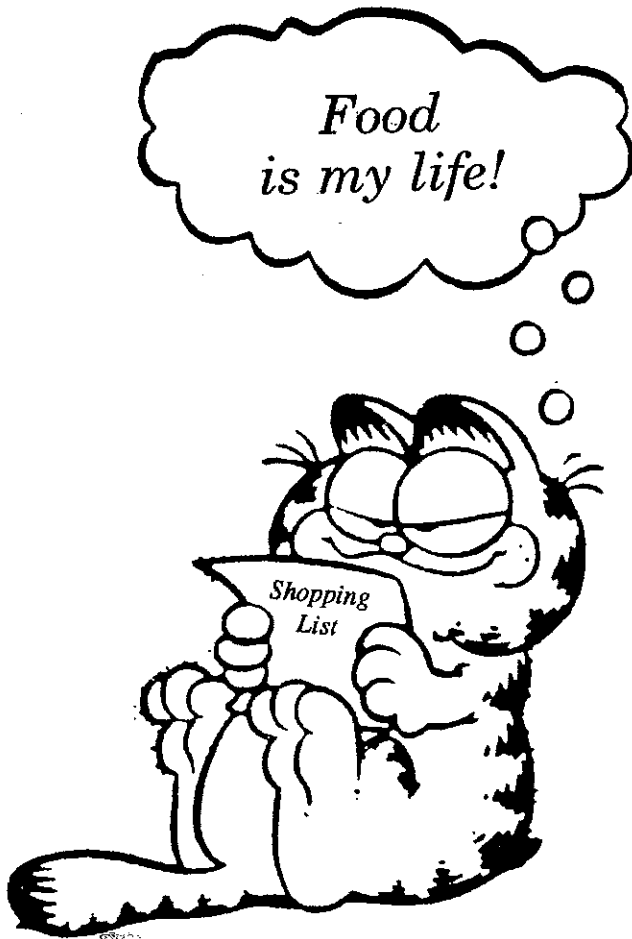


Friendship Jr. High School  
Accelerated Math Program

# *Algebra*



# 3

UNIT #7

Factoring & Problem Solving

UNIT #8

Linear Equations

UNIT #9

Linear Systems

# Factoring & Problem Solving

## Lesson 7.1

### FACTORING REVIEW & THE ZERO PRODUCT PROPERTY

As a review of skills from Unit 6, factor each of these expressions completely:

1●  $3x^3 - 27x$

$$3x(x^2 - 9) = \boxed{3x(x+3)(x-3)}$$

2●  $6y^2 - 20y - 16$

$$\begin{aligned} &2(3y^2 - 10y - 8) \\ &2(3y^2 - 12y + 2y - 8) \\ &2[3y(y-4) + 2(y-4)] \end{aligned}$$

$$\boxed{2(y-4)(3y+2)}$$



3●  $2m^3 + 3m^2n - 8m - 12n$

$$\begin{aligned} &m^2(2m+3n) - 4(2m+3n) \\ &(2m+3n)(m^2-4) \end{aligned}$$

$$\boxed{(2m+3n)(m+2)(m-2)}$$

When solving equations in factored form, use the zero property:

$$\boxed{\text{If } ab=0, a=0 \text{ or } b=0}$$

4●  $2x(x-5) = 0$

$$\begin{aligned} 2x=0 &\text{ or } (x-5)=0 \\ x=0 &\text{ or } x=5 \end{aligned}$$

$$\boxed{x=0 \text{ or } 5}$$

5●  $(y+2)(3y+5) = 0$

$$(y+2)=0 \text{ or } (3y+5)=0$$

$$y=-2 \text{ or } y=-\frac{5}{3}$$

$$\boxed{y=-2 \text{ or } -\frac{5}{3}}$$

6●  $(3n-4)(2n+5) = 0$

$$(3n-4)=0 \text{ or } (2n+5)=0$$

$$n=\frac{4}{3} \text{ or } n=-\frac{5}{2}$$

$$\boxed{n=\frac{4}{3} \text{ or } -\frac{5}{2}}$$

7● The product of four times Maria's age and forty-five less than three times Maria's age is zero. How old is Maria?

$$n = \text{Maria's age}$$

$$4n(3n-45) = 0$$

$$4n=0 \text{ or } (3n-45)=0$$

$$n=0 \text{ or } n=15$$

$$n = \cancel{0} \text{ or } 15$$

zero is an invalid (unreasonable) answer

$$\boxed{\text{Maria is 15 years old}}$$

## Lesson 7.2

### FACTORING EXPRESSIONS TO SOLVE EQUATIONS

Factor and use the zero property to solve:

1●  $x^2 - 9 = 0$

$$(x+3)(x-3) = 0$$

$$x = -3 \text{ or } 3$$

3●  $\frac{2}{3}x^2 - 12x = 0$

$$\frac{2}{3}x(x-18) = 0$$

-or-

$$x(\frac{2}{3}x - 12) = 0$$

$$x = 0 \text{ or } 18$$

2●  $y^2 = -7y$

$$y^2 + 7y = 0$$

$$y(y+7) = 0$$

$$y = 0 \text{ or } -7$$

4●  $a^2 + 16a + 64 = 0$

$$(a+8)^2 = 0$$

$$a = -8$$



- 5● A number decreased by six is multiplied by five more than twice a number producing a product of zero. Find the number.

$$(n-6)(2n+5) = 0$$

$$n = 6 \text{ or } -5/2$$

## Lesson 7.3

### SOLVING EQUATIONS & INTEGER PROBLEMS

Factor and use the zero property to solve:

1●  $2x^2 = 11x - 12$

$$2x^2 - 11x + 12 = 0$$

$$2x^2 - 8x - 3x + 12 = 0$$

$$2x(x-4) - 3(x-4) = 0$$

$$(x-4)(2x-3) = 0$$

$$x = 4 \text{ or } 3/2$$

2●  $x^3 - 24x = 5x^2$

$$x^3 - 5x^2 - 24x = 0$$

$$x(x^2 - 5x - 24) = 0$$

$$x(x-8)(x+3) = 0$$

$$x = 0 \text{ or } 8 \text{ or } -3$$

- 3● Find two consecutive integers whose product is 90.

$n$	-10	9
$n+1$	-9	10

$$n(n+1) = 90$$

$$n^2 + n - 90 = 0$$

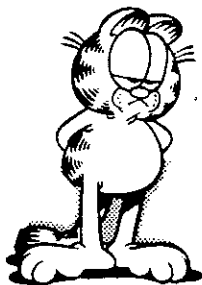
$$(n+10)(n-9) = 0$$

$$n = -10 \text{ or } 9$$

- 4● Find two consecutive negative odd integers whose product is 63.

$$\begin{array}{l} n \\ n+2 \end{array} \begin{array}{|c|} \hline -9 \\ \hline -7 \\ \hline \end{array}$$

$$\begin{aligned} n(n+2) &= 63 \\ n^2 + 2n - 63 &= 0 \\ (n+9)(n-7) &= 0 \\ n &= -9 \text{ or } 7 \end{aligned}$$



- 2● Find two integers whose difference is 3 and whose product is 54.

$$\begin{array}{l} n \\ n-3 \end{array} \begin{array}{|c|} \hline 9 \\ \hline 6 \\ \hline \end{array} \begin{array}{|c|} \hline -6 \\ \hline -9 \\ \hline \end{array}$$

$$\begin{aligned} n(n-3) &= 54 & (n-9)(n+6) &= 0 \\ n^2 - 3n - 54 &= 0 & n &= 9 \text{ or } -6 \end{aligned}$$

- 3● The sum of the squares of two consecutive positive odd integers is 74. Find the integers.

$$\begin{array}{l} n \\ n+2 \end{array} \begin{array}{|c|} \hline 5 \\ \hline 7 \\ \hline \end{array}$$

$$\begin{aligned} n^2 + (n+2)^2 &= 74 & 2(n^2 + 2n - 35) &= 0 \\ n^2 + (n^2 + 4n + 4) &= 74 & 2(n+7)(n-5) &= 0 \\ 2n^2 + 4n - 70 &= 0 & n &= -7 \text{ or } 5 \end{aligned}$$

## Lesson 7.4

### SOLVING MORE COMPLEX PROBLEMS & EQUATIONS

Define a variable and use an equation to solve:

- 1● Find two integers whose sum is 9 and whose product is 20.

$$\begin{array}{l} n \\ 9-n \end{array} \begin{array}{|c|} \hline 5 \\ \hline 4 \\ \hline \end{array} \begin{array}{l} 4 \\ 5 \end{array}$$

$$\begin{aligned} n(9-n) &= 20 \\ 9n - n^2 &= 20 \\ 0 &= n^2 - 9n + 20 \\ (n-5)(n-4) &= 0 \\ n &= 5 \text{ or } 4 \end{aligned}$$



Both answers produce same result

- 4● When one integer is added to the square of the next consecutive integer, the sum is 29. Find the integers.

$$\begin{array}{l} n \\ n+1 \end{array} \begin{array}{|c|} \hline -7 \\ \hline -6 \\ \hline \end{array} \begin{array}{|c|} \hline 4 \\ \hline 5 \\ \hline \end{array}$$

$$\begin{aligned} n + (n+1)^2 &= 29 \\ n + (n^2 + 2n + 1) &= 29 \\ n^2 + 3n - 28 &= 0 \\ (n+7)(n-4) &= 0 \\ n &= -7 \text{ or } 4 \end{aligned}$$

Solve each equation:

5●  $x^3 - 24x = 5x^2$

$$x^3 - 5x^2 - 24x = 0$$

$$x(x^2 - 5x - 24) = 0$$

$$x(x-8)(x+3) = 0$$

$$x = 0 \text{ or } 8 \text{ or } -3$$

6●  $x^4 - 10x^2 + 9 = 0$

Treat  $(x^2)$  as the variable

$$(x^2)^2 - 10(x^2) + 9 = 0$$

$$(x^2 - 9)(x^2 - 1) = 0$$

$$(x+3)(x-3)(x+1)(x-1) = 0$$

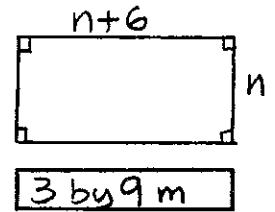
$$x = \pm 3 \text{ or } \pm 1$$

$$n(n+6) = 27$$

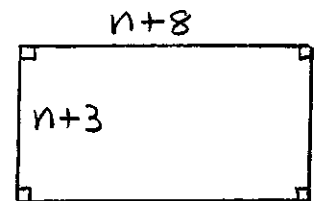
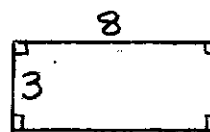
$$n^2 + 6n - 27 = 0$$

$$(n+9)(n-3) = 0$$

$$n = -9 \text{ or } 3$$



- 2● A 3 by 8 cm rectangle increases its area by  $42 \text{ cm}^2$  when both dimensions are increased by the same amount. What are the new dimensions?



$$(n+8)(n+3) - (3)(8) = 42$$

$$(n^2 + 11n + 24) - 24 = 42$$

$$n^2 + 11n - 42 = 0$$

$$(n+14)(n-3) = 0$$

$$n = -14 \text{ or } 3$$

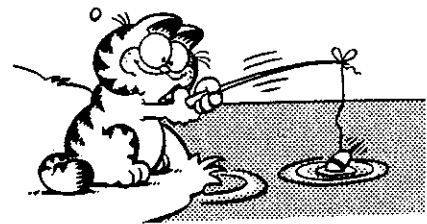
$$6 \text{ by } 11 \text{ cm}$$

## Lesson 7.5

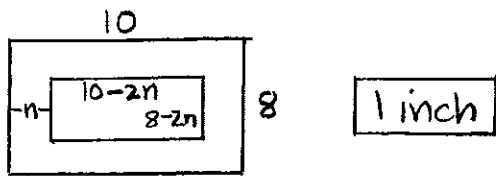
### SOLVING PROBLEMS WITH AREA & VELOCITY

Define a variable. Use an equation to solve.

- 1● The area of a rectangle is  $27 \text{ m}^2$ . If the length is 6 m more than the width, determine the dimensions of the rectangle.



- 3● A uniform amount is trimmed off all sides of an 8 by 10 inch photo to allow it to fit into a frame. If the area of the photo is reduced by  $32 \text{ in}^2$ , how much is trimmed from each side of the photo?



$$(8)(10) - (10-2n)(8-2n) = 32$$

$$80 - (80 - 36n + 4n^2) = 32$$

$$36n - 4n^2 = 32$$

$$0 = 4n^2 - 36n + 32$$

$$4(n^2 - 9n + 8) = 0$$

$$4(n-8)(n-1) = 0$$

$$n = 8 \text{ or } 1$$



Use the formula for height and initial velocity to solve each problem:

$h$  = height

$v$  = initial velocity

$t$  = time



$$h = vt - 16t^2$$

- 4● A flare is launched from a life raft with an initial velocity of 144 feet per second. How many seconds before it returns to the sea?

$$h = vt - 16t^2$$

$$0 = 144t - 16t^2$$

$$16t^2 - 144t = 0$$

$$16t(t-9) = 0$$

$$t = 0 \text{ or } 9$$

$$\boxed{9 \text{ seconds}}$$

"0" is not an answer because of the word "returns."

# 7.1 Problems

## FACTORIZING REVIEW & THE ZERO PRODUCT PROPERTY

Factor completely:

①  $m^3 + 6m^2 + 9m$

⑦  $3b^2 - 36$

②  $18y + 12y^2 + 2y^3$

⑧  $m^3n^2 - 49m$

③  $4a^3 - 36a$

⑨  $2a^2 - 4ab - 70b^2$

④  $3x^3 - 27x$

⑩  $3y^4 - 48$

⑤  $m^4 - p^2$

⑪  $9y^4 + 8y^2 - 1$

⑥  $5a^2 + 7a + 3$

⑫  $8y^4 + 14y^2 - 4$

Solve each equation:

⑬  $(3x+2)(x-7) = 0$

⑭  $(x-8)(2x+7) = 0$

⑮  $(4x-7)(3x+5) = 0$

⑯  $(3x-5)(4x-7) = 0$

⑰  $(2x+3)(x+7) = 0$

⑱  $(4x - \frac{1}{3})(3x + \frac{1}{8}) = 0$

Solve:

- ⑲ The product of a positive number decreased by 5 and the same number increased by 7 is 0. Find the number.

- ⑳ The product of a negative number increased by 2 and the same number decreased by  $\frac{3}{4}$  is 0. Find the number.

## 7.2 Problems

### FACTORING EXPRESSIONS TO SOLVE EQUATIONS

Solve each equation:

- ①  $x^2 = 36$       ⑤  $3y^2 - \frac{4}{3} = 0$   
 ②  $y^2 = 64$       ⑥  $\frac{2}{3}y = \frac{1}{3}y^2$   
 ③  $y^2 = -5y$       ⑦  $m^2 - 24m + 144 = 0$   
 ④  $\frac{1}{2}y^2 - \frac{1}{4}y = 0$       ⑧  $y^2 + 10y = -25$

Use an equation to solve:

- ⑨ The square of a number decreased by 144 is 0. Find the number.  
 ⑩ The area of a square table top is  $4\text{m}^2$ . Find the length of a side.  
 ⑪ The square of a number added to 6 times the number is 0. Find the number.  
 ⑫ The square of a number is

equal to 10 times the number decreased by 25. Find the number.

- ⑬ Jake is younger than 30 by the same number of years that Jackie is older than 30. The product of their ages is 884. How old is each?  
 ⑭ A number decreased by 7 is multiplied by the same number increased by 7. The product is 51. Find the number.

## 7.3 Problems

### SOLVING EQUATIONS & INTEGER PROBLEMS

Solve each equation:

- ①  $p^2 = 5p + 24$   
 ②  $r^2 = 18 + 7r$   
 ③  $2t^2 + 7t = 15$   
 ④  $3y^2 - 7y = 20$   
 ⑤  $6z^2 + 5 = -17z$   
 ⑥  $12m^2 + 3 = -20m$   
 ⑦  $r^3 - 6r^2 + 8r = 0$



- ⑧  $s^3 + 2s^2 - 35s = 0$
- ⑨  $(x+8)(x+1) = -12$
- ⑩  $(r-1)(r-1) = 36$
- ⑪  $(3y+2)(y+3) = y+14$
- ⑫  $(y+4)(3y-2) = -y-14$

Define a variable. Use an equation to solve:

- ⑬ Find two consecutive even integers whose product is 120.
- ⑭ Find two consecutive even integers whose product is 360.
- ⑮ Find two consecutive positive integers whose product is 42.
- ⑯ Find two consecutive negative integers whose product is 56.



## 7.4 Problems

### SOLVING MORE COMPLEX PROBLEMS & EQUATIONS

Define a variable. Use an equation to solve.

- ① Find two integers whose difference is 3 and product is 88.
- ② Find two integers whose difference is 23 and product is -120.
- ③ The sum of the squares of two consecutive odd positive integers is 202. Find the integers.
- ④ The sum of the squares of two consecutive positive integers is 113. Find them.
- ⑤ The sum of two integers is 13. The sum of their squares is 97. Find the integers.
- ⑥ The sum of two integers is 3. The sum of their squares is 185. Find the integers.
- ⑦ When one integer is added to the square of the next consecutive integer, the sum is 41. Find the integers.



- ⑧ When one integer is added to the square of the next consecutive integer, the sum is 55. Find them.

Solve each equation:

⑨  $5b^3 + 34b^2 = 7b$

⑩  $2k^3 + 5k^2 = 42k$

⑪  $y^4 - 8y^2 + 16 = 0$

⑫  $m^4 - 2m^2 + 1 = 0$



## 7.5 Problems

### SOLVING PROBLEMS WITH AREA & VELOCITY

Define a variable. Use an equation to solve.

- ① The area of Jane's living room is  $40 \text{ m}^2$ . The length of the room is  $3 \text{ m}$  more than the width. Find the dimensions.
- ② The length of Mrs. Boland's garden is 5 yards more than its width. The area of the garden is 234 yards. Determine the dimensions.

- ③ A rectangle is 4 by 7 in. If the length and width are increased by the same amount, the area is increased by  $26 \text{ in}^2$ . What are the dimensions?

- ④ A photo is 8 cm wide and 12 cm long. When both dimensions are increased by the same amount, the area of the photo is doubled. What are the new dimensions?

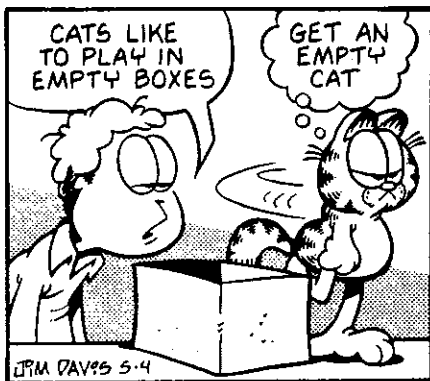
- ⑤ Mr. Steinborn wants to double the area of his garden by adding a strip of uniform width along each of the four sides. The original garden is 10 by 15 feet. How wide is the strip?

- ⑥ A strip of uniform width is plowed along both sides and both ends of a garden that is 12 by 9 feet. If the garden is half plowed, how wide is the strip?

Use the formula to solve:  
 $h = vt - 16t^2$

- ⑦ A flare is launched from a life raft with an initial velocity of 192 ft. per second. How many seconds will it take for the flare to return to the sea?

- ⑧ A golf ball is hit into the air with an initial velocity of 64 ft. per second. How many seconds will it take for the golf ball to hit the ground?
- ⑨ A rocket is fired with an initial velocity of 1640 feet per second. When will it be 816 feet high?
- ⑩ A flare is launched with an initial velocity of 128 feet per second. How many seconds will it take for the flare to return to the sea?



Define a variable. Use an equation to solve.

- ⑪ When the square of the second of two consecutive even integers is added to twice the first integer, the sum is 76. Find the integers.
- ⑫ When the square of the second of two consecutive even integers is added to twice the first integer, the sum is 116. Find the integers.

## Unit 7 REVIEW PROBLEMS

Solve these equations:

- ①  $(4x-3)(2x + \frac{1}{2}) = 0$
- ②  $(x + \frac{2}{3})(3x-5) = 0$
- ③  $n^2 = 81$
- ④  $y^2 - 100 = 0$
- ⑤  $2x^2 + 5x = 12$
- ⑥  $4n^2 - 5n = 6$
- ⑦  $(x+3)(x-5) = 9$
- ⑧  $(x-3)^2 = 16$
- ⑨  $2n^3 - 5n = -9n^2$
- ⑩  $6x^3 - 2x = -x^2$
- ⑪  $n^4 - 5n^2 + 4 = 0$
- ⑫  $x^4 - 17x^2 + 16 = 0$

Integer problems:

- ⑬ Find two consecutive negative integers whose product is 20.
- ⑭ Find two integers whose difference is 4 and whose product is 45.

- ⑮ Find two integers that sum to 11 and have a product of 24.
- ⑯ The sum of two integers is 10. The sum of their squares is 58. Find them.
- ⑰ When one integer is added to the square of the next consecutive even integer, the sum is 40. Find the integers.
- ⑱ When the square of the second of two consecutive positive odd integers is added to twice the first, the sum is 31. Find them.

Velocity:  $h = vt - 16t^2$

- ⑲ A golf ball is hit into the air with an initial velocity of 80 ft. per second. How long until it returns to the ground?
- ⑳ A missile is fired with an initial velocity of 800 ft. per second. When will it be 784 feet high?

Area problems:

- ㉑ The length of a room is 3 feet greater than the width. What are the dimensions if the area is  $70\text{ft}^2$ ?
- ㉒ A 3 by 5 inch rectangle is

increased by the same amount in length and width. The area of the new rectangle is  $48\text{in}^2$  more than the original. What are the new dimensions?

- ㉓ Mark wants to double the size of his 8 by 12 foot garden by adding a strip of uniform width all the way around. How wide must the strip be?
- ㉔ Jennifer's picture is 10cm long and 6cm wide. If she cuts a strip of uniform width all the way around that reduces the area by  $28\text{cm}^2$ , what are the new dimensions of the picture?
- ㉕ When examining the inside dimensions of a frame, the length is 2 inches more than twice the width. The frame is 2 inches all the way around, and it has an area of  $96\text{in}^2$ . What are the outside dimensions?

- ㉖ A frame is  $1\frac{1}{2}$  cm around. The inside length is 2cm less than twice the inside width. If the frame area is  $48\text{cm}^2$ , what are the dimensions of the picture that fits inside?



## Unit 7

# SKILL CHECK

Solve each equation:

- ①  $n^2 = 121$
- ②  $(3x - 5)(2x + 7) = 0$
- ③  $a^2 + 4a = 12$
- ④  $6x^3 - 6x = 5x^2$
- ⑤  $(x + 3)(x - 7) = 11$
- ⑥  $n^4 - 26n^2 + 25 = 0$

Integer problems:

- ⑦ Find two integers whose difference is 5 and whose product is 84.
- ⑧ The sum of the squares of two consecutive even integers is 100. Find the integers.
- ⑨ When the square of the second of two consecutive negative odd integers is added to three times the first, the sum is 22. Find the integers.

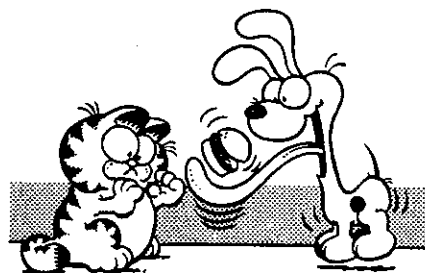
Velocity:  $h = vt - 16t^2$

- ⑩ A golf ball is hit with an initial velocity of 128 feet per second. How

long until it returns to the ground?

Area problems:

- ⑪ A rectangle has a length that is 6 cm greater than its width. What are the dimensions if the area is  $55\text{cm}^2$ ?



- ⑫ A storeroom is 6 by 3 feet. If the length and width are both increased by the same amount, the area is increased by  $70\text{ft}^2$ . What are the new dimensions of the storeroom?
- ⑬ A garden whose length is 12 feet and width is 10 feet has a uniform strip plowed all the way around. If the amount plowed is  $40\text{ft}^2$ , how wide a strip was plowed?



## Unit 7 REMIEDIATION

Solve each equation:

- ①  $x^2 = 49$
- ②  $(4n-5)(3n+2) = 0$
- ③  $n^2 - n = 30$
- ④  $8n^3 - 5n = 18n^2$
- ⑤  $(n+4)(n-9) = 14$
- ⑥  $x^4 - 13x^2 + 36 = 0$



Integer problems:

- ⑦ Find two integers whose difference is 6 and whose product is 27.
- ⑧ The sum of the squares of two consecutive odd integers is 74. Find the integers.
- ⑨ When the square of the second of two consecutive positive even integers is added to

four times the first, the sum is 88. Find the integers.

Velocity:  $h = vt - 16t^2$

- ⑩ A model plane is fired with an initial velocity of 160 feet per second. How long until it returns to the ground?

Area problems:

- ⑪ What are the dimensions of a room if the length is 9 feet greater than the width and the area is  $70 \text{ ft}^2$ ?
- ⑫ A rectangle that is 12 by 9 feet has the length and width reduced by the same amount. The area of the new rectangle is  $68 \text{ ft}^2$  less than the original. What are the new dimensions?



- ⑬ A picture is 10 by 6 cm. It is trimmed by the same amount all the way around. The new area of the picture is  $45 \text{ cm}^2$ . How wide is the strip trimmed away?

## Unit 7

## EXTRA PRACTICE

- ①  $n^2 - 9 = 40$
- ②  $(4x-1)(3x+5) = 0$
- ③  $n^2 - 9n + 20 = 0$
- ④  $(x-5)^2 = 0$
- ⑤  $3x^2 + 5x - 2 = 0$
- ⑥  $(x+3)(x-2) = 14$
- ⑦  $n^2 - 2n - 15 = 0$
- ⑧  $2n^3 - 7n^2 + 3n = 0$
- ⑨  $x^2 - 64 = 0$
- ⑩  $(n+4)(3n-2) = 0$
- ⑪  $2x^2 + x = 15$
- ⑫  $n^4 - 17n^2 + 16 = 0$

## Integer Problems:

- ⑬ Find two consecutive negative integers whose product is 30.
- ⑭ Find two integers whose difference is 3 and whose product is 54.
- ⑮ The sum of the squares of two consecutive even integers is 100. Find the integers.

Velocity:  $h = vt - 16t^2$

- ⑯ A flare is fired into the air with an initial velocity of 80 ft./sec. How long until it returns to the ground.

## Area Problems:

- ⑰ The length of a room is 5 ft. greater than the width, what are the dimensions if the area is 84 ft.<sup>2</sup>?
- ⑱ A 4 by 7 inch rectangle is increased by the same amount in length and width. If the area increases by 42 in.<sup>2</sup> what are the new dimensions?

## Solve:

- ⑲ When the square of the second of two consecutive negative integers is added to four times the first integer, the sum is negative three. Find the integers.
- ⑳ A 9 by 10 cm picture has a uniform amount trimmed away on all sides. If the new area is 18 cm<sup>2</sup> less than the original, how wide a strip was trimmed away?

# Linear Equations

## Lesson 8.1

### RELATIONS & FUNCTIONS

1● Which quadrant contains the coordinate?

a) (-6, 7)	$\begin{array}{c} \text{II} \\ (-, +) \\ \leftarrow \quad \uparrow \\ \text{I} \\ (+, +) \end{array}$	a) II
b) (3, -2)	$\begin{array}{c} \text{II} \\ (-, +) \\ \leftarrow \quad \uparrow \\ \text{I} \\ (+, +) \\ \text{III} \\ (-, -) \\ \downarrow \quad \rightarrow \\ \text{IV} \\ (+, -) \end{array}$	b) IV
c) (9, 4)	$\begin{array}{c} \text{II} \\ (-, +) \\ \leftarrow \quad \uparrow \\ \text{I} \\ (+, +) \\ \text{III} \\ (-, -) \\ \downarrow \quad \rightarrow \\ \text{IV} \\ (+, -) \end{array}$	c) I

3● State whether or not each equation is a linear equation:

Yes: If the equation has an x or y term (or both)

No: If x or y has an exponent greater than 1

If x or y is in the denominator of a fraction

If there is an xy term

2● State the relation as a set of ordered pairs and indicate the domain and range:

a) Char t set of ordered pairs

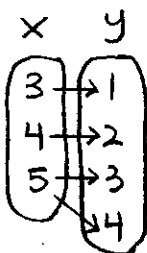
x	y
-2	2
0	3
3	4

$\{(-2, 2), (0, 3), (3, 4)\}$

domain  $\{-2, 0, 3\}$

range  $\{2, 3, 4\}$

b) Mapping set of ordered pairs



$\{(3, 1), (4, 2), (5, 3), (5, 4)\}$

domain  $\{3, 4, 5\}$

range  $\{1, 2, 3, 4\}$

Note: The domain is the set of all x-coordinates. The range is the set of all y-coordinates.

a)  $3x + 2y = 5$   yes

b)  $x^2 - 2 = y$   no

c)  $\frac{x}{3} + y = 2$   yes

d)  $y - xy = 4$   no



e)  $x = 2$   yes

f)  $\frac{3}{y} = 2x - 1$   no

g)  $y - 2 = 3(x + 1)$   yes

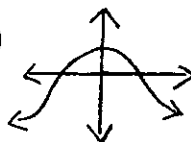
h)  $x^2 - 2x + 1 = 0$   no



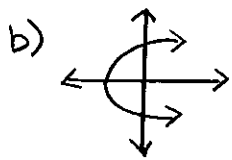
4● State whether or not each relation is a function:

Note: A relation must pass "the vertical line test" to be a function.

a)  yes



continued



b)

**NO**

c)  $\{(4,3), (2,-1), (4,5)\}$

**NO**

d)  $\{(-1,2), (0,2), (1,3)\}$

**YES**

5● Determine the value for each function.

a)  $f(x) = 5x^2 - 2x$  for  $f(-3)$

$$f(-3) = 5(-3)^2 - 2(-3)$$

$$5(9) - (-6) = \boxed{51}$$

b)  $f(x) = 3x - x^2$  for  $f[g(-1)]$   
 $g(x) = x^2 - 3$

$$g(-1) = (-1)^2 - 3 = -2$$

$$f(-2) = 3(-2) - (-2)^2$$

$$(-6) - (4) = \boxed{-10}$$

c)  $f(x) = 4 - 3x$  for  $f[g(a+3)]$   
 $g(x) = x^2 + 1$

$$g(a+3) = (a+3)^2 + 1$$

$$(a^2 + 6a + 9) + 1$$

$$a^2 + 6a + 10$$

$$f(a^2 + 6a + 10) = 4 - 3(a^2 + 6a + 10)$$

$$4 - 3a^2 - 18a - 30$$

$$\boxed{-3a^2 - 18a - 26}$$

Note: You cannot multiply the value of a function by ( ). It is not an equation.

## Lesson 8.2

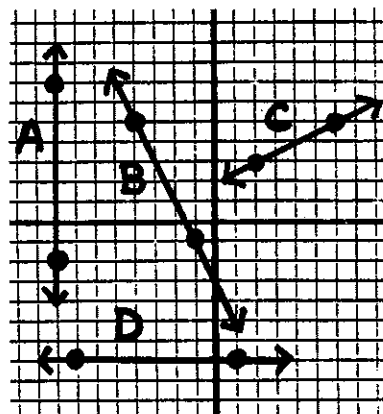
### SLOPE & CHART METHOD

1● Determine the slope from the graph of a line:

$$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$$

A)  $-\frac{9}{0}$

**undef**



B)  $-\frac{6}{3} \boxed{-2}$

C)  $\frac{2}{4} \boxed{\frac{1}{2}}$

D)  $\frac{0}{8} \boxed{0}$

2● Determine the slope from coordinates:

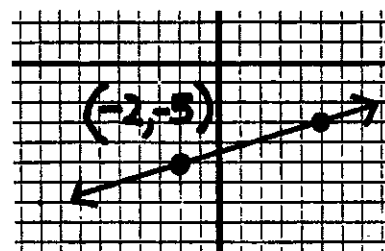
$(-6, 2)$   $(-4, 10)$

$$\frac{(2) - (10)}{(-6) - (-4)} = \frac{-8}{-2} = \boxed{4}$$



3● Graph the line containing a given point and slope:

$(-2, -5)$   $m = \frac{2}{7}$



Plot  
 $(-2, -5)$

Count  
 up 2  
 right 7



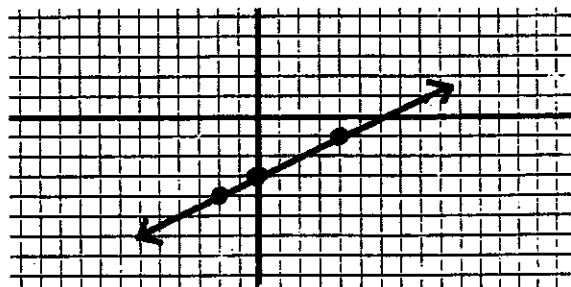
4 ● Graph using the chart method:

$$2x - 4y = 12$$

$$-4y = -2x + 12$$

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

x	y
-2	-4
0	-3
4	-1



Note: Change original equation to  $y = mx + b$  when using the chart method.

Standard  
 $x - 2y = -6$

$$\frac{-A}{B} = \frac{1}{2} \text{ slope}$$

$$\frac{C}{B} = (0, 3) \text{ y-int}$$

$$\frac{C}{A} = (-6, 0) \text{ x-int}$$

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

$$m = \frac{1}{2}$$

$$b = (0, 3)$$

$$\frac{-b}{m} = (-6, 0)$$

$$Ax + By = C$$

$$y = mx + b$$

No fractions  
 "A" is positive  
 Factor out GCF  
 in  
 Standard Form



## Lesson 8.3

### SLOPE-INTERCEPT FORM & STANDARD FORM

Write the equation in both forms. Determine the slope and intercepts:

1 ●  $-2x + 4y = 12$

Standard

$$-2x + 4y = 12$$

$$2x - 4y = -12$$

$$x - 2y = -6$$

Slope-Int

$$-2x + 4y = 12$$

$$4y = 2x + 12$$

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

## Lesson 8.4

### POINT-SLOPE FORM

Write an equation in point-slope form:

Point-Slope Form For A Line  
 Including  $(x_1, y_1)$   
 $y - y_1 = m(x - x_1)$

1 ● Given  $(4, \frac{1}{3})$   $m = 2$

$$y - \frac{1}{3} = 2(x - 4)$$

2 ● Given  $(-3, -1)$   $(0, -3)$   
 continued

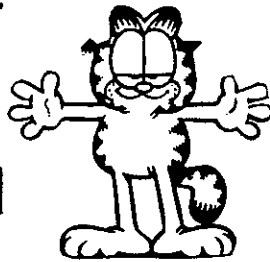
Determine slope:

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

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

-or-

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

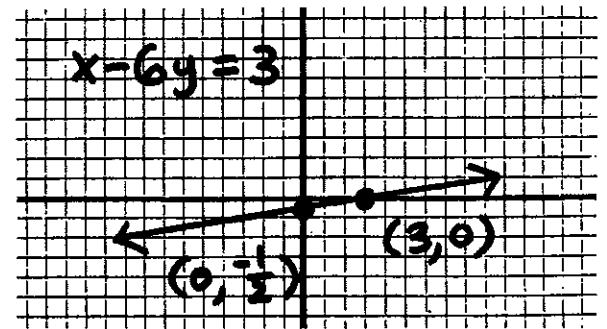


$$\text{slope } (-A/B) = 1/6$$

$$y\text{-int } (C/B) = -1/2$$

$$x\text{-int } (C/A) = 3$$

$1/6$
$(0, -1/2)$
$(3, 0)$



Change the equation to the indicated form. Determine slope and intercepts. Use the intercepts to graph.

- 3● Slope-intercept form for  $y - 4 = 2(x - 3)$

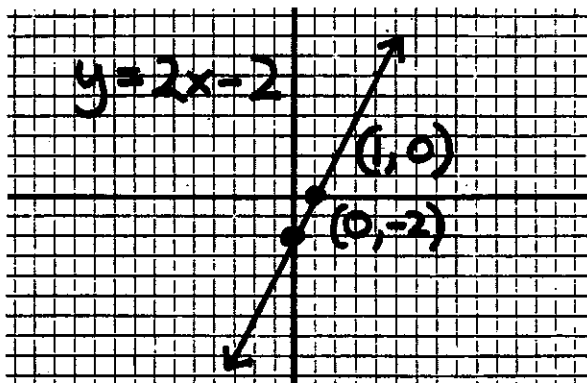
$$y - 4 = 2x - 6 \rightarrow y = 2x - 2$$

$$\text{Slope } (m) = 2$$

$$y\text{-int } (b) = -2$$

$$x\text{-int } (-b/m) = 1$$

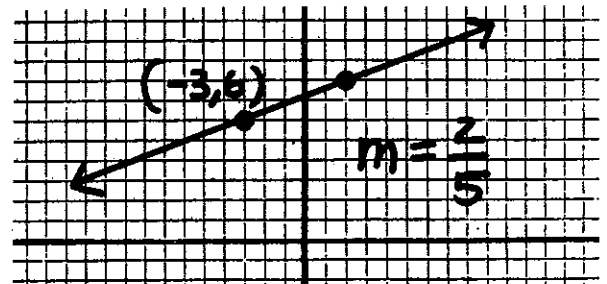
$2$
$(0, -2)$
$(1, 0)$



- 5● Point-slope form for line including  $(-3, 6)$   $m = 2/5$

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

Note: Use the point-slope form for the graph, but change to another form to determine the intercepts.



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

$$5y - 30 = 2(x + 3)$$

$$5y - 30 = 2x + 6$$

$$2x - 5y = -36$$



$$\text{slope } (-A/B) = 2/5$$

$$y\text{-int } (C/B) = 36/5$$

$$x\text{-int } (C/A) = -18$$

$2/5$
$(0, 36/5)$
$(-18, 0)$

- 4● Standard form for

$$4y = \frac{2}{3}x - 2$$

$$12y = 2x - 6$$

$$-2x + 12y = -6$$

$$2x - 12y = 6 \rightarrow x - 6y = 3$$

# Lesson 8.5

## WRITING EQUATIONS

Write an equation for this function in slope-intercept form:

1 ●

x	y
4	3
1	9
-2	15

First determine the slope:  

$$\frac{(3)-(9)}{(4)-(1)} = \frac{-6}{3} = -2$$

Now plug in the slope and any point into the slope-intercept form

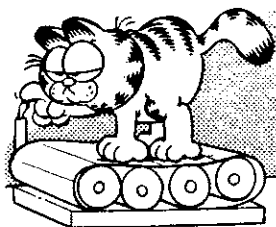
$$y = mx + b$$

$$y = -2x + b$$

$$(3) = -2(4) + b$$

$$3 = -8 + b$$

$$11 = b \rightarrow$$



$$y = -2x + 11$$

Write an equation in both slope-intercept and standard form:

2 ● Given  $(-3, -2)$   $m = -2/3$

Slope-int

$$y = mx + b$$

$$y = \frac{-2}{3}x + b$$

$$(-2) = \frac{-2}{3}(-3) + b$$

$$-2 = 2 + b$$

$$-4 = b$$

$$y = -\frac{2}{3}x - 4$$

Standard

$$\frac{-A}{B} = \frac{-2}{3} \quad A=2 \quad B=3$$

$$Ax + By = C$$

$$2x + 3y = C$$

$$2(-3) + 3(-2) = C$$

$$-12 = C$$

$$2x + 3y = -12$$

3 ● Given  $(8, -2)$   $m = 4$

Slope-int

$$y = mx + b$$

$$y = 4x + b$$

$$(-2) = 4(8) + b$$

$$-2 = 32 + b$$

$$-34 = b$$

$$y = 4x - 34$$

Standard

$$\frac{A}{-B} = \frac{4}{1} \quad A=4 \quad B=-1$$

$$Ax + By = C$$

$$4(8) - 1(-2) = C$$

$$34 = C$$

$$4x - y = 34$$

4 ● Given  $(-4, 3)$   $(-7, -3)$

Determine Slope:  $\frac{(3)-(-3)}{(-4)-(-7)} = \frac{6}{3} = 2$

Slope-int

$$y = mx + b$$

$$y = 2x + b$$

$$(3) = 2(-4) + b$$

$$3 = -8 + b$$

$$11 = b$$

$$y = 2x + 11$$

Standard

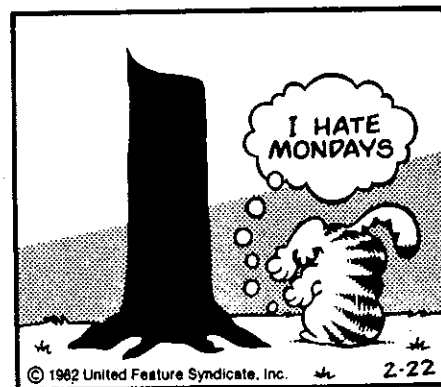
$$\frac{A}{-B} = \frac{2}{1} \quad A=2 \quad B=-1$$

$$2x - y = C$$

$$2(-4) - (-3) = C$$

$$-11 = C$$

$$2x - y = -11$$



# Lesson 8.6

## PARALLEL & PERPENDICULAR

Parallel lines have equal slopes.

Perpendicular lines have slopes that are negative reciprocals.

Determine if the lines are parallel, perpendicular, or neither:

1●  $4x - 3y = 6$      $-A/B = 4/3$   
 $y = \frac{4}{3}x + 1$      $m = 4/3$

**Parallel lines**

2●  $y - 2 = \frac{1}{2}(x + 3)$      $m = 1/2$   
 $6x + 3y = 10$      $-A/B = -2$

**Perpendicular lines**

3●  $y = 2/3$     horizontal  
 $x = 4$     vertical

**Perpendicular lines**

4●  $y = 2/3x + 3$      $m = 2/3$   
 $3x - 2y = 7$      $-A/B = 3/2$

**Neither**

Write an equation:

5● Parallel to  $3x + y = 5$  through  $(-1, 6)$  in standard form

$$3x + y = C$$

$$3(-1) + (6) = C$$

$$3 = C$$

**$3x + y = 3$**



6● Perpendicular to  $y = -3x + 6$  through  $(6, -2)$  in slope-intercept form

$$y = \frac{1}{3}x + b$$

$$b = -4$$

$$(-2) = \frac{1}{3}(6) + b$$

$$-2 = 2 + b$$

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

7● Parallel to  $y = \frac{2}{3}x + 4$  through  $(3, 4)$  in standard form

$$\frac{A}{-B} = \frac{2}{3} \quad A=2 \quad B=3$$

$$2x - 3y = C$$

$$2(3) - 3(4) = C$$

$$-6 = C$$

**$2x - 3y = -6$**

8● Perpendicular to  $y + 4 = \frac{3}{4}(x - 1)$  through  $(-2, -1)$  in point-slope form

**$y + 1 = -\frac{4}{3}(x + 2)$**

9● Perpendicular to  $x = -7$  through  $(-5, 4)$

**$y = 4$**

# Lesson 8.7

## SEGMENT MIDPOINT

To find the midpoint of a segment, take the average of the coordinates of the end points.

- 1● Find the midpoint of a segment with end points (4, 9) and (-6, 13)

$$(4) + (-6) = -2 \div 2 = -1$$

$$(9) + (13) = 22 \div 2 = 11$$

(-1, 11)



- 2● Find the endpoint (B) of  $\overline{AB}$  with midpoint (P), A(2, -6) P(8, -10)

$$(2) + 6 = (8) + 6 = (14)$$

$$(-6) - 4 = (-10) - 4 = (-14)$$

(14, -14)

# 8.1 Problems

## RELATIONS & FUNCTIONS

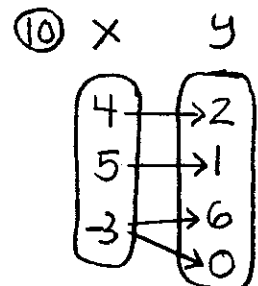
Which quadrant contains each coordinate?

- |            |            |
|------------|------------|
| ① (-3, 6)  | ⑤ (0, 0)   |
| ② (-7, -2) | ⑥ (-5, 4)  |
| ③ (6, 4)   | ⑦ (-3, -8) |
| ④ (7, -2)  | ⑧ (2, 2)   |

State the relation as a set of ordered pairs:

⑨

x	y
2	-1
3	-3
5	2
8	6



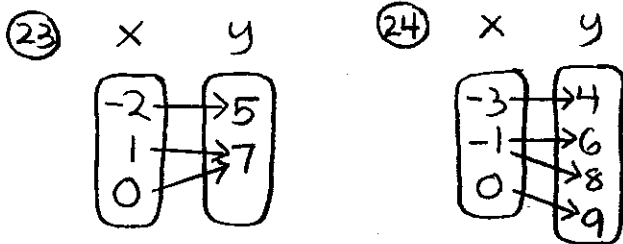
- ⑪ Indicate the domain for #9 above.
- ⑫ Indicate the range for #10 above.

State whether or not each is a linear equation:

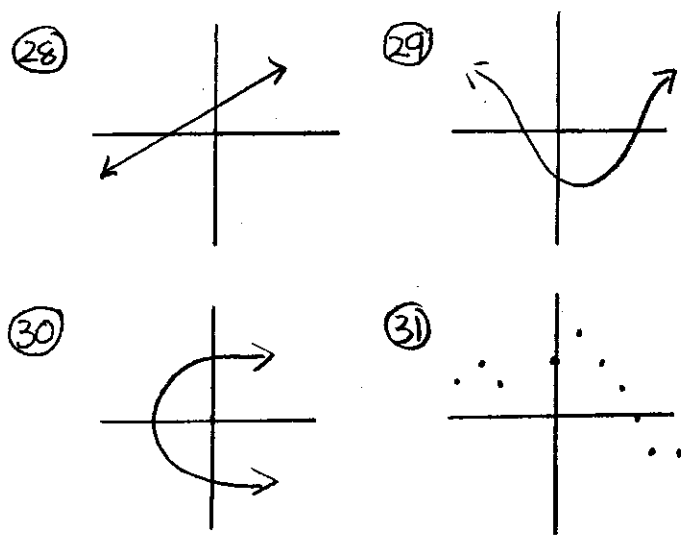
- |                 |                   |
|-----------------|-------------------|
| ⑬ $y = 3x + 2$  | ⑯ $4x^2 - 3x = y$ |
| ⑭ $2m + 3n = 1$ | ⑰ $x = 2$         |
| ⑮ $5x - 7 = 3y$ | ⑱ $x = y^2$       |

(19)  $2x + y = 0$       (21)  $4x^2 - 3x = y$   
 (20)  $\frac{x}{3} - \frac{2}{y} = 4$       (22)  $y - 2 = 3(x - 3)$

State whether or not each relation is a function:



- (25)  $\{(3, 4), (5, 4), (-2, 3), (5, 3)\}$   
 (26)  $\{(8, 4), (5, -2), (6, 3), (2, 3)\}$   
 (27)  $\{(4, 1), (-2, 3), (0, 5), (5, 0), (3, 3)\}$



Determine the value for each function:

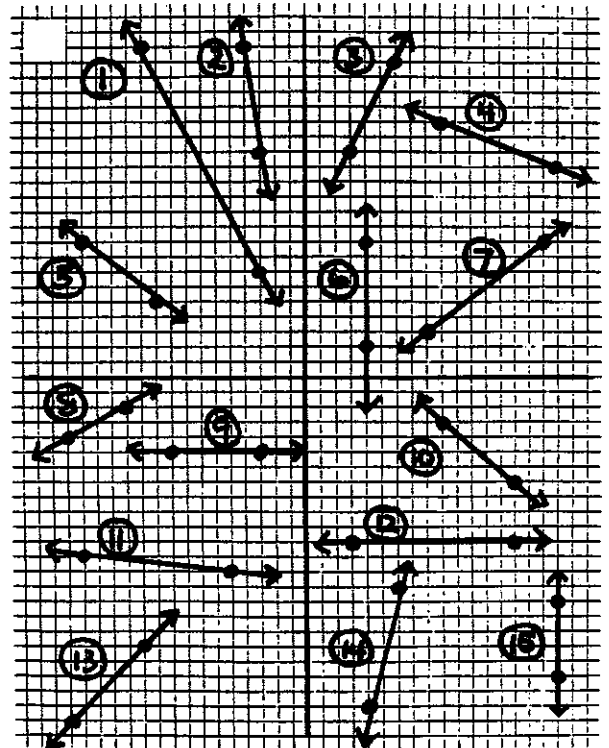
(32)  $f(x) = 3x - 5$  for  $f(-3)$   
 (33)  $f(x) = 2x - 1$  for  $f(-1)$

(34)  $f(x) = x^2 - x$  for  $f(-1)$   
 (35)  $f(x) = x^2 - 2x$  for  $f(2n)$   
 (36)  $f(x) = 3x^2 - x$  for  $f(a+1)$   
 (37)  $f(x) = x^2 + 3x$  for  $f[g(-3)]$   
        $g(x) = 2x + x$   
 (38)  $f(x) = 2x - x$  for  $f[g(-2)]$   
        $g(x) = x^2 - x$

## 8.2 Problems

### SLOPE & CHART METHOD

Determine the slope from a graph:



Determine slope from the coordinates:

- (16)  $(-3, -5)(-8, 5)$     (20)  $(-4, 2)(-9, 2)$   
 (17)  $(0, -3)(-7, 3)$     (21)  $(-6, -1)(0, -9)$   
 (18)  $(-2, -4)(-2, -8)$     (22)  $(-3, 4)(-3, -3)$   
 (19)  $(6, 8)(-4, -3)$     (23)  $(4, -1)(6, -1)$

Graph the line containing:

- (24)  $(-6, -6) m=2$     (28)  $(-8, -2) m=\text{und.}$   
 (25)  $(-8, 0) m=1/4$     (29)  $(-1, -5) m=-2/5$   
 (26)  $(0, 0) m=-3$     (30)  $(-4, 6) m=0$   
 (27)  $(-6, 4) m=0$     (31)  $(-8, 2) m=\text{und.}$

Graph using the chart method:

- (32)  $y=2x-1$   
 (33)  $y=x+5$   
 (34)  $y=x$   
 (35)  $y=-3x+1$   
 (36)  $x+y=9$     (38)  $2x+y=5$   
 (37)  $x-y=-2$     (39)  $3x-y=4$



### Review

- (40) Which quadrant includes the point  $(-8, -3)$ ?  
 (41) Indicate if the following relation is a function. List

the domain and range.

x	-2	0	2	2	5
y	-3	1	4	6	9

- (42) Indicate if the following are linear equations:

- a)  $3x=9$   
 b)  $x^2+y=1$   
 c)  $y=\frac{x}{3}$



- (43) Determine the value of the following function:

$f(x)=2x-3$  for  $f[g(n+1)]$   
 $g(x)=x^2$

## 8.3 Problems

### SLOPE-INTERCEPT FORM & STANDARD FORM

Write each equation in both slope-intercept and standard forms. Determine the slope and intercepts.

- (1)  $y=3x-9$     (5)  $\frac{1}{3}x-y=2$   
 (2)  $y=-2x+8$     (6)  $\frac{2x}{5}+y=4$   
 (3)  $6x-2y=4$     (7)  $3x=9-6y$   
 (4)  $-8x-4y=12$     (8)  $-x=12-2y$

# 8.4 Problems

## POINT-SLOPE FORM

Given the slope and a point or two points, write an equation in point-slope form:

- ①  $(3, 2)$   $m = -4$     ④  $(\frac{1}{2}, -4)$   $m = \frac{1}{2}$   
 ②  $(-1, 3)$   $m = 2$     ⑤  $(-3, -8)$   $(-1, 6)$   
 ③  $(2, -5)$   $m = \frac{2}{3}$     ⑥  $(4, 9)$   $(2, -1)$

Change the equation to the form indicated. Determine the slope and both intercepts. Draw the graph.

Slope - intercept form:

- ⑦  $2x = 6 - y$   
 ⑧  $y - 2 = 3(x + 4)$

Standard form:

- ⑨  $y = \frac{2}{3}x - 3$     ⑩  $y + \frac{5}{2} = \frac{1}{2}(x - 2)$

Graph the line by using the point-slope form. Identify the slope. Then change forms to determine the intercepts:

- ⑪  $y - 3 = 2(x - 4)$   
 ⑫  $y + 6 = -3(x + 2)$

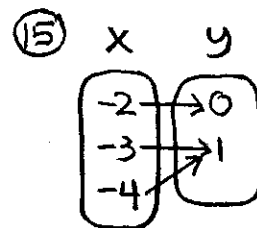


### Review

Which quadrant contains each coordinate:

- ⑬  $(7, -6)$     ⑭  $(-3, 8)$

Indicate if the following relation is a function. List the domain and range:



State whether or not these are linear equations:

- ⑯  $y = 0$     ⑰  $2x - 3xy = 4$

Determine the slope:

- ⑱  $(7, -2)$   $(9, -2)$     ⑲  $(6, -3)$   $(6, -8)$

Determine the function value:

- ⑳  $f(x) = -2x$   
 $g(x) = 2x - x^2$   
 for  $f[g(n+2)]$



# 8.5 Problems

## WRITING EQUATIONS

Write an equation in slope-intercept form for each function:

①

x	-3	-2	-1	0	1
y	-5	-3	-1	1	3

②

x	-2	-1	0	1	2
y	-3	1	5	9	13

③

x	-4	-2	0	2	4
y	-13	-5	3	11	19

④

x	1	3	5	7	9
y	5	17	29	41	53

⑤

x	y
1	4
2	8
3	12

⑥

x	y
1	-3
2	-6
3	-9

⑦

x	y
-5	28
-3	18
-1	8

⑧

x	y
-4	26
-2	22
0	18



Write an equation in both slope-intercept and standard form for a line that includes:

- ⑨  $(-6, -3)$   $m = -\frac{1}{2}$       ⑬  $(9, 1)(8, 2)$   
 ⑩  $(9, 1)$   $m = \frac{2}{3}$       ⑭  $(6, -1)(4, -2)$   
 ⑪  $(5, 7)$   $m = 0$       ⑮  $(-5, 1)(-7, 9)$   
 ⑫  $(-2, 3)$   $m = \text{und.}$       ⑯  $(6, 2)(3, 3)$

### Review

Write an equation in point-slope form for a line including:

- ⑰  $(-4, -3)(-7, 3)$       ⑱  $(-2, 4)(-5, 5)$

# 8.6 Problems

## PARALLEL & PERPENDICULAR

Determine if the following pairs of lines are parallel, perpendicular, or neither:

- ①  $2x + 3y = 6$       ④  $4x - 3y = 1$   
 $y = -\frac{2}{3}x + 1$        $y - 2 = -\frac{3}{4}(x + 1)$   
 ②  $x - 2y = 4$       ⑤  $3x + y = -7$   
 $y = -2x + 3$        $y - 1 = \frac{1}{3}(x + 3)$   
 ③  $3x - y = 4$       ⑥  $x = 2$   
 $y = \frac{1}{3}x - 2$        $y = 3$

⑦  $x - 4y = 3$   
 $y = \frac{1}{4}x + 2$

⑨  $y = \frac{2}{3}x + 3$   
 $y = -\frac{3}{2}x$

⑧  $2x - y = 3$   
 $x + 2y = 3$

⑩  $y - 2 = 2(x + 1)$   
 $2x - y = 0$

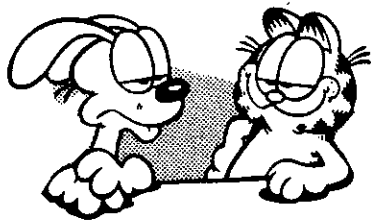
write the equation of a line:

⑪ Parallel to  $6x + y = 4$   
through  $(-2, 3)$  in standard form

⑫ Parallel to  $5x - 2y = 7$  through  
 $(0, -4)$  in standard form

⑬ Parallel to  $y = -\frac{3}{5}x + 4$   
through  $(0, -1)$  in slope-intercept form

⑭ Parallel to  
 $y = \frac{3}{4}x - 1$   
through  
the origin  
in slope-intercept form



⑮ Perpendicular to  $5x - 3y = 7$   
through  $(8, -2)$  in standard form

⑯ Perpendicular to  $3x + 8y = 4$   
through  $(0, 4)$  in standard form

⑰ Perpendicular to  $y = 3x - 2$   
through  $(6, -1)$  in slope-intercept form

⑱ Perpendicular to  $y = -3x + 7$   
through  $(-3, 1)$  in slope-intercept form

⑲ Parallel to  $y - 2 = \frac{2}{3}(x - 3)$

through  $(5, -2)$  in point-slope form

⑳ Parallel to  $y + 3 = -2(x + \frac{1}{2})$   
through  $(-1, -1)$  in point-slope form

㉑ Perpendicular to  $y - 4 = \frac{1}{2}(x + 1)$   
through  $(4, -2)$  in point-slope form

㉒ Perpendicular to  $y + 3 = -4(x - 1)$   
through  $(3, 3)$  in point-slope form

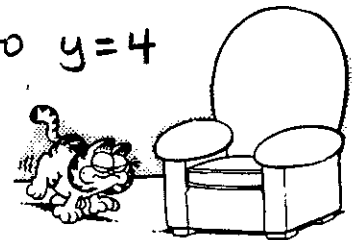
㉓ Parallel to  $3x - 6y = 2$  through  
 $(1, 2)$  in slope-intercept form

㉔ Perpendicular to  $2x + y = 5$   
through  $(-1, -3)$  in slope-intercept form

㉕ Perpendicular to  $y = 5x - 3$   
through  $(0, -1)$  in standard form

㉖ Parallel to  $y = x$  through  
 $(7, -2)$  in standard form

㉗ Parallel to  $y = 4$   
through  
 $(2, -5)$



㉘ Through  
 $(2, 7)$   
perpendicular to  $x = -2$

㉙ Perpendicular to  $y = 5$   
through  $(0, -2)$



㉚ Parallel to  
 $x = -1$   
through  $(-3, -4)$

# 8.7 Problems

## SEGMENT MIDPOINT

Find the midpoint of a line segment with end points:

- ①  $(3,5)(11,7)$     ③  $(6,-7)(4,-11)$   
 ②  $(5,9)(-7,3)$     ④  $(4,-7)(-8,1)$

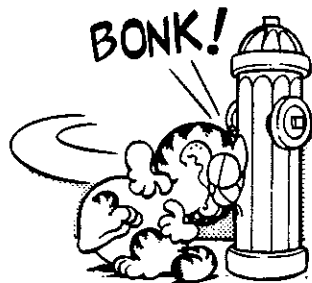
Find the end point (B) of  $\overline{AB}$  with midpoint (P):

- ⑤  $A(3,5)$   $P(5,-7)$     ⑦  $A(5,7)$   $P(5,6)$   
 ⑥  $A(7,4)$   $P(9,-3)$     ⑧  $A(3,-5)$   $P(-3,8)$

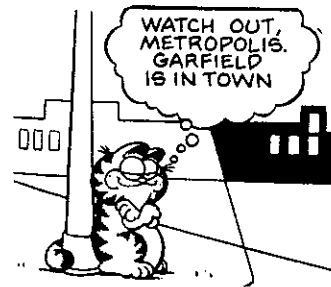
### Review

Write an equation:

- ⑨ Parallel to  $3x - y = 4$  through  $(2, -4)$  in slope-intercept form
- ⑩ Perpendicular to  $y = 2x + 1$  through  $(4, 3)$  in standard form
- ⑪ Perpendicular to  $2x - y = 5$  through  $(-1, 2)$  in point-slope form
- ⑫ Parallel to  $y = 2$  through the point  $(-3, -1)$



- ⑬ Write an equation in slope-intercept form:



x	y
-4	2
-7	8
-10	14
-13	20
-16	26

- ⑭ Write an equation in standard form for a line through  $(-2, 3)$   $(-5, 12)$
- ⑮ Write an equation in point-slope form for a line through  $(-1, 5)$  with a slope of  $-\frac{1}{2}$
- ⑯ Using the intercept method, graph  $2x - y = 6$
- ⑰ Using the slope method, graph a line through  $(0, -4)$  with a slope  $= -4$

## Unit 8 REVIEW PROBLEMS

Which quadrant contains:

- ①  $(-8, 4)$     ②  $(7, -3)$

State the ordered pairs, domain, and range:

③

x	y
-2	-3
3	-1
4	0
	5

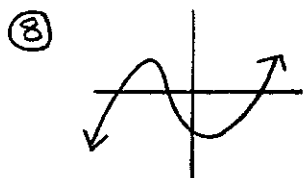
State whether or not the equation is a linear equation:

④  $2x - y^2 = 3$       ⑤  $y = 2$

State whether or not the relation is a function:

⑥  $\{(6,3), (2,5), (4,5), (1,0)\}$

⑦  $\{(-1,-3), (0,-2), (2,3), (2,4)\}$

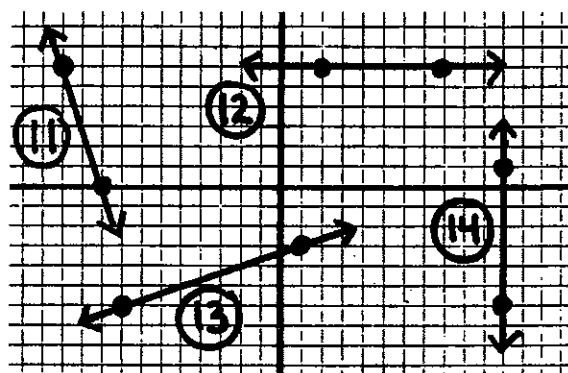


Determine the value:

⑨  $f(x) = 2x^2 - 3x$  for  $f(-2)$

⑩  $f(x) = 3x - x^2$  for  $f[g(n+2)]$   
 $g(x) = 2x - 3$

Determine slope:



⑮ Determine the slope of a line containing  $(-6,3)$   $(-6,5)$

⑯ Determine the slope of a line containing  $(-2,-9)$   $(10,-4)$

Graph a line containing:

⑰  $(-4, 2)$   
 $m = -3$

⑱  $(6, -4)$   
 $m = 0$

Change the equation to the indicated form, Give the slope and intercepts.

Slope-intercept form:

⑲  $3x = 12 + 6y$       ⑳  $4x - 2y = 6$

Standard form:

㉑  $y = \frac{3}{4}x - 2$       ㉒  $6y - 8 = 12x + 10$

Graph each equation from the information in the given form:

㉓  $3x - 2y = 12$       ㉔  $y = 3x$

㉕  $x + 4y = 8$       ㉖  $y - 2 = \frac{3}{4}(x + 4)$

㉗  $y = -5x + 10$       ㉘  $y + 5 = -2(x - 3)$

Write an equation in slope-intercept form for each function:

㉙

x	y
-2	-8
-6	-2
-10	4

㉚

x	y
-3	-12
-1	-4
1	4

Write an equation in slope-intercept form:

31)  $(-6, 3)$       32)  $(-8, 4)$   
 $m = -2$                $(0, 4)$

Write an equation in standard form:

33)  $(-9, -3)$       34)  $(6, -10)$   
 $m = 4$                $(8, -6)$

Write an equation in point-slope form:

35)  $(-3, -5)$       36)  $(4, -5)$   
 $m = -2/3$                $(8, -13)$

Indicate if the lines are parallel, perpendicular, or neither:

37)  $3x - 5y = 7$   
 $y - 2 = -\frac{3}{5}(x + 1)$

38)  $y = -4x + 2$   
 $x - 4y = 3$



Write an equation for a line that is:

39) Parallel to  $3x - 2y = 4$  through  $(-6, 2)$  in standard form

40) Perpendicular to  $y = \frac{2}{3}x + 1$  through  $(6, -4)$  in slope-intercept form

41) Perpendicular to  $2x - 3y = 7$  through  $(4, -3)$  in slope-intercept form

42) Parallel to  $y = -\frac{1}{2}x + 8$  through  $(6, -2)$  in standard form

43) Parallel to  $y = -4$  through the point  $(-1, 2)$

44) Perpendicular to  $x = 4$  through  $(5, 7)$

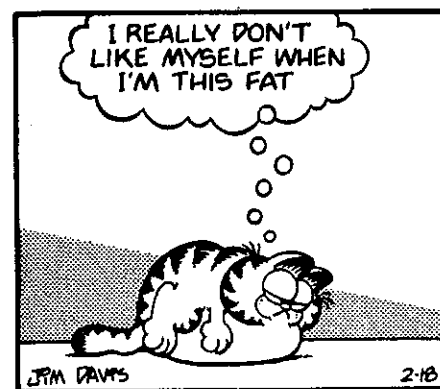
Find the midpoint or end point as indicated:

45) Find P (midpoint) of  $\overline{AB}$   
 $A(-6, 11)$      $B(-12, 15)$

46) Find B (end point) of  $\overline{AB}$   
 $A(-2, 7)$      $P(-5, 9)$

Graph the following linear equations:

47)  $y = -5x$       48)  $y = \frac{1}{2}x$



## Unit 8

# SKILL CHECK

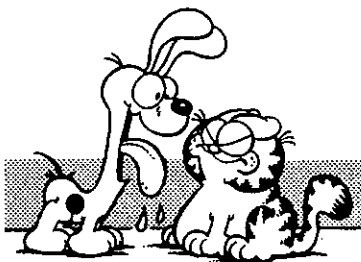
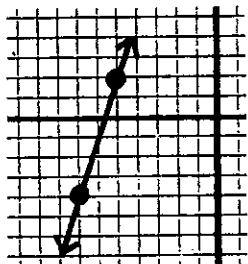
① Which quadrant contains the point  $(-8, -9)$ ?

② Is  $2xy = 6$  a linear equation?

③ Is the following relation a function?  
 $\{(-4, -2), (-3, -2), (0, 1), (5, 1)\}$

④ Determine the value:  
 $f(x) = 2x^3 - x^2$  for  $f(-2)$ .

⑤ Determine the slope:



⑥ Determine the slope of a line containing  $(-4, 2)$  and  $(-4, 9)$ .

⑦ Write the equation  $2x - 4y = 8$  in slope intercept form and indicate the slope and both intercepts.

⑧ Write  $4y = \frac{4}{3}x - 2$  in standard form and indicate the slope and both intercepts.

⑨ Write an equation in slope-intercept form for the

following relation:

x	-7	-10	-13	-16	-19
y	-4	2	8	14	20

Graph each equation:

⑩  $y = -\frac{2}{3}x + 6$     ⑫  $y + 6 = \frac{1}{3}(x - 4)$

⑪  $5x - 2y = -10$     ⑬  $x = 3y$

Write an equation for a line:

⑭ Including  $(4, -3)$  and  $(5, -7)$  in standard form

⑮ Including  $(2, -3)$  and  $(4, -3)$  in any form

⑯ Including  $(2, -5)$  with slope  $= -\frac{2}{5}$  in point-slope form

⑰ Perpendicular to  $y = \frac{1}{3}x - 5$  through  $(-6, 3)$  in standard form

Find the midpoint of  $\overline{AB}$ :

⑱ A  $(4, -7)$     B  $(-2, 5)$

Determine the value of this function:

⑲  $f[g(3n+2)]$

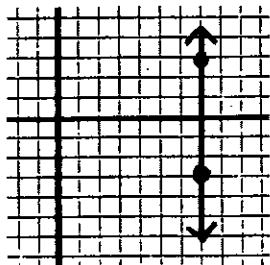
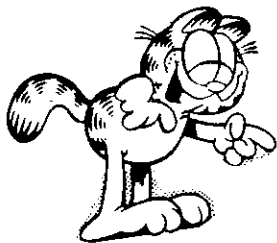
$f(x) = 2x - 3x^2$

$g(x) = 6 - x$

## Unit 8

# REMEDIATION

- ① Which quadrant contains the point  $(4, 6)$ ?
- ② Is  $\frac{x}{2} - y = 3$  a linear equation?
- ③ Is the following relation a function?  
 $\{(5, -2), (4, -1), (5, 0), (3, -3)\}$
- ④ Determine the value of:  
 $f(x) = 3x^2 - x^3$  for  $f(-3)$ .
- ⑤ Determine the slope:



- ⑥ Determine the slope of a line containing  $(5, -2)$  and  $(-7, -5)$ .
- ⑦ Write  $x + 3y = -9$  in slope-intercept form and indicate the slope and both intercepts.
- ⑧ Write  $6y = -\frac{3}{4}x + 9$  in standard form and indicate the slope and both intercepts.
- ⑨ Write an equation in slope-intercept form for the relation at the right:

x	y
4	7
9	-3
14	-13

Graph each equation:

- ⑩  $y = -\frac{3}{4}x - 6$
- ⑪  $3x - 2y = 6$
- ⑫  $y + 4 = -2(x - 1)$
- ⑬  $-4y = 6x$

Write an equation for a line:

- ⑭ Including  $(4, -1)$  and  $(6, -13)$  in standard form
- ⑮ Including  $(7, -1)$  and  $(7, 0)$  in any form
- ⑯ Including  $(2, -6)$  with a slope  $= \frac{1}{2}$  in point-slope form
- ⑰ Perpendicular to  $y = -3x + 6$  through  $(12, 12)$  in standard form

Find the midpoint of  $\overline{AB}$ :

- ⑱  $A(-1, 7)$   $B(-5, 21)$

Determine the value:

- ⑲  $f(x) = 5x - 2x^2$   
 $g(x) = 2x + 2$   
 for  $f[g(2a - 3)]$



Unit 8

# EXTRA PRACTICE

① Which quadrant contains:

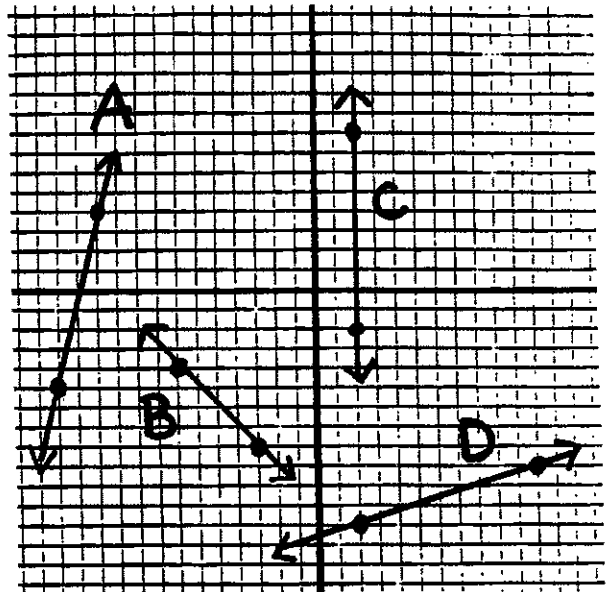
- A.  $(-5, -2)$       C.  $(-1, 5)$   
 B.  $(4, -3)$       D.  $(3, 2)$

② Is the following a linear equation?

- A.  $y = -4 - x$   
 B.  $x^2 = -5$   
 C.  $x = 2y$   
 D.  $y = \frac{3}{x} - 2$



⑤ Determine the slope:



③ Is the following relation a function?

- A.  $\{(-2, 3), (-3, 2), (5, 5)\}$   
 B.  $\{(-1, -1), (4, -7), (3, -7)\}$   
 C.  $\{(4, -3), (5, -3), (6, -3)\}$   
 D.  $\{(-2, 1), (-1, 2), (-2, 2)\}$

⑥ Determine the slope of a line containing:

- A.  $(-2, 3)$   $(-4, 7)$   
 B.  $(-5, 9)$   $(-7, 9)$   
 C.  $(-3, 8)$   $(-7, 10)$   
 D.  $(4, -1)$   $(4, -5)$

④ Determine the function value:

- A.  $f(x) = x - x^2$  for  $f(-2)$   
 B.  $f(x) = 2x^2 - 3x + 1$  for  $f(-3)$   
 C.  $f(x) = x^2 - 4x$  for  $f(-4)$   
 D.  $f(x) = (x - 3)^2$  for  $f(1)$

⑦ Write in slope-intercept form and indicate the slope and both intercepts:

- A.  $4x = 3 - y$   
 B.  $x + 2y = 6$   
 C.  $6x - 3y = 12$   
 D.  $2x - 6y = -18$



⑧ Write in standard form and indicate the slope and both intercepts:

A.  $4y = \frac{2}{3}x + 6$

B.  $y + 3 = -3(x - 4)$

C.  $3y - 6x = 9$

D.  $6y = 3x - \frac{3}{4}$

⑨ Write an equation in slope-intercept form for the following relation:

A. 

x	-2	-5	-8	-11
y	4	6	8	10

B. 

x	2	9	16	23
y	-3	-5	-7	-9

C. 

x	5	-1	-7	-13
y	9	11	13	15

D. 

x	-4	-8	-12	-16
y	8	5	2	-1

⑩ Graph each equation:

A.  $y = \frac{3}{4}x - 4$

B.  $y = -3x + 6$

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

D.  $y = \frac{2}{3}x - 6$



⑪ Graph each equation:

A.  $2x - y = 6$

B.  $3x + 2y = -12$

C.  $x - 4y = 8$

D.  $2x - 5y = -10$

⑫ Graph each equation:

A.  $y - 3 = -2(x + 5)$

B.  $y + 4 = 5(x - 3)$

C.  $y - 5 = -\frac{1}{2}(x + 2)$

D.  $y - 6 = \frac{2}{3}(x - 4)$

⑬ Graph each equation:

A.  $y = 3x$

B.  $y = -4$

C.  $x = -2$

D.  $y = -x$

⑭ Write an equation for:

A. A line including  $(-3, -5)$  and  $(-2, 4)$  in standard form

B. A line including  $(-5, 7)$  and  $(3, 3)$  in standard form

C. A line including  $(-2, 4)$  and  $(2, -2)$  in standard form

D. A line including  $(0, 0)$  and  $(-3, 1)$  in standard form

⑮ Write an equation for:

A. A line including  $(-5, 2)$  and  $(-5, 5)$  in any form

B. A line including  $(-3, 7)$  and  $(2, 7)$  in any form

C. A line including  $(-2, 3)$  and  $(4, 3)$  in any form

D. A line containing  $(0, -1)$  and  $(4, -1)$  in any form

C. Perpendicular to  $y = 5x - 10$  through  $(-15, 8)$

D. Parallel to  $y = 3x - 4$  through  $(2, 4)$

⑯ For line  $\overline{AB}$ , find:

A. midpoint if  $A(-3, 5)$   $B(-7, 11)$

B. Endpoint if  $A(4, -2)$   $M(-6, 10)$

C. Midpoint if  $A(-3, 1)$   $B(0, 7)$

D. Endpoint if  $M(4, 2)$   $B(-3, 7)$

⑰ Write an equation for:

A. A line including  $(4, -5)$   $m = \frac{2}{3}$  in point-slope form

B. A line including  $(-3, -6)$   $m = -5$  in point-slope form

C. A line including  $(-4, 7)$   $m = \frac{1}{4}$  in point-slope form

D. A line including  $(-3, 2)$   $m = 3$  in point-slope form

⑰ Determine the value of the function:

A.  $f[g(n+2)]$  for

$$f(x) = x - 2x^2$$

$$g(x) = 3x - 2$$

B.  $f[g(n-3)]$

$$f(x) = 2x^2 - 5$$

$$g(x) = x + 1$$

C.  $f[g(2n+1)]$

$$f(x) = x^2 - 3x$$

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

D.  $f[g(2n-3)]$

$$f(x) = x^2 - 2x$$

$$g(x) = x - 3$$

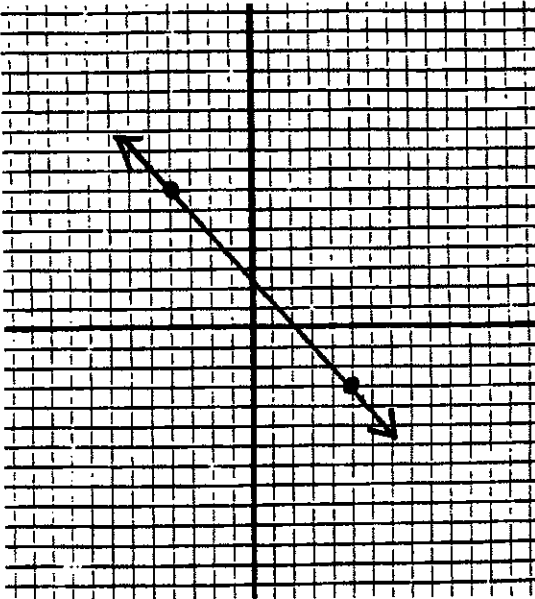
⑰ Write an equation for a line in standard form:

A. Perpendicular to  $y = 2x - 5$  through  $(-6, 4)$

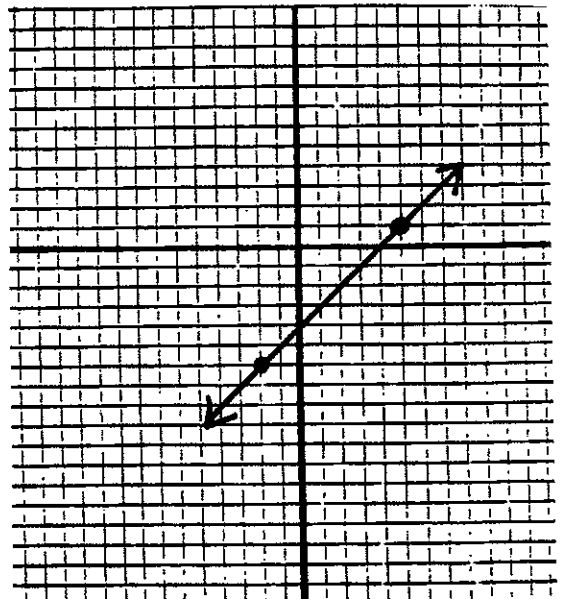
B. Parallel to  $y = -\frac{1}{3}x + 2$  through  $(2, -1)$

20) Write an equation in point-slope form for:

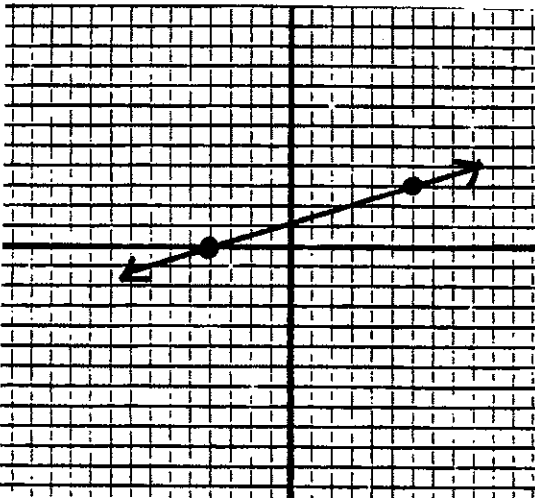
A.



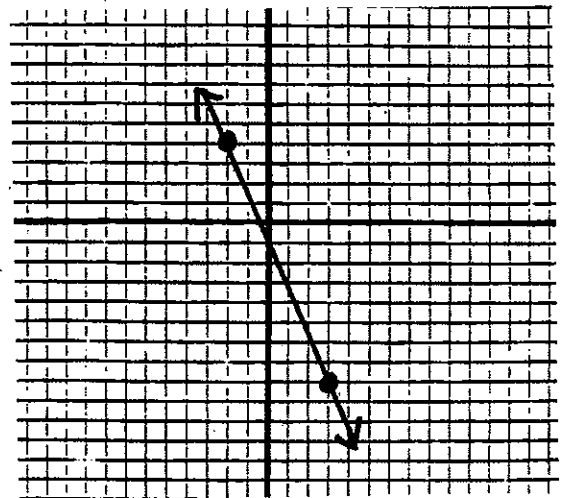
C.



B.



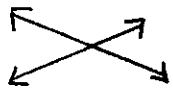
D.



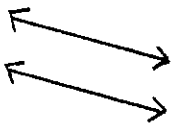
# Linear Systems

## Lesson 9.1 CLASSIFYING SYSTEMS

Classifying Systems:	
Independent	Different lines
Dependent	Same line
Consistent	Shared point(s)
Inconsistent	Parallel lines



Independent  
Consistent  
1 Solution



Independent  
Inconsistent  
No Solutions



Dependent  
Consistent  
INF Solutions

Classify the system and state the number of solutions:

1 ●  $4x - y = 8$  slope = 4  
 $y = 2x + 3$  slope = 2

Different lines, not parallel

**Independent, Consistent** 1

2 ●  $y = \frac{1}{3}x + 4$  slope =  $\frac{1}{3}$  y-int (0,4)  
 $x + 3y = 12$  slope =  $-\frac{1}{3}$  y-int (0,4)

Same line

**Dependent, Consistent** INF

3 ●  $2x + 5y = 10$  slope =  $-\frac{2}{5}$  y-int (0,2)  
 $y = -\frac{2}{5}x + 3$  slope =  $-\frac{2}{5}$  y-int (0,3)

Parallel lines

**Independent, Inconsistent** 0

## Lesson 9.2 SUBSTITUTION METHOD

Use substitution to solve. Then classify and state the number of solutions:

1 ●  $y = 2x + 1$   
 $4x + 2y = 26$

$4x + 2(2x + 1) = 26$

$4x + 4x + 2 = 26$

$8x = 24$

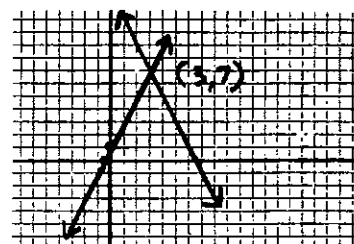
$x = 3$



$y = 2x + 1$

$y = 2(3) + 1 = 7$

**Independent, Consistent** 1



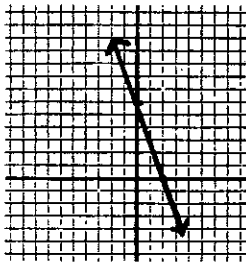
Solution  
(3,7)

# Lesson 9.3

## ELIMINATION METHOD

Use elimination to solve:

$$2 \bullet \begin{aligned} 3x + y &= 6 & \rightarrow & y = -3x + 6 \\ 2y - 12 &= -6x \\ 2(-3x + 6) - 12 &= -6x \\ -6x + 12 - 12 &= -6x \\ 12 &= 12 \end{aligned}$$



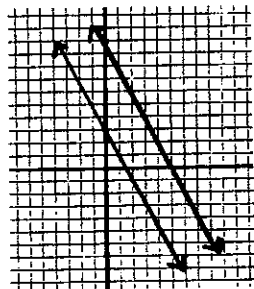
Dependent  
Consistent

INF

Single line

$$1 \bullet \begin{aligned} x - 2y &= 5 & \text{Add to} \\ 2x + 2y &= 7 & \text{eliminate "y"} \\ \hline x - 2y &= 5 & x - 2y = 5 \\ 2x + 2y &= 7 & (4) - 2y = 5 \\ 3x &= 12 & -2y = 1 \\ x &= 4 & y = -\frac{1}{2} \end{aligned} \quad \boxed{(4, -\frac{1}{2})}$$

$$3 \bullet \begin{aligned} 6x + 3y &= 30 \\ y &= -2x + 3 \\ 6x + 3(-2x + 3) &= 30 \\ 6x - 6x + 9 &= 30 \\ 9 &= 30 \end{aligned}$$



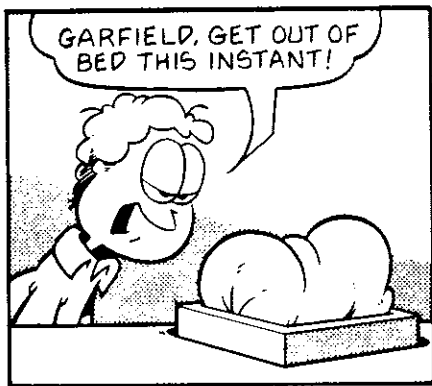
Independent  
Inconsistent

∅

Parallel lines

$$2 \bullet \begin{aligned} 3a + 4b &= -25 & \text{mult. by 3} \\ 2a - 3b &= 6 & \text{mult. by 4} \\ \hline 9a + 12b &= -75 & 2(-3) - 3b = 6 \\ 8a - 12b &= 24 & -6 - 3b = 6 \\ \hline 17a &= -51 & -3b = 12 \\ a &= -3 & b = -4 \end{aligned} \quad \boxed{(-3, -4)}$$

$$3 \bullet \begin{aligned} \frac{1}{2}x - y &= -20 & \text{mult. by 2} \\ \frac{1}{4}x + \frac{3}{4}y &= 10 & \text{mult. by -4} \\ \hline x - 2y &= -40 & x - 2(16) = -40 \\ -x - 3y &= -40 & x - 32 = -40 \\ \hline -5y &= -80 & x = -8 \\ y &= 16 & \end{aligned} \quad \boxed{(-8, 16)}$$



Set up a system of equations and solve using substitution:

- 4 • A father is three times the age of his son. Six years ago, the father was

four times his son's age.  
How old are they now?

$x$  = father's age now  
 $y$  = son's age now

$$x = 3y$$

$$(x-6) = 4(y-6)$$

$$x-6 = 4y-24 \quad x=3y$$

$$x-4y = -18 \quad x=3(18)$$

$$(3y)-4y = -18 \quad x=54$$

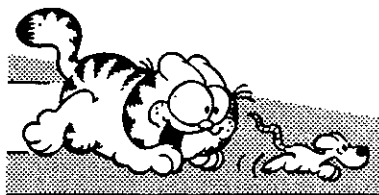
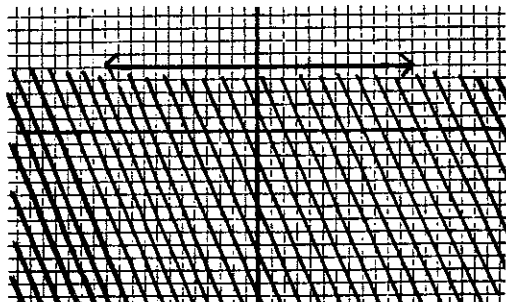
$-y = -18$       father 54 yrs  
 $y = 18$         son      18 yrs

## Lesson 9.4

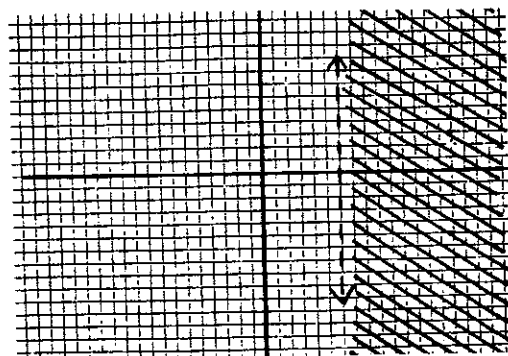
### GRAPHING INEQUALITIES

Graph each inequality:

1 ●  $y \leq 5$



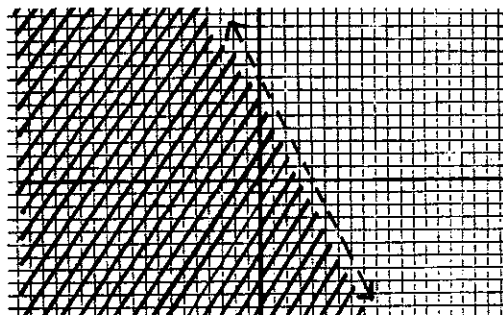
2 ●  $x > 6$



3 ●  $2x + y < 8$

Always change to slope-intercept form before graphing

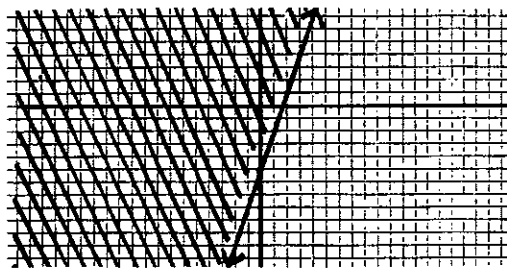
$$y < -2x + 8$$



4 ●  $6x - 2y \leq 10$

$$-2y \leq -6x + 10$$

$$y \geq 3x - 5$$

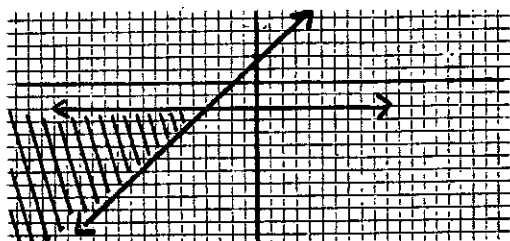


# Lesson 9.5

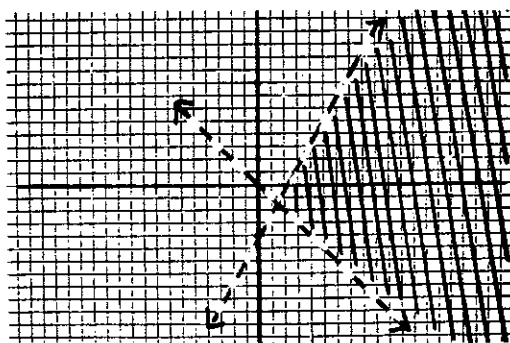
## SYSTEMS OF INEQUALITIES

Solve each system by graphing:

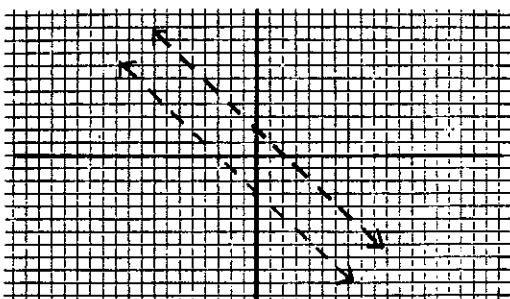
1●  $y \geq x + 2$   
 $y \leq -2$



2●  $2x - y > 4 \rightarrow y < 2x - 4$   
 $y > -x$



3●  $y > -x + 2$   
 $y < -x - 3$  no solutions



# Lesson 9.6

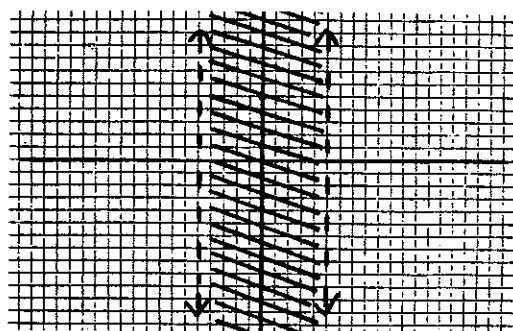
## ABSOLUTE VALUE INEQUALITIES

Solve each system by graphing:

1●  $|x| - 3 < 2$

$|x| < 5$

$x < 5$  and  $x > -5$

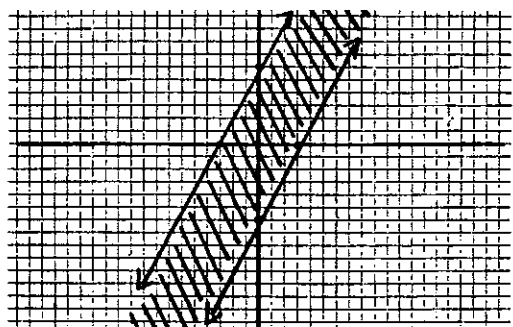


2●  $|2x - y| \leq 6$

$2x - y \leq 6$  and  $2x - y \geq -6$

$-y \leq -2x + 6$  and  $-y \geq -2x - 6$

$y \geq 2x - 6$  and  $y \leq 2x + 6$



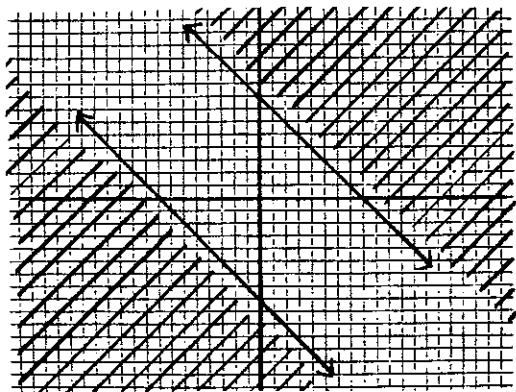
### Summary

$<, \leq$  indicates intersection (and)  
 $>, \geq$  indicates union (or)

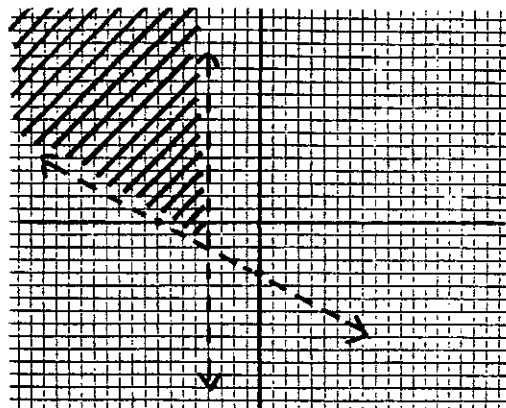
3●  $|x+y| \geq 8$

$x+y \geq 8$  or  $x+y \leq -8$

$y \geq -x+8$  or  $y \leq -x-8$



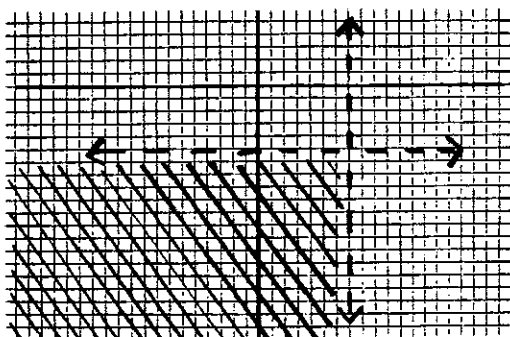
6●



$x < -4$     $y > -\frac{1}{2}x - 4$

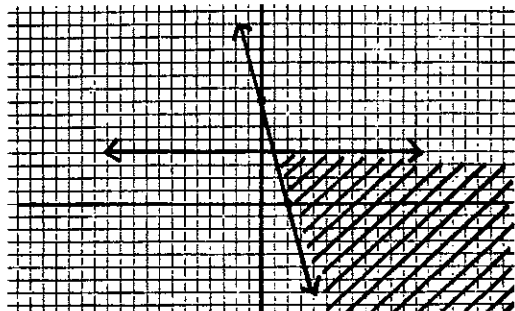
Write a system of inequalities for each graph:

4●



$y < -5$     $x < 7$

5●



$y \leq 4$     $y \geq -4x + 8$

## Lesson 9.7

### DIGIT PROBLEMS



Set up a system to solve each digit problem:

- 1● The sum of the digits of a two digit number is 13. The units digit is 1 more than twice the tens digit. Find the number.

Two digit number (tu)

$t + u = 13$

$u = 2t + 1$

**49**

$t + (2t + 1) = 13$

$3t + 1 = 13$     $u = 2t + 1$

$3t = 12$     $u = 2(4) + 1$

$t = 4$     $u = 9$



## Lesson 9.8

### PROBLEM SOLVING

Use a system of equations to solve:

- 2● The units digit of a two digit number is 4 times the tens digit. The number is 4 more than 3 times the units digit. Find the number.

$$u = 4t$$

$$10t + u = 3u + 4$$

$$10t - 2u = 4 \quad u = 4t$$

$$10t - 2(4t) = 4 \quad u = 4(2)$$

$$10t - 8t = 4 \quad u = 8$$

$$2t = 4$$

$$t = 2$$

**28**

- 1● A boat travels 24 miles upstream in 3 hours. The return trip takes 2 hours. Find the speed of the boat and the rate of the current.

$$R \times T = D$$

Upstream  $(r-c) \cdot 3 = 24$

Downstream  $(r+c) \cdot 2 = 24$

$$3r - 3c = 24 \quad \text{divide by 3}$$

$$2r + 2c = 24 \quad \text{divide by 2}$$

$$r - c = 8 \quad (10) - c = 8 \rightarrow c = 2$$

$$r + c = 12$$

$$2r = 20$$

$$r = 10$$

boat: 10 mph  
current: 2 mph

- 2● A plane flies 150 miles in 20 minutes with a tailwind behind it. Against the wind, the plane can fly 25 miles farther in a half hour. Find the speed of the plane and the rate of the wind.

$$R \times T = D$$

With wind  $(r+w) \cdot \frac{1}{3} = 150$

Against wind  $(r-w) \cdot \frac{1}{2} = 175$

continued

- 3● The sum of the digits of a two digit number is 10. If the digits are reversed, the new number is 1 less than twice the original number. Find the original number.

$$t + u = 10 \rightarrow t = 10 - u$$

$$10u + t = 2(10t + u) - 1$$

$$10u + t = 20t + 2u - 1$$

$$8u - 19t = -1$$

$$8u - 19(10 - u) = -1$$

$$8u - 190 + 19u = -1$$

$$27u = 189$$

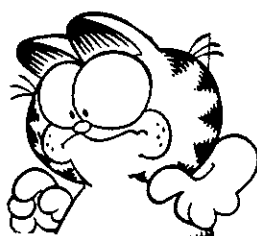
$$u = 7$$

$$t = 10 - u$$

$$t = 10 - (7)$$

$$t = 3$$

**37**



$$\frac{1}{3}r + \frac{1}{3}w = 150 \quad \text{mult. by 3}$$

$$\frac{1}{2}r - \frac{1}{2}w = 175 \quad \text{mult. by 2}$$

$$r + w = 450 \quad (400) + w = 450$$

$$r - w = 350 \quad w = 50$$


---


$$2r = 800$$

$$r = 400$$

Plane: 400mph  
wind: 50mph

- 3● A 10 pound assortment of candy contains mints that sell for \$1.50 per pound and caramels that sell for \$1.30 per pound. If the mixture sells for \$1.44 per pound, how many pounds of each candy are in the assortment?

$m$  = pounds of mints  
 $c$  = pounds of caramels

$$m + c = 10 \rightarrow m = 10 - c$$

$$1.50m + 1.30c = 10(1.44)$$

$$1.5m + 1.3c = 14.4$$

$$15m + 13c = 144$$

$$15(10 - c) + 13c = 144$$

$$150 - 15c + 13c = 144$$

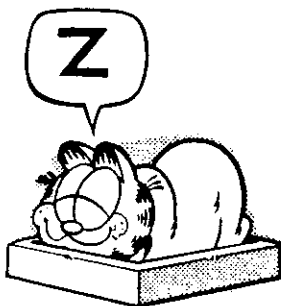
$$-2c = -6$$

$$c = 3$$

$$m + c = 10$$

$$m + (3) = 10$$

$$m = 7$$



3 lbs. caramels, 7 lbs. mints

- 4● Paula invests \$16,000, part at 12% and part at 10%. After one year, the 12% investment earned twice as much interest as the 10% investment. How much money is invested at each rate?

$x$  = \$ invested at 12%  
 $y$  = \$ invested at 10%

$$x + y = 16,000 \rightarrow x = 16,000 - y$$

$$.12x = 2(.10y)$$

$$.12x = .2y$$

$$12x = 20y$$

$$12(16,000 - y) = 20y$$

$$192,000 - 12y = 20y$$

$$192,000 = 32y$$

$$y = 6,000$$



$$x + y = 16,000$$

$$x + (6,000) = 16,000$$

$$x = 10,000$$

\$10,000 at  
12%  
\$6,000 at  
10%

## Unit Review

### ABSOLUTE VALUE GRAPHING

The following systems show an intersection between the absolute value inequality and a second inequality.

Note: The absolute value inequality may be a union or an intersection.

continued

Graph the Systems:

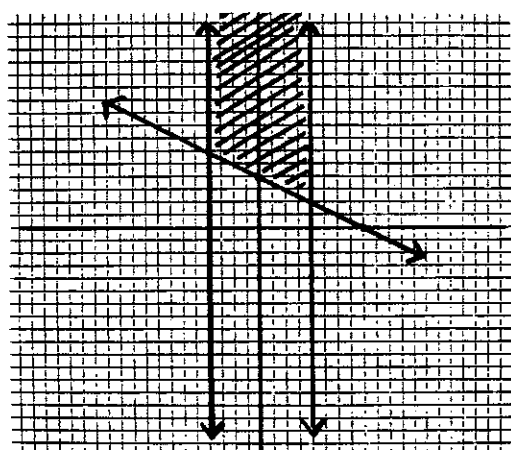
1 •  $|x| \leq 4$   
 $x+2y \geq 8$



$x \leq 4$  and  $x \geq -4$

$-4 \leq x \leq 4$  and

$x+2y \geq 8 \rightarrow y \geq -\frac{1}{2}x+4$



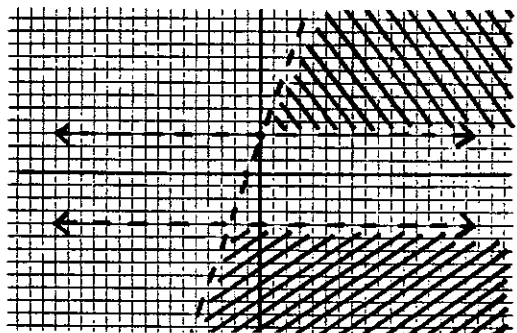
2 •  $|2y+1| > 7$   
 $y < 3x+3$



$|2y+1| > 7$

$2y+1 > 7$  or  $2y+1 < -7$

$(y > 3$  or  $y < -4)$  and  $y < 3x+3$



# 9.1 Problems

## CLASSIFYING SYSTEMS

Classify the system and state the number of solutions:

①  $3x+y=6$   
 $x-y=2$

⑤  $x+2y=6$   
 $y=-\frac{1}{2}x+3$

②  $x+2y=5$   
 $2x+4y=1$

⑥  $x+y=6$   
 $x-y=2$

③  $2x-3y=-5$   
 $x=2$

⑦  $9x-4y=2$   
 $y=-x+6$

④  $2x+3y=4$   
 $4x+6y=8$

⑧  $y=-\frac{1}{2}x+4$   
 $3x+6y=24$

Graph each system and classify:

⑨  $y=x+3$   
 $x+3y=5$

⑪  $x=9$   
 $y=6$

⑩  $4x-2y=10$   
 $y=2x-5$

⑫  $y=-3x$   
 $x=4y$



⑬  $3x-2y=12$   
 $y-4=\frac{3}{2}(x+4)$

⑭  $y-3=2(x-2)$   
 $3y+2x=13$

## 9.2 Problems

### SUBSTITUTION METHOD

Use substitution to solve, classify, and state the number of solutions:

- |  |  |
|--|--|
| ① $y = 3x$<br>$x + 2y = -21$             | ⑤ $3x + 2y = 14$<br>$x + \frac{2}{3}y = 4$ |
| ② $y = 2x$<br>$x + 2y = 8$               | ⑥ $x + 2y = 3$<br>$2x + 4y = 6$            |
| ③ $3x + y = 2$<br>$2x - y = \frac{1}{2}$ | ⑦ $y - 4 = 3(x + 2)$<br>$6x - 2y = 12$     |
| ④ $3x + y = 7$<br>$10x - 3y = -2$        | ⑧ $x + \frac{1}{2}y = 4$<br>$y = -2x + 8$  |



Graph each system. Use substitution to check the solution and identify the point of intersection:

- |                                 |                                |
|---------------------------------|--------------------------------|
| ⑨ $2x + 5y = 15$<br>$y = x - 4$ | ⑩ $y = -2x + 6$<br>$x + y = 2$ |
|---------------------------------|--------------------------------|

## 9.3 Problems

### ELIMINATION METHOD

Use elimination to solve:

- |                                  |   |
|----------------------------------|---|
| ① $x + y = 7$<br>$x - y = 9$     | ⑤ $5x + 3y = 10$<br>$6x - 9y = 12$                            |
| ② $2x - 3y = -4$<br>$x = 7 - 3y$ | ⑥ $9x + 8y = 7$<br>$18x - 14 = 16y$                           |
| ③ $3x + 3y = 6$<br>$2x - y = 1$  | ⑦ $\frac{1}{3}x - y = 0$<br>$\frac{1}{5}x + \frac{2}{5}y = 1$ |
| ④ $x - 5y = 0$<br>$2x - 3y = 7$  | ⑧ $\frac{1}{8}(x + y) = 1$<br>$x - y = 4$                     |

Write a system of equations and solve using substitution:

- ⑨ The difference between two numbers is four. Twice the larger number is three times the sum of the smaller number and two. Find them.
- ⑩ The larger of two numbers is twice the smaller one. If the greater is increased by eighteen, the result is four less than four times the smaller one. Find the two numbers.
- ⑪ Layla is three times as old as Diana. In ten years, Layla will be twice as old as Diana. How old is Layla now?

- ⑫ A rectangle has a perimeter of 40 cm. The length of the rectangle is 1 cm less than twice the width. Find the length and width.

Solve using elimination:

$$\begin{array}{l} \textcircled{16} \quad 2x - 3y = 15 \\ \quad \quad 3x - y = 12 \end{array} \quad \begin{array}{l} \textcircled{17} \quad 2x + 6y = 12 \\ \quad \quad y = -\frac{1}{3}x + 2 \end{array}$$

## 9.4 Problems

### GRAPHING INEQUALITIES

Graph each inequality:

- |                |                   |
|----------------|-------------------|
| ① $y > 3$      | ⑦ $2x \geq 3y$    |
| ② $y \leq -2$  | ⑧ $x > y$         |
| ③ $x \leq -6$  | ⑨ $y > -x - 5$    |
| ④ $x > 4$      | ⑩ $y \leq 3x - 6$ |
| ⑤ $2x - y < 1$ | ⑪ $4x - y > 8$    |
| ⑥ $x + 4y < 8$ | ⑫ $x + 3y \leq 9$ |

### Review

Classify the system and indicate the number of solutions:

- |   |   |
|---|---|
| ⑬ $y = \frac{1}{4}x - 3$<br>$x - 4y = 12$ | ⑮ $x + 2y = 3$<br>$y = -\frac{2}{3}x + 4$ |
| ⑭ $y - 3 = 2(x + 4)$<br>$2x - y = 6$      |   |



## 9.5 Problems

### SYSTEMS OF INEQUALITIES

Solve by graphing:

- |                                    |                                  |
|------------------------------------|----------------------------------|
| ① $x > 3$<br>$y < 6$               | ⑤ $y - x > 3$<br>$y - x < -1$    |
| ② $y \geq -2$<br>$x < 4$           | ⑥ $2y - 3 > 2x$<br>$y + 2 < x$   |
| ③ $y \leq x + 3$<br>$y \geq x - 2$ | ⑦ $y \geq x - 3$<br>$y > -x - 1$ |
| ④ $x \geq -4$<br>$y + x \leq 3$    | ⑧ $y - x > 1$<br>$y < -2$        |

## 9.6 Problems

### ABSOLUTE VALUE INEQUAL.

Solve by graphing:

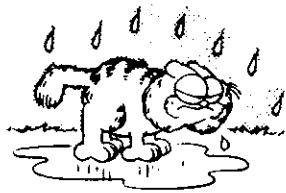
- |                                   |           |
|-----------------------------------|-----------|
| ① $x + 2y < 4$<br>$3x - y \geq 6$ | Continued |
|-----------------------------------|-----------|

②  $|y| + 3 < x$

③  $|x-1| \leq y$

④  $|y+3| \geq x$

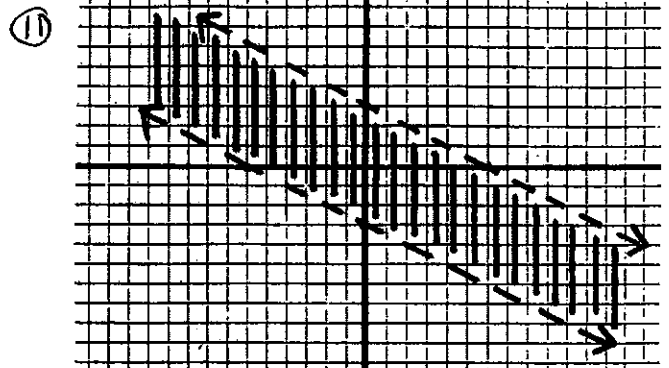
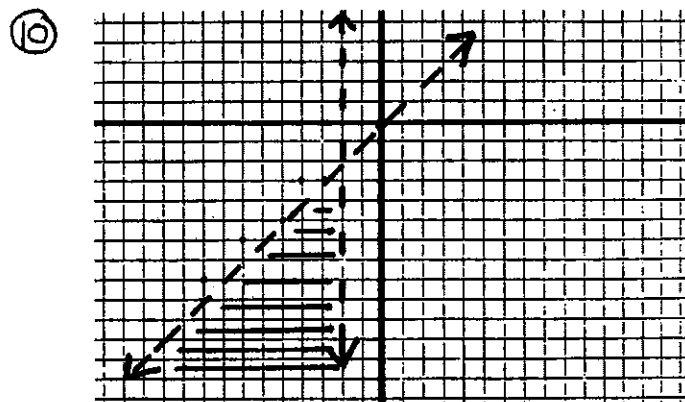
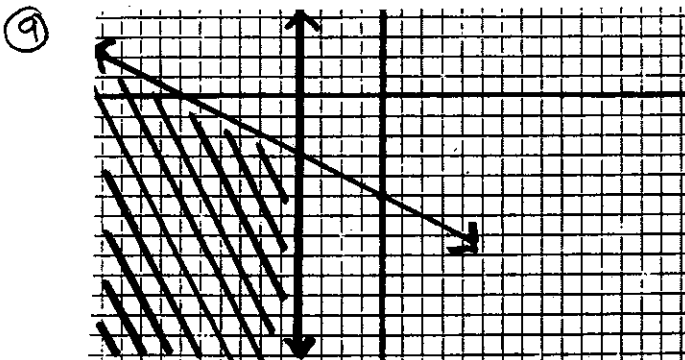
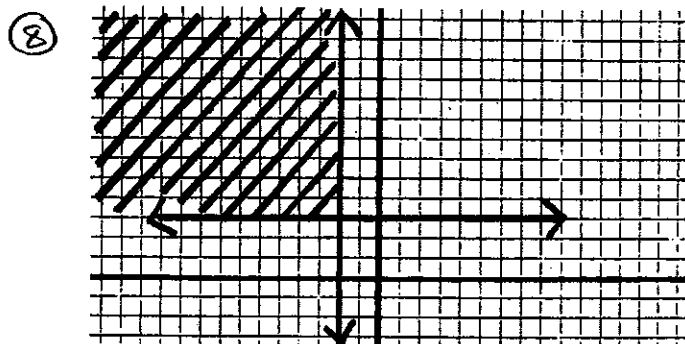
⑤  $|x| \geq y$



⑥  $|y-x| \leq 4$

⑦  $|2x+y| > 6$

Write a system of inequalities for each graph:



# 9.7 Problems

## SOLVING DIGIT PROBLEMS

- ① The sum of the digits of a two digit number is 13. Twice the tens digit is two less than 5 times the units digit. Find the number.
- ② The tens digit of a two digit number is 6 more than the units digit. The number is 2 more than 8 times the sum of the digits. Find the number.



- ③ The sum of the digits of a two digit number is 12. The units digit is twice the

tens digit. Find the number.

④ The units digit of a two digit number is one more than twice the tens digit. The sum of the digits is 7. Find the number.

⑤ The sum of the digits of a two digit number is 12. If the digits are reversed, the new number is 18 less than the original number. Find the original number.

⑥ The sum of the digits of a two digit number is 7. If the digits are reversed, the new number is 3 less than 4 times the original number. Find the original number.

⑦ A two digit number is equal to 7 times the units digit. If 18 is added to the number, its digits are reversed. Find the number.

⑧ The sum of the digits of a two digit number is 9. If 45 is subtracted from the number, the digits are reversed. Find the number.

### Review

Solve by graphing:

⑨  $4x - y > 8$       ⑩  $|2x - y| < 4$   
 $y \geq -3$

# 9.8 Problems

## MORE PROBLEM SOLVING

### PART I

① While traveling with the wind, a plane flies 300 miles in 40 minutes. It returns against the wind in 45 minutes. Find the air speed of the plane and the rate of the wind.

② An airplane travels 1800 miles in 3 hours flying with the wind. On the return trip, it takes 4 hours to travel 2000 miles against the wind. Find the rate of the wind and the rate of the plane in still air.



③ How many pounds of candy that sells for 80¢ per pound should be mixed with candy that sells for \$1.50 per pound to make 20 pounds of a mixture to sell at \$1.01 per pound?

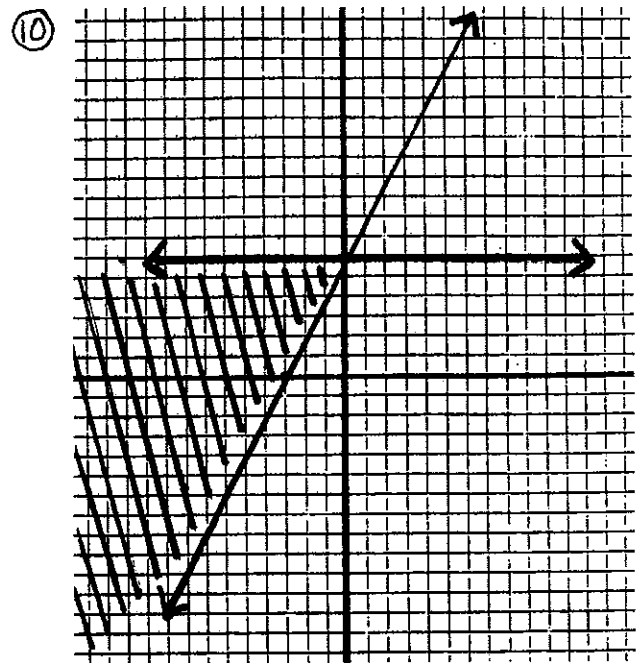
④ Joe sold 30 peaches from his tree for a total of \$7.50. He sold the small

ones for 20¢ each and the large ones for 35¢ each. How many of each kind did he sell?

⑤ Louise walks from her home to the city in 4 hours. She can travel the same distance on her bicycle in 1 hour. If she rides 6 mph faster than she walks, what is her speed on her bicycle?

⑥ A man invests \$4000, part at 10% and the rest at 12% annual interest. If he earns \$460 interest at the end of one year, how much did he invest at each rate?

Write a system of inequalities for the graph below:



### Review

⑦ The tens digit of a two digit number is 4 more than the units digit. If the digits are reversed, the sum of the new number and the original number is 154. Find the original number.

Classify the following system and indicate the number of solutions:

⑧  $4x - y = 6$   
 $y = -4x + 3$

Solve the system by graphing:

⑨  $|3x + y| + 1 \geq 7$



### PART II

⑪ Flying with the wind, a plane travels 300 miles in 45 minutes. Later that day, against the wind, the plane travels half that distance in 30 minutes. Find the speed of the plane and the rate of the wind.

⑫ A boat travels downstream 48 miles in 4 hours. The return trip upstream takes 6 hours. Find the speed of the boat in still water and the rate of the current.

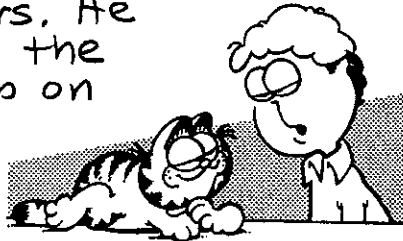
⑬ Mrs. Ruben mixes peanuts which sell for \$1.65 per pound and almonds which



sell for \$2.10 per pound. She makes a 30 pound mixture that sells for \$1.83 per pound. How much of each should she mix?

⑭ The corner market sells 35 pieces of fruit for \$18. The apples sell for \$.60 and oranges sell for \$.45. How many of each are sold?

⑮ Aaron can run to the beach in 2 hours. He can make the same trip on his skateboard in 90 minutes. If he goes 2 mph faster on his skateboard, how fast can he run?



⑯ Jim invests \$6000, part at 8% and part at 12%. If he earns \$640 in interest after one year, how much is invested at each rate?

### Review

⑰ The tens digit of a two digit number is 3 more than the units digit. If the digits are reversed, the sum of the new number and the original number is 99. Find the original number.

Classify the following system

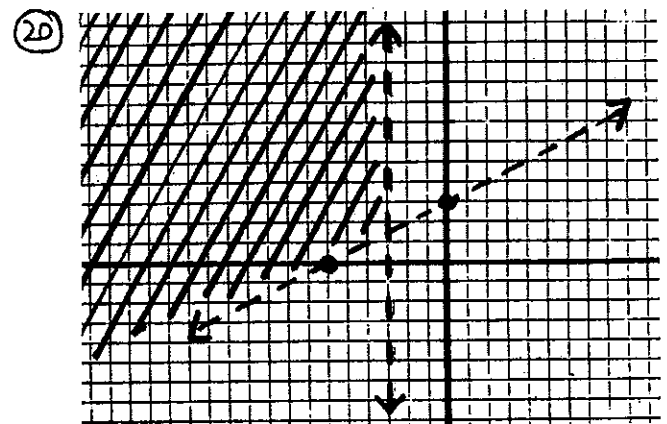
and indicate the number of solutions:

$$\textcircled{18} \begin{cases} y = -\frac{2}{3}x + 3 \\ 2x + 3y = 5 \end{cases}$$

Solve the system by graphing:

$$\textcircled{19} |2x - y| < 6$$

Write a system of inequalities for the graph:



## Unit 9 REVIEW PROBLEMS

Classify and state the number of solutions:

$$\textcircled{1} \begin{cases} y = \frac{2}{3}x + 4 \\ 2x + 3y = 6 \end{cases}$$

$$\textcircled{3} \begin{cases} y = -3x + 5 \\ 3x + y = 7 \end{cases}$$

$$\textcircled{2} \begin{cases} x - 4y = 8 \\ y = \frac{1}{4}x - 2 \end{cases}$$

$$\textcircled{4} \begin{cases} y - 2 = 3(x + 2) \\ y = \frac{1}{3}x + 1 \end{cases}$$

Graph the system:

⑤  $y = -3x - 6$   
 $y = 5x$

⑥  $y = -4$   
 $2x + y = 10$

Use substitution to solve:

⑦  $y = 2x + 1$   
 $3x - y = -4$

⑧  $2x = 4y$   
 $3x - 2y = 8$

Use elimination to solve:

⑨  $3x + y = -2$   
 $4x + 3y = 4$

⑪  $\frac{1}{3}x + \frac{1}{3}y = 5$   
 $\frac{2}{3}x - \frac{2}{3}y = -2$

⑩  $2x - 5y = 16$   
 $3x + 2y = 5$

⑫  $\frac{1}{2}x + 2y = -10$   
 $\frac{1}{4}x - \frac{1}{4}y = 5$

Graph the inequality:

⑬  $y > 4x - 8$

⑭  $2x - y \geq -6$



Graph the system:

⑮  $x > -2$   
 $y < 4x + 4$

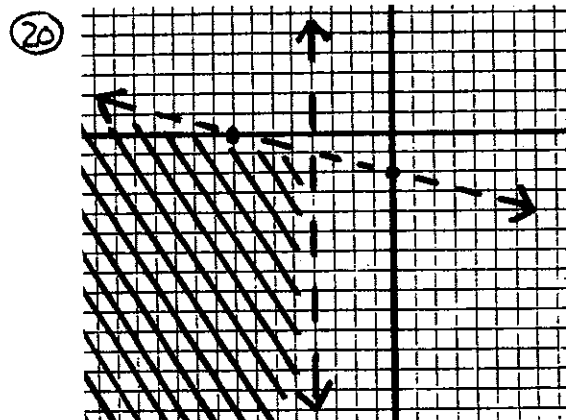
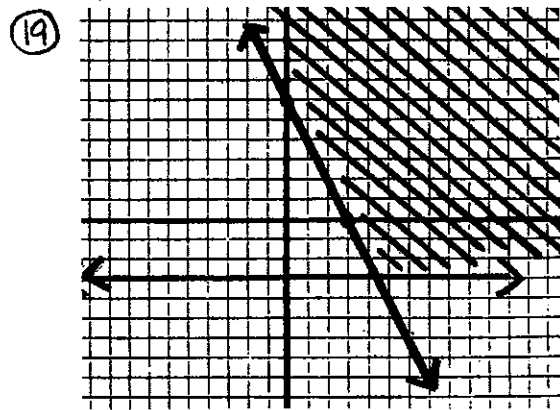
⑰  $|x + y| < 4$

⑯  $y \leq 5$   
 $y \geq \frac{2}{3}x + 2$

⑱  $|3x - y| \geq 6$



Write a system for the solution of each graph:



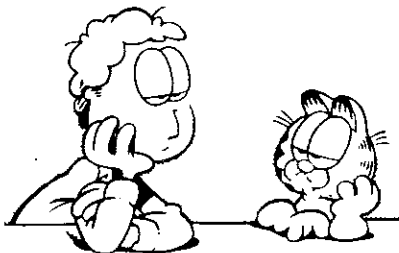
Solve using a system:

⑳ The sum of the digits of a two digit number is 11. The units digit is 1 more than four times the tens digit. Find the number.

㉑ The sum of the digits of a two digit number is 9. The tens digit is 3 less than twice the units digit. Find the number.

㉒ The units digit of a two digit number is 12 less

than twice the tens digit. If the digits are reversed, the new number is 45 less than the original. Find the original number.



24) The tens digit of a two digit number is half the units digit. If the digits are reversed, the new number is 9 less than twice the original number. Find the original number.

25) Traveling downstream, a boat goes 60 miles in 3 hours. Against the current, the boat travels the same distance in twice the time. What is the rate of the boat and what is the rate of the current?

26) Flying with the wind, a plane travels 600 miles in  $1\frac{1}{2}$  hours. Against the wind, the plane makes the same distance in 2 hours. What is the speed of the plane and the speed of the wind?

27) \$12,000 is invested, part at 6% and part at 10%. After 1 year, the 6% investment has earned \$80 more interest than the 10% investment. How much is invested

at each rate?

28) \$6400 is invested, part at 8% and part at 12%. After one year, he has earned \$712 in interest. How much did he invest at each rate?

Graph the system:

$$\begin{array}{ll} 29) & |x+1| \leq 3 \\ & x+y \leq 3 \end{array} \quad \begin{array}{l} 30) & 3x+y \leq 6 \\ & |y| \geq 5 \end{array}$$

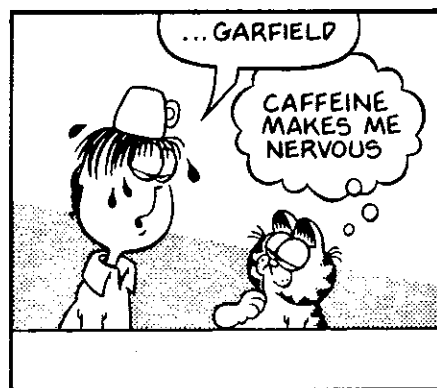
### Additional Practice ABSOLUTE VALUE GRAPHING

Graph the following systems:

$$\begin{array}{ll} 1) & |y| - 3 < 2 \\ & 3x - y < 8 \end{array} \quad \begin{array}{l} 4) & |y| \leq 2x + 4 \\ & x \leq 3 \end{array}$$

$$\begin{array}{ll} 2) & |x| + 4 \geq 7 \\ & y \geq \frac{2}{3}x - 6 \end{array} \quad \begin{array}{l} 5) & |y| \geq -2x + 6 \\ & y \leq 3 \end{array}$$

$$\begin{array}{ll} 3) & |2x + y| > 4 \\ & y \leq 3x \end{array} \quad \begin{array}{l} 6) & |y| < x + 5 \\ & x < 2 \end{array}$$



## Unit 9 SKILL CHECK

Classify and state the number of solutions:

①  $y = \frac{2}{5}x - 4$       ②  $3x - 2y = 4$   
 $2x - 5y = 20$        $y = \frac{2}{3}x + 1$

Use substitution to solve:

③  $y = 3x + 1$   
 $5x - 2y = 1$

Use elimination to solve:

④  $4x - 3y = 3$       ⑤  $\frac{4}{5}x + \frac{1}{5}y = 12$   
 $3x - 5y = 16$        $\frac{3}{2}x - \frac{1}{2}y = 5$

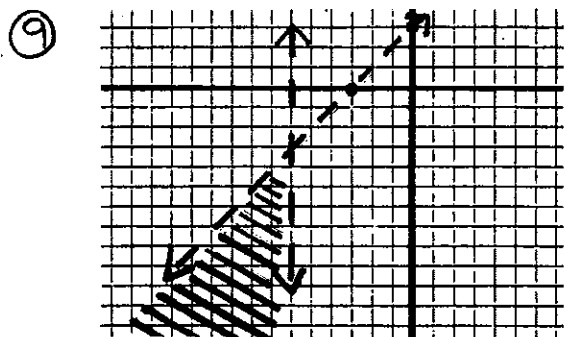
Graph this inequality:

⑥  $y > 2x + 6$

Graph the system:

⑦  $x \geq -4$       ⑧  $|2x + y| < 4$   
 $y \leq -x + 4$

Write a system for:



Solve using a system:

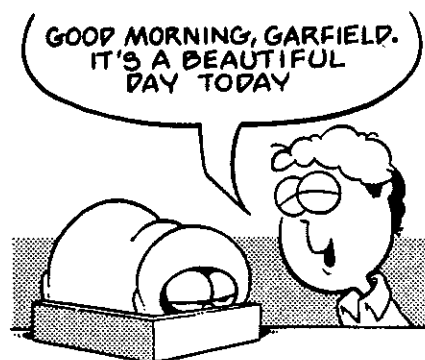
⑩ The units digit of a two digit number is half the tens digit. If the digits are reversed, the original number is 12 less than twice the new one. Find the original number.

⑪ A boat travels 30 miles upstream in 5 hours. With the current, the boat can travel 2 miles less in just 2 hours. What is the speed of the boat and the rate of the current?

⑫ \$10,000 is invested, part at 8% and part at 9%. If the interest for one year is \$860, how much is invested at each rate?

Graph the system:

⑬  $|y| \geq 6$   
 $y \leq x - 5$



## Unit 9 REMEDATION

Classify and state the number of solutions:

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

Use substitution to solve:

③  $y = -3x + 2$   
 $5x + 2y = 6$

Use elimination to solve:

④  $5x - 4y = -11$       ⑤  $\frac{2}{3}x - \frac{1}{3}y = 14$   
 $3x + 3y = -12$        $\frac{1}{6}x + \frac{1}{6}y = -1$

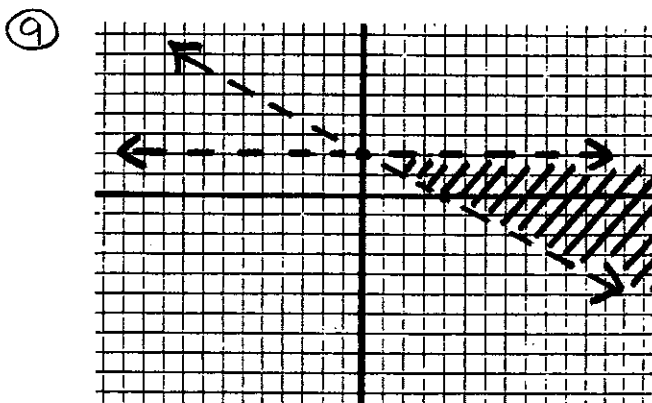
Graph this inequality:

⑥  $y \leq -4x - 8$

Graph the system:

⑦  $y \leq 6$       ⑧  $|x - y| > 3$   
 $y \geq \frac{1}{2}x + 2$

Write a system for:



Solve using a system:

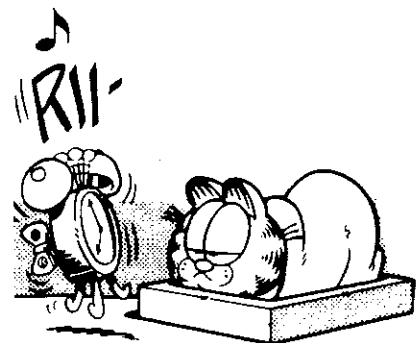
⑩ The tens digit of a two digit number is 3 less than twice the units digit. If the digits are reversed, the sum of the new number and twice the original number is 153. Find the original number.

⑪ A plane flies 600 miles in 2 hours with a tailwind. Flying against the wind, the plane flies 80 miles less in the same amount of time. Find the speed of the plane and the speed of the wind.

⑫ \$7000 is invested, part at 10% and part at 7%. If the interest for one year is \$550, how much is invested at each rate?

Graph the system:

⑬  $|y + 2| \leq 6$   
 $2x + y \leq 8$



# Unit 9

## EXTRA PRACTICE

Classify and state the number of solutions:

①  $3x - y = 6$   
 $y = 3x + 6$

③  $2x + 3y = 12$   
 $y = \frac{2}{3}x + 4$

②  $x - 2y = 8$   
 $y = \frac{1}{2}x - 4$

④  $y - 2 = \frac{3}{4}(x - 1)$   
 $4x + 3y = 10$

use substitution to solve:

⑤  $x = 3y$   
 $2x - y = 10$

⑥  $y = -3x - 5$   
 $2x + 3y = 6$

use elimination to solve:

⑦  $3x - y = 17$   
 $2x + 5y = 0$

⑧  $4x + 3y = 13$   
 $3x + 4y = 22$

Graph the inequality:

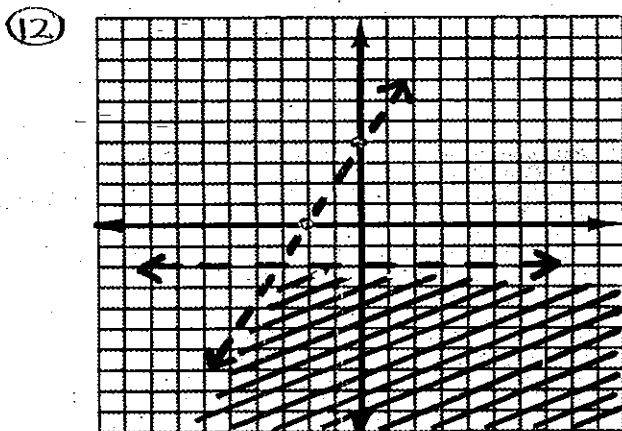
⑨  $y > 2x + 6$

Graph the system:

⑩  $y \geq 4$   
 $y \leq x - 1$

⑪  $|2x - y| > 4$

Write a system for the solution graphed below:



Solve using a system:

- ⑬ The sum of the digits of a two digit number is 9. Three times the units digit is 3 less than twice the tens digit. Find the number.

- ⑭ The units digit of a two digit number is 1 less than 4 times the tens digit. If the digits are reversed, the new number is 45 more than the original. Find the original number.

- ⑮ A boat travels 42 miles downstream in 3 hours. Against the current, it makes the return trip in 7 hours. Find the rate of the boat in still water and the rate of the current.

- ⑯ \$9000 is invested, part at 8% and part at 6%. If the interest earned in one year is \$612, how much is invested at each rate?

Solve the system:

⑰  $\frac{3}{5}x + \frac{2}{5}y = -2$

$3x - \frac{1}{2}y = -35$

Graph the system:

⑱  $|y| \geq 4$

$y \geq -2x + 4$



# Algebra Skills Review

## "A"

### Problems

### QUARTER #3 REVIEW

Identify the property:

- ①  $(3n^2)(mn) = (mn)(3n^2)$   
 ②  $5xy^2(\frac{1}{2}n) = 5xy^2(\frac{1}{2}n)$

Evaluate the expression:

$a = -2, b = -1, c = 2$

③  $\frac{2a^2 - b^3}{b(b-c)}$

Solve for n:

④  $3xn - 2xy = y^2(n-x)$

Solve the inequality:

⑤  $2x - \frac{2x}{3} < 4(x-6)$

Solve and graph on a number line:

⑥  $|2n - 4| > 10$

⑦  $|n - 7| - 1 \leq 2$  and  $n \neq 5$

Simplify each expression:

⑧  $(4a^2b^{-3}c)^2(-\frac{1}{2}a^{-3}bc^2)^3$

⑨  $\frac{-8x^{-3}yz^2}{6x^{-5}y^4z^{-3}}$

⑩  $\frac{-9a^2x^{2n-1}}{3ax^{n+2}}$



multiply / Divide polynomials:

⑪  $(4x - 3y)(x + 5y)$

⑫  $(2a^x - 3b^{2x+1})^2$

⑬  $(3a^3 - b^3) \div (a - 2b)$

Evaluate in scientific notation:

⑭  $\frac{210 \times 10^{-3}}{.14 \times 10^4}$

Factor completely:

⑮  $32mn^5 - 2m^5n$

⑯  $8a^2 - 2ab - b^2$

⑰  $16x^2 - 16y^2 + a^2y^2 - a^2x^2$

Solve each equation:

⑱  $24a = -9a^2 - 16$

⑲  $2n^3 - 12n = -5n^2$

Determine the value of the function:

⑳  $f(x) = 2x^2 - 3x$  for  $f(n+1)$

Determine the indicated solution for each linear equation problem:

- (21) Write an equation in standard form for a line containing the points:  $(-2, 3)$   $(-5, 4)$ . Then use the equation to determine the intercepts.

- (22) Use the following relation to write an equation in slope-intercept form:

x	-2	-5	-8	-11	-14	-17
y	5	7	9	11	13	15

- (23) Put the equation  $\frac{2}{3}y = \frac{8}{3}x - 2$  in standard form, indicate the slope and both intercepts. Then draw the graph.

- (24) Write an equation in point-slope form (not slope-intercept form) for a line including the point  $(4, -7)$  and a slope of  $-3$ .

- (25) Write an equation in slope-intercept form for a line perpendicular to  $y = 2x - 5$  through  $(1, 7)$ . Then graph it.

- (26) Find the midpoint of  $\overline{AB}$  if  $A = (4, -6)$  and  $B = (-2, 8)$

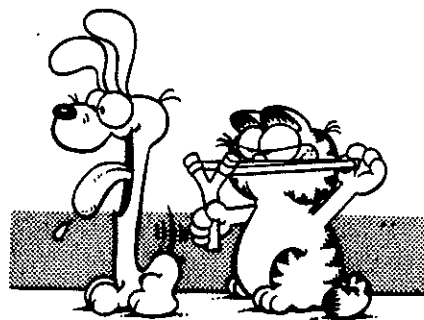
Determine the indicated solution for each systems problem:

- (27) Classify the system and indicate the number of solutions:  
 $y = 3x - 5$   
 $2x - y = 5$

- (28) Solve the system using substitution:  
 $y = 2x - 1$   
 $3x - 2y = -2$

- (29) Solve the system using elimination:  
 $3m + 2n = 10$   
 $4m - 3n = -32$

- (30) Graph the system:  
 $|2x - y| < 4$





# "B"

## Problems

### QUARTER #3 REVIEW

Identify the property:

$$\textcircled{1} \left(\frac{4x}{y^2}\right)(0) = 0$$

$$\textcircled{2} \text{ If } n = 3xy \text{ and } 3xy = 4b \\ \text{then } n = 4b$$

Evaluate the expression:

$$x = -3, y = -2, z = -1$$

$$\textcircled{3} 2x^2 - 3y(x - 2z)$$

Solve for x:

$$\textcircled{4} 3y(x - 2y) = 2(x - y^2)$$

Solve the inequality:

$$\textcircled{5} \frac{3n - 4}{10} > \frac{2(n - 3)}{5}$$

Solve and graph on a number line:

$$\textcircled{6} |n + 3| \leq 8$$

$$\textcircled{7} |n - 4| > 2 \text{ and } n \geq 0$$

Simplify each expression:

$$\textcircled{8} (-3x^2y^3z^{-1})^2 \left(-\frac{1}{3}x^3y^{-1}z^{-2}\right)^3$$

$$\textcircled{9} \frac{27a^{-2}b^3c^{-1}d}{-18ab^{-4}c^2d^3}$$

$$\textcircled{10} \frac{14n^2x^{3a-1}}{-2nx^{a+4}}$$

Multiply/Divide polynomials:

$$\textcircled{11} (a - 4b)(2a + b)$$

$$\textcircled{12} (x^{2n} + 3y^{n-1})^2$$

$$\textcircled{13} (4a^3 - b^3) \div (a + 3b)$$

Evaluate in scientific notation:

$$\textcircled{14} (.03 \times 10^{-4})(.05 \times 10^{-2})$$

Factor completely:

$$\textcircled{15} n^2 - 1$$

$$\textcircled{16} 4x^3 + 2x^2y - 12xy^2$$

$$\textcircled{17} (a + b)^2 - 3(a + b) - 4$$

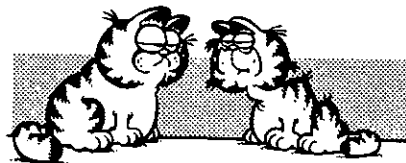
Solve each equation:

$$\textcircled{18} 13x = -10 - 4x^2$$

$$\textcircled{19} n^5 - 10n^3 + 9n = 0$$

Determine the value of the function:

$$\textcircled{20} f(x) = 2x - x^2 \text{ for } f(2n-1)$$



Determine the indicated solution for each linear equation problem:

②1 Write an equation in slope-int. form for a line containing the point  $(4, -2)$  with a slope of  $\frac{2}{3}$ . Then use the equation to determine the intercepts.

②2 Use the following relation to write an equation in standard form:

x	3	-1	-5	-9
y	-2	0	2	4

②3 Put the equation  $9y - 12 = 6x$  in standard form, indicate the slope and both intercepts. Then draw the graph.

②4 Write an equation in point-slope form for a line including the points:  $(-2, 7)$   $(-4, 3)$

②5 Write an equation in standard form for a line parallel to  $y = \frac{2}{3}x - 3$  through  $(-2, 1)$ . Then graph it.

②6 Find the midpoint of  $\overline{XY}$  if  $X = (-5, 8)$  and  $Y = (-7, -2)$ .

Determine the indicated solution for each systems problem:

②7 Classify the system and indicate the number of solutions:

$$y = -\frac{3}{5}x + 1$$

$$3x + 5y = 5$$

②8 Solve the system using substitution:

$$3x + y = 1$$

$$x - 2y = 12$$

②9 Solve the system using elimination:

$$x - 4y = 10$$

$$3x - 2y = 0$$

③0 Graph the system:

$$y \geq -x + 4$$

$$y \leq 3x - 6$$



# "C"

## Problems

### QUARTER #3 REVIEW

Identify the property:

- ① If  $2n-1=x$  then  $x=2n-1$   
②  $(\frac{-1}{3x}) + (\frac{1}{3x}) = 0$

Evaluate the expression:

$$a = -1, b = 2, c = -2$$

③  $3a^3 - (b-2c)^2$

Solve for b:

④  $2a(b+2a) = 3b+5a$

Solve the inequality:

⑤  $2 - \frac{3n}{4} < 4(n+5) + 1$

Solve and graph on a number line:

⑥  $|3n-6| > 3$

⑦  $|n| > 4$  and  $|n| \leq 6$

Simplify each expression:

⑧  $(-2x^2y^4z^3)^3 (\frac{1}{2}x^{-1}y^{-2}z)^3$

⑨  $\frac{16a^{-2}b^{-3}cd^4}{-12ab^3c^{-2}d^3}$

⑩  $\frac{6n^3x^{3a-b}}{2nx^{a+2b}}$



Multiply/Divide polynomials:

⑪  $(x-4y)(3x-4y)$

⑫  $(2a^{x+1} - 3b^{x-1})^2$

⑬  $(5x^4 - 3y^4) \div (x+y)$

Evaluate in scientific notation:

⑭  $\frac{32.5 \times 10^4}{2.5 \times 10^{-2}}$

Factor completely:

⑮  $(3x-2y)^2 - (x-5y)^2$

⑯  $6a^3b + 7a^2b^2 + 2ab^3$

⑰  $x^2a^4 - x^2b^4 + y^2b^4 - y^2a^4$

Solve each equation:

⑱  $4n^3 + n = 4n^2$

⑲  $a^3 = 16a$

Determine the value of the function:

⑳  $f(x) = x - 3x^2$  for  $f(a+2)$

Determine the indicated solution for each linear equation problem:

- ②1 Write an equation in standard form for a line containing the points  $(-4, 5)$  and  $(-10, 17)$ . Then use the equation to determine the intercepts.
- ②2 Write an equation in slope-intercept form for a line that goes through the origin with a slope of  $-4$ .
- ②3 Put the equation  $10y = 20 + 5x$  in standard form, indicate the slope and both intercepts. Then draw the graph.
- ②4 Write an equation in point-slope form for a line defined by these points:  $(2, 6)$   $(-1, 4)$
- ②5 Write an equation in slope-int form for a line perpendicular to  $2x - 5y = 6$  through the point  $(-4, -2)$ . Then draw the graph.
- ②6 Find the midpoint of  $\overline{GH}$  if  $G = (-1, 9)$  and  $H = (7, -11)$ .

Determine the indicated solution for each systems problem:

- ②7 Classify the system and indicate the number of solutions:

$$y = \frac{2}{7}x - 4$$
$$2x - 7y = 14$$

- ②8 Solve the system using substitution:

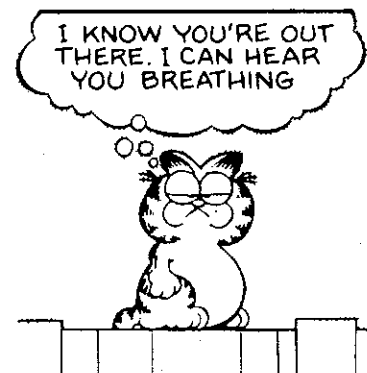
$$2x - y = 5$$
$$x - 4y = -1$$

- ②9 Solve the system using elimination:

$$3x - y = -2$$
$$4x - 3y = 4$$

- ③0 Graph the system:

$$6x + 3y < 15$$
$$2x - y < 2$$



# Problem Solving Review

## "A"

### Problems

## QUARTER #3 REVIEW

### INTEGER PROBLEMS

- ① Find the larger of two consecutive odd integers such that the larger one decreased by three less than twice the smaller is negative six.
- ② Find a negative even integer such that three more than twice the integer is between  $-11$  and  $+5$ .
- ③ Paul is  $\frac{4}{5}$  as old as John. 4 years ago, Paul was half as old as John will be next year. How much older is John?
- ④ When one integer is added to the square of the next consecutive integer, the sum is 55. Find the integers.
- ⑤ The sum of the digits of a two digit number is 10. If the digits are reversed, the new

number is 2 less than 3 times the original, what is the original number?

### MONEY PROBLEMS

- ⑥ Bill earns \$180 per week plus 7% commission on sales. How much must he sell to take home a total of \$320 in one week?
- ⑦ Ellen has \$4.50 in dimes and quarters. If she has 27 coins in all, how many are dimes?
- ⑧ Dominick paid \$81.90 for clothes. This includes a 5% sales tax, what was the cost before the tax?
- ⑨ Jean-Luc invested \$4000 at 6% and 8% annual interest. How much was invested at each rate if he earned \$270 in interest for the year?



## MIXTURE PROBLEMS

- ⑩ The Addams family purchased 11 tickets to the variety show. Adult tickets sold for \$3.50, child tickets sold for \$1.25, how many of each did they purchase for \$20.50?
- ⑪ How much acid should be added to 800 ml of a 25% acid solution to make a 40% solution?

## RATE, TIME, & DISTANCE

- ⑫ Alice starts walking to school at 7:30 AM at a rate of 3 mph. Her brother Marshall begins riding his bike to school at 7:40 AM at a rate of 6 mph. At what time will he catch up to her?
- ⑬ A barge travels 32 miles up the river in 4 hours. The return trip takes only 2 hours, what is the rate of the current?

## AREA AND PERIMETER

- ⑭ A rectangle has a length four inches less than three times its width, The perimeter is

48 inches, what is the area of the rectangle?

- ⑮ The outside width of a picture frame is 6 inches less than the length. If the frame is 1 inch all the way around and has an area of  $64 \text{ in}^2$ , what are the dimensions of a photo that fits exactly inside?
- ⑯ Mr. Williams has a 10 by 15 foot garden. He wants to double its area by adding a strip of uniform width along each of the four sides. How wide must the strip be?



# "B"

## Problems

### QUARTER #3 REVIEW

#### INTEGER PROBLEMS

- ① Find the middle of three consecutive integers such that the smallest decreased by three times the largest is zero
- ② Find a positive odd integer such that two less than four times the integer is between  $-6$  and  $+14$ .
- ③ Lou is  $\frac{3}{4}$  as old as Vince. Next year, Lou will be  $\frac{2}{3}$  as old as Vince will be four years from now. How old will Vince be next year?

OH BOY!  
HAMBURGERS!  
I LOVE  
HAMBURGERS!



- ④ Find two integers whose difference is two and whose product is sixty-three.
- ⑤ The tens digit of a two digit number is three less

than the units digit. If the digits are reversed, the new number is 2 more than twice the original. What is the original number?

#### MONEY PROBLEMS

- ⑥ The club owes \$175 to the park district for rental of the concert hall. If the club earns 11% commission on sales and all tickets sell for \$5, how many tickets must the club sell to earn \$100 profit after repaying the park district?
- ⑦ Ralph has a jar full of nickels, dimes, and quarters. He has twice as many quarters as nickels and six fewer dimes than quarters. He has a total of \$5.40. How many quarters?
- ⑧ Gerald purchased a radio for \$72 when it was on sale at 10% off. What was the original price?

- ⑨ Nelson invested \$8000, part at 12% and part at 9%. His 12% investment earned more interest. In fact, he earned \$60 more than twice as much interest on the 12% investment compared to the 9% investment. How much was invested at 9%?

### MIXTURE PROBLEMS

- ⑩ Peanuts sell for \$1.75 per pound, and cashews for \$2.05 per pound. How many pounds of each should be put into a 15 pound mixture that sells for \$1.85 per pound?
- ⑪ There are two metal alloys, one with 25% copper and one with 50% copper. How much of each should be used to produce 1000 g of an alloy that is 32% copper?

### RATE, TIME, & DISTANCE

- ⑫ A plane leaves at 2:30 PM and flies due east for two hours. Another plane, travelling 50 mph faster, leaves 30 min. later flying due west. At 4:30 PM, the planes are 1300 miles apart. Find the rate of each plane.

- ⑬ Max rode his bicycle 36 miles against the wind in 3 hours. The return trip took 1 hour 48 minutes with the wind. Assuming Max peddled at a constant rate, what was the speed of the wind?

### AREA AND PERIMETER

- ⑭ The base of an isosceles triangle is one cm less than half the length of the equal sides. The perimeter is 34 cm. How long is the base?



- ⑮ A rectangle has a length 3 in. longer than its width. If the length is decreased by 5 in. and the width is increased by 4 in., the area is decreased by 16 in.<sup>2</sup>. What are the dimensions of the original rectangle?

(continued)



- ⑩ Mr. Willis has a 6 by 8 foot patio. By adding a uniform strip of concrete on all four sides, he will increase the area of the patio by  $72 \text{ ft}^2$ . How wide is the strip?

- ④ Find two consecutive even integers such that the sum of the first and the square of the second is 40.
- ⑤ The tens digit of a two digit number is 3 more than the units digit. If reversed, the sum of the original number and the new number will be 121. How much larger is the original number?

# "C"

## Problems

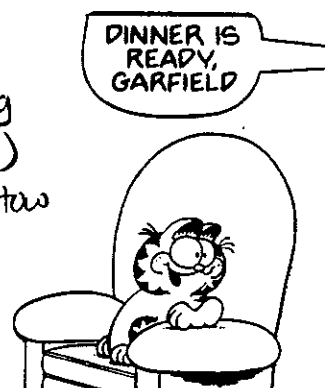
### QUARTER #3 REVIEW

#### INTEGER PROBLEMS

- ① Find the smallest of three consecutive even integers if twice the middle one decreased by the largest is seven.
- ② Find an odd integer that is also a prime number such that 3 less than twice the integer is between 5 and 17.
- ③ Aaron is twelve years older than Cindy. 7 years ago, Aaron was 3 times as old as Cindy. In how many years will Cindy be as old as Aaron was seven years ago?

#### MONEY PROBLEMS

- ⑥ Natalie earns \$210 per week plus  $7\frac{1}{2}\%$  commission on sales. What are her sales if she takes home \$1575 over a three week period?
- ⑦ Jack has \$2.55 in coins. He has seven more nickels than dimes and 27 coins in all (the rest are quarters). How many nickels does he have?
- ⑧ Susan's total cost (including 5% sales tax) was \$18.90. How much tax did she pay?



- ⑨ Alex invested \$14,000, part at 8% and part at 10%. The 10% investment earned more. It earned \$100 more than twice as much as his other investment. How much was invested at each rate?

### MIXTURE PROBLEMS

- ⑩ Chocolate caramels sell for \$2.40 per pound, chocolate cherries sell for \$1.90. How much of each should be mixed in a 10-pound box that sells for \$23?
- ⑪ How much 80% salt solution should be added to 200g of a 30% solution to obtain a 60% solution?

### RATE, TIME, & DISTANCE

- ⑫ Martha and Noreen are 350 miles apart. They begin driving toward each other - Martha at 1:00 and Noreen at 1:15 PM. If Martha drives 10 mph faster, and they meet at 5:00 PM, how fast is Martha driving?

- ⑬ The jet stream is rapid air movement in the sky. If a plane flies 800 miles in 2 hours against the jet stream and makes the return trip with the jet stream in 1 hour 15 minutes, what is the speed of the plane in still air?

### AREA AND PERIMETER

- ⑭ The length of a rectangle is 5 m less than 3 times its width. The perimeter is 38 m. Find the area.
- ⑮ A photo is 3 cm longer than it is wide. It fits exactly in a frame that is 1 cm all the way around and has an area of  $50 \text{ cm}^2$ . Find the dimensions of the photo.
- ⑯ A rectangle that is 4 by 9 inches has the length and width increased by the same amount. If the area increases by  $30 \text{ in}^2$ , what is the perimeter of the new rectangle?



Quarterly Exam #3 - Skills

# REMEDICATION & EXTRA PRACTICE

Identify the property:

① If  $x^2 = a + b$  then  $a + b = x^2$

$$(x+y) + z = x + (y+z)$$

Evaluate the expression:

$$x = -1 \quad y = -2 \quad z = -3$$

②  $x^2y - 2xyz$

$$3x^3y^2 + xy^3$$

Solve the inequality:

③  $4 + \frac{2(n+7)}{3} > 3n + 11$

$$\frac{3n}{2} - 4 \leq 3(n+2) + n$$

Solve and graph on a number line:

④  $|2x-1| - 3 \leq 6$

$$|x-5| + 4 > 7$$

Simplify each expression:

⑤  $(-\frac{1}{2}a^2b^{-1}c^3)^2 (-2a^{-1}b^2c^{-2})^3$

$$(-4a^{-3}b^{-2}c^2)^2 (\frac{1}{2}a^3b^2c^{-1})^3$$

⑥  $\frac{-15x^{-3}y^2z^{-2}}{10x^2y^{-1}z^{-4}}$

$$\frac{-8xy^{-2}z^2}{-6x^{-4}y^{-1}z^{-3}}$$

Multiply / Divide

⑦  $(2a-3b)(a-4b)$

$$(3a-b)(5a-2b)$$

⑧  $(3x^3-y^3) \div (x+y)$

$$(16x^3+2y^3) \div (2x-y)$$

Evaluate in scientific notation:

⑨  $\frac{38 \times 10^4}{.4 \times 10^{-1}}$

$$\frac{.225 \times 10^{-5}}{1.5 \times 10^{-2}}$$



Factor completely:

⑩  $18a^3 - 2ab^2$

$$12a^4 - 27a^2b^2$$

⑪  $6x^2 - 19xy + 10y^2$

$$4x^2 - 10xy - 6y^2$$

Solve the equation:

$$\textcircled{12} \quad 2n^3 - 6n = -n^2$$
$$5n^2 + 3n = -2n^3$$

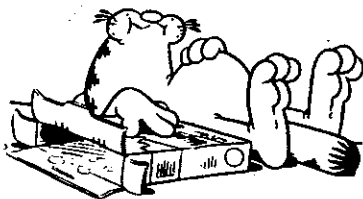
Linear equations:

- $\textcircled{13}$  Write an equation in standard form for a line containing the points  $(-3, 5)$  and  $(2, 4)$ . Use the equation to determine the intercepts.

Write an equation in standard form for a line containing the points  $(2, -6)$  and  $(-6, -8)$ . Use the equation to determine the intercepts.

- $\textcircled{14}$  Write an equation in slope-intercept form for a line perpendicular to  $2x - y = 6$  through  $(-4, 2)$ . Graph it.

Write an equation in slope-intercept form for a line perpendicular to  $x + 2y = 9$  through  $(-2, 4)$ . Graph it.



Classify the system and indicate the number of solutions:

$$\textcircled{15} \quad 2x + 3y = 6$$
$$y = \frac{-2}{3}x + 2$$

$$x + 4y = 12$$

$$y = \frac{1}{4}x + 3$$



Solve the system:

$$\textcircled{16} \quad 2x + 5y = 1$$
$$3x - 2y = -8$$

$$3x - 4y = 0$$

$$5x - 3y = -11$$

Graph the system:

$$\textcircled{17} \quad y > \frac{2}{3}x + 6$$
$$3x + 2y < -2$$

$$y > \frac{5}{2}x + 5$$

$$2x + 3y > 6$$

Determine the function value:

$$\textcircled{18} \quad f(x) = -3 - 2x - x^2$$

for  $(n-3)$

$$f(x) = -x^2 + 4x$$

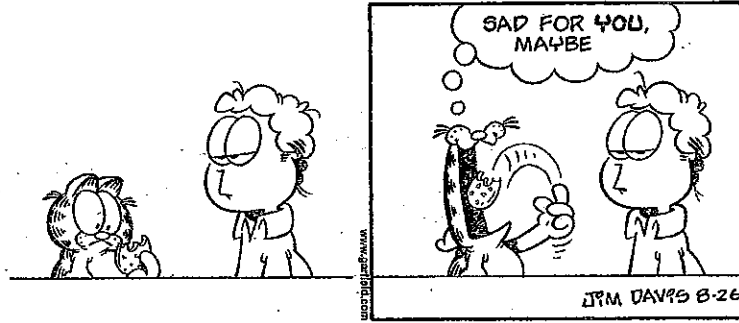
for  $(2n+1)$

Multiply:

$$\textcircled{19} (a^{2x-1} - 3b^{3x})^2 \\ (3a^{x+3} - 4b^{5x})^2$$

Factor completely:

$$\textcircled{20} 9a^2x^4 - 9a^2y^4 + b^2y^4 - b^2x^4 \\ a^4x^4 - 16b^4x^4 + 16b^4y^4 - a^4y^4$$



### Quarterly Exam #3 - Problem Solving

## REMEDICATION & EXTRA PRACTICE

- ① Find the smallest of three consecutive integers if the middle one decreased by nine is one less than twice the smallest.

Find the middle of three consecutive odd integers if three more than the largest decreased by five less than twice the smallest is fifty more than three times the middle one.

- ② Ralph is  $\frac{4}{5}$  as old as Alice. Three years ago, Alice was  $\frac{3}{4}$  as old as Ralph will be twelve years from now. How old was Alice last year?

Betty is  $\frac{2}{3}$  as old as Veronica. In two years, Betty will be  $\frac{4}{5}$  as old as Veronica was two years ago. How old will Betty be next year?



- ③ When an even integer is added to the square of the next consecutive even integer, the sum is 154. Find the integers. (one set)

When three times an integer is added to the square of the next consecutive integer, the sum is fifty-one. Find the integers. (two sets)

- ④ The sum of the digits of a two digit number is twelve. If the digits are reversed, the new number is twelve less than twice the original. Determine the number.

The tens digit of a two digit number is one less than the units digit. If the digits are reversed, twice the new number is seventy-four more than the original. Determine the number.

- ⑤ Thomas has one less dime than quarter and half as many nickels as quarters. If he has \$3.65 in all, how many dimes does he have?

Ben has three times as many quarters as nickels and five less dimes than quarters. If he has \$3.90 in all, how many total coins does he have?

- ⑥ Andrew invests \$8160, part at 10% and part at 8%. He earns three times as much from the 10% investment. How much did he invest at 8%?

Stephanie invests \$11,000 part at 9% and part at 6%. He earns \$210 more from the 6% investment. How much did she invest at 9%?

- ⑦ How many kg of a 20% Copper alloy must be added to 50 kg of a 60% alloy to reduce the concentration of copper to 30%?

How many ounces of pure gold should be added to 25 ounces of a 40% alloy to raise the concentration of gold to 50%?

- ⑧ Jarod and Sydney are 600 miles apart when they decide to drive toward each other. Jarod

leaves at 1:00 PM driving 20 mph faster than Sydney who starts driving one hour later. How fast is Sydney driving if they are 290 miles apart at 4:30 PM?

Steve and Eydie leave the concert hall driving in opposite directions. Steve leaves at 6:30 PM and Eydie leaves 30 minutes later. Steve drives 10 mph faster. How fast is Steve driving if they are 325 miles apart at 10:30 PM?

- ⑨ Captain Stubbings' boat travels 96 miles downstream in 6 hours, Captain Queeg's boat travels upstream and goes only  $\frac{1}{4}$  that distance in  $\frac{1}{2}$  the time. If both boats travel at the same rate in still water, what is the rate of the current?

If you ride your bicycle 50 miles in 5 hours with the wind and 10 miles more in twice the time against the wind, what is the speed of the wind?

- ⑩ A 3 by 5 inch photo fits exactly into a rectangular frame with an area of

9 square inches. What is the uniform width of the frame?

A sidewalk with an area of  $100 \text{ ft}^2$  is built around a 6 by 15 foot rectangular garden. What is the uniform width of the garden?

