ 6 + 16 &= 22 \\ 22 &= 22 \checkmark \end{aligned}$$

$$\begin{aligned} 7(3) + (4) &= 12 \\ 21 + 4 &= 12 \\ 25 &\neq 12 \times \end{aligned}$$

Answer B

$$\begin{aligned} 2(2) + 4(-2) &= 22 \\ 4 + -8 &= 22 \\ -4 &\neq 22 \times \end{aligned}$$

$$7(2) + (-2) = 12$$

Answer C Answer D

$$\begin{aligned} 2(1) + 4(5) &= 22 \\ 2 + 20 &= 22 \\ 22 &= 22 \checkmark \end{aligned}$$

$$\begin{aligned} 7(1) + (5) &= 12 \\ 7 + 5 &= 12 \\ 12 &= 12 \checkmark \end{aligned}$$

$$\begin{aligned} 2(-1) + 4(6) &= 22 \\ -2 + 24 &= 22 \\ 22 &= 22 \checkmark \end{aligned}$$

$$\begin{aligned} 7(-1) + (6) &= 12 \\ -7 + 6 &= 12 \\ -1 &\neq 12 \times \end{aligned}$$

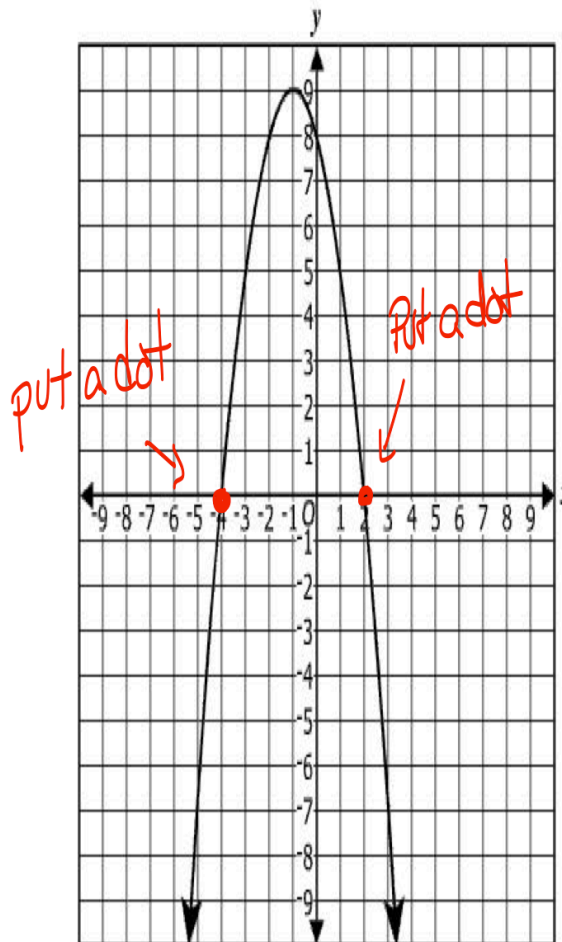
Directions: Click on the grid to **plot each of the solutions**. You **must plot all solutions**.

Read the directions banner!

The graph of $y = -x^2 - 2x + 8$ is shown.

On the grid, identify each of the **solutions** to $-x^2 - 2x + 8 = 0$.

x-intercepts



only mark the x-intercepts for the solution. If there are two you MUST mark BOTH.

Do Not plot any extra points.

What value of x makes this equation true?

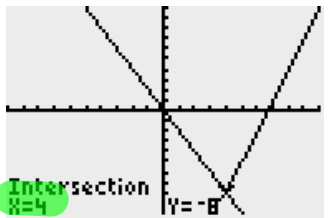
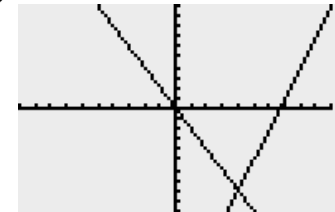
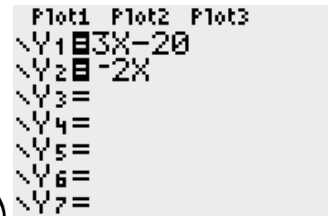
- A -20 $3(-20) - 20 = -2(-20)$ X
- B -4 $3(-4) - 20 = -2(-4)$ X
- C 4 $3(4) - 20 = -2(4)$ ✓
- D 20 $3(20) - 20 = -2(20)$ X

$$\begin{aligned} 3x - 20 &= -2x \\ -3x &\quad -3x \\ \hline -20 &= -5x \\ \frac{-20}{-5} &= \frac{-5x}{-5} \\ 4 &= x \end{aligned}$$

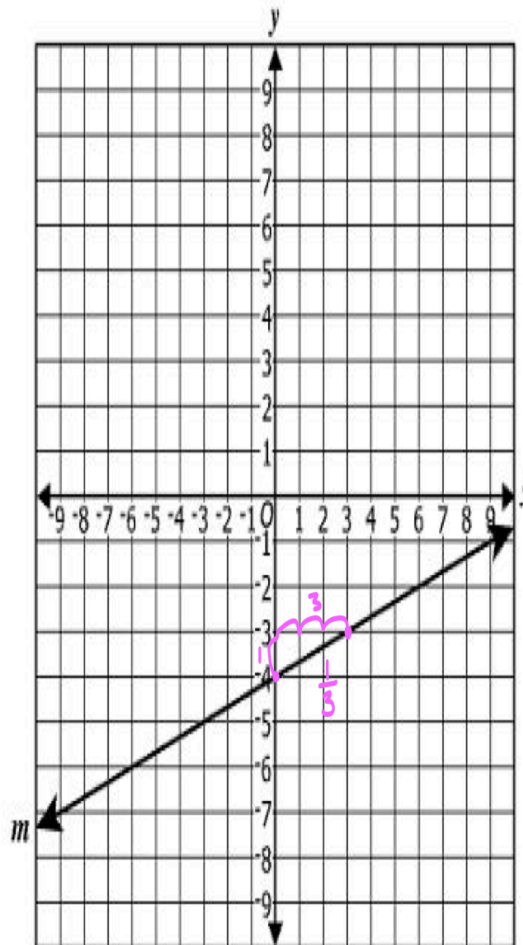
$y =$
 $y_1 = 3x - 20$

$y_2 = -2x$

graph
 2nd
 Trace
 5
 enter
 enter
 enter
 look at x-value



Which equation best represents line m ?



slope (m)
Positive
y-intercept (b)
Negative

A $y = -3x - 4$ X

B $y = \frac{-1}{3}x - 4$ X

C $y = \frac{1}{3}x - 4$

D $y = 3x - 4$

Put equations
in $y =$ 1@a time
graph
Match graphs

Directions: Click and drag the answers to the correct boxes.

Read the directions banner

Christopher incorrectly solved an inequality as shown.

Step 1: $-4(x-7)+1 \leq -3$

Step 2: $-4(x-7) \leq -4$

Step 3: $-4x+28 \leq -4$

Step 4: $-4x \leq -32$

Step 5: $x \leq 8$

*he did not flip the sign
when dividing by a negative
on both sides of the inequality*

Between which two consecutive steps did Christopher make a mistake?

Directions: Type your answer in the box.

Read the directions banner

Solve for n :

$$\frac{3n-7}{6} = \frac{2n+5}{3}$$

$$3(3n-7) = 6(2n+5)$$

$$9n-21 = 12n+30$$

$$\begin{array}{r} -9n \quad -9n \\ \hline -21 = 3n+30 \\ -30 \quad -30 \\ \hline -51 = 3n \\ \frac{-51}{3} \quad \frac{3n}{3} \\ -17 = n \end{array}$$

$$\frac{3n-7}{6} = \frac{2n+5}{3}$$

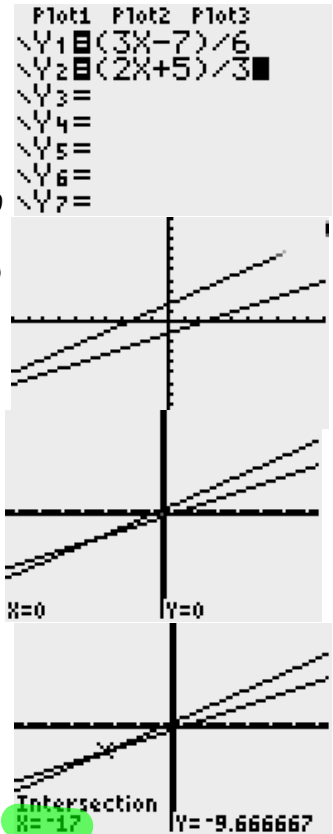
$n = -17$

$Y =$
 $Y_1 = (3x-7)/6$
 $Y_2 = (2x+5)/3$
 graph

Zoom
 3
 enter
 2nd

Trace

5
 enter
 enter
 enter
 look at x value



Must make equation = 0

What values of x are solutions of $3x^2 + 11x = 20$?

A $-\frac{4}{3}$ and 5

B $-\frac{5}{3}$ and 4

C -4 and $\frac{5}{3}$

D -5 and $\frac{4}{3}$

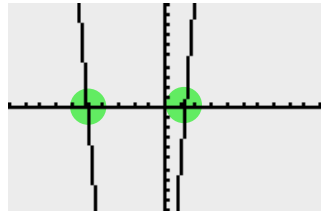
$$\frac{-20 \quad -20}{3x^2 + 11x - 20 = 0}$$

old Calc

$y =$
 $y_1 = 3x^2 + 11x - 20$

graph

look at x-intercepts



New Calc

Apps

8

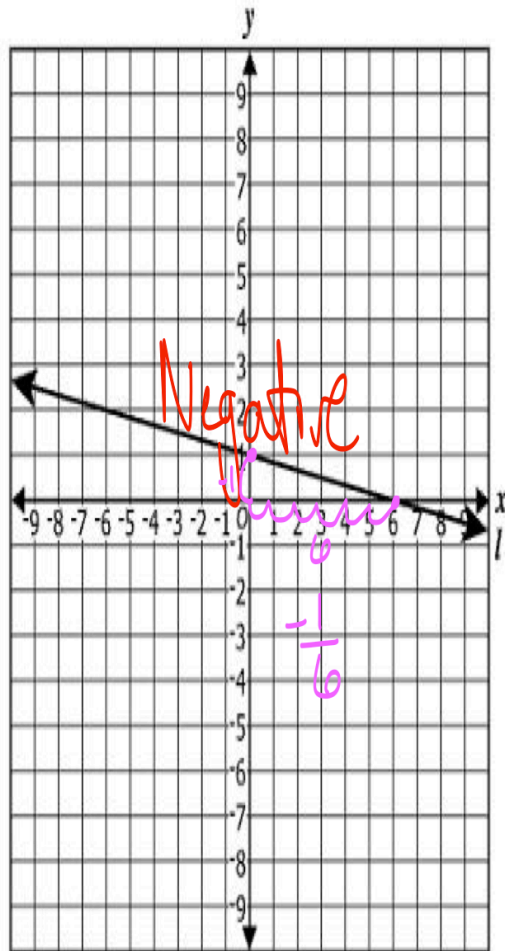
1

Next

change items

Solve

The graph of line l is shown.



Which number is closest in value to the slope of line l ?

A -6

B $-\frac{1}{6}$

C $\frac{1}{6}$

D 6