

Friendship Jr. High School
Accelerated Math Program

Algebra

*In today's busy
world, relaxation is
practically a lost
art form . . .*



1

UNIT #1

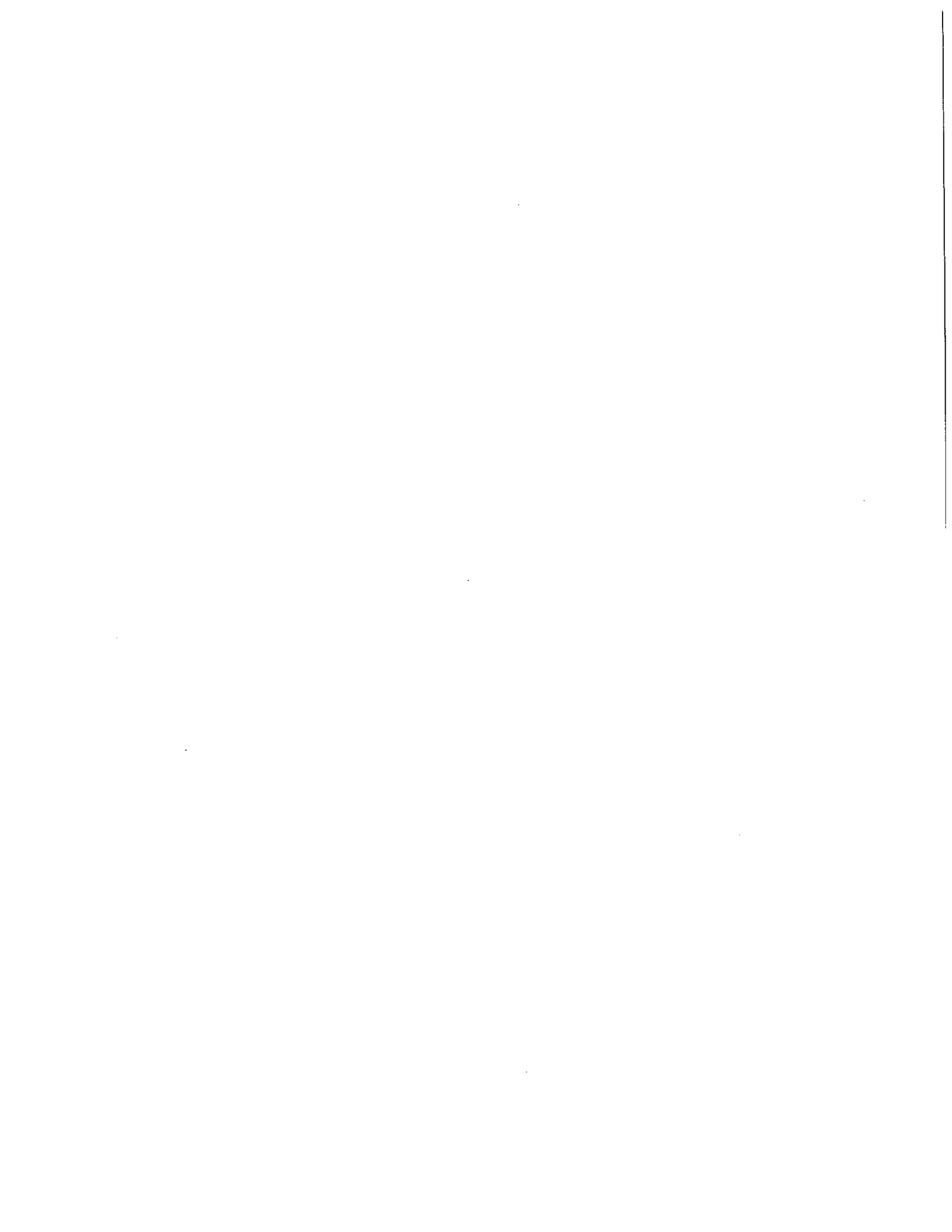
Foundation Skills

UNIT #2

Solving Equations

UNIT #3

Solving Inequalities



Foundation Skills

Lesson 1.1

PROPERTIES OF REAL NUMBERS

Commutative Property of Addition

$$a + b = b + a$$

Commutative Property of Multiplication

$$ab = ba$$

Associative Property of Addition

$$a + (b + c) = (a + b) + c$$

Associative Property of Multiplication

$$a(bc) = (ab)c$$

Additive Identity

$$a + 0 = a$$

Multiplicative Identity

$$(a)(1) = a$$

Additive Inverse

$$(a) + (-a) = 0$$

Multiplicative Inverse

$$(a) \left(\frac{1}{a}\right) = 1$$

Closure

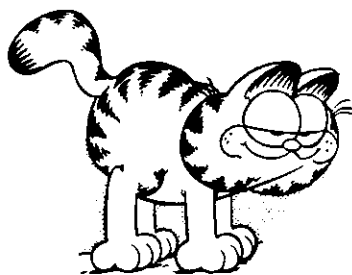
$$3.5 + 2.\bar{7} = \text{a rational no.}$$

Zero Property

$$(a)(0) = 0$$

Distributive Property

$$a(b + c) = ab + ac$$



PROPERTIES OF EQUALITY

Reflexive Property of Equality

$$a = a$$

Substitution Property of Equality

$$9a = 3^2a$$

Symmetric Property of Equality

$$\text{IF } a = b, \text{ then } b = a$$

Transitive Property of Equality

$$\text{IF } a = b \text{ and } b = c, \\ \text{then } a = c$$

Lesson 1.2

ALGEBRAIC EXPRESSIONS & PROBLEM SOLVING

Write an algebraic expression for each:

- 1● A number decreased by three

$$\boxed{n-3}$$

- 2● Four more than five times a number

$$\boxed{5n+4}$$

- 3● The product of two less than a number and five more than twice the number

$$\boxed{(n-2)(2n+5)}$$

Define a variable, establish a key, and solve:

- 4● Three times a number decreased by seven is twenty-six. Find the number.

$n =$ the number

$$3n - 7 = 26$$

$$3n = 33$$

$$n = 11$$

$$\boxed{11}$$



- 5● The sum of John's age and Glenn's age is twenty-two. Five years from now, John will be three times as old as Glenn. How old will John be two years from now?

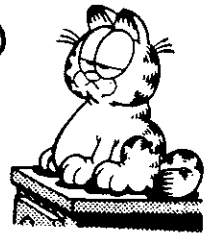
	<u>Now</u>	<u>In 5</u>
John	$22-n$	$27-n$
Glenn	n	$n+5$

$$27-n = 3(n+5)$$

$$27-n = 3n+15$$

$$12 = 4n$$

$$n = 3$$



$$\text{John now } (22-n) = 19$$

$$\text{In two years: } 19+2 = 21$$

$$\boxed{21 \text{ years old}}$$

- 6● Dean is seven years older than Jerry. Five years ago, Jerry was half Dean's age. How old was Jerry last year?

	<u>Now</u>	<u>5 ago</u>
Dean	$n+7$	$n+2$
Jerry	n	$n-5$

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

$$n+2 = 2n-10$$

$$12 = n$$

$$\text{Jerry now } (n) = 12$$

$$\text{last year: } 12-1 = 11$$

$$\boxed{11 \text{ years old}}$$



Lesson 1.3

EVALUATING & SIMPLIFYING ALGEBRAIC EXPRESSIONS

Evaluate each expression:
 $a = -1$, $b = -3$, $c = 2$

1● $3ab - c^2$

$$3(-1)(-3) - (2)^2$$
$$(9) - (4) = \boxed{5}$$

2● $3(2a - b) - ac$

$$3(2(-1) - (-3)) - (-1)(2)$$
$$3(-2 + 3) - (-2)$$
$$3(1) + (2) = \boxed{5}$$

3● $\frac{-2a^3b}{a^2c}$

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

$$\frac{-6}{2} = \boxed{-3}$$



Simplify each expression:

4● $5x - 3y - 2x + 9y$

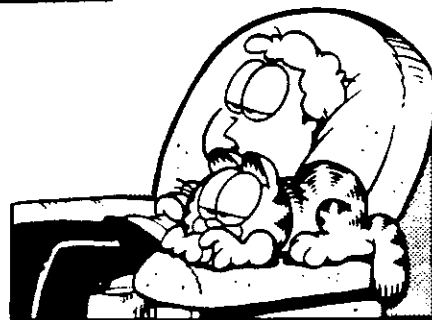
$$\boxed{3x + 6y}$$

5● $3(x + 2y) - 4(2x - y)$

$$3x + 6y - 8x + 4y$$
$$\boxed{-5x + 10y}$$

6● $4a^2 - 2a(a + b) - 3ab$

$$4a^2 - 2a^2 - 2ab - 3ab$$
$$\boxed{2a^2 - 5ab}$$



7● $2x(3x - y) - 3y(x + 2y)$

$$6x^2 - 2xy - 3xy - 6y^2$$
$$\boxed{6x^2 - 5xy - 6y^2}$$

8● $4a^2 - 3a(2a - b) + 2a(a - 3b)$

$$4a^2 - 6a^2 + 3ab + 2a^2 - 6ab$$
$$\boxed{-3ab}$$

1.1 Problems

IDENTIFYING PROPERTIES

Identify the property:

① If $a=7$ and $7=e$, then $a=e$

② $15a^2 + 0 = 15a^2$

③ $a(bc) = (ab)c$

④ $2x + y = y + 2x$

⑤ $(x+y)^2 = (x+y)^2$

⑥ $1 = \frac{1}{2y^2} \cdot 2y^2$

⑦ $3a(a+2b) = 3a^2 + 6ab$

⑧ If $x=y$ then $y=x$

⑨ $3a^2b \cdot 0 = 0$

⑩ $2.0\bar{3} + 4\frac{1}{8} = \text{a rational no.}$

⑪ $49x^2y = 7^2x^2y$

⑫ $xy = yx$

⑬ $(4ab) + (-4ab) = 0$

⑭ $n + (m+p) = (n+m) + p$

⑮ $8xy^2 = (1)(8xy^2)$

⑯ $ab + (c+d) = ab + (d+c)$

⑰ If $3n^2 = ab$ and $ab = c$, then $3n^2 = c$

⑱ $4(xy^2) = (4x)y^2$

⑲ $3(2a-b) = 3(2a-b)$

⑳ $a^2 - 3ab = a(a-3b)$

㉑ $0 = (0)(-3xy)$

㉒ If $a+b=c$, then $3(a+b)-1 = 3c-1$

㉓ $0 = (-5a^2) + 5a^2$



㉔ $(2a-b)(1) = 2a-b$

㉕ $x + (y+z) = (y+z) + x$

㉖ $(3n)(n-1) = (n-1)(3n)$

㉗ $ab + (bc+d) = (ab+bc) + d$

㉘ $(-9)(-12) = \text{an integer}$

㉙ If $2nm^2 = 3x$, then $3x = 2nm^2$

㉚ $(3xy) \left(\frac{1}{3xy}\right) = 1$

㉛ $4a + 12 = 12 + 4a$

㉜ $9nm = 0 + 9nm$

(continued)



③③ $24xy - 6 = 24xy - (8 - 2)$

③④ $8abc = 8abc$

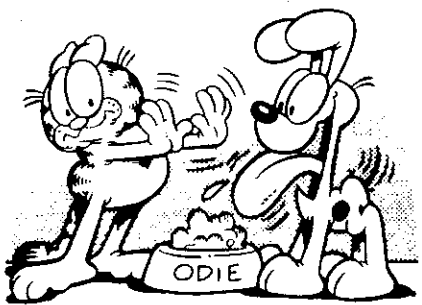
③⑤ If $4x = y$ and $y = n^3$,
then $4x = n^3$

1.2 Problems

ALGEBRAIC EXPRESSIONS & PROBLEM SOLVING

Write an algebraic expression for each:

- ① A number decreased by nine
- ② Twice a number increased by fourteen
- ③ Two less than four times a number
- ④ The product of a number increased by five and three less than four times the number.



Define a variable, establish a key (as needed), and solve:

- ⑤ A number decreased by 19 is 83. Find the number.
- ⑥ 67 decreased by twice a number is 39. Find the number.
- ⑦ How old is Tyrone if twice his age increased by 17 is 53?
- ⑧ Twenty-seven years ago, Clarice was 21. How old is she now?
- ⑨ Bill is five inches taller than Bob and the sum of their heights is 137 inches. How tall is Bob?
- ⑩ Twice Mary Lou's height increased by 17 inches is 141 inches. How tall is she?
- ⑪ Bob's dad is twenty-seven years older than Bob. The sum of their ages five years ago was forty-five. How old is Bob now?
- ⑫ The sum of the ages of Mrs. Black and her daughter is fifty-six. Eight years from now, Mrs. Black will be twice her daughter's age. How old is her daughter now?
- ⑬ The sum of Bill's age and Roy's age is fifty. Five years ago, Bill was exactly three times Roy's age. How

old will Bill be next year?

⑭ Alice is twenty-two years older than Gert. Three years ago, Gert was exactly half Alice's age. How old is Gert this year?

⑮ Sheila is the same age now that her sister was two years ago. Next year, the sum of their ages will be forty-two. How old is Sheila's sister this year?

1.3 Problems

EVALUATING & SIMPLIFYING ALGEBRAIC EXPRESSIONS

Evaluate each expression
 $a = -2$, $b = 2$, $c = -1$

① $3a - 2b$

② $b - 3c$

③ $2ab - c^2$

④ $4ac + b^3$

⑤ $2a(b - c)$

⑥ $3b(2c - 2a)$

⑦ $4a^2b - 2ac$

⑧ $3a + 2bc^3$

⑨ $3a(a - c)$

⑩ $b^2(2c + 3a)$

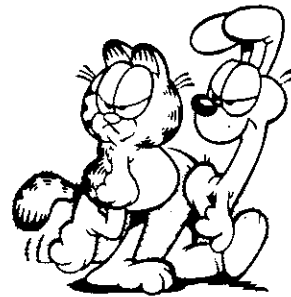


⑪ $\frac{2ab}{3a^2c}$

⑫ $\frac{-3bc}{ac^3}$

⑬ $a^2c - 2abc$

⑭ $-3ab - 2c^4$



Simplify each expression:

⑮ $3n - m + 4n + 6m$

⑯ $2a - 3b - 5a + b$

⑰ $2(x + y) - 3x$

⑱ $4n - 2(m - 3n)$

⑲ $2x^2 - 3xy + 2x(x - y)$

⑳ $3a(a + b) - 2ab - a^2$

㉑ $4(2a - 1) - 3(2 - a)$

㉒ $-3(b - 2) + 4(3 - 2b)$

㉓ $a - 3b(a - 1) + b$

㉔ $2x - 3x(y - 2) + 3xy$

Review

Write an algebraic expression for each:

㉕ Three less than twice a number

㉖ The product of a number

increased by one and twice the number decreased by seven

Define a variable, establish a key (as needed), and solve:

- ②⑦ Sue is eight years older than Mary. In four years, Mary will be half Sue's age. How old was Mary last year?
- ②⑧ The sum of Bart's age and Jim's age is thirty. Nine years ago, Bart was twice as old as Jim. How old is Bart now?



Identify the property:

- ②⑨ $\frac{2}{3ab} \cdot \frac{3ab}{2} = 1$
- ③⑩ If $2xy = n$, then $n = 2xy$
- ③⑪ $3a = (3a)(1)$
- ③⑫ $4ab - c = 4ab - c$
- ③⑬ $4(nm) = (4n)(m)$
- ③⑭ $6 + 2ab^2 = 2ab^2 + 6$

Unit 1 REVIEW PROBLEMS



Identify the property:

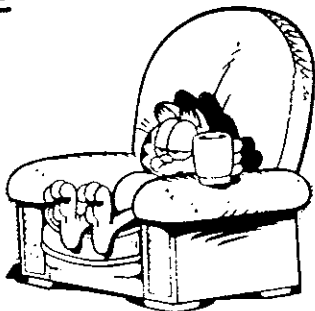
- ① $4a - 3 = 4a - 3$
- ② $(7)(16) = \text{a whole number}$
- ③ $14xy \cdot 1 = 14xy$
- ④ If $3x = 2y$ and $2y = z$, then $3x = z$
- ⑤ $\frac{1}{2a^2} \cdot 2a^2 = 1$
- ⑥ $9abc = (5+4)abc$
- ⑦ $2a + (x+2y) = (x+2y) + 2a$
- ⑧ $12n = 0 + 12n$
- ⑨ $4a(a+b) = 4a^2 + 4ab$
- ⑩ $(ab)(3x) = (3x)(ab)$
- ⑪ $2n(mp) = 2nm(p)$
- ⑫ If $4xy = y^2$, then $y^2 = 4xy$
- ⑬ $-5n^2 + 5n^2 = 0$
- ⑭ $7a + 2b = 2b + 7a$
- ⑮ $0 = 2n \cdot 0$
- ⑯ $5 + (2x+3) = (5+2x) + 3$
- ⑰ If $3n = m^2$, then $3n - 2mp = m^2 - 2mp$

Write an algebraic expression:

- ⑱ Three less than five times a number
- ⑲ Twice a number increased by seven
- ⑳ The product of a number decreased by nine and three times the number
- ㉑ The sum of twice a number and two less than four times the number

Define a variable, establish a key (as needed), and solve:

- ㉒ Twice a number decreased by twelve is two. Find the number.
- ㉓ Three more than four times a number is twenty-seven. Find the number.

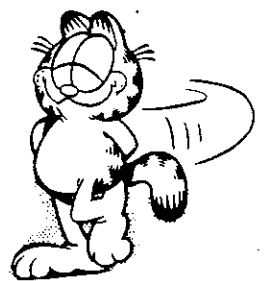


- ㉔ Simon is four years older than Art. Six years ago, Simon was three times Art's age. How old will Simon be in two years?

- ㉕ Betty is six years younger than Jean. Four years ago, Betty was half Jean's age. How many years from now will Jean be twenty-one years old?
- ㉖ Jennifer and Liz are sisters. The sum of their ages is fourteen. Two years from now, Jennifer will be twice as old as Liz. How many years older is Jennifer?
- ㉗ The sum of the ages of Evan and Krista is twenty-four. Six years ago, Evan was three times as old. How old was Krista last year?

Evaluate each expression:
 $x = -1, y = -2, z = 3$

- ㉘ $5xy - z^2$
- ㉙ $2x^2y - 4z$
- ㉚ $3(x - 2y) - y^2$
- ㉛ $4y - 2(2x + y)$
- ㉜ $3x^3 - y^3$
- ㉝ $2xy - x^3z$
- ㉞ $\frac{-2x}{3x^2z}$



㉟ $\frac{xyz}{2x^5}$

continued

Simplify each expression:

- 36 $a + 2c - 3a - 2c$
 37 $4x - y - 5x - 3y$
 38 $2(3n - m) - 2n + m$
 39 $4a - 3(2a - 1) + 2$
 40 $2x(x - 2y) - 3(x^2 + 1)$
 41 $2ab - 3(a - 3ab) + 2a$
 42 $6x - 2x(x + 3) - 3x^2$
 43 $4n(m - n) - 3m(n - 1)$
 44 $7x - 3(x - 2y) + 5xy$

Unit 1

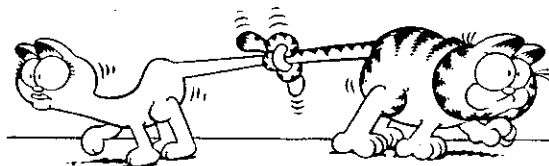
SKILL CHECK

Identify the property:

- ① $(4xy^2)(1) = 4xy^2$
 ② $\frac{2x^2}{3ab} = \frac{2x^2}{3ab}$
 ③ $2^3abc = 8abc$
 ④ If $a^2b = c$, then $c = a^2b$

Write an algebraic expression:

- ⑤ The product of two less than twice a number and three more than the number



Define a variable, establish a key (as needed), and solve:

- ⑥ Twelve less than four times a number is sixteen. Find the number.
 ⑦ The sum of Ben's age and Bill's age is twenty-four. Six years ago, Bill was twice as old as Ben. How old will Ben be on his next birthday?

Evaluate each expression:
 $x = -3$, $y = -1$, $z = 2$

- ⑧ $3(2x - y)$
 ⑨ $2xy^3 - 3xz^2$
 ⑩ $2y - 3(xy - z)$



Simplify each expression:

- ⑪ $4ab - 3a(b - 2a) - 5a^2$
 ⑫ $3(x^2 - xy) - 2x(x - 4y) - 2xy$
 ⑬ $a(3a - b) - ab - 2(a^2 - b)$

continued

Solve:

- ⑭ Three years from now, Jenny will be twice Craig's age. Two years ago, Jenny was seven times as old as Craig. What is the sum of their ages right now?

Define a variable, establish a key (as needed), and solve:

- ⑥ Three more than twice a number is twenty-five. Find the number.
- ⑦ Ann is twice Murray's age. Eight years ago, Ann was four times Murray's age. How old was Murray two years ago?

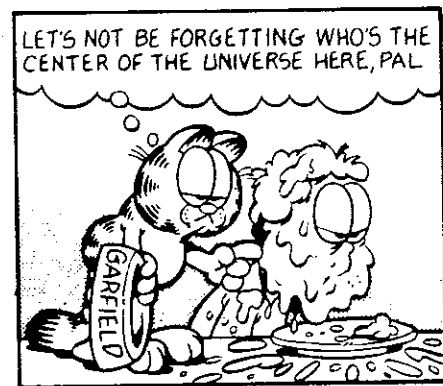
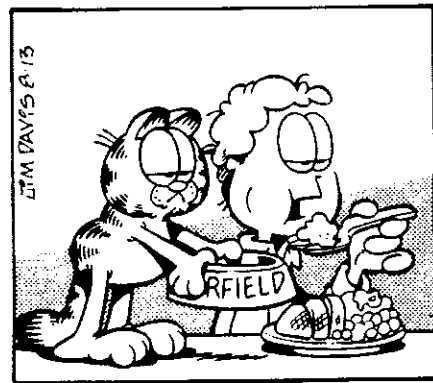
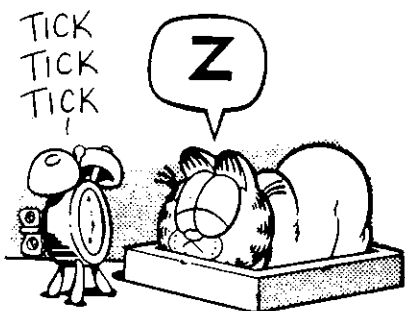
Unit 1 REMIEDIATION

Identify the property:

- ① $4x + 3y = 3y + 4x$
- ② $a(ab) = (aa)b$
- ③ $2b^2 (\frac{1}{2}b^2) = 1$
- ④ $3x^2y = 3x^2y$

Write an algebraic expression:

- ⑤ The sum of three more than a number and five less than four times a number



Evaluate each expression:
 $a=2, b=-2, c=-3$

- ⑧ $2(3b-c)$
- ⑨ $3ab^2 - 2b^3$
- ⑩ $3ac - 2(bc-a)$

Simplify each expression:

- ⑪ $2xy - 3z(x-2) + z - xz$
⑫ $2a(a-ab) - 3a^2(z-b) - a^2b$
⑬ $4x(x-2y) - xy - 3(x^2+xy)$

Solve:

- ⑭ Four years ago, Tom was four times as old as Jerry. Two years from now, Tom will be twice Jerry's age. How old was Tom last year?



Unit 1

EXTRA PRACTICE

Identify the property:

- ① If $n^2 = 3x$ then $3x = n^2$
② $\frac{3n}{5} \cdot \frac{5}{3n} = 1$
③ If $a = b$ and $b = c$ then $c = a$
④ $(5xy)(0) = 0$
⑤ $4a + 3b = 3b + 4a$

⑥ $3x^2 + 0 = 3x^2$

Write an algebraic expression for:

- ⑦ Twelve less than three times a number.
⑧ The product of four less than twice a number and five more than the number.

Define a variable, establish a key (as needed), and solve:

- ⑨ Four less than twice a number is sixteen. Find the number.
- ⑩ Dennis four years younger than Margaret. Six years ago, Margaret was three times as old as Dennis. How old was Margaret last year?
- ⑪ The sum of Dobie's age and Maynard's age is thirty-five. Five years from now, Dobie will be twice Maynard's age. How old is Maynard now?

Evaluate each expression:
 $x = -1$ $y = -2$ $z = -3$

- ⑫ $2x + y$
- ⑬ $3y^2 - 2z$
- ⑭ $3(x + z) - 2y$
- ⑮ $2xyz - x^3$

Simplify each expression:

⑯ $3x - 2y + x - 4y$

⑰ $3a - 2(4a + 3) - 5$

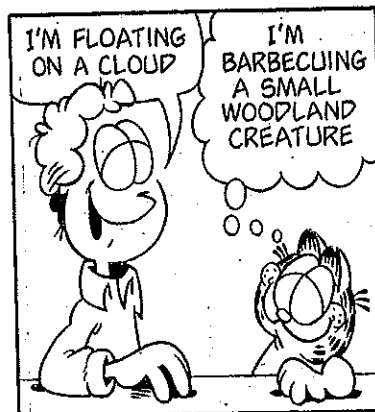
⑱ $2y^2 - 4y(x - 2y) + 6xy$

Solve:

- ⑲ Three years ago, Mike was three times Tony's age. Three years from now, Mike will be twice as old as Tony. How old is Mike now?

Simplify:

⑳ $4a^2 - 5ab + 2a(b - 3a) - 3(a^2 + 2ab)$



Solving Equations

Lesson 2.1

MULTIPLY & DIVIDE TO SIMPLIFY EXPRESSIONS

Use the distributive property to simplify:

$$1 \bullet \frac{2}{3}(9a-12b) - \frac{3}{4}(8b+12a)$$

$$6a - 8b - 6b - 9a$$

$$\boxed{-3a - 14b}$$

$$2 \bullet \frac{1}{2}(5x-10y) - \frac{1}{3}(x+6y)$$

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

$$\frac{15}{6}x - 5y - \frac{2}{6}x - 2y$$

$$\boxed{\frac{13}{6}x - 7y}$$

Simplify each expression:

$$3 \bullet \frac{12x-8y}{4} = \boxed{3x-2y}$$

$$4 \bullet \frac{-14n+20m}{4} = \boxed{\frac{-7n+10m}{2}}$$



$$5 \bullet \frac{16a-12b}{-12} = \boxed{\frac{-4a+3b}{3}}$$

$$6 \bullet \frac{12x-15y}{4} = \boxed{\frac{12x-15y}{4}}$$

Lesson 2.2

SOLVING EQUATIONS & WORKING WITH VARIABLES

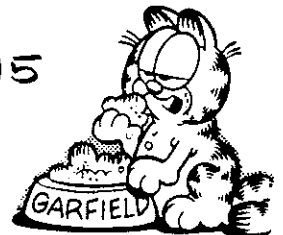
Solve each equation:

$$1 \bullet \frac{2n-3}{5} = n+3$$

$$2n-3 = 5n+15$$

$$-3n = 18$$

$$\boxed{n = -6}$$



$$2 \bullet 4(x-3) = 2x-2(5-x)-2$$

$$4x-12 = 2x-10+2x-2$$

$$4x-12 = 4x-12$$

$$-12 = -12$$

Identity

$\boxed{\text{All Solutions}}$

$$3 \bullet 8 - 3(a-1) = a - 2(2a+1)$$

$$8 - 3a + 3 = a - 4a - 2$$

$$11 - 3a = -3a - 2$$

$$11 = -2 \quad \text{False Equation}$$

No Solutions

$$4 \bullet \frac{3n-2}{7} = \frac{4(n+3)}{2}$$

$$\frac{3n-2}{7} = \frac{4n+12}{2}$$

$$2(3n-2) = 7(4n+12)$$

$$6n-4 = 28n+84$$

$$-22n = 88$$

$n = -4$



$$5 \bullet \text{Solve for } x:$$

$$3ax - bc = d$$

$$3ax = d + bc$$

$x = \frac{d+bc}{3a}$ for $a \neq 0$

$$6 \bullet \text{Solve for } n:$$

$$\frac{2a+n}{c} = b$$

$$2a+n = bc$$

$n = bc - 2a$

$$7 \bullet \text{Solve for } a:$$

$$ab - c = 3a - 2b$$

$$ab - 3a = c - 2b$$

$$a(b-3) = c-2b$$

$$a = \frac{c-2b}{b-3}$$



$a = \frac{c-2b}{b-3}$ for $b \neq 3$

Lesson 2.3

INTEGER PROBLEMS

For each problem, define a variable and use an equation to solve:

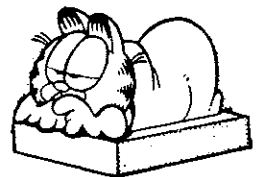
- Twice a number decreased by six is forty-four. Find the number.

$n =$ the number

$$2n - 6 = 44$$

$$2n = 50$$

$n =$ **25**

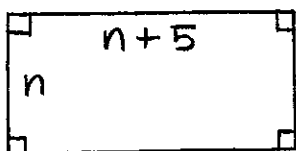


- Four times a number decreased by two less than twice the number is twelve. Find the number.

$n =$ the number

$$\begin{aligned}4n - (2n - 2) &= 12 && \text{Be sure} \\4n - 2n + 2 &= 12 && \text{to use} \\2n &= 10 && \text{()} \\n &= \boxed{5} && \text{in the} \\ & && \text{equation}\end{aligned}$$

- 3● A rectangle is 5cm longer than it is wide. The perimeter is 42 cm. Find the area.



$$\begin{aligned}2(n) + 2(n+5) &= 42 \\2n + 2n + 10 &= 42 \\4n + 10 &= 42 \\4n &= 32 \\n &= 8\end{aligned}$$

Sides: $n = 8$ $n + 5 = 13$
area: $8 \cdot 13 = \boxed{104 \text{ cm}^2}$

- 4● Find the middle of three consecutive integers if twice the smallest decreased by three times the largest is 0.



$$\begin{array}{r} -6x \\ \boxed{-5}x + 1 \\ -4x + 2 \end{array}$$

$$\begin{aligned}2(x) - 3(x+2) &= 0 \\2x - 3x - 6 &= 0 \\-x &= 6 \\x &= -6\end{aligned}$$

Lesson 2.4

RATIO, PROPORTION, AND PERCENT

- 1● Find $4\frac{5}{8}\%$ of 80

$$\frac{\text{part}}{\text{whole}} = \frac{n}{80} = \frac{4.625}{100}$$

$$100n = 370$$

$$n = \boxed{3.7}$$

alternate method:

$$4\frac{5}{8}\% = .04625$$

$$.04625 \times 80 = \boxed{3.7}$$

- 2● \$2142.25 is $104\frac{1}{2}\%$ of what?

$$\frac{\text{part}}{\text{whole}} = \frac{2142.25}{n} = \frac{104.5}{100}$$

$$\begin{aligned}104.5n &= 214225 \\n &= 2050 \quad \boxed{\$2050}\end{aligned}$$

- 3● Jack paid \$25.92 for a briefcase on sale for 20% off. How much did he save?

$$\frac{\text{purchase pr.}}{\text{original pr.}} = \frac{25.92}{n} = \frac{80}{100}$$

$$80n = 2592$$

$$n = 32.4$$

$$\text{org. pr.} - \text{purch. pr.} = \text{sav.}$$

$$\$32.40 - \$25.92 = \boxed{\$6.48}$$

- 4● Al earns \$275 per week in salary plus 8% commission on all sales. How much must he sell during a three week period to take home a total of \$2305?

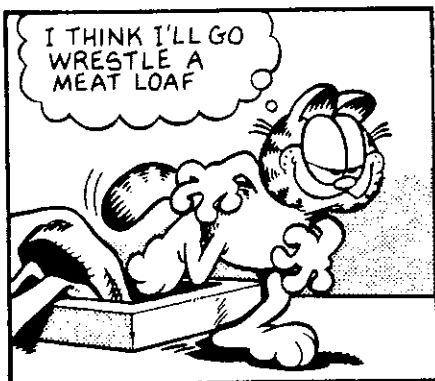
n = amount of sales

$$.08n + 3(275) = 2305$$

$$.08n + 825 = 2305$$

$$.08n = 1480$$

$$n = 18,500 \quad \boxed{\$18,500}$$



2.1 Problems

MULTIPLY & DIVIDE TO SIMPLIFY EXPRESSIONS

Use the distributive property to simplify each expression:

- ① $\frac{1}{2}(6x+8y) - \frac{1}{3}(6x+9y)$
- ② $\frac{2}{7}(21x+35a) + \frac{4}{7}(35x-21a)$
- ③ $\frac{3}{4}(4a-12b) + \frac{1}{8}(16a+48b)$
- ④ $\frac{5}{6}(-24a+36b) + \frac{1}{3}(60a-42b)$
- ⑤ $\frac{1}{2}(-\frac{1}{3}a + \frac{2}{3}b) + \frac{2}{3}(\frac{1}{2}a - \frac{3}{4}b)$
- ⑥ $\frac{1}{2}(-\frac{2}{3}a - \frac{3}{4}b) - \frac{3}{4}(\frac{4}{9}a - \frac{1}{2}b)$

Simplify each expression (if possible):

$$\textcircled{7} \quad \frac{3a+9}{3}$$

$$\textcircled{8} \quad \frac{6x+24}{6}$$

$$\textcircled{9} \quad \frac{7a+35}{-7}$$

$$\textcircled{10} \quad \frac{14n-56}{-7}$$

$$\textcircled{11} \quad \frac{25x+14}{5}$$

$$\textcircled{12} \quad \frac{-3n-8}{4}$$

$$\textcircled{13} \quad \frac{16n-8x}{-12}$$

$$\textcircled{14} \quad \frac{15x-10y}{-10}$$

$$\textcircled{15} \quad \frac{14n-10m}{-4}$$

$$\textcircled{16} \quad \frac{20a-30b}{12}$$



2.2 Problems

SOLVING EQUATIONS & WORKING WITH VARIABLES

Solve each equation:

$$\textcircled{1} \frac{4x+5}{7} = 7$$

$$\textcircled{2} \frac{4n+8}{16} = 7$$

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

$$\textcircled{4} \frac{2x+6}{2} = 3x+11$$

$$\textcircled{5} 3-4x = 10x+10$$

$$\textcircled{6} 3x-5 = 7x+7$$

$$\textcircled{7} 17+2n = 21+2n$$

$$\textcircled{8} -5x-1 = -5x-1$$

$$\textcircled{9} -3(n+5) = 3(n-1)$$

$$\textcircled{10} 4(2a-1) = -10(a-5)$$

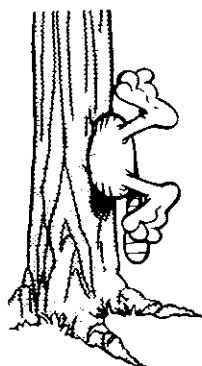
$$\textcircled{11} -2(2x-3) = 6-4x$$

$$\textcircled{12} 5n+4 = 7(n+1)-2n$$

$$\textcircled{13} 3(x-5) = \frac{1}{5}(10x-25)$$

$$\textcircled{14} 4(2n-8) = \frac{1}{7}(49n+70)$$

$$\textcircled{15} \frac{2n-6}{3} = \frac{3(n+2)}{2}$$



$$\textcircled{16} \frac{5x-4}{6} = \frac{4(2-x)}{-8}$$

Solve each equation for x :

$$\textcircled{17} x+r=2d$$

$$\textcircled{18} 5x=y$$

$$\textcircled{19} \frac{d+x}{e} = f$$

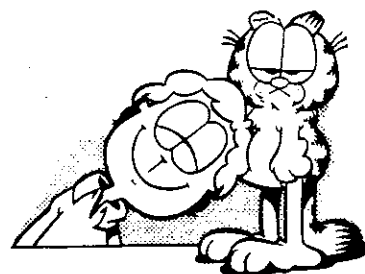
$$\textcircled{20} \frac{x+a}{b} = c$$

$$\textcircled{21} ax+b=c$$

$$\textcircled{23} ax-b=cx-3b$$

$$\textcircled{22} ex-2y=3z$$

$$\textcircled{24} dx+c=2x$$



2.3 Problems

INTEGER PROBLEMS

For each problem, define a variable and use an equation to solve:

$\textcircled{1}$ Twice a number increased by four times the number is ninety-six. Find the number.

$\textcircled{2}$ Twice a number increased by twelve is thirty-one less than three times the number. Find the number.

- ③ A number decreased by five less than twice itself is nine. Find the number.
- ④ Five times a number decreased by four more than twice the number is 119. Find the number.
- ⑤ A rectangular playground is 60m longer than it is wide. It can be enclosed by 920m of fencing. Find its length.
- ⑥ A soccer field is 75 yards shorter than 3 times its width. Its perimeter is 370 yards. Find its dimensions.
- ⑦ Brad bought a used bike for \$8 more than half its original price. Brad paid \$40 for the bike. What was the original price?
- ⑧ The lengths of the sides of a triangle are consecutive odd integers. If the perimeter is 27 cm, find the longest side.
- ⑨ Find four consecutive even integers such that twice the least increased by the greatest is 96.
- ⑩ Find the largest of four consecutive odd integers such that the sum of the first and twice the second is 175.

Review

Simplify each expression:

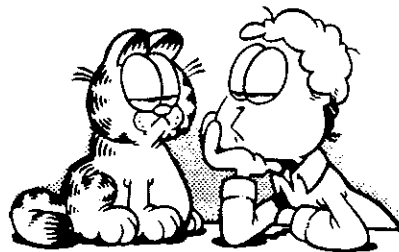
⑪ $\frac{2}{3}(-6x-3y) - \frac{1}{2}(4y+8x)$

⑫ $\frac{-28x+35y}{-21}$

Solve each equation for x :

⑬ $2a + 8x + b = ax$

⑭ $\frac{4x-2}{7} = \frac{2(2-x)}{-5}$



2.4 Problems

RATIO, PROPORTION, AND PERCENT

Solve each problem:

- ① 28 is 20% of what number?
- ② 37 is what percent of 296?
- ③ Find 4.3% of \$6070.
- ④ Find $6\frac{1}{8}\%$ of \$9.40.

⑤ \$7030.50 is $107\frac{1}{2}\%$ of what?

⑥ \$54,000 is $108\frac{2}{5}\%$ of what?

⑦ Find 0.1% of \$5000

⑧ 90 is 60% of what number?

⑨ Janice scored 85% on the last test. She answered 34 questions correctly. How many questions were on the test?

⑩ In a 180 kg sample of ore, there was 3.2% metal. How many kg of metal were in the sample?



⑪ Henry paid \$21.45 for a video that was on sale for 25% off. How much did he save on the purchase of the video?

⑫ Sandra saved \$2.72 on a sweater that was marked down 8% . How much did she pay for the sweater during the sale?

⑬ June earns \$125 per week in salary and 8% commission on all sales. How much did she sell in order to earn \$200 in one week?

⑭ Vic earns \$320 per week in salary and 5.5% com-

mission on sales. How much did he sell to earn \$551 in one week?

⑮ Charlie earns \$215 each week and 6% commission. How much did he sell to take home \$975 during a 3 week period last month?

⑯ Kevin earns \$190 per week plus 7.5% commission. How much did he sell to take home \$665 during a 2 week period?

Review

Simplify each expression:

⑰ $\frac{1}{4}(-\frac{2}{3}a - \frac{1}{2}b) - \frac{2}{3}(\frac{3}{4}b - \frac{1}{2}a)$

⑱ $\frac{24a - 36b}{-18}$



Solve each equation:

⑲ $3(4n - 2) = \frac{2}{3}(9n - 9) + 6n$

⑳ $\frac{3(2x - 1)}{7} = \frac{5x + 4}{8}$

Solve for a:

㉑ $3ab - c = 2ac$

Solve:

㉒ A rectangle has a length 4 inches more than twice



its width and a perimeter of 56 inches. Determine the area.

- ② Find the largest of three consecutive integers if three times the smallest decreased by twice the middle one is four.

Unit 2

REVIEW

PROBLEMS

Simplify each expression:

① $\frac{2}{3}(9x - 6y) - \frac{3}{4}(8y - 4x)$

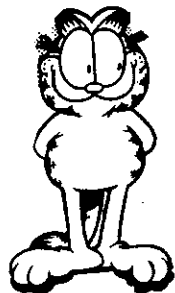
② $\frac{1}{2}(4a - 3b) - \frac{1}{4}(6b + 8a)$

③ $\frac{-10x - 15y}{-5}$

④ $\frac{18a - 12b}{6}$

⑤ $\frac{-26m + 18n}{12}$

⑥ $\frac{20a - 15b}{-10}$



Solve each equation:

⑦ $\frac{3n - 5}{-4} = n - 11$

⑧ $\frac{-2x + 5}{5} = 2x + 13$

⑨ $3(4n - 1) = 2(3n + 4) + 6n$

⑩ $5(6 - 3x) = 3(x + 4)$

⑪ $\frac{1}{2}(5n - 4) = 2n - 1$

⑫ $\frac{3}{4}(n + 3) = 3 - 3n$

⑬ $\frac{3x - 5}{4} = \frac{6(2 - x)}{-9}$

⑭ $\frac{2(n + 4)}{-3} = \frac{5n + 7}{12}$

Solve for x:

⑮ $4ax - ab = 3c - cx$

⑯ $2y + 3ax = 4y + x$

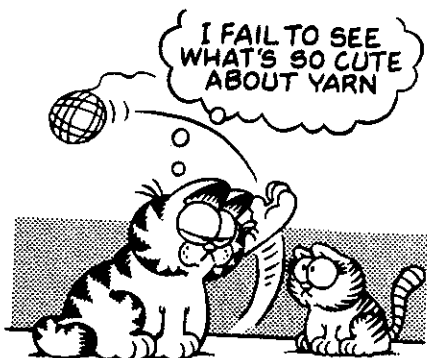
For each problem, define a variable and use an equation to solve:

- ⑰ Twice a number decreased by three more than four times the number is negative thirteen. Find the number.

- ⑱ A number decreased by five less than twice itself is seven. Find the number.

- ⑲ The length of a rectangle is two less than three times its width. IF the perimeter is 28 cm, what is the area?

- ⑳ In an isosceles triangle, the congruent sides are three more than twice the base. Find the measure of the base if the perimeter is 41 inches.

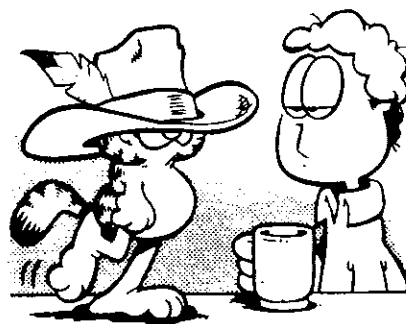


- ㉑ Find the second largest of four consecutive integers if the smallest increased by three times the largest is 17.
- ㉒ Determine the largest of three consecutive integers if the largest decreased by one more than twice the smallest is 8.
- ㉓ Find the middle of three consecutive odd integers if twice the largest decreased by the middle one is thirteen.
- ㉔ Find the largest of three consecutive even integers if three times the smallest decreased by twice the largest is equal to two.



Solve:

- ㉕ 24 is what percent of 64 ?
- ㉖ Find $2\frac{1}{5}\%$ of 85.
- ㉗ \$210.75 is $105\frac{3}{8}\%$ of what ?
- ㉘ \$149.10 is $106\frac{1}{2}\%$ of what ?
- ㉙ A radio was on sale for 10% off. If Bob paid \$30.60 for the radio, what was the original price ?
- ㉚ Marty saved \$5.40 on a jacket that was marked down 15%. How much did Marty pay for the jacket ?
- ㉛ Christopher is paid \$170 per week in salary and 12% commission on sales. What are his sales if he takes home \$918 during a three week period ?



- ㉜ Maggie earns \$205 per week and $7\frac{1}{2}\%$ commission on sales. If she took home \$620 during a two week period last month, determine her sales during that period.

Unit 2

SKILL CHECK

Simplify each expression:

① $\frac{2}{5}(10a-15b) - \frac{1}{3}(6b+3a)$

② $\frac{-8x-12y}{-6}$



Solve each equation:

③ $\frac{4x-2}{3} = x+1$

④ $\frac{3}{4}(n-2) = n$

⑤ $2(5x-3) = 7(x-1) + 3x$

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

Solve for x:

⑦ $2x - ab = 3c - 2ab$

⑧ $xy - 2n = 3x + 5$

Solve:

⑨ The length of a rectangle is three times the width and the perimeter is 32 inches. Find the area.

⑩ Find the middle of three consecutive integers if the largest decreased by two

more than twice the smallest is ten.

⑪ Find $4\frac{3}{8}\%$ of 120.

⑫ \$84.40 is $105\frac{1}{2}\%$ of what?

⑬ Jan paid \$21.12 for a radio on sale at 12% off. How much did she save?

⑭ Terry earns \$230 per week plus $6\frac{1}{2}\%$ commission on sales. How much must she sell over a three week period to take home \$976?



Unit 2 REMIEDIATION

Simplify each expression:

① $\frac{3}{4}(8x - 12y) - \frac{2}{5}(20y + 5x)$

② $\frac{14n - 21m}{-14}$



Solve each equation:

③ $\frac{3n - 7}{2} = 2n - 6$

④ $\frac{1}{2}(3x - 4) = x - 7$

⑤ $4(a - 3) = 2(3a - 6) - 2a$

⑥ $\frac{2(5n - 1)}{-8} = \frac{3n + 1}{-2}$

Solve for n:

⑦ $2a - 4n = 3a + b$

⑧ $nm + x = xy - 2n$

Solve:

- ⑨ The perimeter of a rectangle is 26 m. The length is one less than six times the width. Find the dimensions.

- ⑩ Find the largest of four consecutive odd integers

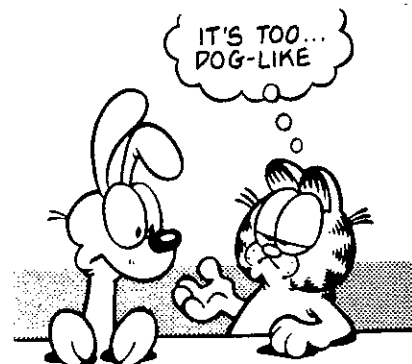
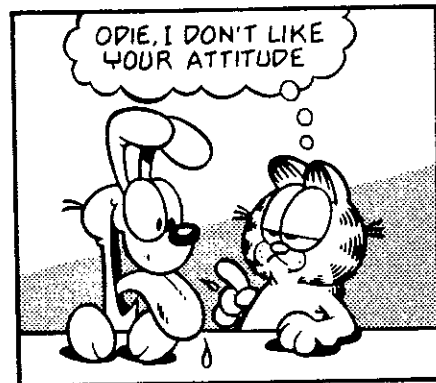
if three times the largest decreased by two more than twice the smallest is eleven.

- ⑪ Find $6\frac{3}{4}\%$ of 54.

- ⑫ \$7.75 is $12\frac{1}{2}\%$ of what?

- ⑬ Sam saved \$2.90 on a CD that was on sale for 20% off. How much did he pay?

- ⑭ Bill earns \$125 per week plus $8\frac{1}{4}\%$ commission on all sales. How much did he sell in a four week period if he earns a total of \$599?



Unit 2

EXTRA PRACTICE

Simplify each expression:

① $\frac{2}{3}(2x-9y) - \frac{1}{3}(6x+3y)$

② $\frac{15a-20b}{5}$

③ $\frac{-12x-10y}{-8}$

Solve each equation:

④ $\frac{4n-2}{7} = -2$

⑤ $4(2x-5) = 2(4x+3)$

⑥ $3(x-4) = 2(3x-8) - 2$

⑦ $\frac{3}{4}(2n-2) = 2(n+1) - 2$

⑧ $3n - 2(4n+1) = 8 - 5(n+2)$

⑨ $\frac{4a-3}{7} = \frac{-3(a+2)}{3}$

Solve for x:

⑩ $5a + 2x = 3c$

Solve:

⑪ Four times a number decreased by eight is negative twenty. Find the number.

⑫ The length of a rectangle is two less than three times the width. The perimeter is 20 inches. Find the dimensions.

⑬ Find the largest of three consecutive odd integers if the largest decreased by twice the smallest is sixteen more than the middle one.

⑭ 8 is what percent of 40?

⑮ Find $2\frac{1}{4}\%$ of 80.

⑯ \$32.40 is 60% of what?

⑰ Selena paid \$15.30 for a DVD that was on sale for 15% off. What was the original price?

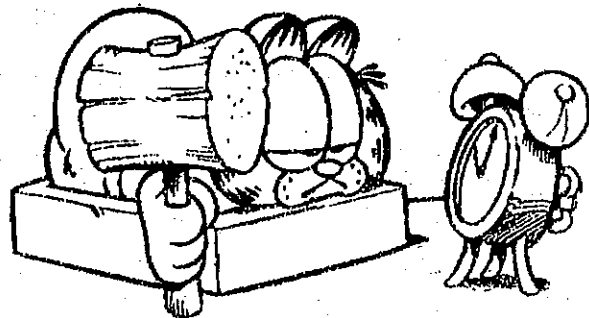
⑱ Paul earns a salary of \$310 per week plus 6% of his sales. Determine his sales if he takes home \$1122 over a three week period of time.

Solve for x:

⑲ $2a + bx = 7 - cx$

Solve:

⑳ Find the middle of three consecutive integers if three times the smallest decreased by twice the largest is two more than twice the smallest.



Solving Inequalities

Lesson 3.1

SOLVING INEQUALITIES & GRAPHING SOLUTIONS

Solve each inequality and graph the solution:

1 ● $2(n+5) \leq 4n+16$

$$2n+10 \leq 4n+16$$

$$-2n \leq 6$$

$$\boxed{n \geq -3}$$



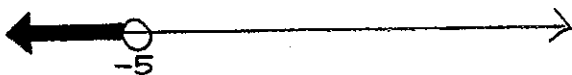
2 ● $2x + \frac{3x}{5} < x - 8$

$$10x + 3x < 5x - 40$$

$$13x < 5x - 40$$

$$8x < -40$$

$$\boxed{x < -5}$$

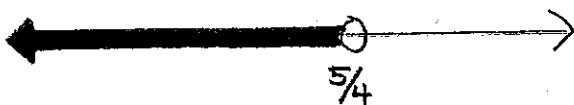


3 ● $4x - 5 > 2(4x - 5)$

$$4x - 5 > 8x - 10$$

$$-4x > -5$$

$$\boxed{x < 5/4}$$



4 ● $\frac{2(n-3)}{3} \geq \frac{4-4n}{-5}$ } Change denominator to positive value

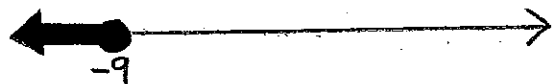
$$\frac{2n-6}{3} \geq \frac{4n-4}{5}$$

$$5(2n-6) \geq 3(4n-4)$$

$$10n-30 \geq 12n-12$$

$$-2n \geq 18$$

$$\boxed{n \leq -9}$$



5 ● $4(3n-5) < 2(6n-3)$

$$12n - 20 < 12n - 6$$

$$-20 < -6 \text{ Identity}$$

$$\boxed{\text{All Solutions}}$$



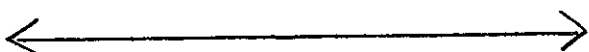
$$6 \bullet \frac{3n-5}{2} \geq \frac{9n}{6}$$

$$6(3n-5) \geq 2(9n)$$

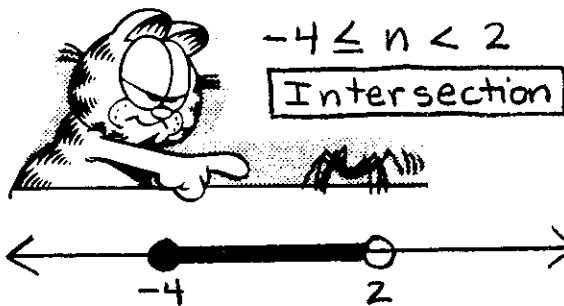
$$18n-30 \geq 18n$$

$$-30 \geq 0 \text{ False Inequality}$$

No Solutions



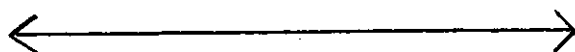
4 ●



$$5 \bullet a \geq 5 \text{ and } a \leq 2$$

Intersection

There are no points ≥ 5 and ≤ 2 . No solutions.



Lesson 3.2

GRAPHING UNIONS & INTERSECTIONS

Write each compound sentence without "and":

$$1 \bullet -6 < n \text{ and } n \leq 2$$

$$-6 < n \leq 2$$

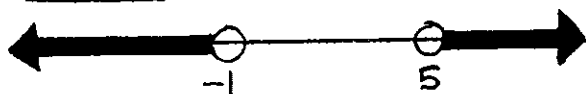
$$2 \bullet x > 1/4 \text{ and } x < 9/2$$

$$1/4 < x < 9/2$$

Graph the solution for each and identify as a union or intersection:

$$3 \bullet x > 5 \text{ or } x < -1$$

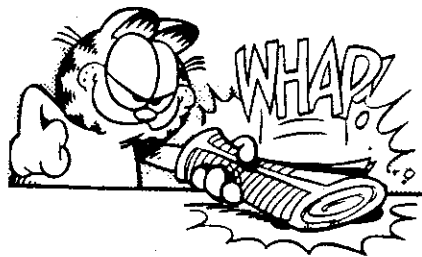
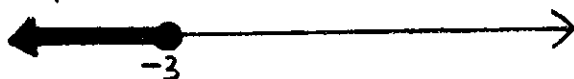
Union



$$6 \bullet x \leq 2 \text{ and } x \leq -3$$

Intersection

The solution should be written as $x \leq -3$. These points satisfy both inequalities.



$$7 \bullet x \leq 2 \text{ or } x \leq -3$$

Union

These points satisfy one inequality or the other.



8 ● $a > -3$ or $a \leq 2$

Union

All points satisfy one inequality or the other.



Put each inequality in final form and graph the solution:

9 ● $2x - 3 < 5$ or $2 - x < -7$

$2x < 8$ or $-x < -9$
 $x < 4$ or $x > 9$

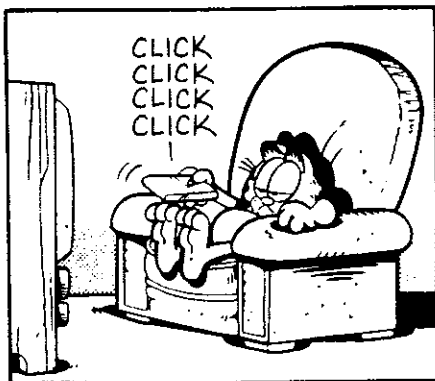
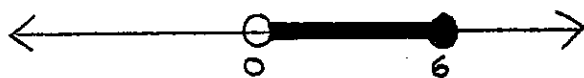
$x < 4$ or $x > 9$



10 ● $n - 4 < 2n - 4 \leq n + 2$

$n - 4 < 2n - 4$ and $2n - 4 \leq n + 2$
 $0 < n$ and $n \leq 6$

$0 < n \leq 6$



11 ● $x \neq 2$ and $3x - 1 > -13$
 $3x > -12$
 $x > -4$

$x \neq 2$ and $x > -4$



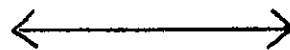
12 ● $x - 5 < x - 8 \leq x + 3$

$x - 5 < x - 8$ and $x - 8 \leq x + 3$
 $-5 < -8$ and $-8 \leq 3$

(False) (True)

Since this is an intersection, only points that satisfy both inequalities are solutions.

No Solutions

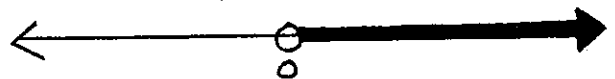


13 ● $2n - 4 > -4$ or $n + 5 \geq 8$

$2n > 0$ or $n \geq 3$
 $n > 0$

$n > 0$

This one inequality describes the union



Write the compound sentence or inequality for each graph:



$-5 \leq x < 3$



$x < -5$ or $x > 1$



$x \geq -1$ and $x \neq 3$

Lesson 3.3

PROBLEM SOLVING WITH INEQUALITIES

Use an inequality to solve:

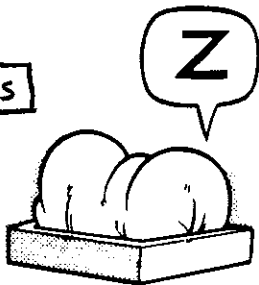
- 1 ● The car wash fund raiser earns a profit of \$1.50 on each car. How many cars must be washed to earn at least \$85?

n = number of cars washed

$$1.50n \geq 85$$

$$n \geq 56.\bar{6}$$

At least 57 cars



- 2 ● Three times an integer decreased by five gives a result between eighteen and twenty-seven. What are the integers?

n = the integer(s)

$$18 < 3n - 5 < 27$$

$$18 < 3n - 5 \text{ and } 3n - 5 < 27$$

$$23 < 3n \text{ and } 3n < 32$$

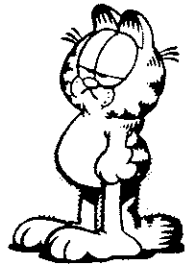
$$\frac{23}{3} < n \text{ and } n < \frac{32}{3}$$

$$\frac{23}{3} < n < \frac{32}{3}$$

$$7\frac{2}{3} < n < 10\frac{2}{3}$$

Possible integer values:

8, 9, 10



- 3 ● The sum of two consecutive positive odd integers is at most 23 and at least 11. What are the integers?

n

$n+2$

$$11 \leq (n) + (n+2) \leq 23$$

$$11 \leq 2n+2 \text{ and } 2n+2 \leq 23$$

$$9 \leq 2n \text{ and } 2n \leq 21$$

$$\frac{9}{2} \leq n \text{ and } n \leq \frac{21}{2}$$

$$4\frac{1}{2} \leq n \leq 10\frac{1}{2}$$

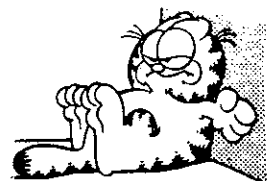
$$4\frac{1}{2} \leq n \leq 10\frac{1}{2}$$

n is odd: must be 5, 7, or 9

n

$n+2$

5	7	9
7	9	11



Lesson 3.4

EQUATIONS & INEQUALITIES WITH ABSOLUTE VALUE

Solve and graph:

1● $|x| = 4$

$x = 4$ or $x = -4$ Union

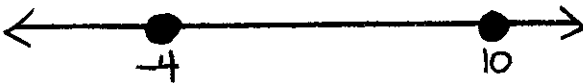


2● $|n-3| - 2 = 5$

$|n-3| = 7$

$n-3 = 7$ or $n-3 = -7$

$n = 10$ or $n = -4$ Union



Absolute Value:

Equation = Union

Inequality < Intersection

Inequality > Union

3● $|y+3| < 6$

$y+3 < 6$ and $y+3 > -6$

$y < 3$ and $y > -9$

$-9 < y < 3$ Intersection

Always put an intersection in compound inequality form.



4● $|8-2x| \geq 4$

$8-2x \geq 4$ or $8-2x \leq -4$

$-2x \geq -4$ or $-2x \leq -12$

$x \leq 2$ or $x \geq 6$ Union

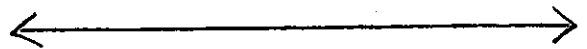


5● $|n+3| + 8 \leq 4$

$|n+3| \leq -4$

An absolute value cannot be less than or equal to a negative value.

No Solutions



6● $|y+3| + 2 > 1$

$|y+3| > -1$

An absolute value is always greater than a negative.

All Solutions



Lesson 3.5

MORE PRACTICE WITH ABSOLUTE VALUE

This section provides more practice with absolute value equations and inequalities.

3.1 Problems

SOLVING INEQUALITIES & GRAPHING SOLUTIONS

Solve each inequality and graph the solution:

- ① $3n - 2 < 2(n - 3)$
- ② $4(2x - 1) \geq 6x - 10$
- ③ $3x + 5 \geq 35 - 2(2x + 1)$
- ④ $4n - 19 < 57 - 3(3n - 5)$
- ⑤ $3a + 4 > 5(a + 3) - 7$
- ⑥ $4x + 9 > 3(2x + 4) + 7$
- ⑦ $2a + \frac{4a}{3} \leq 3(2a + 1) + 5$
- ⑧ $3n - \frac{n}{2} \geq 2(2n - 5) + 4$
- ⑨ $\frac{2(n+3)}{5} > \frac{2+n}{-3}$
- ⑩ $\frac{x-3}{6} > \frac{2(x+3)}{3}$
- ⑪ $\frac{2a}{3} - a \geq 3(4a - 1)$
- ⑫ $12 - \frac{5n}{4} < 2(5n - 1)$
- ⑬ $\frac{3(x-2)}{2} > \frac{6x}{4}$
- ⑭ $\frac{1-n}{-5} \leq \frac{2(n-1)}{10}$

3.2 Problems

GRAPHING UNIONS & INTERSECTIONS

Write each compound sentence without "and":

- ① $-3 > x$ and $x > -7$
- ② $p > \frac{3}{4}$ and $p \leq \frac{11}{9}$
- ③ $y \leq \frac{4}{9}$ and $y \geq \frac{-4}{3}$
- ④ $m < \frac{-6}{5}$ and $m > \frac{-13}{7}$

Graph the solution and identify as a union or intersection:

- ⑤ $r > 2$ or $r \leq -2$
- ⑥ $x > -5$ and $x < 0$
- ⑦ $-3 < n < 3$
- ⑧ $d \geq 0$ or $d < 4$





continued



Put each inequality in final form and graph:

- ⑨ $3+x < -4$ or $3+x > 4$
 ⑩ $-1+b > -4$ or $-1+b < 3$
 ⑪ $-5 < 4-3x < 13$
 ⑫ $-3-x \leq 2x \leq 3+x$
 ⑬ $2x-1 \leq 2x+8 < 2x+4$
 ⑭ $n-1 < 2n+3 \leq n+4$
 ⑮ $x \neq 6$ and $3x+1 > 10$
 ⑯ $2x+4 \leq 6$ or $x \geq 2x-4$

Write the compound sentence or inequality for each graph:

- ⑰ 
 ⑱ 
 ⑲ 
 ⑳ 



3.3 Problems

PROBLEM SOLVING WITH INEQUALITIES

Use an inequality to solve:

- ① The Daily Herald pays 15¢ per paper delivered by its first year carriers. How many papers must be delivered for a carrier to earn at least \$5.30?
 ② A bookstore makes a profit of \$4.30 on each two-volume set of sports books. How many sets must be sold for the store to make a profit of at least \$175?
 ③ Duane earns \$12,000 per year plus 6% commission on sales. How much did he sell if his income was between \$21,000 and \$27,000?
 ④ If four times an integer is increased by three, the result is between thirteen and twenty-five. What is the integer?
 ⑤ The sum of two consecutive positive odd integers is at most 18. What are the integers?
 ⑥ The sum of two consecutive positive even integers is at most 22. What are the integers?

Review

Solve the inequality:

$$\textcircled{7} \quad 2 - \frac{2n}{3} < 3(3n-1)$$

$$\textcircled{8} \quad \frac{2(3x-4)}{3} \geq \frac{4x-1}{2}$$

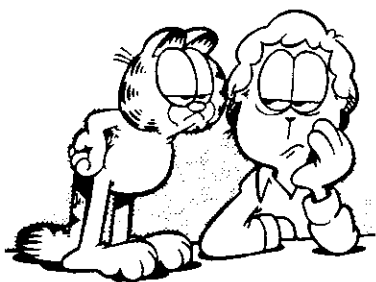
Put the inequality in final form and graph:

$$\textcircled{9} \quad 3-2x < 5 \text{ or } 3x-1 > -10$$

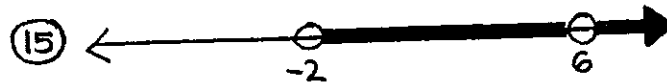
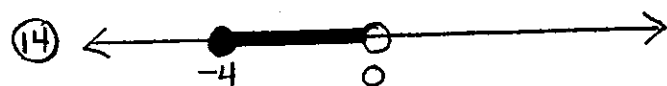
$$\textcircled{10} \quad 5n+2 \geq 17 \text{ and } n \neq 7$$

$$\textcircled{11} \quad n-4 < 2n+1 \leq n+10$$

$$\textcircled{12} \quad 2a+1 > 11 \text{ or } 3a < a-6$$



Write the compound sentence or inequality for each graph:



3.4 Problems

EQUATIONS & INEQUALITIES WITH ABSOLUTE VALUE

Solve and graph:

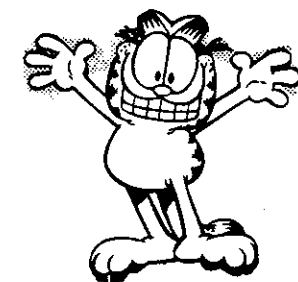
$$\textcircled{1} \quad |x+4|=6$$

$$\textcircled{2} \quad |y+1|=5$$

$$\textcircled{3} \quad |x|+7=12$$

$$\textcircled{4} \quad |n|-4=3$$

$$\textcircled{5} \quad |y-1| < 4$$



$$\textcircled{10} \quad |n+3|+7 > 5$$

$$\textcircled{6} \quad |2-x| \leq 1$$

$$\textcircled{11} \quad |4x+4|+2 \leq 22$$

$$\textcircled{7} \quad |12-3x| \geq 12$$

$$\textcircled{12} \quad |6x+6|-3 \leq 33$$

$$\textcircled{8} \quad |y+1| > 4$$

$$\textcircled{13} \quad |2x+1|+3 \geq 1$$

$$\textcircled{9} \quad |x-3|+5 \leq 2$$

$$\textcircled{14} \quad |10x+10|-1 \geq 89$$

Review

Put each inequality in final form, identify as a union or intersection, and graph:

$$\textcircled{15} \quad 3n+1 < 4 \text{ or } 2n-1 \geq 7$$

$$\textcircled{16} \quad 3x-2 \leq 5x+4 < 3x+12 \text{ and } x \neq 0$$

Use an inequality to solve:

$$\textcircled{17} \quad \text{Five times an integer decreased by seven is at least}$$

(continued)

22 and at most 34. Find the integer.

- ⑫ The sum of two consecutive odd integers is between -5 and +13. What are the integers?

3.5 Problems

MORE PRACTICE WITH ABSOLUTE VALUE

Solve each equation or inequality and graph the solution:

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



Review

Solve and graph:

⑨ $\frac{3(n-3)}{4} < \frac{n-6}{-2}$

Write the compound sentence without "and":

⑩ $x \geq -8$ and $x < 0$

Write the compound sentence:



Put the inequality in final form and graph:

⑬ $2n - 1 < 3n + 6 < 2n + 8$ and $n \neq -2$

Use an inequality to solve:

- ⑭ Sherwin earns \$18,000 per year plus 5% commission on all sales. How much did he sell if his income was between \$21,600 and \$24,500?
- ⑮ Three times an integer decreased by four is at least 21 and at most 37. Find the integer.



Unit 3

REVIEW PROBLEMS

Solve each inequality and graph the solution:

① $4(n-3) \leq 2(3n-5) - 6$

② $3(2x+1) > 4(3+3x) + 3$

③ $4a + \frac{a}{3} \geq 2(a-5) - 4$

④ $\frac{2n}{5} + 1 < 3(n-5) - n$

⑤ $\frac{2(x+4)}{3} > \frac{x+7}{2}$

⑥ $\frac{-2(n+5)}{8} \leq \frac{4-3n}{-7}$

⑦ $2(3n+5) < 3(2n-1)$

⑧ $n-3 \geq 4n - 3(n+1)$

Write each compound sentence without "and":



⑨ $-2 < n$ and $4 > n$

⑩ $x \geq \frac{-2}{3}$ and $x < \frac{1}{2}$

Put in final form and graph:

⑪ $2n-1 > 5$ or $4-3n > -2$

⑫ $4(x+1) \geq -8$ or $9-5x < -1$

⑬ $3n+4 < 3n-2 < 3n+1$

⑭ $n-5 \leq 2n+1 \leq n+4$

⑮ $3a+4 < -5$ and $-2a > 4$

⑯ $4x \geq 2x+4$ and $-3(2x-1) \leq 3$

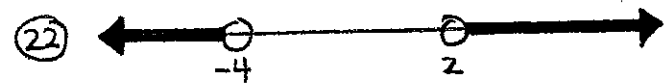
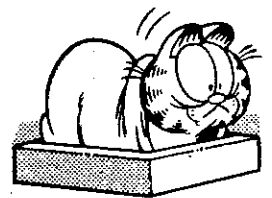
⑰ $3n-1 < 4n+4 < 2n+8$

⑱ $2x-2 > 4$ or $3x-1 < 14$

⑲ $x-1 \leq 2x < x+4$ and $x \neq 0$

⑳ $3x-1 \leq 11$ and $x \neq -2$

Write the compound sentence and identify as a union or intersection:



Use an inequality to solve:

㉔ Twice an integer increased by four is between 17 and 27. What is the integer?

㉕ Three times an integer

decreased by four is between -9 and $+1$. Find the integer.

②7 Andrew earns \$15,200 plus 6% commission on sales. What are his sales if he takes home between \$16,400 and \$18,200?

②8 Betty earns \$11,100 plus 7% commission on sales. If she takes home between \$12,780 and \$16,280, what were her sales?

②9 The sum of three consecutive integers is at least 17 and at most 26. What are the integers?

③0 The sum of three consecutive even integers is at least -1 and at most $+20$. What are the integers?

Solve and graph:

③1 $|n+1| + 4 = 7$

③2 $|2x-4| - 3 = 5$

③3 $|3a-2| + 4 < 3$

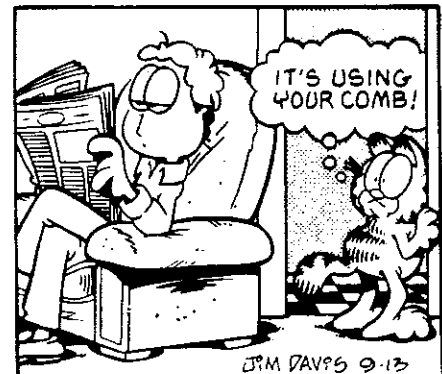
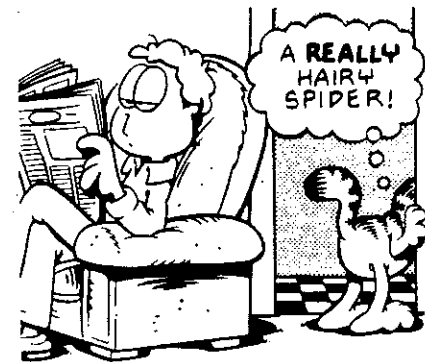
③4 $|2n+3| + 4 \geq 2$

③5 $|a+4| > 2$

③6 $|2n-1| \geq 5$

③7 $|x-6| - 2 \leq 10$

③8 $|2a+4| + 1 < 13$



Unit 3

SKILL CHECK

Solve and graph:

① $3(n-1) > 4n-7$

② $\frac{n}{2} + 4 \leq 2(n-1) - \frac{3n}{2}$

③ $\frac{2(x+1)}{3} < \frac{3x+1}{4}$

write as a compound sentence without "and":

④ $2a < 6$ and $3a \geq -9$

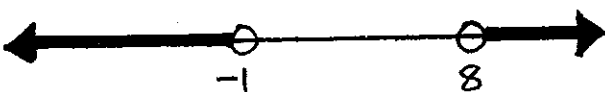
Put in final form and graph the solution:

⑤ $3n-5 < 4n+6 < 2n+8$

⑥ $4(x+4) \leq 4x+8 \leq 2(2x+5)$

⑦ $3n+4 \leq -2$ or $2n-5 \geq 3$

write the compound sentence and identify as a union or intersection:

⑧ 

Use an inequality to solve:

⑨ Four times an even integer decreased by three is between -12 and 7. Find the integer.

⑩ Larry earns 8% commission on sales plus a salary of \$16,000. If he takes home between \$16,960 and \$21,600, what were his sales?

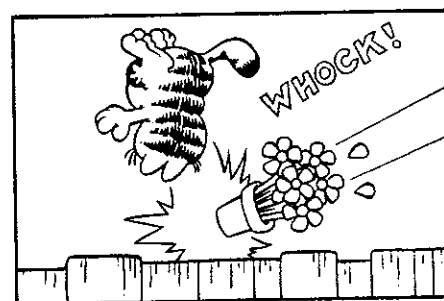
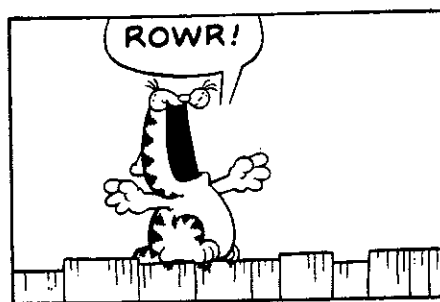
⑪ Find two consecutive odd integers if twice the first decreased by the second is at least 2 and at most 8.

Solve and graph:

⑫ $x-3 \leq 3x+5 < 2x+8$ and $x \neq -1$

⑬ $|2n-4| - 2 \geq 4$

⑭ $|3x+2| + 4 < 10$



Unit 3 REMEDICATION

Solve and graph:

① $2(a-3) \leq 5a-3$

② $\frac{2n}{3} - 1 > n - 4$

③ $\frac{3(2n+2)}{2} > \frac{6n-7}{2}$

Write as a compound sentence without "and":

④ $5n-1 \leq 14$ and $2n+3 > -1$



Put in final form and graph the solution:

⑤ $2x-6 \leq 3x+4 < x+12$

⑥ $2(4n-1) < 8n+5 < 4(2n+3)$

⑦ $3a+1 < -5$ or $2a+6 < 3a-2$



Write the compound sentence and identify as a union or intersection:



Use an inequality to solve:

⑨ Twice an odd integer increased by three is at least -4 and at most 10 . Find the integer.

⑩ Ben took home between $\$16,820$ and $\$25,460$ last year. If he earns $\$12,500$ in salary plus 12% commission on sales, what were his sales?

⑪ Find three consecutive even integers if the sum of the middle one and twice the largest is between -10 and 12 .

Solve and graph:

⑫ $[3n < n-8$ or $2n > n+6]$ and $n \neq -7$

⑬ $|5x+3| - 1 > 7$

⑭ $|2n-5| + 3 \leq 6$



Unit 3

EXTRA PRACTICE

Solve and graph:

① $2(4a-6) < -6$

② $-3(x-2) \geq 2(x-1)+3$

③ $2(n+3) < \frac{n}{4} - 1$

④ $-3(3x+2) \geq 2(x-3) - 11x$

⑤ $\frac{2n+7}{3} \geq \frac{3(3n-2)}{6}$

Write as a compound without "and":

⑥ $x > -2$ and $x < 4$

Solve and graph:

⑦ $3x-2 < -8$ or $x-7 > 3$

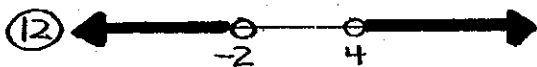
⑧ $x+4 \leq 2x+9 \leq x+15$

⑨ $6n+5 < 2(3n+4) < 3(2n-1)$

⑩ $x \geq 4x-9$ or $2x \geq x+4$

⑪ $n-8 > 3n-4$ and $n \neq -6$

Write as a compound and identify as a union or intersection:



Use an inequality to solve:

⑭ Three times an integer decreased by 5 is between 12 and 15. Find the integer.

⑮ Five times an integer decreased by 3 is greater than 6 and less than 25. Find the integer.

⑯ Bruce earns \$14,200 plus a 5% commission on sales. Determine his sales if he takes home between \$21,200 and \$25,200.

Solve and graph:

⑰ $|3x-6| \geq 12$

⑱ $|2x+6|-4 < 6$

⑲ $x-3 < 2x+5 < x+9$

use an inequality to solve:

⑳ Find two consecutive odd integers if the sum of the first and four times the second is between 30 and 56.



Cumulative Review

"A"

Problems

QUARTER #1 REVIEW

Identify the property:

- ① If $a+7=2c$ and $b=7$, then $a+b=2c$
- ② $a(m+n) = am + an$

Write an algebraic expression:

- ③ The sum of three more than twice a number and five less than the number.

Evaluate each expression:

$$\begin{aligned} a &= -2 \\ b &= -1 \\ c &= +3 \end{aligned}$$

- ④ $2ab^2 - 3bc$
- ⑤ $2b^3 - 3(ac - b)$



Simplify each expression:

- ⑥ $8xy - 3x(2x - 4y) - 2x^2$
- ⑦ $4a(a - 2b) - 3b(a + 2b) + b^2$

Solve each equation:

- ⑧ $\frac{3n-4}{8} = 3n+10$

⑨ $5(3n-2) = 4(n+4) + 3n - 2$

Solve the inequality:

⑩ $\frac{n+5}{3} < \frac{4(3n-1)}{12}$

Solve and graph:

- ⑪ $2n-9 \leq 3n-4 < n+8$
- ⑫ $2x+3 \leq 7$ or $3(x-4) > 6$

Solve for n:

⑬ $3n - 2m = mn + 4$

Define a variable, set up an equation, and solve:

- ⑭ Mrs. Benson is four times as old as her son Nick. Six years ago, Mrs. Benson was three times as old as Nick will be two years from now. How old was Nick last year?

- ⑮ Twice a number increased by 12 is 31 less than 3 times the number. Find the number.



- ⑩ Sam's backyard is 25 m longer than it is wide. It can be enclosed by 170 m of fencing. What is the yard's area?
- ⑪ \$85.69 is $104\frac{1}{2}\%$ of what?
- ⑫ If tires are on sale at 20% off, what is the original price for a set of tires on sale for \$128?
- ⑬ Three times an even integer decreased by two is between 8 and 24. Find the integer.
- ⑭ Alex earns a regular salary of \$400 a week plus 4% commission on sales. If he takes home \$520, what were his sales for the week?

WHAT'S THAT? OH NO, MY DEAR. EVEN THOUGH YOU ARE JUST A LASAGNA, I ADMIRE YOU FOR YOUR MIND



Solve and graph:

- ⑮ $|4n - 6| > 10$
- ⑯ $|n - 3| \leq -4$
- ⑰ $|n - 5| + 3 < 8$

"B" Problems

QUARTER #1 REVIEW

Identify the property:

- ① $3mn \left(\frac{1}{3}mn\right) = 1$
- ② If $-7ax^2 = 3y$, then $3y = -7ax^2$

Write an algebraic expression for the following:

- ③ The product of three less than a number and two more than the square of the same number.

Evaluate each expression:
 $x = -1$, $y = 4$, $z = -2$

④ $-x^2 - 3xy$

⑤ $\frac{2xy^2 + 8z}{4x^3y}$



Simplify each expression:

⑥ $3x(2y - x) - 2x(3x + y)$

⑦ $\frac{-12m - 20mn}{8m}$

Solve each equation:

⑧ $3(a - 4) - 5a = a + 3$

⑨ $6 - \frac{3n}{2} = 9 - 2n$

Solve the inequality :

⑩ $4(x-3) \geq 8(x-1)$

Solve and graph :

⑪ $n+6 < 3n+10 \leq n+16$

⑫ $a-3 \leq 4$ or $3(a-2) < 5a-2$

Solve for x :

⑬ $4(x-3y) = xy + y^2$

Define a variable, set up an equation, and solve :

⑭ Alice is half Fay's age. 6 years ago, Fay was 3 times as old as Alice was 4 years ago. How much older is Fay than Alice ?

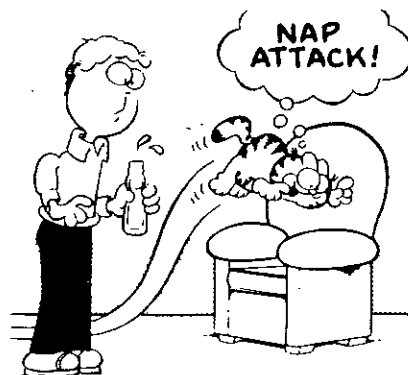
⑮ Twice the smallest of three consecutive even integers decreased by three times the middle integer is negative two. Find the middle integer.

⑯ Two sides of an isosceles triangle are two inches less than twice the base. If the perimeter is 26, find the base.

⑰ What is $22\frac{1}{2}\%$ of 140 ?

⑱ Sharon saved \$10.80 on

a bookcase. If the bookcase was on sale for 15% off, how much did she pay ?



⑲ Find a negative odd integer such that 6 more than 4 times the integer is greater than -7 and less than 19. Find the integer.

⑳ Julia earns a salary of \$225 per week plus a 5% commission on sales. Over a three week period, Julia took home \$815. What were her sales ?

Solve and graph on a number line :

⑳ $|6x-6|-2 \leq 16$

㉑ $|n-1|+4 > 2$

㉒ $|3n-6| > 15$



"C"

Problems QUARTER #1 REVIEW

Identify the property:

- ① $3a + (2n-1) = (2n-1) + 3a$
- ② $0 = (-3m^2) + (3m^2)$

Write an algebraic expression:

- ③ The difference of an integer cubed and three less than four times the integer.

Evaluate each expression:

$$\begin{aligned} a &= 2 \\ b &= -2 \\ c &= -1 \end{aligned}$$

- ④ $abc - 2bc^3$
- ⑤ $4bc - 2(ab^2 - 1)$



Simplify each expression:

- ⑥ $4ab - 2a(3a-b) - 5a^2$
- ⑦ $3x(2x-y) - 4x^2 - 3(x^2 - xy)$

Solve each equation:

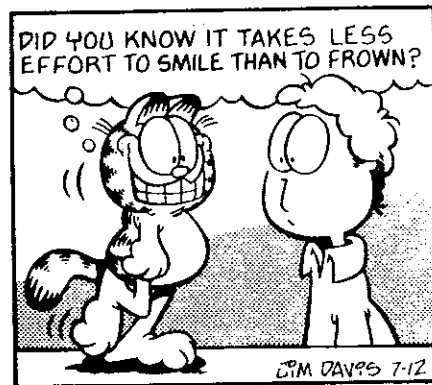
- ⑧ $\frac{2(n-5)}{3} - n = 3n$
- ⑨ $2(3x-4) - 2x = \frac{x-2}{3}$

Solve the inequality:

⑩ $\frac{2(n-3)}{6} > \frac{4n-4}{9}$

Solve and graph:

- ⑪ $x-1 \leq 3x+7 < 2x+8$
- ⑫ $3n-4 > 11$ or $2n-4 < -2$



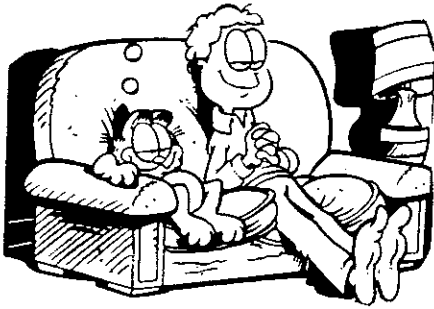
Solve for n:

⑬ $5x - 3n = x^2 - 2mn$

Define a variable, set up an equation, and solve:

- ⑭ The sum of the ages of

Mrs. McCann and her son Arthur is 57. In 6 years, Mrs. McCann will be twice as old as her son. How old is Arthur?



18) The tickets were purchased for \$51.20 after 20% was deducted from the original price. How much money was saved?

19) One more than four times a positive even integer is between -7 and 26. Find the integer.

20) Nick earns a weekly salary of \$175 plus $7\frac{1}{2}\%$ commission on sales. What are his sales if he takes home \$725 over a two week period?

15) Five times a number decreased by negative two is negative thirteen. Find the number.

16) The garden is four feet longer than it is wide. If it can be enclosed by a fifty-two foot fence, what are the dimensions of the garden?

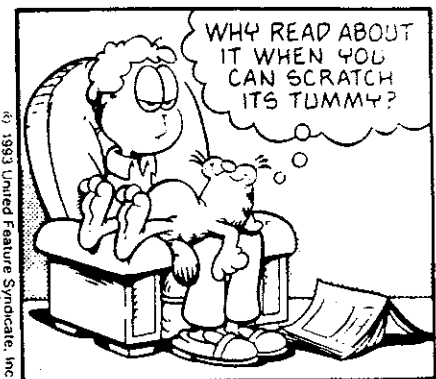
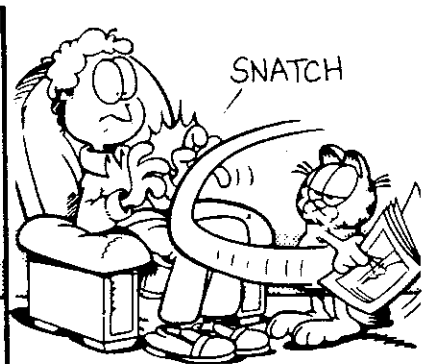
17) 15 is 18% of what?

Solve and graph on a number line:

21) $|x| + 3 < 2$

22) $|5n - 10| + 15 \geq 25$

23) $|3n| - 6 < 12$



Quarterly Exam #1

REMEDICATION & EXTRA PRACTICE

Identify the property:

① If $x^2y = 2a$ and $2a = z^2$,
then $x^2y = z^2$

$(ab)c = a(bc)$

② $ab + 3c = 3c + ab$

If $4n = 3y$, then
 $3y = 4n$

Evaluate each expression:
 $a = -2$ $b = -1$ $c = 2$

③ $2ab^2 - cb^3$

$abc + 2a^2b$

④ $3bc - 2b^5 + ac$

$2b - ac - b^2c^2$

Simplify:

⑤ $3xy - 2x(x-4y) - 2xy + 3x^2$
 $a^2b - 2a(a+ab) - 5a^2$

⑥ $4a(a+b) - 2a(b-3a)$

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

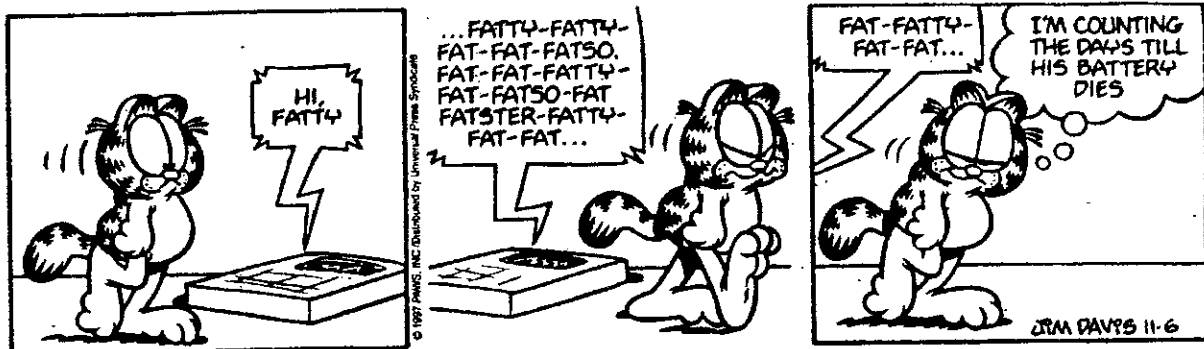
Solve each equation:

⑦ $\frac{3x+7}{2} = x+1$

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

⑧ $3(3n-5) - 4n = 5$

$2(3x-4) - 2(x+3) = x-11$



Solve the inequality:

$$\textcircled{9} \frac{2(4x-3)}{5} > \frac{2x+2}{3}$$

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

Solve for x :

$$\textcircled{10} 2y + 5x = xy + 3$$

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

Solve and graph:

$$\textcircled{11} x - 4 < 3x + 2 \leq x + 8$$

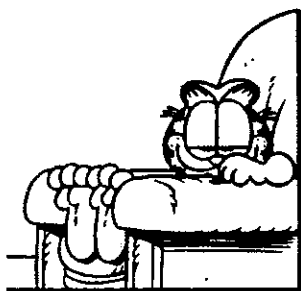
$$2x - 6 \leq 3x + 8 \leq x + 14$$

$$\textcircled{12} 2n - 5 > 9 \text{ or } 3n - 5 < 7$$

$$n + 3 \leq -5 \text{ or } 2n - 3 \geq 7$$

$$\textcircled{13} |2n - 5| \geq 7$$

$$|3n - 3| > 12$$



$$\textcircled{14} |2n - 5| - 8 < 3$$

$$|n + 2| - 6 \leq 4$$

Define a variable, set up an equation, and solve:

- $\textcircled{15}$ Jay is 4 times as old as Paul. Four years ago, Jay was twice the age that Paul will be two years from now. How old was Jay last year?

Albert is 5 times as old as Joey. Five years ago, Albert was three times the age Joey will be next year. How old was Joey two years ago?

- $\textcircled{16}$ Four times an integer increased by 8 equals one less than the integer. Find the integer.

Three less than twice an integer equals seven more than four times the integer. Find it.

- $\textcircled{17}$ A rectangle has a length two inches more than twice its width. If the perimeter is 22 inches,

determine the area.

A rectangle's length is three inches less than three times its width. Determine the area if the perimeter is 34 in.

- ⑱ A clock is on sale for 15% off. If the new purchase price is \$15.64, how much money is saved during the sale?

The price of a video is \$9.12 after a 5% off coupon is applied to the purchase. Determine the original price.

- ⑲ Six more than twice a negative even integer is greater than -9 and less than 10. Find the integer.

One more than three times a positive odd integer is greater than -12 and less than 11.

- ⑳ Janice earns a regular weekly salary of \$180 plus 12% commission on sales. If she takes home \$708 in one week,

how much were her sales?

Molly earns \$120 per week and 4% commission on sales. After two weeks, she takes home \$631.20. What were her sales for the two week period?

Solve and graph:

- ㉑ $|x-5| < 3$ and $x \neq 4$
 $|2x-3| \geq 7$ and $x \neq 7$

