MAT 0022C/0028C Final Exam Review

BY:

West Campus Math Center

Math Connections

Topics

- **Factoring**
  - #1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18
- **Problem Solving (Word Problems)**
  - #19, 20, 21, 22, 23, 24, 25, 26, 27, 66, 67, **68**, 69, 70
- **Graphing**
  - #28, 29, 30, 31, 32, 33, 34, 35
- **Exponents and Polynomials**
  - #36, 37, 38, 39, 40, 41, 42, 43, 44, 45
- **Square Roots/Radicals**
  - #46, 47, 48, 49, 50, 51, **68**
- **Equations and Inequalities**
  - #52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65,
- **Test Taking Tips**
  - **MyMathLab Tips**, How to study, General Test Taking Tips

Problem #1, 2, 3 (GCF)

1) 2
2) $15m^5$
3) $44x^2$

Find the GCF for the list.

1) 16, 10

1) GCF = **2**

2) $15m^5$, $135m^9$

2) GCF = **$15m^5$**

3) $88x^2$, $44x^7$

3) GCF = **$44x^2$**

Remember GCF for like variables = **smallest exponent**

EXAMPLE: GCF for x^5, x^3 = **x^3 (pick smallest exponent)**

Factoring Trinomials

(Leading Coefficient = 1)

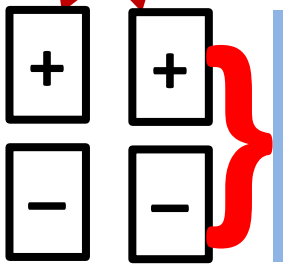
Form: $x^2 + bx + c$

Signs could be + or – in the trinomial.

Form: x^2 + bx + c

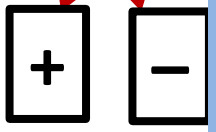
Factored Form: (x)(x)

+c



Match Sign of Middle Term *bx*

-c



Sign of Bigger Factor Matches Middle Term *bx*

Problem #4 (Factoring Trinomials)

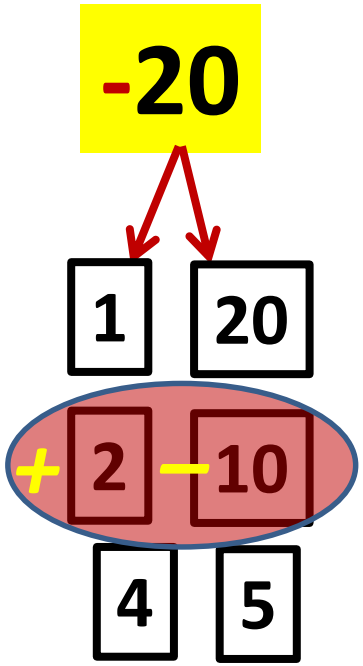
Factor the trinomial completely. If the polynomial cannot be factored, write "prime."

4) $x^2 - 8x - 20$

4) $(x - 10)(x + 2)$

Factored Form: (x)(x)

Find factors of **20** that ***subtract*** to make **8.**



Sign of bigger factor matches middle term *bx*

Solution: (x + 2)(x – 10)

Problem #5 (Factoring Trinomials)

Factor the trinomial completely. If the polynomial cannot be factored, write "prime."

5) $x^2 - 3x - 40$

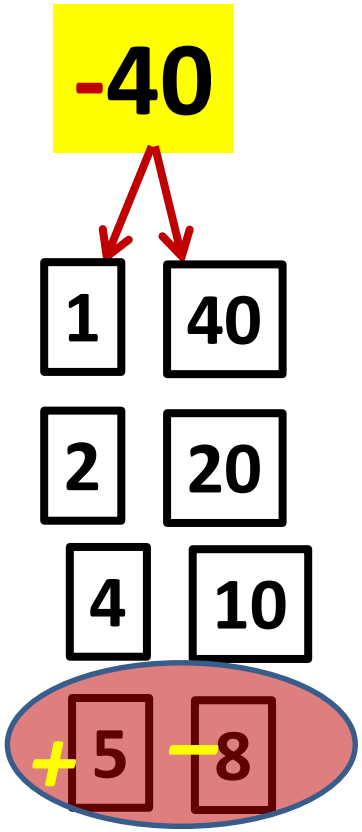
5) $(x - 8)(x + 5)$

Factored Form: (x)(x)

Find factors of **40** that ***subtract*** to make **3.**

Sign of bigger factor matches middle term *bx*

Solution: (x + 5)(x – 8)



Problem #6 (Factoring)

Factor the four-term polynomial by grouping.

6) $xy + 6x - 3y - 18$

$xy + 6x$ | $-3y - 18$

GCF = x | GCF = -3

$x(y + 6)$ | **$-3(y + 6)$**

$(y + 6)$ **$(x - 3)$**

$(y + 6)(x - 3)$

6) $(y + 6)(x - 3)$

Problem #7 (Factoring)

Factor the four-term polynomial by grouping.

7) $xy - 2yz + 7x - 14z$

$xy - 2yz$ | $+ 7x - 14z$

GCF = y

$y(x - 2z)$

$(x - 2z)$

GCF = +7

$+7(x - 2z)$

$(y + 7)$

$(x - 2z)(y + 7)$

7) $(y + 7)(x - 2z)$

Problem #8 (Factoring)

Factor the four-term polynomial by grouping.

8) $10x^2 - 8x - 15x + 12$

$10x^2 - 8x \mid - 15x + 12$

GCF = 2x

$2x(5x - 4)$

$(5x - 4)$

GCF = –3

$-3(5x - 4)$

$(2x - 3)$

Live example!

$(5x - 4)(2x - 3)$

8) $(2x - 3)(5x - 4)$

Factoring Trinomials

(Leading Coefficient $a \neq 1$)

Form: $ax^2 + bx + c$

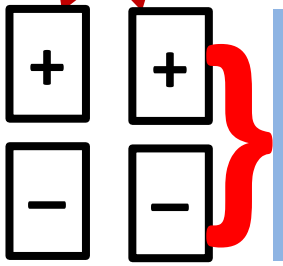
Signs could be + or – in the trinomial.

2 methods:

1) A·C method **2)** Guess-and-check

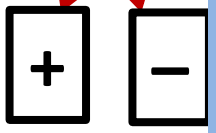
We will illustrate **both methods.**

+a·c



Match Sign of Middle Term *bx*

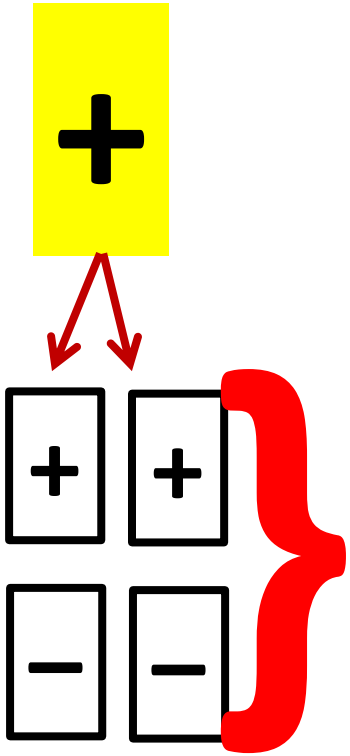
-a·c



Sign of Bigger Factor Matches Middle Term *bx*

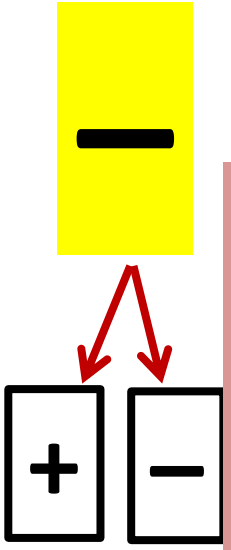
SIGN RULES

(For all Factoring Methods)



Match Sign of Middle Term

bx



Sign of Bigger Factor Matches Middle Term

bx

Problem #9 (Factoring – AC method)

Factor the trinomial completely.

9) $8x^2 + 17x - 21$

Find factors of **168** that ***subtract*** to make **17.**

Sign of bigger factor matches middle term
bx

4 terms: $8x^2 + 24x - 7x - 21$

We now factor by grouping!

-168

1	168	8	21
2	81	12	14
3	56		
4	42		
6	28		

– 7 + 24

Problem #9 CONT…

Factor the trinomial completely.

9) $8x^2 + 17x - 21$

-168

$-7 \quad +24$

4 terms: $8x^2 + 24x - 7x - 21$

$8x^2 + 24x \mid - 7x - 21$

GCF = $8x$ GCF = -7

$8x(x + 3)$ $-7(x + 3)$

$(x + 3)$ $(8x - 7)$

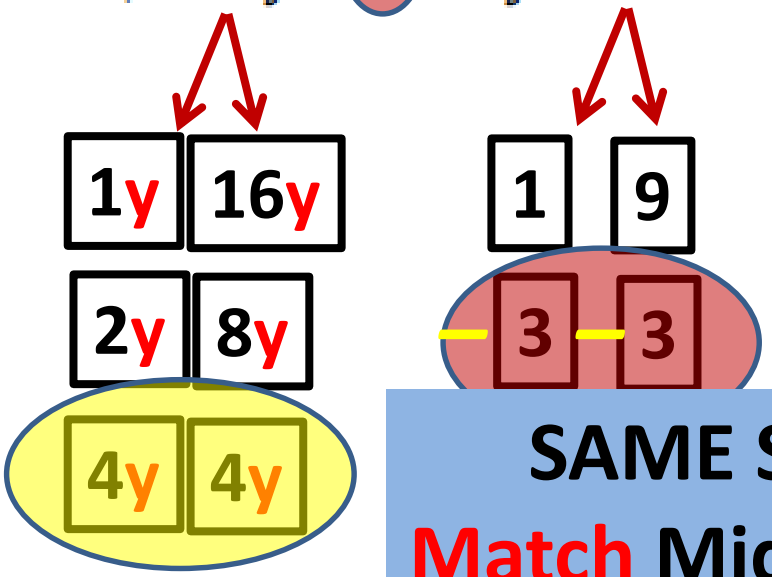
$(x + 3)(8x - 7)$

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

Problem #10
(Factoring – Guess/check method)

Factor the trinomial completely.

$$10)\ 16y^2 - 24y + 9$$



SAME SIGNS,
Match Middle Term!

$$10)\ (4y - 3)(4y - 3)$$

$(4y - 3)(4y - 3)$

$(4y - 3)^2$

Problem #11 (Factoring – AC method)

Factor the trinomial completely.

11) $12x^2 - 7x - 12$

Find factors of **144** that ***subtract*** to make **7.**

Sign of bigger factor matches middle term *bx*

4 terms: $12x^2 + 9x - 16x - 12$

We now factor by grouping!

-144

1	144	+9	−16
2	72	12	12
3	48		
4	38		
6	24		
8	18		

Live example!

Problem #11 CONT…

Factor the trinomial completely.

11) $12x^2 - 7x - 12$

-144

+9 **–16**

4 terms: $12x^2 + 9x - 16x - 12$

$12x^2 + 9x$ | **$- 16x - 12$**

GCF = 3x | GCF = – 4

$3x(4x + 3) - 4(4x + 3)$

(4x + 3) **(3x – 4)**

(4x + 3)(3x – 4)

11) $(4x + 3)(3x - 4)$

Live example!

Problem #12 (Factoring)

Factor the trinomial completely.

12) $x^2 + 12x + 36$

Factored Form: (x)(x)

Find factors of **36** that ***add*** to make **12.**

SAME SIGNS, Match Middle Term!

Solution: (x + 6)(x + 6) = $(x + 6)^2$

12) $(x + 6)^2$

+36

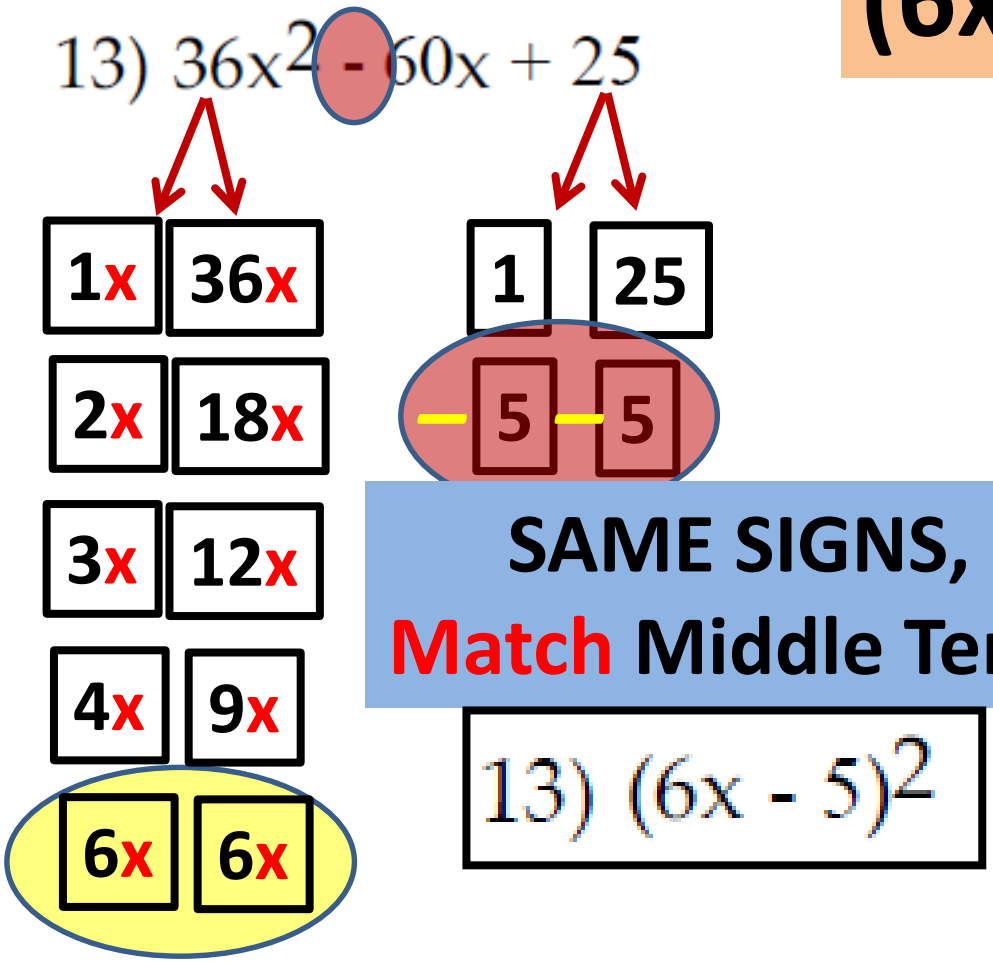
1	36
2	18
3	12
4	9

+ 6 + 6

Problem #13 (Factoring)

Factor the trinomial completely.

$13)\ 36x^2 - 60x + 25$



SAME SIGNS,
Match Middle Term!

$13)\ (6x - 5)^2$

$(6x - 5)(6x - 5)$

$(6x - 5)^2$

Factoring Difference of Squares

Form: $a^2 - b^2$

Factored Form: (a + b)(a – b)

where a and b are square roots.

Perfect square	Square root	Perfect square	Square root
1	$\sqrt{1} = 1$	81	$\sqrt{81} = 9$
4	$\sqrt{4} = 2$	100	$\sqrt{100} = 10$
9	$\sqrt{9} = 3$	121	$\sqrt{121} = 11$
16	$\sqrt{16} = 4$	144	$\sqrt{144} = 12$
25	$\sqrt{25} = 5$	169	$\sqrt{169} = 13$
36	$\sqrt{36} = 6$	196	$\sqrt{196} = 14$
49	$\sqrt{49} = 7$	225	$\sqrt{225} = 15$
64	$\sqrt{64} = 8$		

For variable, divide exponent by 2

EXAMPLES:

$$\sqrt{x^2} = x^1 = x$$

$$\sqrt{x^4} = x^2$$

$$\sqrt{x^{10}} = x^5$$

$$\sqrt{x^{88}} = x^{44}$$

$$\sqrt{x^{100}} = x^{50}$$

Problem #14 (Difference of Squares)

Factor the binomial completely.

14) $4x^2 - 25$

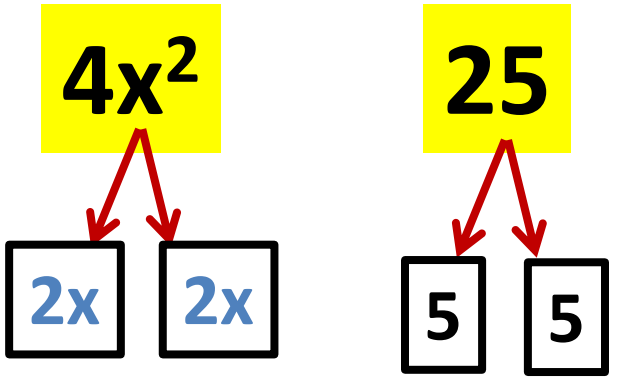
Factored Form: (+)(–)

Solution: (2x + 5)(2x – 5)

14) $(2x + 5)(2x - 5)$

Perfect square	Square root
1	$\sqrt{1} = 1$
4	$\sqrt{4} = 2$
9	$\sqrt{9} = 3$
16	$\sqrt{16} = 4$
25	$\sqrt{25} = 5$

$$\sqrt{x^2} = x^1 = x$$



Problem #15 (Difference of Squares)

Factor the binomial completely.

15) $25x^2 - 64y^2$

25	$\sqrt{25} = 5$
36	$\sqrt{36} = 6$
49	$\sqrt{49} = 7$
64	$\sqrt{64} = 8$

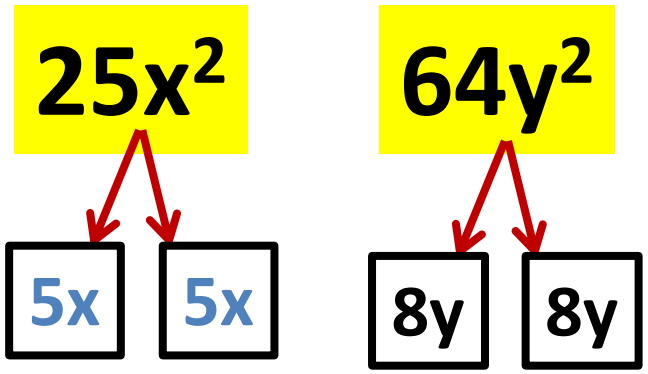
$\sqrt{x^2} = x^1 = x$

$\sqrt{y^2} = y^1 = y$

Factored Form: (+)(–)

Solution: (5x + 8y)(5x – 8y)

15) $(5x + 8y)(5x - 8y)$



Problem #16 (Difference of Squares)

Factor the binomial completely.

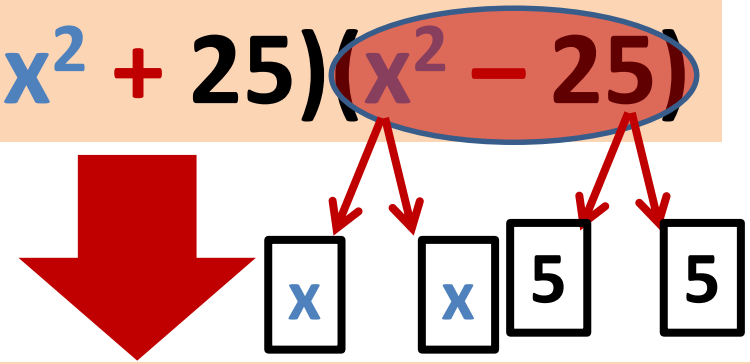
16) $x^4 - 625$

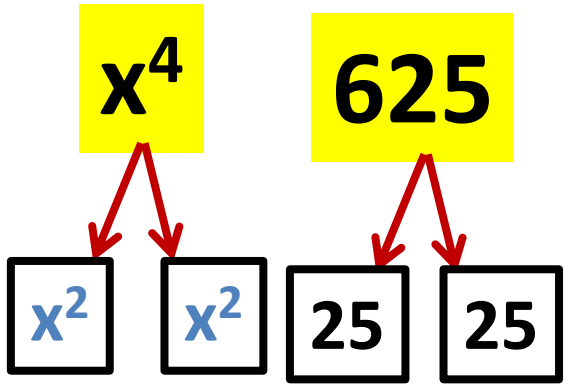
$\sqrt{625} = 25$

$\sqrt{x^4} = x^2$

Factored Form: (+)(−)

Solution: $(x^2 + 25)(x^2 - 25)$





Solution: $(x^2 + 25)(x - 5)(x + 5)$

16) $(x^2 + 25)(x + 5)(x - 5)$

Live example!

Factoring ONLY vs. Solving

Factor:

$x^2 + 6x + 8$

$(x \quad)(x \quad)$

Find factors of **8** that ***add*** to make **6**.

+8

Same Signs, Match Middle

1	8
+2	+4

$(x + 2)(x + 4)$

Solve:

$x^2 + 6x + 8 = 0$

$(x + 2)(x + 4) = 0$

$(x + 2) = 0$ → $x = -2$

$(x + 4) = 0$ → $x = -4$

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Problem #17 (Factoring)

Solve the equation.

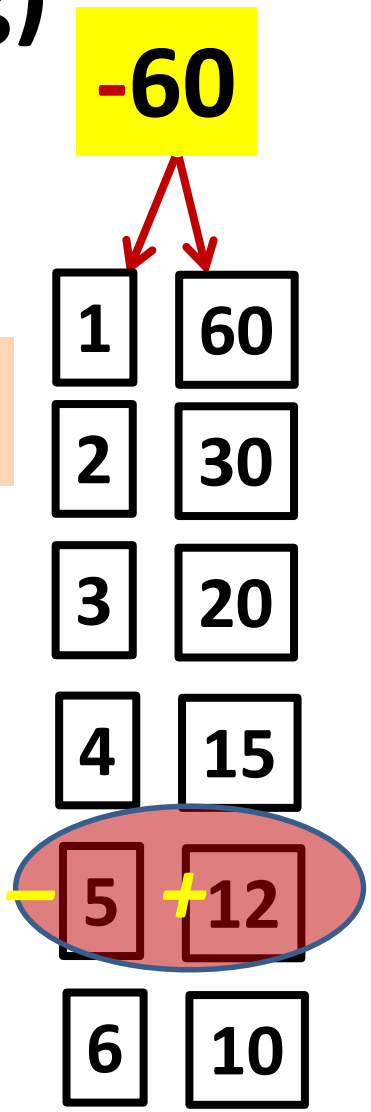
17) $x^2 + 7x - 60 = 0$

Factored Form: (x)(x) = 0

Find factors of **60** that ***subtract*** to make **7.**

Sign of bigger factor matches middle term *bx*

Factored: (x – 5)(x + 12) = 0



Problem #17 CONT…

Solve the equation.

17) $x^2 + 7x - 60 = 0$

17) -12, 5

Factored: (x – 5)(x + 12) = 0

(x – 5) = 0

x = 5

(x + 12) = 0

x = –12

Problem #18 (Factoring)

First Step, make equation equal to 0
ADD 40 to both sides!

18) $x^2 - 13x = -40$

Solve: $x^2 - 13x + 40 = 0$

+40

Factored Form: (x)(x) = 0

Find factors of **40** that ***add*** to make **13.**

1	40
2	20
4	10
−5	−8

Same Signs, Match Middle

Factored: (x – 5)(x – 8) = 0

Problem #18 CONT…

18) $x^2 - 13x = -40$

18) 8, 5

Solve: $x^2 - 13x + 40 = 0$

Factored: $(x - 5)(x - 8) = 0$

$(x - 5) = 0$

$x = 5$

$(x - 8) = 0$

$x = 8$

Live example!

Problem Solving (Types)

- Percent and Applications
- Proportions
- Perimeter (Rectangle)
- Pythagorean Theorem ($a^2 + b^2 = c^2$)

Percent Applications (2 methods)

Proportion:

$$\frac{PART}{TOTAL} = \frac{\%}{100}$$

Key Words:

$$\frac{\boldsymbol{IS}}{\boldsymbol{OF}} = \frac{\%}{100}$$

What number/percent
→ **Variable**

Equation:

Key Words:

IS: =

OF: Multiply

What number/percent
→ **Variable**

Problem #19 (Problem Solving)

Translate to an equation and solve.

19) 75% of 84 is what number?

75% of 84 is what number?

Proportion:

$$\frac{IS}{OF} = \frac{\%}{100}$$

Solve:

$$\frac{x}{84} = \frac{75}{100}$$

Equation to solve:

100x = 75 · 84

100x = 6300

x = 63

19) 63

Problem #19 (Method #2)

Translate to an equation and solve.

19) 75% of 84 is what number?

75% of 84 is what number?

Change 75% → 0.75

Equation to solve:

$$0.75 \cdot 84 = x$$

$$x = 63$$

19) 63

Problem #20 (Problem Solving)

Translate to an equation and solve.

20) 90 is what percent of 60?

90 is what percent of 60?

Proportion:

$$\frac{IS}{OF} = \frac{\%}{100}$$

Solve:

$$\frac{90}{60} = \frac{x}{100}$$

Equation to solve:

60x = 90 · 100

60x = 9000

x = 150%

20) 150%

Problem #20 (Method #2)

Translate to an equation and solve.

20) 90 is what percent of 60?

90 is what percent of 60?

Equation to solve:

$$90 = x \cdot 60$$

$$x = \frac{90}{60} = \frac{3}{2} = 1.5$$

Change 1.5 → 150%

Equation to solve:
$90 = x \cdot 60$

Problem #21 (Problem Solving)

Translate to an equation and solve.

21) 125% of what number is 75?

125% of what number is 75?

Proportion:

$$\frac{IS}{OF} = \frac{\%}{100}$$

Solve:

$$\frac{75}{x} = \frac{125}{100}$$

Equation to solve:

$125x = 75 \cdot 100$

$125x = 7500$

$x = 60$

21) 60

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Problem #21 (Method #2)

Translate to an equation and solve.

21) 125% of what number is 75?

125% of what number is 75?

Change 125% → 1.25

Equation to solve:

$$1.25 \cdot x = 75$$

21) 60

Live example!

$$x = \frac{75}{1.25} = \frac{7500}{125} = 60$$

Problem #22 (Problem Solving)

Solve.

22) A $230 painting is on sale at 5% off. Find the sale price.

Proportion:

$$\frac{PART}{TOTAL} = \frac{\%}{100}$$

Total = $230; Percent = 5%

Part is missing (Discount Amount)

Equation to solve:

100x = 230 · 5

Solve:

$$\frac{x}{230} = \frac{5}{100}$$

100x = 1150

22) $218.50

x = $11.50 (Discount)

Sales Price = $230 - $11.50 **= $218.50**

Problem #22 (Alternative Method)

Solve.

22) A $230 painting is on sale at 5% off. Find the sale price.

Total = $230
Percent = 5%
Discount = 5% of 120,000

of: key word for multiply!

Solve: (0.05)(230) **= $11.50 (Discount)**

Sales Price = $230 - $11.50 **= $218.50**

22) $218.50

Problem #23 (Problem Solving)

Solve. If needed, round money amounts to two decimal places and all other amounts to one decimal place.

23) Students at Maple School earned $408 selling candles. They want to accumulate $2000 for a club trip. What percent of their goal has been reached?

Proportion:

$$\frac{PART}{TOTAL} = \frac{\%}{100}$$

Total = $2000; Part = $408

Percent is missing

Equation to solve:

$2000x = 408 \cdot 100$

Solve:

$$\frac{408}{2000} = \frac{x}{100}$$

$2000x = 40800$

23) 20.4%

$x = 20.4\%$

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Problem #23 (Alternative Method)

Solve. If needed, round money amounts to two decimal places and all other amounts to one decimal place.

23) Students at Maple School earned $408 selling candles. They want to accumulate $2000 for a club trip. What percent of their goal has been reached?

$$\frac{PART}{TOTAL} = \frac{408}{2000} \begin{matrix} \div 2 \\ = \\ \div 2 \end{matrix} \frac{204}{1000} = 0.204$$

$$= 20.4\%$$

Live example!

Problem #24 (Problem Solving)

Substitute the given values into the formula and solve for the unknown variable.

24) $P = 2L + 2W$; $P = 24$, $W = 6$

Just Plug-in:

$P = 24$, $W = 6$

$$P = 2L + 2W;\ P = 24,\ W = 6$$

Live example!

$$24 = 2L + 2(6)$$

24) 6

$$24 = 2L + 12$$

Solve:

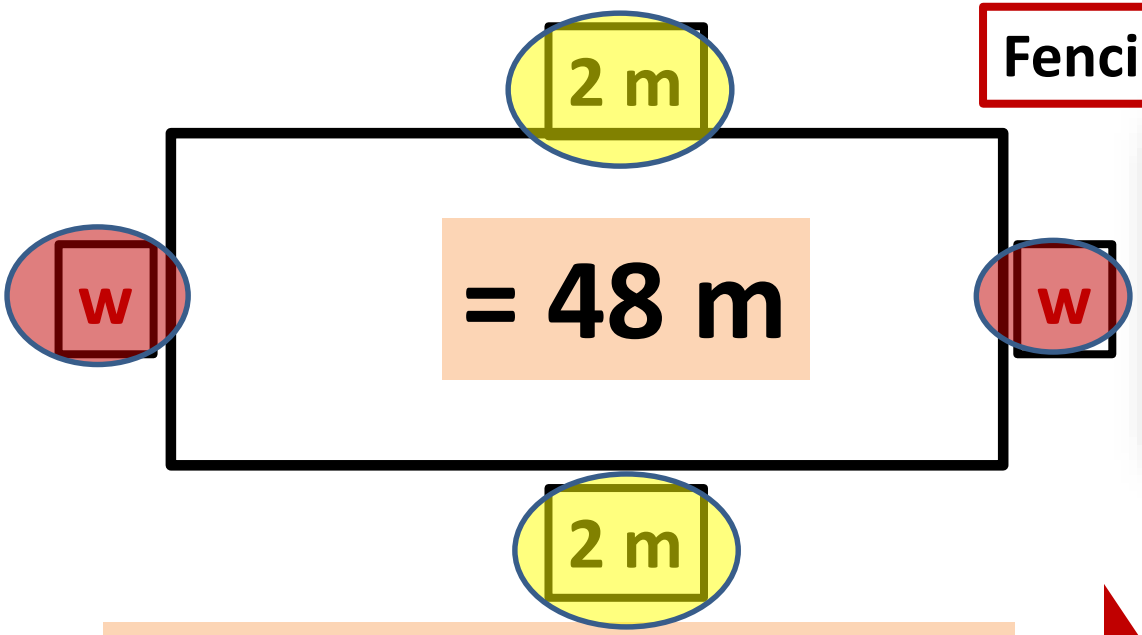
$$2L + 12 = 24$$

$$L = 6$$

Problem #25 (Problem Solving)

Solve.

25) You have taken up gardening for relaxation and have decided to fence in your new rectangular shaped masterpiece. The length of the garden is 2 meters and 48 meters of fencing is required to completely enclose it. What is the width of the garden?



Fencing goes around (Perimeter)

25) 22 m

Solve: $2w + 4 = 48$

w = 22 m

Problem #26, 27 (Problem Solving)

Translate the question into a proportion. Do not solve.

26) 7% of what number is 43.3?

27) 38.8 is 65% of what number?

26) **7%** of what number is **43.3**?

27) **38.8** is **65%** of what number?

Proportion:

$$\frac{IS}{OF} = \frac{\%}{100}$$

26)

$$\frac{43.3}{b} = \frac{7}{100}$$

27)

$$\frac{38.8}{b} = \frac{65}{100}$$

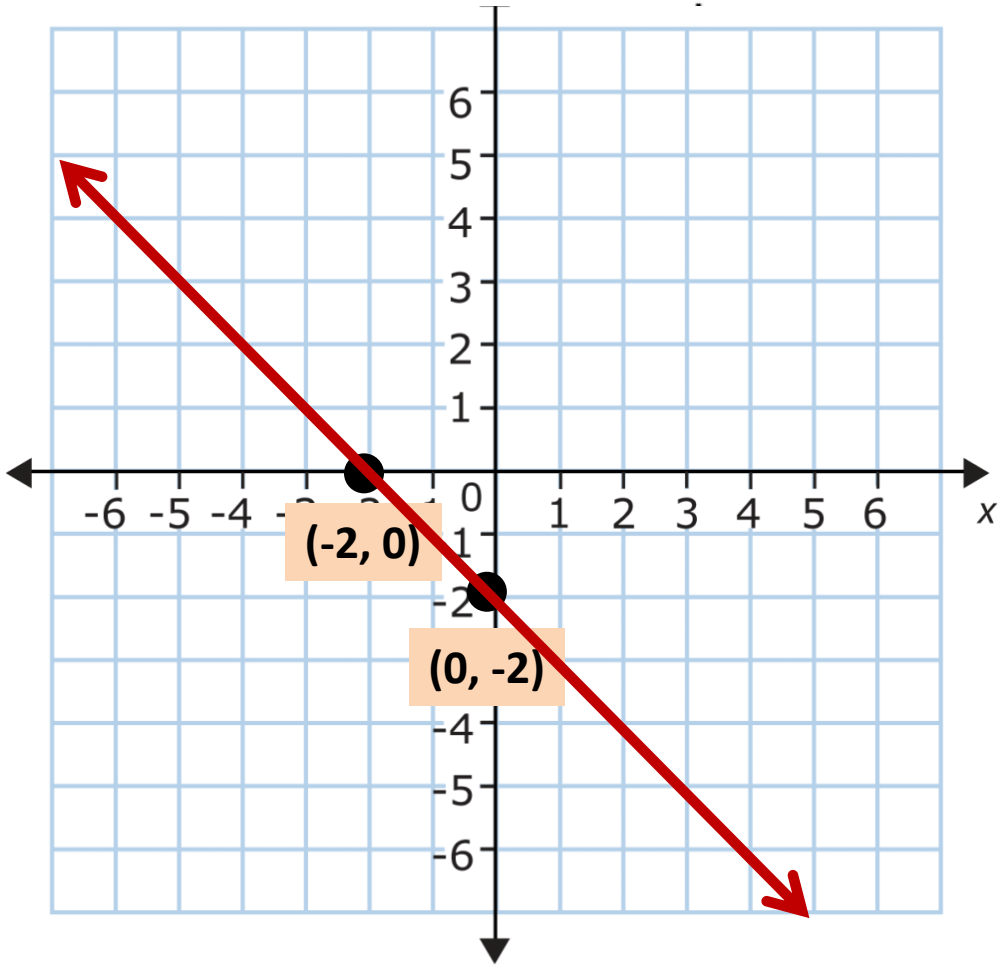
26) $\frac{43.3}{b} = \frac{7}{100}$

27) $\frac{38.8}{b} = \frac{65}{100}$

Problem #28 (Graphing)

Graph the linear equation by finding and plotting its intercepts.

28) $x + y = -2$



x	y
(0,	-2)
(-2 ,	0)

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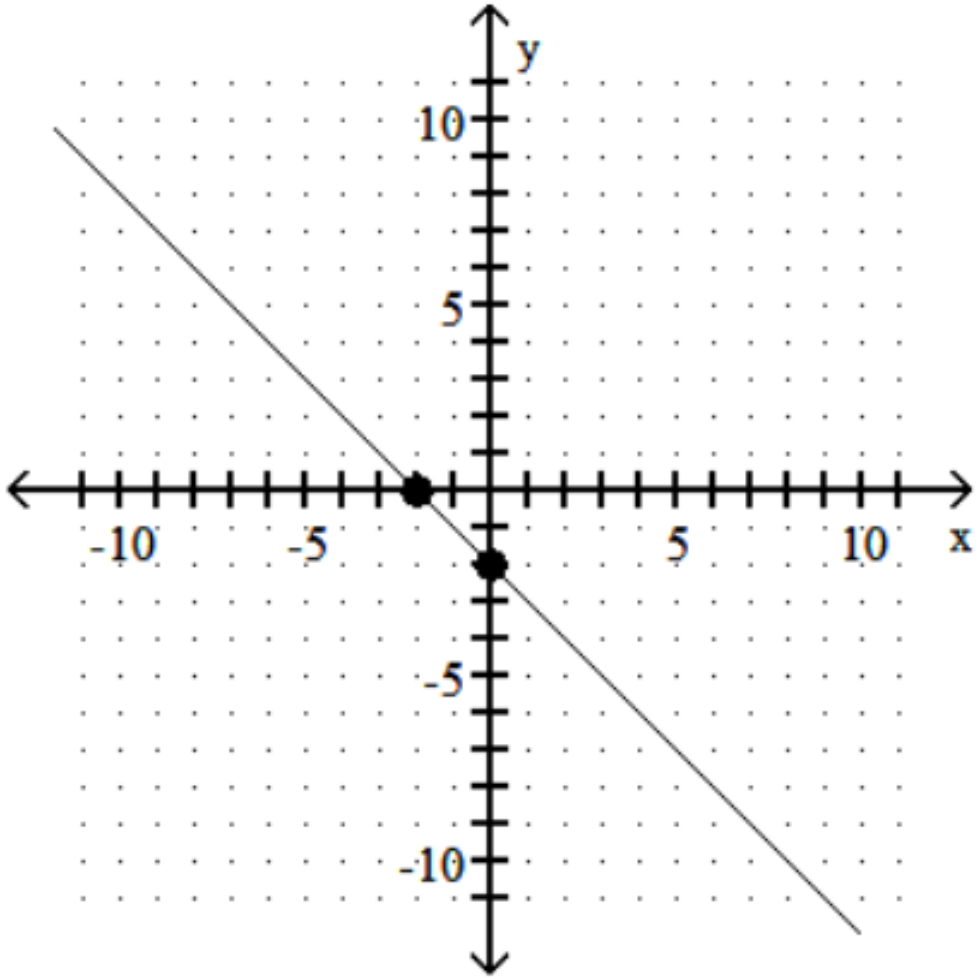
Solution for #28

28) (-2, 0), (0, -2)



Problem #29 (Graphing)

Graph the linear equation by finding and plotting its intercepts.

29) $16y - 4x = -8$

x-intercept (Plug y = 0):

$16(0) - 4x = -8$

Solve:

$-4x = -8;$

$x = 2$

x-int: (2, 0)

y-intercept (Plug x = 0):

$16y - 4(0) = -8$

Solve

$16y = -8;$

$y = -\frac{8}{16} = -\frac{1}{2}$

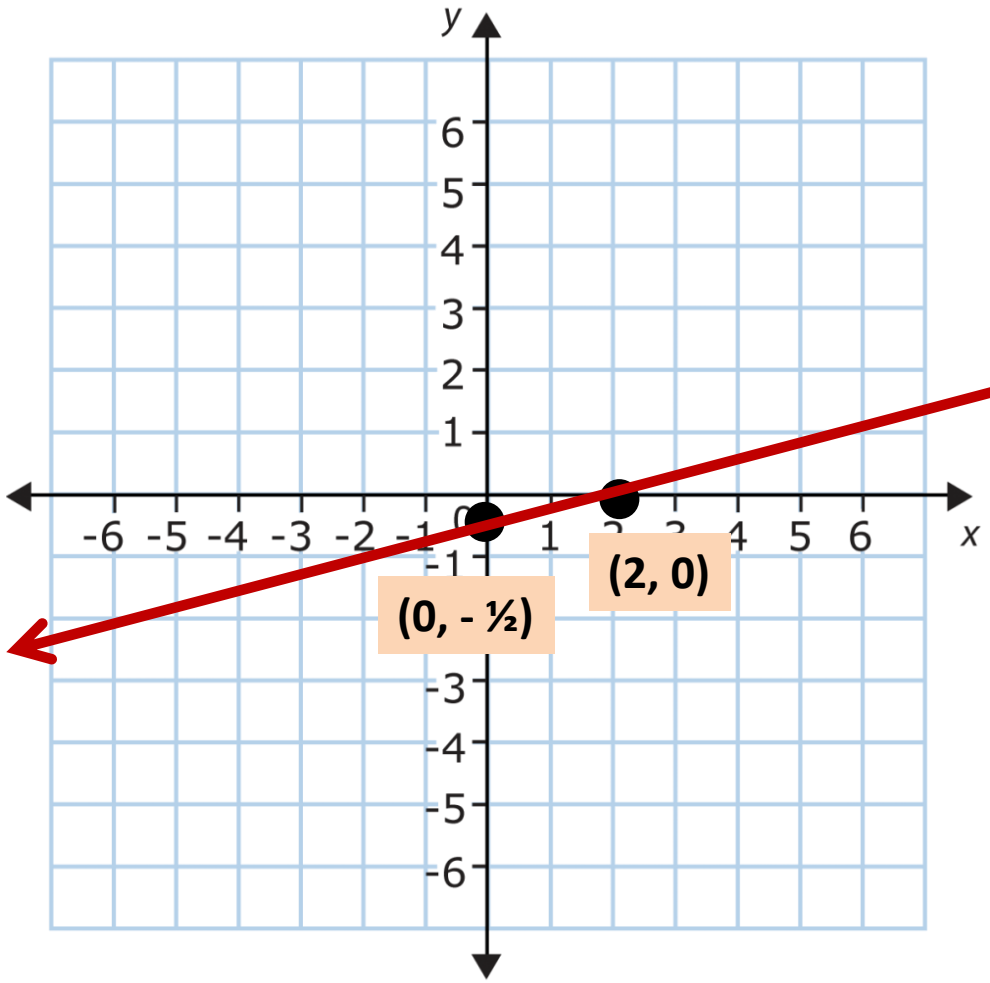
y-int: $(0, -\frac{1}{2})$

x	y
(2,	0)
(0,	$-\frac{1}{2}$)

Problem #29 (Graphing)

Graph the linear equation by finding and plotting its intercepts.

29) $16y - 4x = -8$



x	y
(2,	0)
(0,	$-\frac{1}{2}$)

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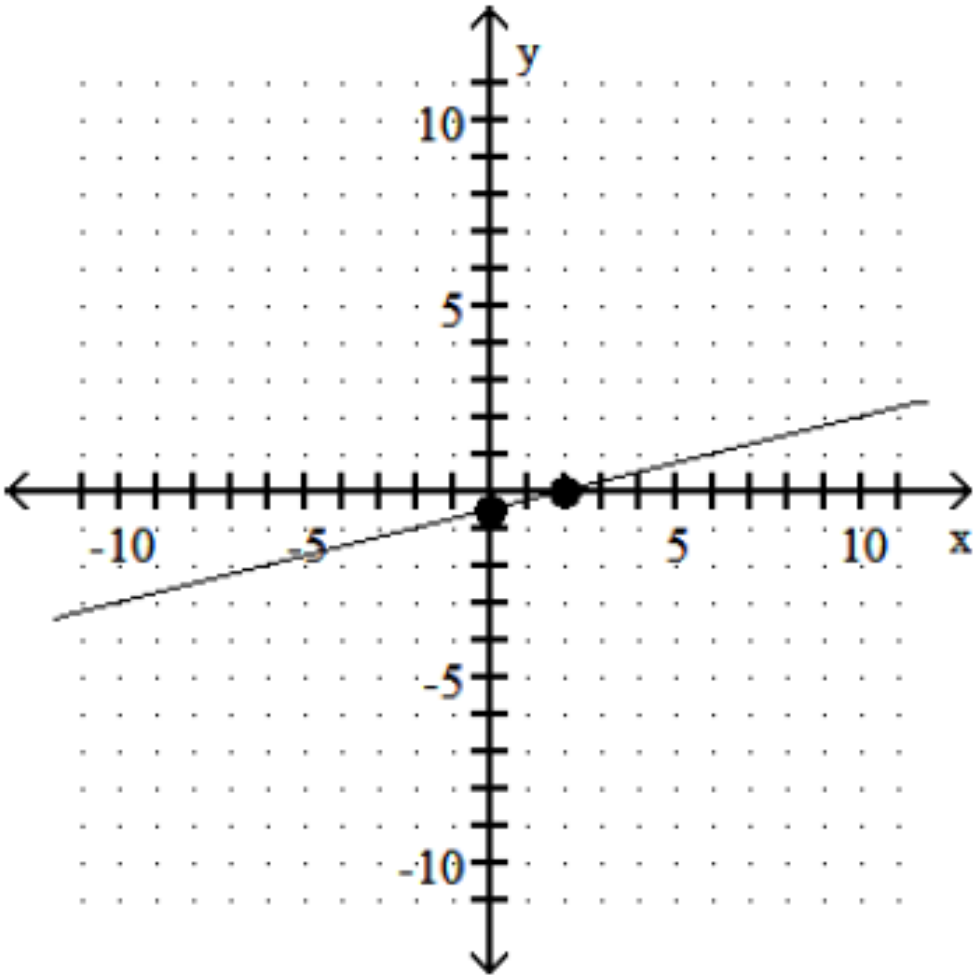
Solution for #29

29) $(0, -\frac{1}{2}), (2, 0)$

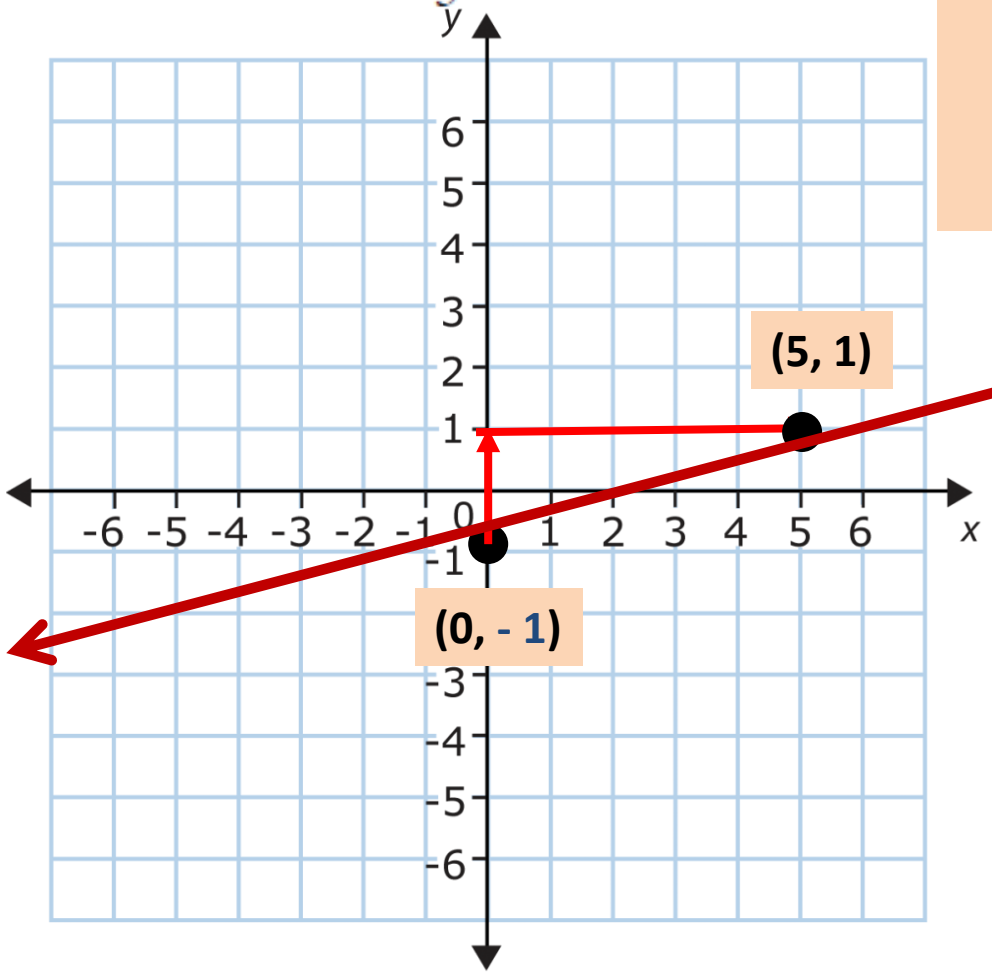


Live example!

Problem #30 (Graphing)

Graph the equation.

30) $y = \frac{2}{5}x - 1$



Slope-intercept form:

$y = mx + b$

$y = \frac{2}{5}x - 1$

First point: (0, -1)

Slope $= \frac{2}{5} = \frac{UP\ 2}{RIGHT\ 5}$

Problem #30 (Alternative Method)

Graph the equation.

30) $y = \frac{2}{5}x - 1$

x	y
(0 ,	-1)
(5 ,	1)

For x = 0:

$$y = \frac{2}{5}(0) - 1$$

y = –1

For x = 5:

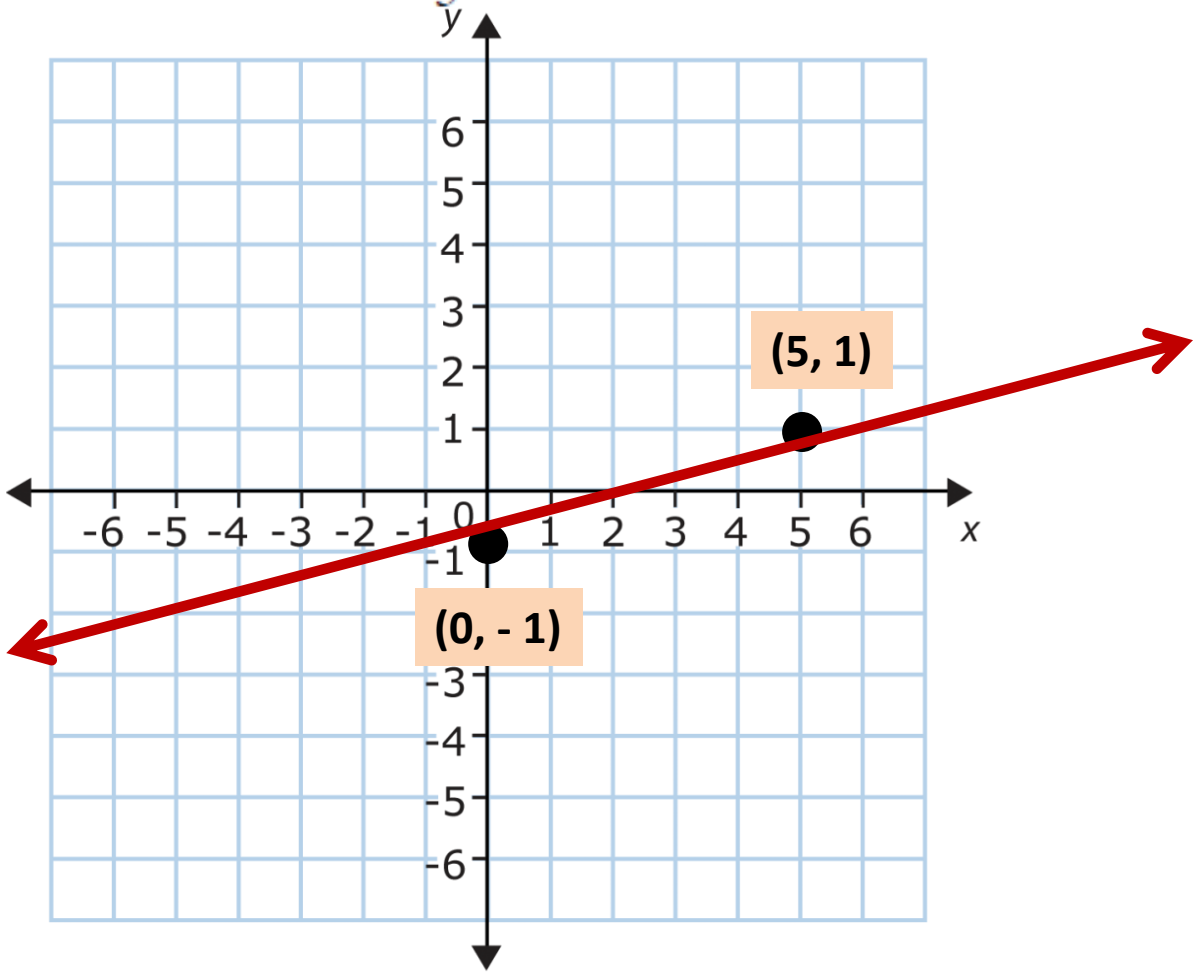
$$y = \frac{2}{5}(5) - 1$$

y = 1

Problem #30 CONT…

Graph the equation.

30) $y = \frac{2}{5}x - 1$



x	y
(0 ,	-1)
(5 ,	1)

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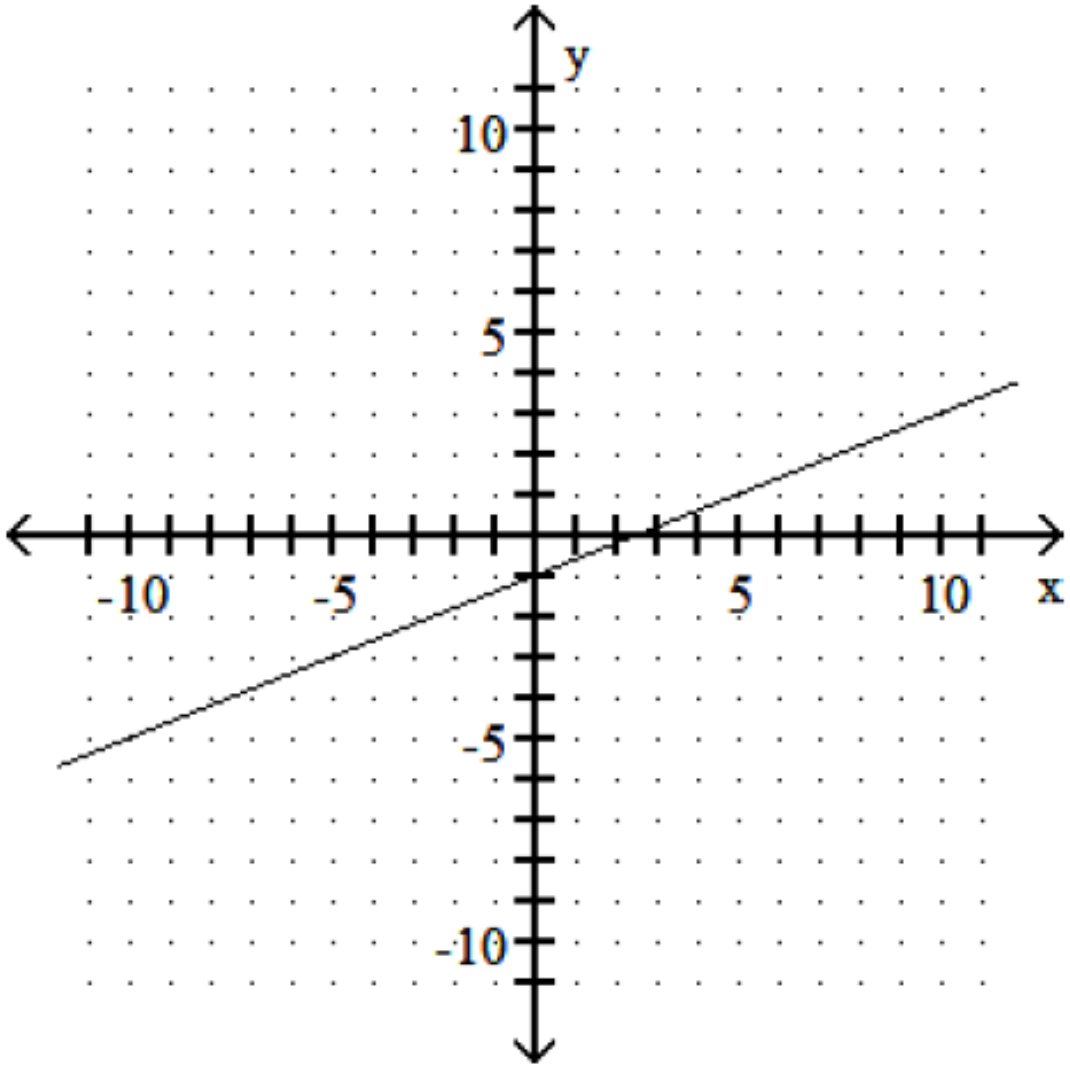
Solution for #30

30)



Live example!

Problem # 31 (Slope)

Find the slope of the line.

31) $y = -8x - 10$

31) $m = -8$

1) Remember slope-intercept form; **$y = mx + b$**

2) The slope is the coefficient of x; **m**.
Number in front of x is the slope.

The slope for $y = -8x - 10$ **is -8.**
m = - 8 (SLOPE)

Problem #32 (Slope)

Find the slope of the line that passes through the points.

32) (-9, -5) and (8, 7)

x_1 y_1 x_2 y_2

Slope between 2 points

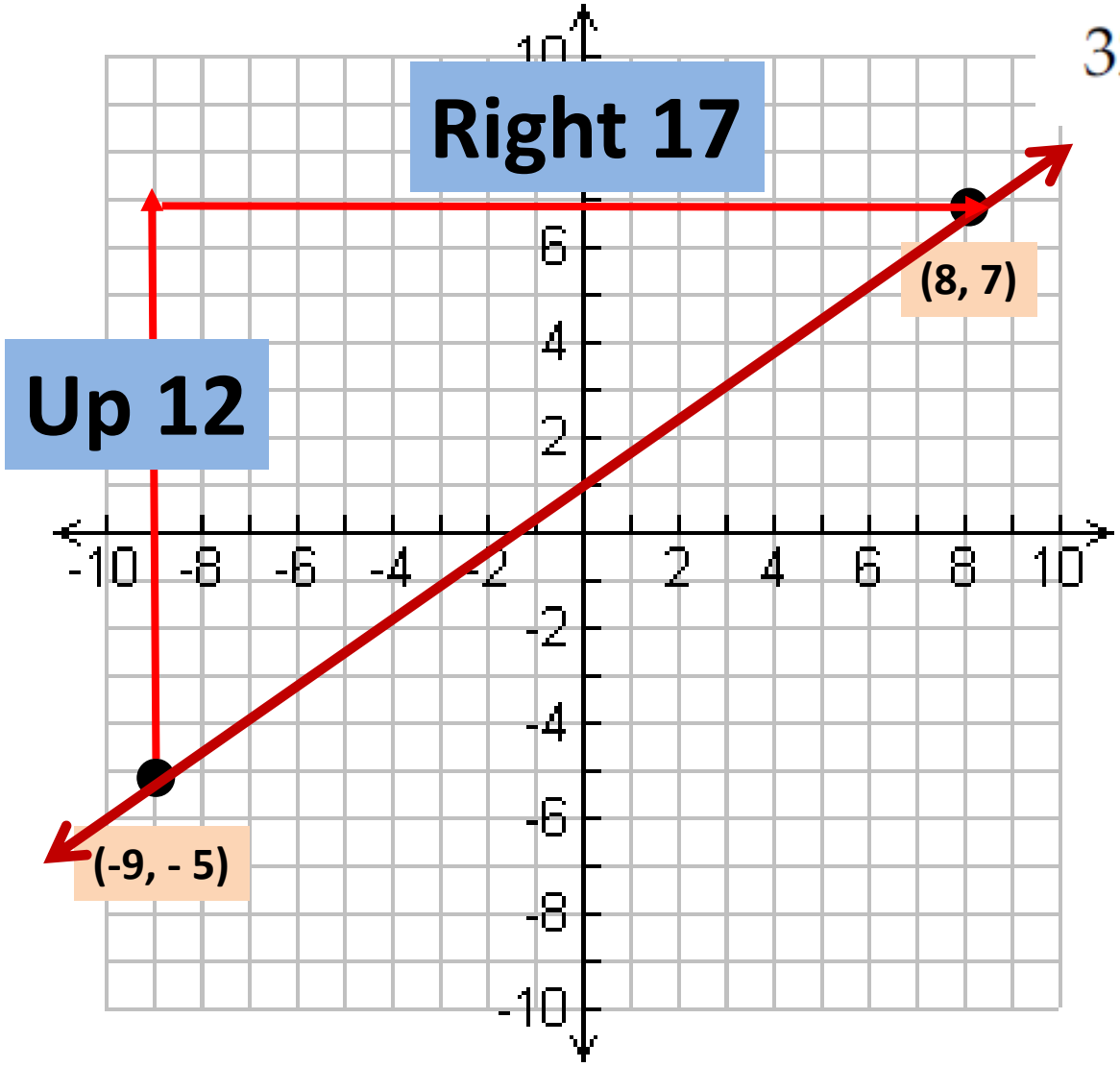
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

32) $\frac{12}{17}$

$$m = \frac{7 - -5}{8 - -9} = \frac{7 + 5}{8 + 9} = \frac{12}{17}$$

Problem #32 (Checking)

32) (-9, -5) and (8, 7)



= positive slope

Problem #33 (Graphing)

Graph.

33) $-x + 2y = -7$

Any method is acceptable since no method is specified.

After Solving, we have:

$y = \frac{1}{2}x - \frac{7}{2}$ →

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

Slope-intercept form:

$y = mx + b$

Solve for y.

Slope-intercept form:

$y = mx + b$

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

First point: $(0, -3\frac{1}{2})$

Slope $= \frac{1}{2} = \frac{UP\ 1}{RIGHT\ 2}$

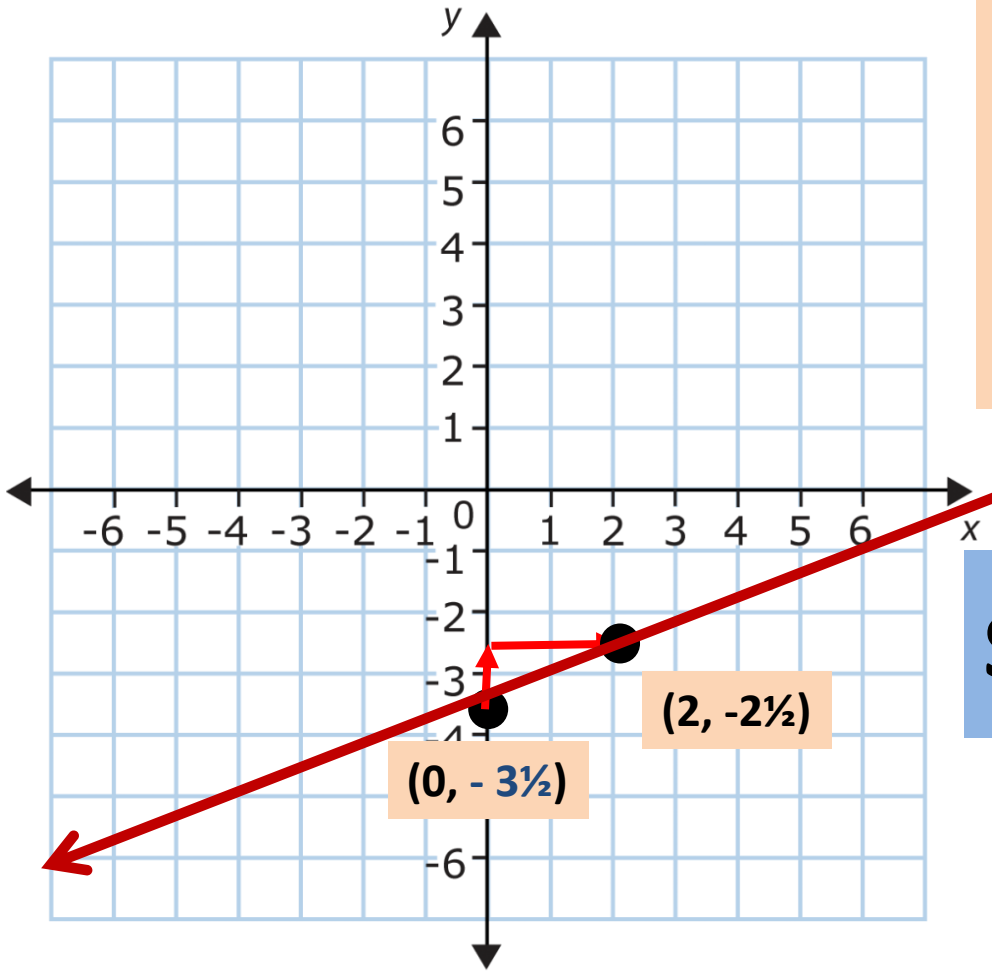
Problem #33 CONT

Slope-intercept form:

$$y = mx + b$$

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

First point: $(0, -3\frac{1}{2})$



Slope = $\frac{1}{2} = \frac{UP\ 1}{RIGHT\ 2}$

Problem #33 (Alternative Method)

We must still solve for y:

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

x	y
(0 ,	-3½)
(2 ,	-2½)

For x = 0:

$y = \frac{1}{2}(0) - 3\frac{1}{2}$

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

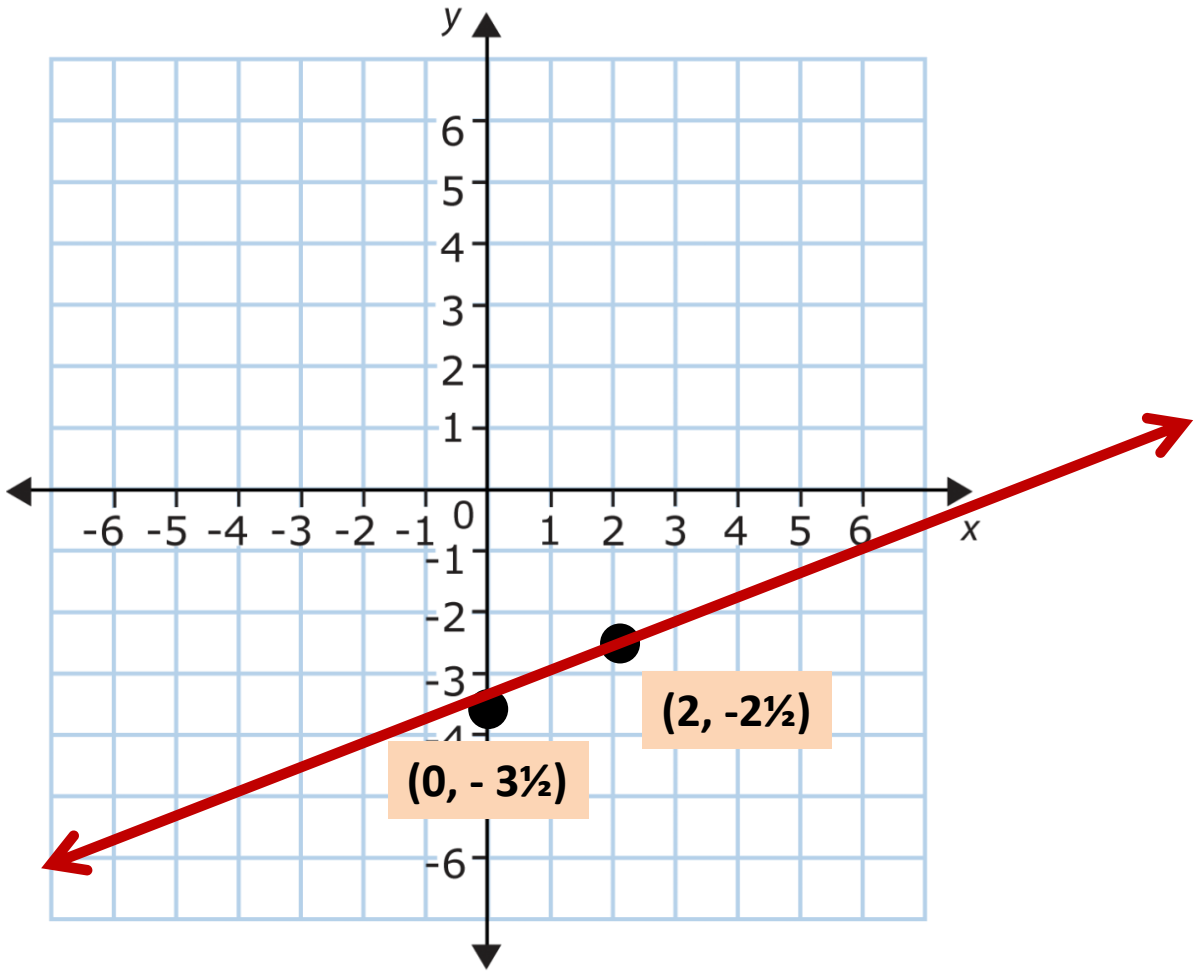
For x = 2:

$y = \frac{1}{2}(2) - 3\frac{1}{2}$

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

Problem #33 CONT…

x	y
(0 ,	-3½)
(2 ,	-2½)



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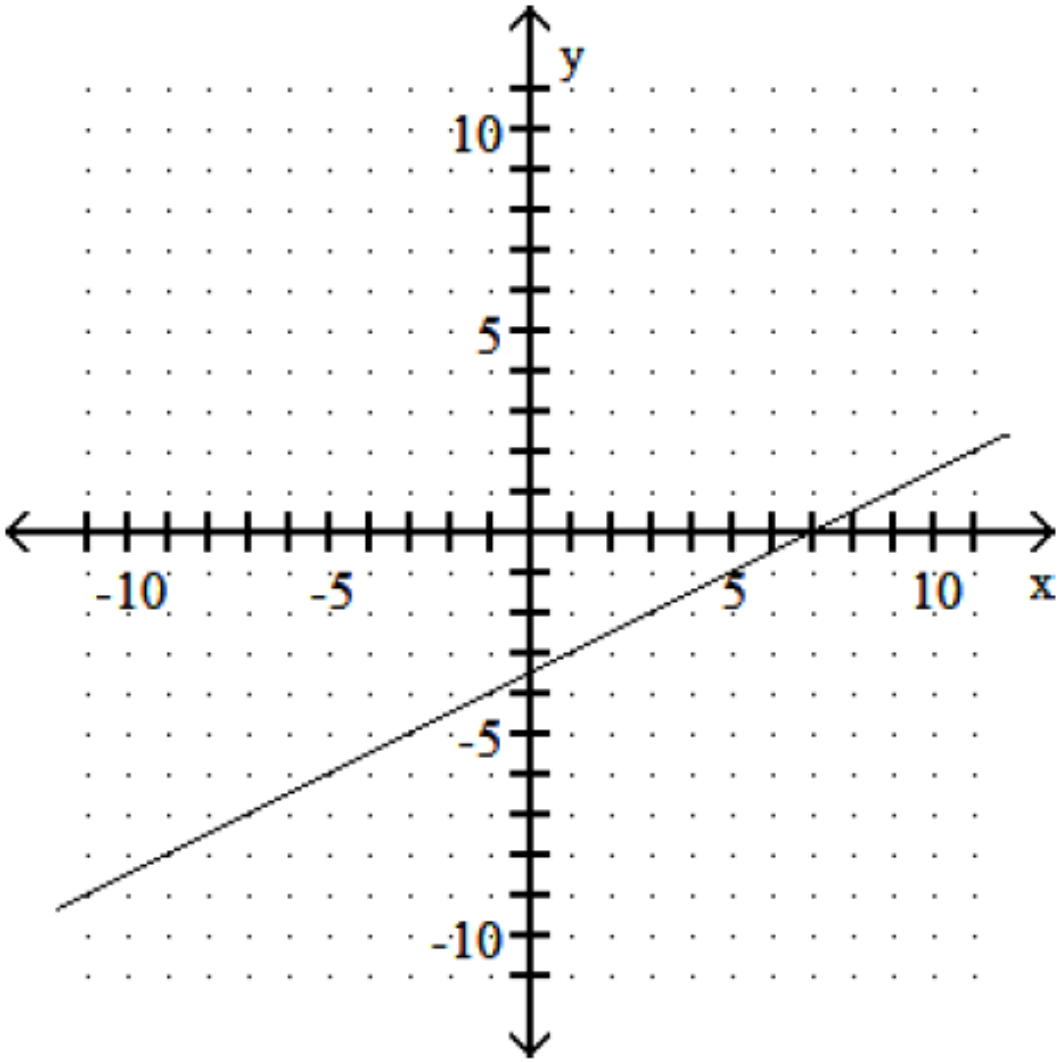
Solution for #33

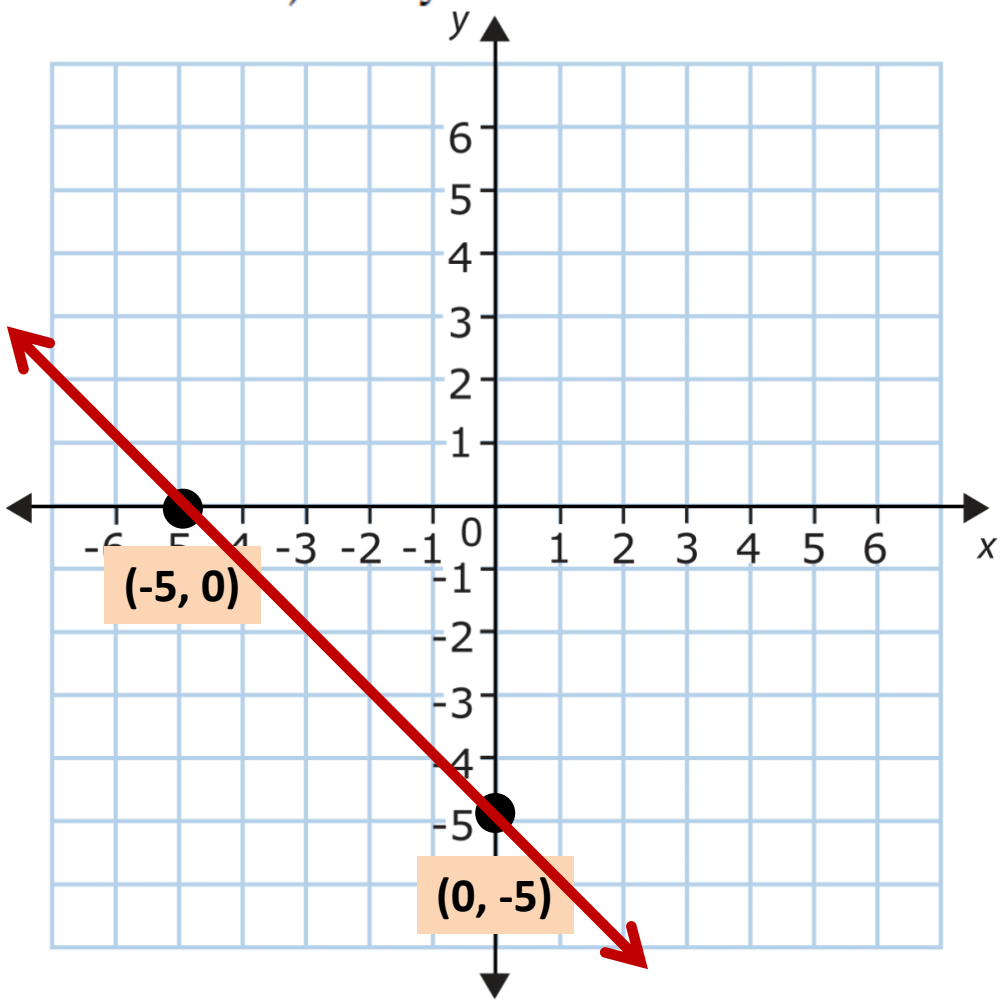
33)



Problem #34 (Graphing)

Graph the linear equation by finding and plotting its intercepts.

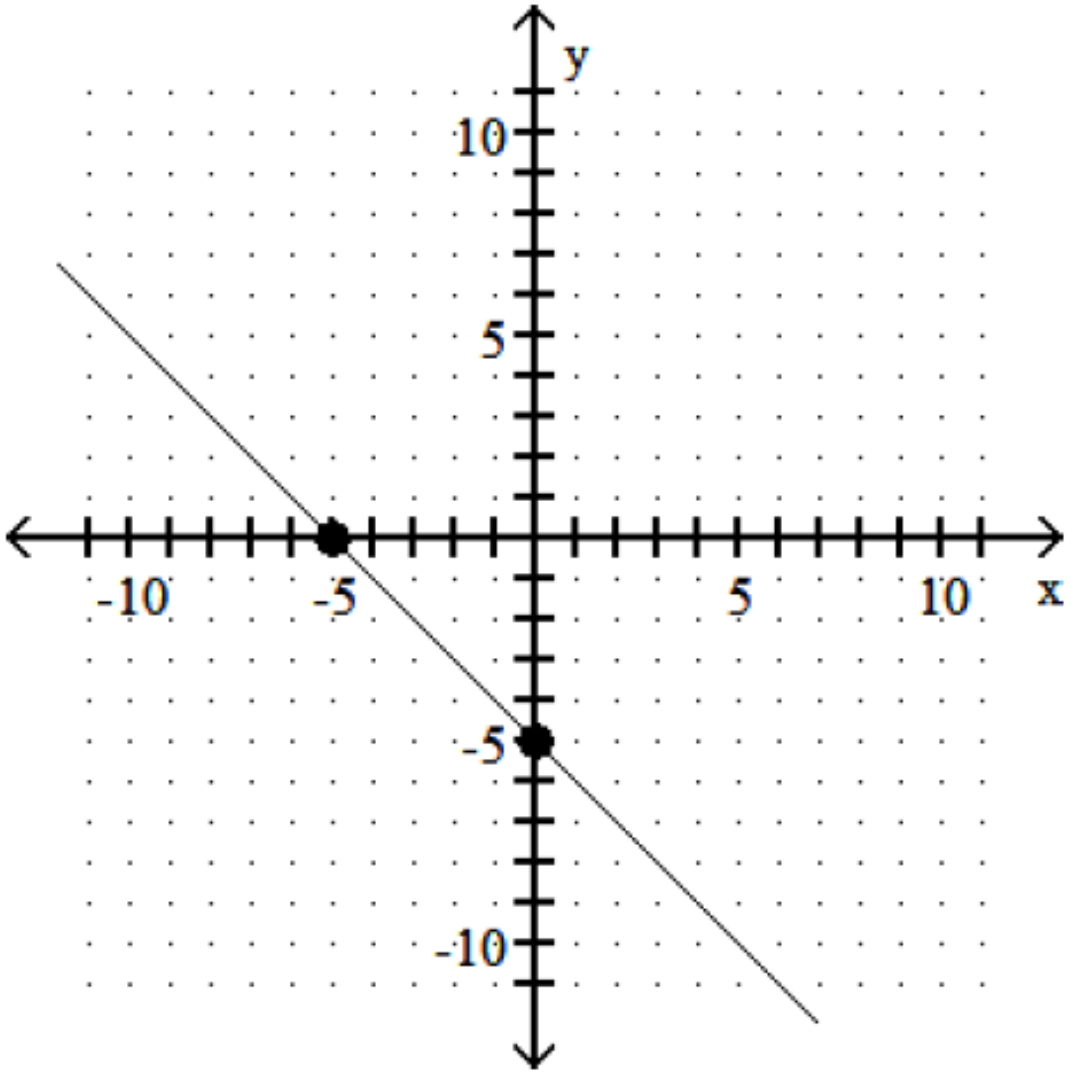
34) $x + y = -5$



x	y
(0,	-5)
(-5 ,	0)

Solution for #34

34)



Problem #35 (Intercepts)

Find the x– and y– intercepts.

35) $4x + 5y = 20$

35) (5, 0), (0, 4)

x-intercept (Plug y = 0):

$4x + 5(0) = 20$

Solve:

$4x = 20$;

$x = 5$

x-int:

(5, 0)

y-intercept (Plug x = 0):

$4(0) + 5y = 20$

Solve:

$5y = 20$;

$y = 4$

y-int:

(0, 4)

x	y
(5 ,	0)
(0,	4)

Problem #36 (Exponents)

Multiply.

36) $(-3m^2z^4)(2m^2z^2)$

36) $-6m^4z^6$

1) Remember property: $x^m x^n = x^{m+n}$

EXAMPLE: $x^5x^2 = x^7$

(For multiplication → **ADD** exponents for like variables)

2) For coefficients, multiply!

$$(-3m^2z^4)(2m^2z^2) = -6m^4z^6$$

Problem #37, 38 (Simplifying)

Combine like terms.

37) $6m^2 + 10m - 17m^2 + 5m$

$6m^2 + 10m - 17m^2 + 5m = -11m^2 + 15m$

38) $9x^5 + 4x^4 - 3x^5$

$9x^5 + 4x^4 - 3x^5 = 6x^5 + 4x^4$

37) $-11m^2 + 15m$

38) $6x^5 + 4x^4$

Problem #39 (Polynomials)

Add and write the resulting polynomial in descending order of degree.

39) $(9x + 6) + (-11x + 4)$

Descending Order: Highest → Lowest Exponent
Number/Constant is always last!
Concept: Combining Like Terms

$$9x + 6 - 11x + 4$$

$$= -2x + 10$$

39) $-2x + 10$

Problem #40 (Polynomials)

Subtract the polynomials.

40) $(4x^7 - 8x^6 - 5) - (2x^7 + 11x^6 + 19)$

Just copy

Multiply by -1 (change signs)

$4x^7$	$-8x^6$	-5
$-2x^7$	$-11x^6$	-19

40) $2x^7 - 19x^6 - 24$

$2x^7 - 19x^6 - 24$

Problem #41 (Exponents)

Simplify.

41) $(-3xy^4)^4$

41) $81x^4y^{16}$

1) Remember property: $(x^m)^n = x^{mn}$

EXAMPLE: $(x^5)^2 = x^{10}$

(For exponents to exponents → **MULITPLY** exponents for like variables)

2) For coefficients, raise to exponent like usual!

$(-3x^1y^4)^4 = (-3)^4 x^4y^{16} = 81x^4y^{16}$

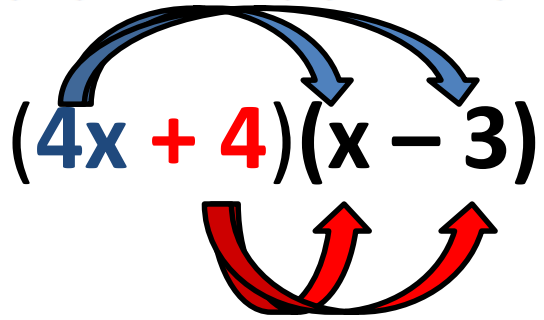
Check: $(-3xy^4)(-3xy^4)(-3xy^4)(-3xy^4) = 81x^4y^{16}$

Problem #42 (Polynomials)

Multiply the binomials using FOIL.

42) $(4x + 4)(x - 3)$

42) $4x^2 - 8x - 12$



$4x^2 - 12x$

$+4x - 12$

$4x^2 - 8x - 12$

Problem #43 (Polynomials)

Multiply using the rules for special products.

43) $(3a - 4)^2$

Write the binomial twice!

$(3a - 4)(3a - 4)$

$9a^2 - 12a$

$-12a + 16$

43) $9a^2 - 24a + 16$

$9a^2 - 24a + 16$

Problem #44 (Exponents)

Simplify.

44) $(-3a^6b^4)^3$

44) $-27a^{18}b^{12}$

1) Remember property: $(x^m)^n = x^{mn}$

EXAMPLE: $(x^5)^2 = x^{10}$

(For exponents to exponents → **MULITPLY** exponents for like variables)

2) For coefficients, raise to exponent like usual!

$(-3a^6b^4)^3 = (-3)^3 a^{18}b^{12} = -27a^{18}b^{12}$

Check: $(-3a^6b^4)(-3a^6b^4)(-3a^6b^4) = -27a^{18}b^{12}$

Problem #45 (Polynomials)

Multiply using the rules for special products.

45) $(3m + 1)^2$

Write the binomial **twice**!

$(3m + 1)(3m + 1)$

$9m^2 + 3m$

$+ 3m + 1$

45) $9m^2 + 6m + 1$

$9m^2 + 6m + 1$

Simplifying Square Roots

Know your perfect squares!

We will factor our biggest perfect square!

Perfect square	Square root	Perfect square	Square root
1	$\sqrt{1} = 1$	81	$\sqrt{81} = 9$
4	$\sqrt{4} = 2$	100	$\sqrt{100} = 10$
9	$\sqrt{9} = 3$	121	$\sqrt{121} = 11$
16	$\sqrt{16} = 4$	144	$\sqrt{144} = 12$
25	$\sqrt{25} = 5$	169	$\sqrt{169} = 13$
36	$\sqrt{36} = 6$	196	$\sqrt{196} = 14$
49	$\sqrt{49} = 7$	225	$\sqrt{225} = 15$
64	$\sqrt{64} = 8$		

For variable, divide exponent by 2

EXAMPLES:

$$\sqrt{x^2} = x^1 = x$$

$$\sqrt{x^4} = x^2$$

$$\sqrt{x^{10}} = x^5$$

$$\sqrt{x^{88}} = x^{44}$$

$$\sqrt{x^{100}} = x^{50}$$

Problem #46 (Square Roots/Radicals)

Simplify. Assume variables represent nonnegative values.

46) $\sqrt{48x^2y}$

$\sqrt{16x^2} \cdot \sqrt{3y}$

4x $\sqrt{3y}$

$4x\sqrt{3y}$

Perfect square	Square root
1	$\sqrt{1} = 1$
4	$\sqrt{4} = 2$
9	$\sqrt{9} = 3$
16	$\sqrt{16} = 4$

$\sqrt{x^2} = x$

46) $4x\sqrt{3y}$

Problem #47 (Square Roots/Radicals)

Simplify. Assume variables represent nonnegative values.

47) $\sqrt{108x^2}$

$\sqrt{36x^2} \cdot \sqrt{3}$

6x $\sqrt{3}$

6x $\sqrt{3}$

Perfect square	Square root
1	$\sqrt{1} = 1$
4	$\sqrt{4} = 2$
9	$\sqrt{9} = 3$
16	$\sqrt{16} = 4$
25	$\sqrt{25} = 5$
36	$\sqrt{36} = 6$

$\sqrt{x^2} = x$

47) $6x\sqrt{3}$

Problem #48 (Square Roots/Radicals)

Simplify. Assume that all variables represent positive numbers.

48) $\sqrt{49x^{13}}$

$\sqrt{49x^{12}} \cdot \sqrt{x}$

$7x^6$ $\sqrt{x}$

$7x^6\sqrt{x}$

Perfect square	Square root
1	$\sqrt{1} = 1$
4	$\sqrt{4} = 2$
9	$\sqrt{9} = 3$
16	$\sqrt{16} = 4$
25	$\sqrt{25} = 5$
36	$\sqrt{36} = 6$
49	$\sqrt{49} = 7$

$\sqrt{x^{12}} = x^6$

Live example!

48) $7x^6\sqrt{x}$

Problem #49 (Square Roots/Radicals)

Simplify. Assume that all variables represent positive numbers.

$$49)\ \sqrt{\frac{32y^5}{49x^8}} = \frac{\sqrt{32y^5}}{\sqrt{49x^8}} = \frac{4y^2\sqrt{2y}}{7x^4}$$

$\sqrt{32y^5}$

$\sqrt{16y^4} \cdot \sqrt{2y}$

$4y^2$ $\quad \sqrt{2y}$

$$\frac{4y^2\sqrt{2y}}{7x^4}$$

$$49)\ \frac{4y^2\sqrt{2y}}{7x^4}$$

Square root

$\sqrt{1} = 1$

$\sqrt{4} = 2$

$\sqrt{9} = 3$

16 $\quad \sqrt{16} = 4$

$\sqrt{y^4} = y^2$

Problem #50 (Square Roots/Radicals)

Add or subtract by first simplifying each radical and then combining any like radical terms. Assume that all variables represent positive real numbers.

50) $4\sqrt{5} - 7\sqrt{20}$

$4\sqrt{5} - 7(2\sqrt{5})$

$4\sqrt{5} - 14\sqrt{5}$

$-10\sqrt{5}$

$\sqrt{20}$

$\sqrt{4} \cdot \sqrt{5}$

$2 \quad \sqrt{5}$

$2\sqrt{5}$

Perfect square	Square root
1	$\sqrt{1} = 1$
4	$\sqrt{4} = 2$

50) $-10\sqrt{5}$

Problem #51
(Square Roots/Radicals)

Add or subtract by first simplifying each radical and then combining any like radical terms. Assume that all variables represent positive real numbers.

51) $\sqrt{48} - 10\sqrt{243} - 9\sqrt{12}$

$4\sqrt{3} - 10(9\sqrt{3}) - 9(2\sqrt{3})$

$4\sqrt{3} - 90\sqrt{3} - 18\sqrt{3}$

$-104\sqrt{3}$

51) $-104\sqrt{3}$

Live example!

$\sqrt{48}$

$\sqrt{16} \cdot \sqrt{3}$

4 $\sqrt{3}$

$\sqrt{243}$

$\sqrt{81} \cdot \sqrt{3}$

9 $\sqrt{3}$

$\sqrt{12}$

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

2 $\sqrt{3}$

Problem #52 (Equations)

Solve the equation for the indicated variable.

52) $A = P + PRT$ for T

$A = P + PRT$

$-P \quad -P$

$\frac{A - P}{PR} = \frac{PRT}{PR}$

$T = \frac{A - P}{PR}$

52) $T = \frac{A - P}{PR}$

Problem #53 (Equations)

Solve the equation for the indicated variable.

53) $V = \frac{1}{3}Ah$ for h

Clear fractions!

$\cdot 3 \quad V = \cdot 3 \frac{1}{3} Ah$

$\frac{3V}{A} = \frac{Ah}{A}$

$h = \frac{3V}{A}$

53) $h = \frac{3V}{A}$

Problem #54 (Equations)

Solve the equation.

54) $3x = 4(x + 4) - 5$

$3x = 4(x + 4) - 5$

$3x = 4x + 16 - 5$

$3x = 4x + 11$

$-4x \quad -4x$

$-1x = 11$

$-1 \quad -1$

$x = -11$

54) -11

Problem #55 (Equations)

Solve the equation.

55) $-4(x + 3) - 36 = -14 - 10$

$-4(x + 3) - 36 = -14 - 10$

$-4x - 12 - 36 = -24$

$-4x - 48 = -24$

$+48 \quad +48$

$-4x = 24$

$-4 \quad -4$

$x = -6$

55) -6

Problem #56 (Equations)

Solve. $56)\ \frac{6}{5}x = -\frac{1}{2} - \frac{3}{5}$

Clear fractions!

LCD = 10

$\cdot 10 \quad \cdot 10 \quad \cdot 10$

$$\frac{6}{5}x = -\frac{1}{2} - \frac{3}{5}$$

$2 \cdot 6x = 5 \cdot -1 - 2 \cdot 3$

$12x = -5 - 6$

$$\frac{12x}{12} = \frac{-11}{12}$$

$$x = -\frac{11}{12}$$

$$56)\ -\frac{11}{12}$$

Problem #57 (Equations)

Solve. 57) $\frac{a}{3} - \frac{1}{3} = -5$

Clear fractions!

LCD = 3

$\cdot 3 \quad \frac{a}{3} - \frac{1}{3} = -5 \quad \cdot 3$

$a - 1 = -15$

$+1 \quad +1$

$a = -14$

57) -14

Live example!

Problem #58 (Equations)

Solve. 58) $\frac{5}{3} - \frac{x}{5} = \frac{13}{15}$

Clear fractions!

LCD = 15

5 3

$\cdot 15 \quad \frac{5}{3} - \frac{x}{5} = \frac{13}{15} \quad \cdot 15$

$5 \cdot 5 - 3x = 13$

$25 - 3x = 13$

$-25 \quad -25$

$-3x = -12$

$-3 \quad -3$

$x = 4$

58) 4

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Problem #59 (Equations)

Solve the equation.

59) $7x - 7 = 5x - 8$

Get variable to 1 side!

$7x - 7 = 5x - 8$

$-5x \quad\quad -5x$

$2x - 7 = -8$

$+7 \quad\quad +7$

$2x = -1$

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

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

59) -0.5

Problem #60 (Equations)

Solve the equation.

60) $1.4x - 3.1 = 0.7x - 1.98$

Clear Decimals!
Move decimal point 2 places over.

$1.4\mathbf{0}x - 3.1\mathbf{0} = 0.7\mathbf{0}x - 1.98$

$140x - 310 = 70x - 198$

$-70x \qquad -70x$

$70x - 310 = -198$

$+310 \qquad +310$

$70x = 112$

Problem #60 CONT…

Solve the equation.

60) $1.4x - 3.1 = 0.7x - 1.98$

$$\frac{70x}{70} = \frac{112}{70}$$

$$\frac{112}{70} \overset{\div 2}{\underset{\div 2}{=}} \frac{56}{35} \overset{\div 7}{\underset{\div 7}{=}} \frac{8}{5}$$

DIVIDE!

x = 1.6

60) 1.6

Problem #61 (Equations)

Solve the equation.

Clear Decimals!
Move decimal point 2 places over.

61) $-0.7x + 1.15 = -0.4x + 2.05$

$-0.70x + 1.15 = -0.40x + 2.05$

$-70x + 115 = -40x + 205$

$+40x \qquad +40x$

$-30x + 115 = 205$

$-115 \qquad -115$

$-30x = 90$

$-30 \qquad -30$

$x = -3$

61) -3

Live example!

Graphing Inequalities

For < or >: ○ ( )

For ≤ or ≥: ● [ ]

Interval Notation

For $<$ or $>$: **Use ( )**

For $\leq$ or $\geq$: **Use [ ]**

For $-\infty$ or ∞: **Use ( ) ONLY!**

Problem #62 (Inequalities)

Solve the inequality. Graph the solution set and write it in interval notation.

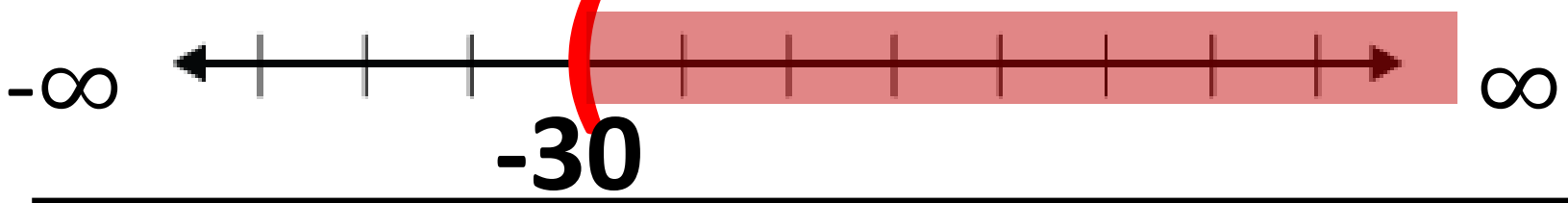
62) $-\frac{1}{5}x < 6$

Inequality Flips/Reverses
When both sides are multiplied/divided by a negative!

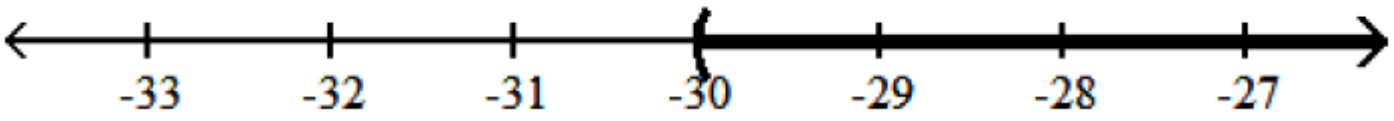
$\cdot -5 \quad -\frac{1}{5}x < 6 \quad \cdot -5$

$x > -30$

Interval Notation:
(-30, ∞)



62) (−30, ∞)



Problem #63 (Inequalities)

Solve the inequality. Graph the solution set and write it in interval notation.

63) $24x + 28 \leq 4(5x + 11)$

$24x + 28 \leq 4(5x + 11)$

$24x + 28 \leq 20x + 44$

$-20x \quad\quad -20x$

$4x + 28 \leq 44$

$-28 \quad\quad -28$

$4x \leq 16$

$\frac{4x}{4} \leq \frac{16}{4}$

Since both sides are being divided by a positive 4, WE DO NOT FLIP INEQUALITY SYMBOL!

$x \leq 4$

Problem #63 CONT…

Solve the inequality. Graph the solution set and write it in interval notation.

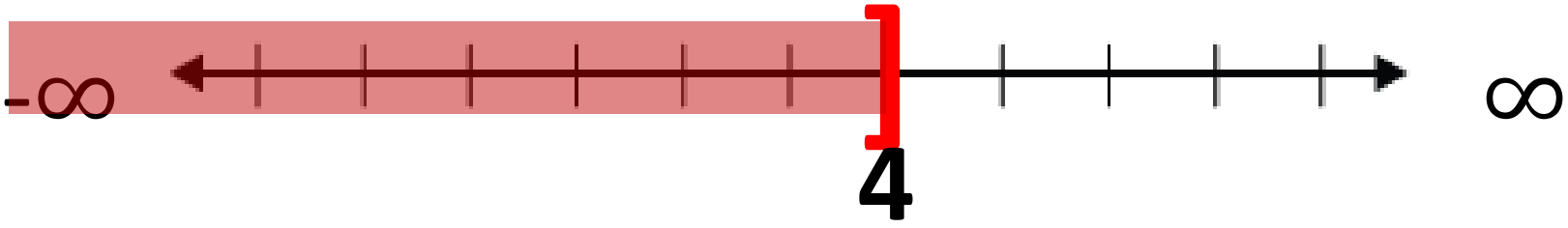
63) $24x + 28 \leq 4(5x + 11)$

$$x \leq 4$$

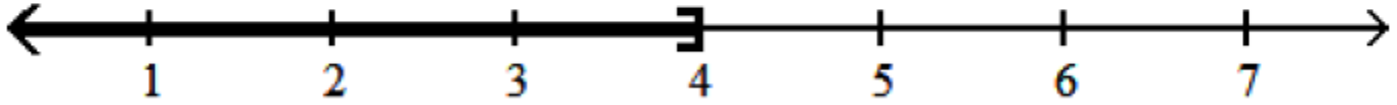
Live example!

Interval Notation:

$(-\infty, 4]$



63) $(-\infty, 4]$



Problem #64 (Inequalities)

Solve the inequality.

64) $-5(6y + 3) < -35y + 30$

$-5(6y + 3) < -35y + 30$

$-30y - 15 < -35y + 30$

$+35y \quad +35y$

$5y - 15 < 30$

$+15 \quad +15$

$5y < 45$

$\frac{5y}{5} < \frac{45}{5}$

Since both sides are being divided by a positive 5, WE DO NOT FLIP INEQUALITY SYMBOL!

$y < 9$

Problem #64 CONT…

Solve the inequality.

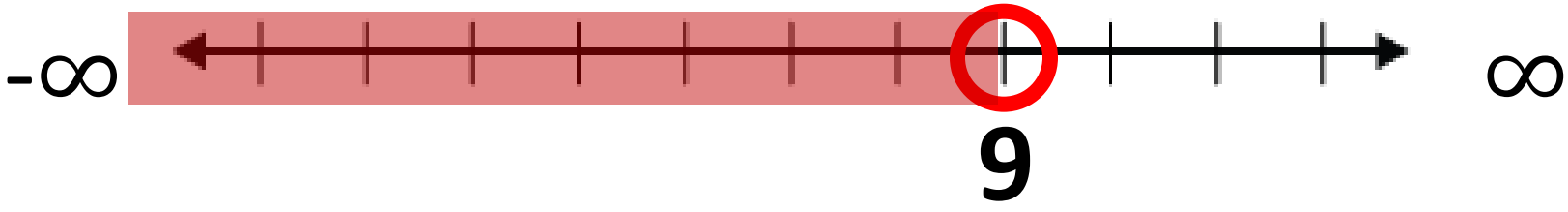
64) $-5(6y + 3) < -35y + 30$

$y < 9$

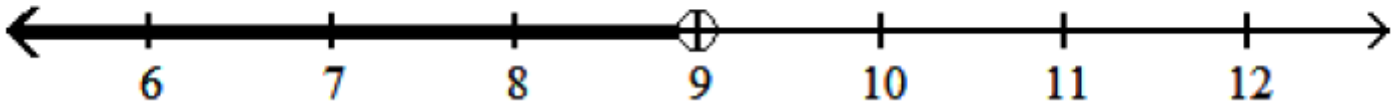
Live example!

Set-builder Notation:

$\{y \mid y < 9\}$



64) $\{y \mid y < 9\}$



Problem #65 (Inequalities)

Solve the inequality.

65) $\frac{y}{5} > 6$

Since both sides are being multiplied by a positive 5, WE DO NOT FLIP INEQUALITY SYMBOL!

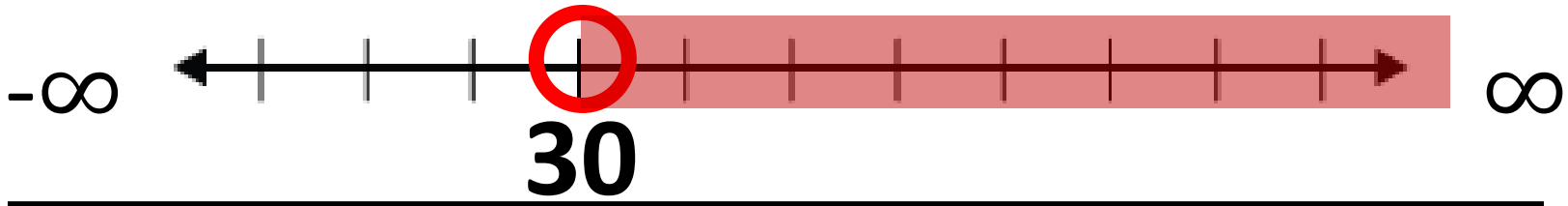
$\cdot 5$

$\frac{1}{5}y > 6 \quad \cdot 5$

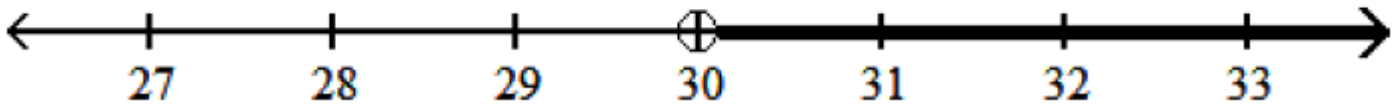
$y > 30$

Set-builder Notation:

$\{y \mid y > 30\}$

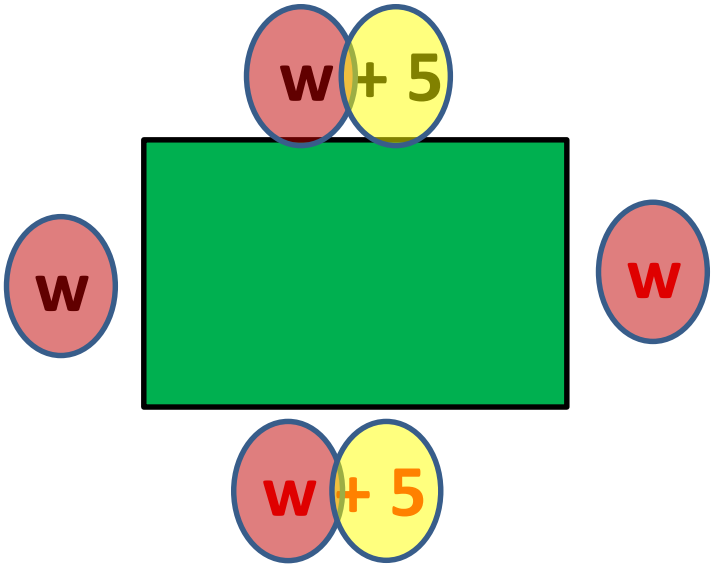


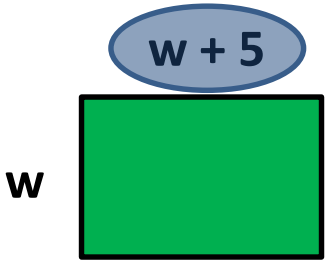
65) $\{y \mid y > 30\}$



Problem #66 (Problem Solving)

A fence is to be installed around a rectangular field.
The field's perimeter is 210 feet. The length of the field is 5 feet more than the width, find the length.





w = 50 feet
Width

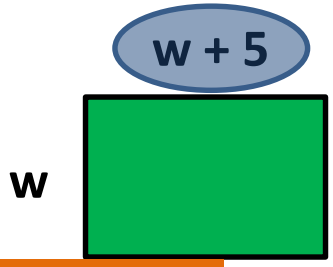
Solve:
4w + 10 = 210

50 + 5 = 55 ft
Length

Problem #66 (Alternative Method)

A fence is to be installed around a rectangular field.
The field's perimeter is 210 feet. The length of the field is 5 feet more than the width, find the length.

$$P = 2L + 2W$$



SOLVE:

$$210 = 2(W + 5) + 2W$$

SOLVE:

$$210 = 2W + 10 + 2W$$

Solve:

$$4w + 10 = 210$$

$$50 + 5 = 55 \text{ ft}$$

Length

w = 50 feet

Width

Problem #67 (Problem Solving)

A county assesses annual property taxes at a rate of 4% of the appraised value of the property. A property is appraised for $120,000. What are the property taxes?

Total = $120,000
Percent = 4%
Part is missing (Taxes)

Proportion:

$$\frac{PART}{TOTAL} = \frac{\%}{100}$$

Solve:

$$\frac{x}{120,000} = \frac{4}{100}$$

Equation to solve:

$$100x = 120000 \cdot 4$$

$$100x = 480000$$

$$x = \$4,800$$

Live example!

Problem #67 (Alternative Method)

A county assesses annual property taxes at a rate of 4% of the appraised value of the property. A property is appraised for $120,000. What are the property taxes?

Total = $120,000
Percent = 4%
Taxes = 4% of 120,000

of: key word for multiply!

Solve: (0.04)(120,000) **= $4,800**

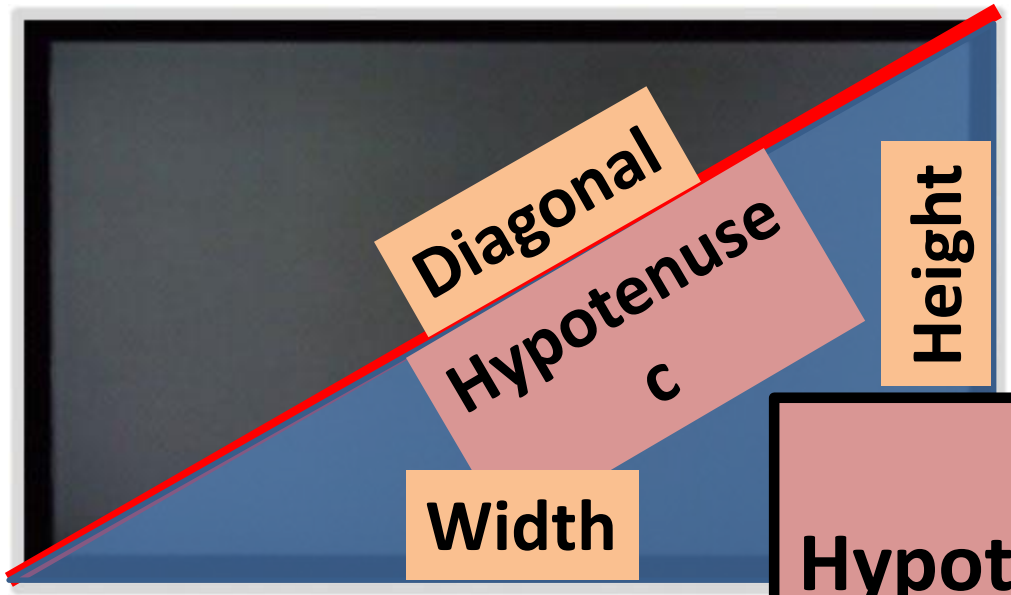
Live example!

Problem #68 (Problem Solving/Square Roots)

Television Sets: What does it mean to refer to a 20-in TV set or a 25-in TV set? Such units refer the diagonal of the screen.

a) A 15-in TV set also has a width of 12 inches. What is its height?

b) A 20-in TV set also has a width of 16 inches. What is its height?



Right Triangle

$a^2 + b^2 = c^2$

(*Pythagorean Theorem*)

Diagonal of TV = Hypotenuse of Right Triangle

Problem #68 (Problem Solving/Square Roots) PART A

Television Sets: What does it mean to refer to a 20-in TV set or a 25-in TV set? Such units refer the diagonal of the screen.

a) A 15-in TV set also has a width of 12 inches. What is its height?

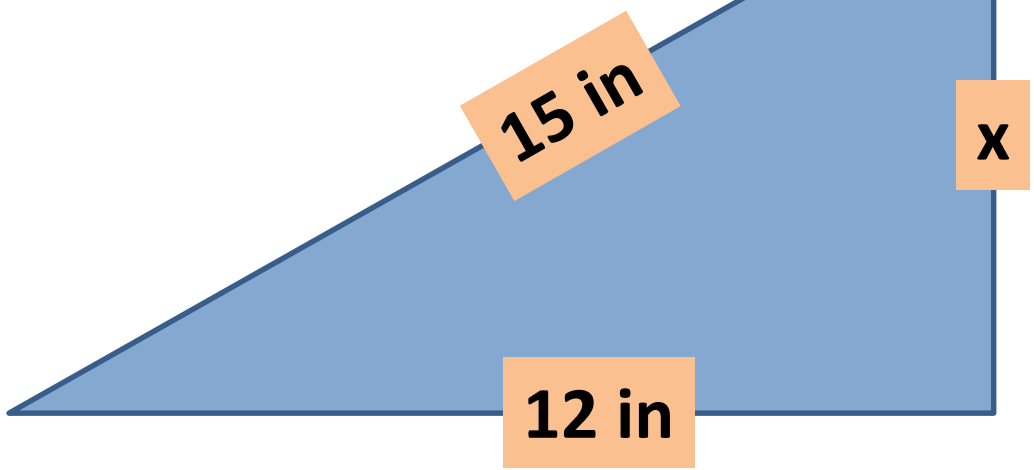
Solve: $x^2 + 12^2 = 15^2$

$x^2 + 144 = 225$

$-144 \quad -144$

$x^2 = 81$

$x = \sqrt{81} = 9$ in



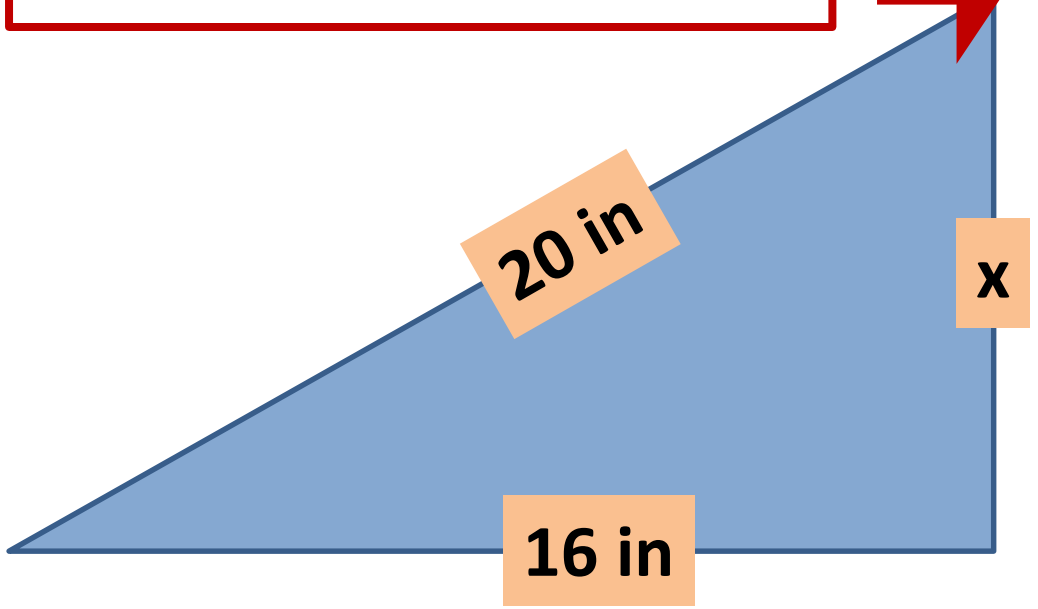
Live example!

Problem #68 (Problem Solving/Square Roots) PART B

Television Sets: What does it mean to refer to a 20-in TV set or a 25-in TV set? Such units refer the diagonal of the screen.

b) A 20-in TV set also has a width of 16 inches. What is its height?

Solve: $x^2 + 16^2 = 20^2$



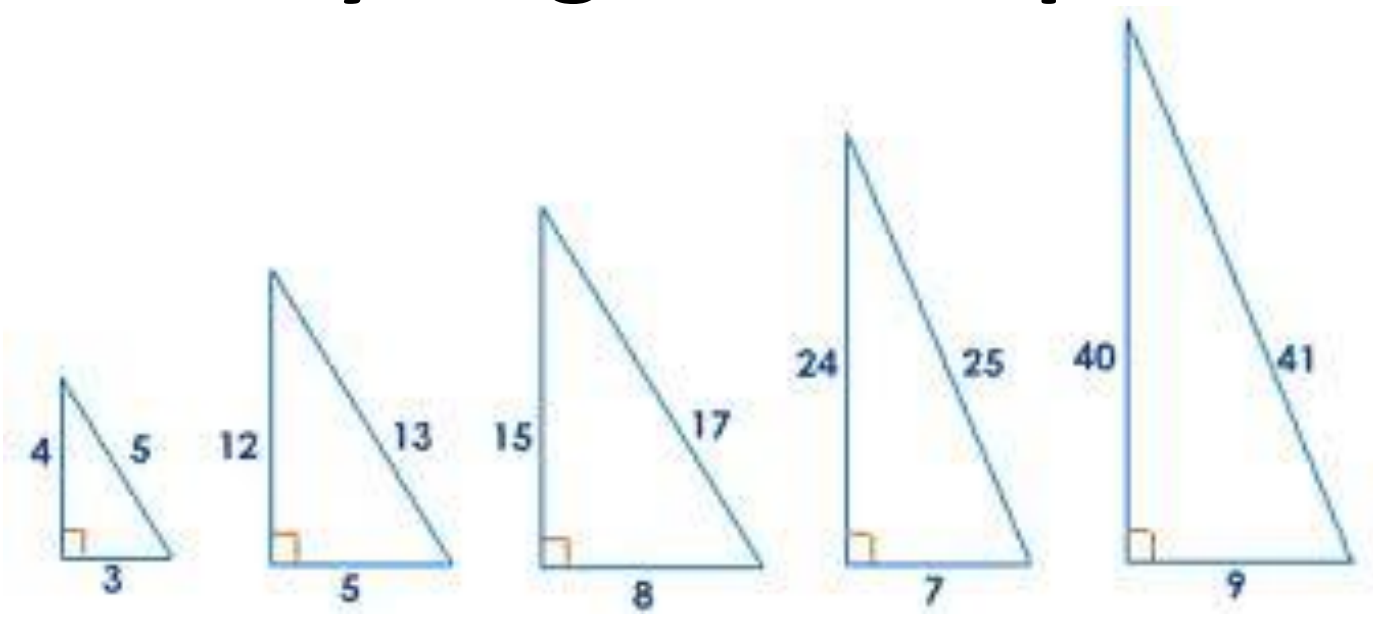
$x^2 + 256 = 400$

$-256 \quad -256$

$x^2 = 144$

$x = \sqrt{144} = 12$ in

Pythagorean Triples



Common Pythagorean Values:

1) 3, 4, 5
2) 5, 12, 13
3) 8, 15, 17
4) 7, 24, 25
5) 9, 40, 41

& Their Multiples

Times 3:
1) 9, 12, 15

Times 4:
1) 12, 16, 20

Times 10:
2) 50, 120, 130

Problem #69 (Problem Solving)

People drive, on average, 11,400 miles per year. About how many miles each week is that? **Round to the nearest tenth.**

NOTE: 1 year = 52 weeks

$$\frac{11,400}{52}$$

Long divide!

$= 219.23 \approx$ **219.2 miles per week**

Problem #70 (Problem Solving)

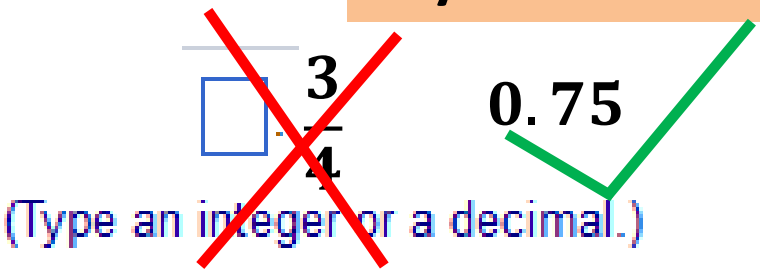
A woman earns $2600 per month and budgets $338 per month for food. What percent of her monthly income is spent on food?

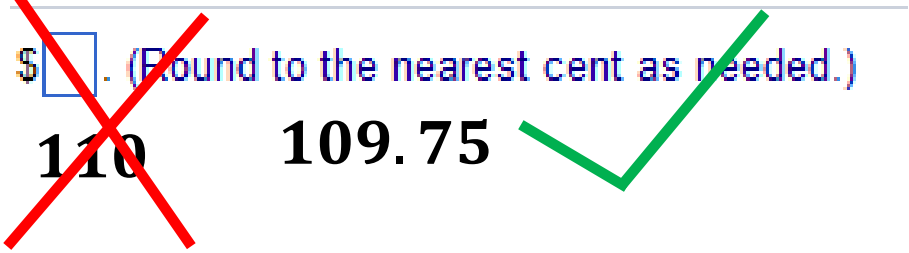
$$\frac{PART}{TOTAL} = \frac{338}{2600} \begin{matrix} \div 2 \\ = \\ \div 2 \end{matrix} \frac{169}{1300} \begin{matrix} \div 13 \\ = \\ \div 13 \end{matrix} \frac{13}{100}$$

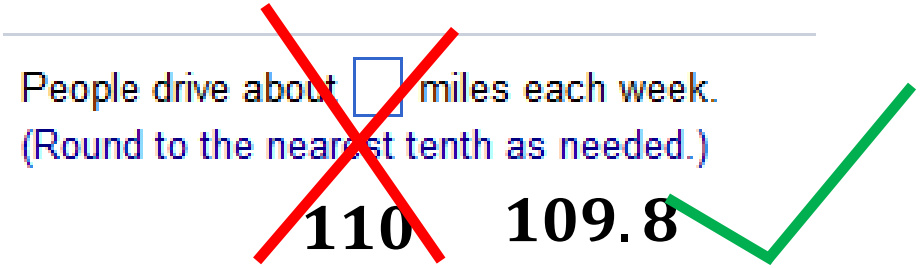
$$= 13\%$$

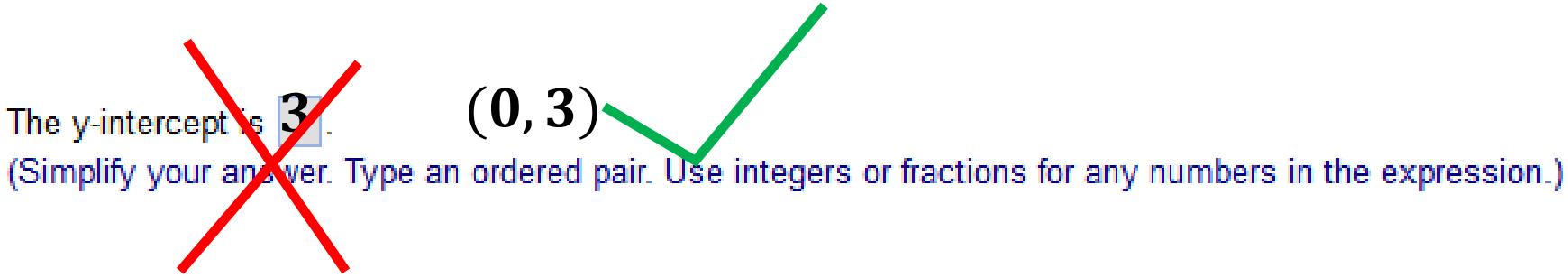
MyMathLab Tips

Pay careful attention to all instructions!









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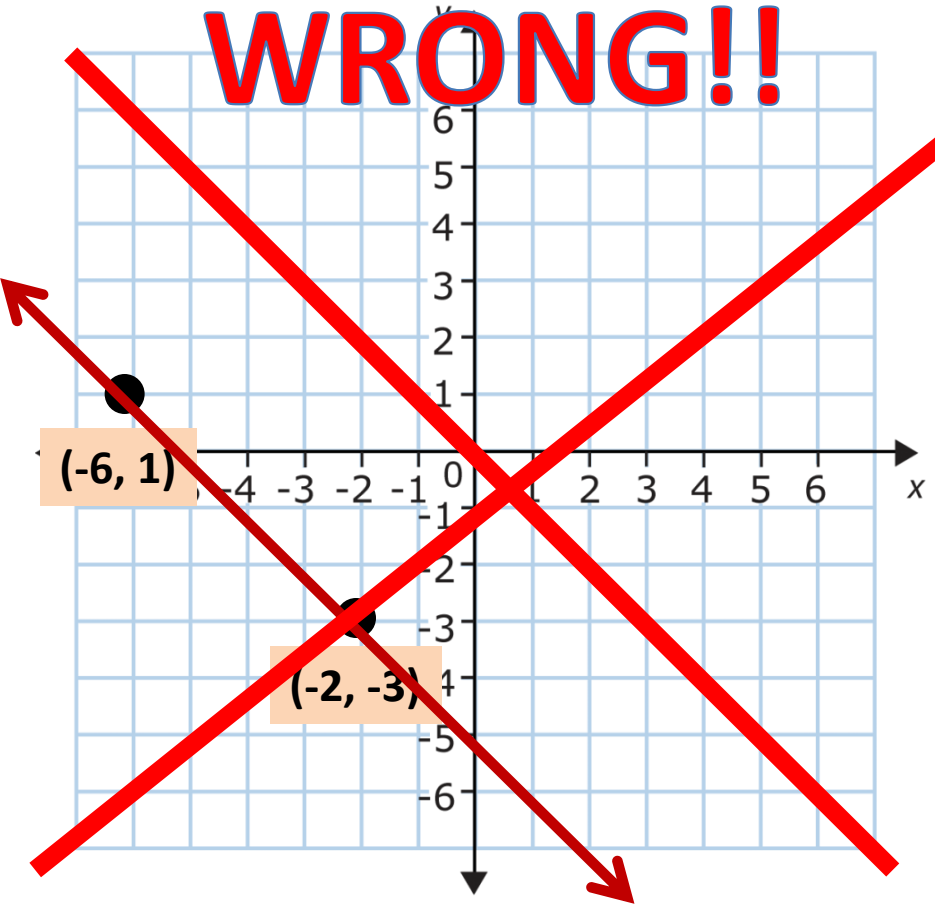
MyMathLab Tips CONT…

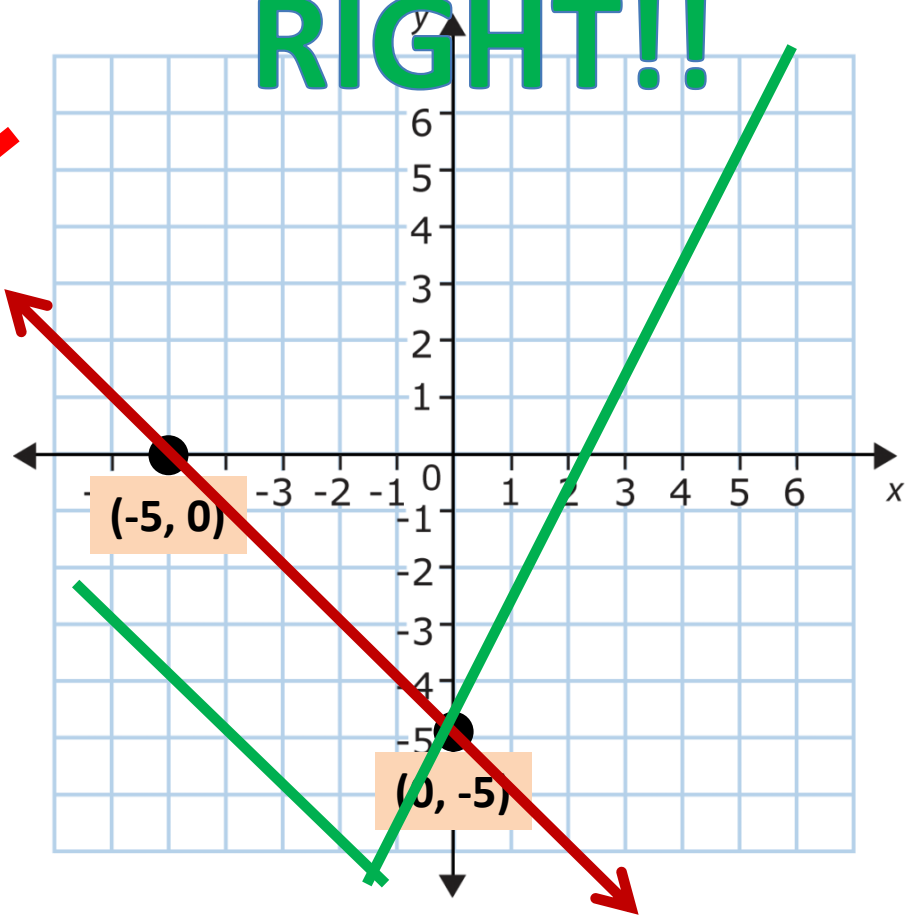
Graph the linear equation by finding and plotting its intercepts.

34) $x + y = -5$

WRONG!!



RIGHT!!



How to Study…

1) This workshop is a good step towards studying for the final (Review this presentation and video)

2) Work on the practice final exam in MyMathLab with no help, notes, calculators, or any assistance **and time yourself.**

3) Review the workshop packet and try to do each problem by yourself with no help, notes, calculators, or any assistance.

4) Review your in-class exams, on-line quizzes, and on-line homework.

5) Visit the Math Connections for additional support and resources!

Study a little each day, DO NOT CRAM!!

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General Test Taking Tips

1) Preview the exam and do the problems that are easy and you are familiar with.

2) Pace yourself… do not spend too much time on any 1 problem.

3) DO NOT RUSH!

4) Go back and check your answers (if time allows).

5) Follow instructions **carefully!**

6) Double check your work!

When you submit your exam, review your exam!

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Now go study and do well on your final exam!