Gr. 8

Advanced Math

Summer Work

Mrs. Mitchell

Name _____ Date _____

Variables and Equations

Solving Basic Equations

$$12x + 3 = 123$$
$$12x + 3 - 3 = 123 - 3$$
$$12x = 120$$
$$x = 10$$

Solve each equation for the given variable.

1. $4(x - 6) = 8$
2. $4 + 3g = -14$
3. $14a + 5 - 8a = -1$
4. $4e + 6 - 11e = -8$
5. $-9r + 5 = -22$
6. $2m - 9 - 8m = -27$
7. $b + 9 - 2b = 6$
8. $4j - 9j + 3 = -32$
9. $5(j - 4) + j = -8$
10. $\frac{m}{4} + 6 = 2$
11. $3d - 5 - 2d = -9$
12. $-5 + 6d + 3 = 34$
13. $2k + 3(k + 4) = -3$
14. $5(m - 3) + 2m = 27$
15. $-j + 5j + 2 = -14$
16. $7t - 3 + 4t = -25$
17. $4(c + 2) = -28$
18. $12k - 3(5 + 5) = 54$
19. $3e + 4e + 1 = 36$
20. $-6r + 12 - 8r = -2$

Name _____ Date _____

Variables and Equations

Solving Equations with Variables on Both Sides

$$6x - 7 = x + 33$$
$$6x - x - 7 = x - x + 33$$
$$5x - 7 + 7 = 33 + 7$$
$$5x = 40$$
$$x = 8$$

Solve each equation for the given variables.

1. $7 - 6a = 6 - 7a$
2. $3c - 12 = 14 + 5c$
3. $3x - 3 = {}^{-}3x + {}^{-}3$
4. $2x - 7 = 3x + 4$
5. $9a + 5 = 3a - 1$
6. $8(x - 3) + 8 = 5x - 22$
7. $5t + 7 = 4t - 9$
8. ${}^{-}10x + 6 = {}^{-}7x + {}^{-}9$
9. ${}^{-}7c + 9 = c + 1$
10. $2x + 6 = 5x - 9$
11. $\frac{5}{2}x + 3 = \frac{1}{2}x + 15$
12. $5 + 3x = 7(x + 3)$
13. $12m - 9 = 4m + 15$
14. $2(x - 4) + 8 = 3x - 8$
15. ${}^{-}6 - ({}^{-}2n) = 3n - 6 + 5$
16. $4(2y - 4) = 5y + 2$
17. $2(r - 4) = 5[r + ({}^{-}7)]$
18. $6(x - 9) = 4(x - 5)$
19. $4(t + 5) - 3 = 6t - 13$
20. $4e - 19 = {}^{-}3(e + 4)$

Name _____ Date _____

Equations

Simplifying Expressions

$2(3w + 2b) = 6w + 2 \cdot 2b = 6w + 4b$

Expand each expression using the distributive property.

1. $^{-}5(2s + 2m) =$

2. $4(2d + 6b) =$

3. $^{-}4(j + k + g) =$

4. $2(^{-}t + 4e) =$

5. $7(3y - 8) =$

6. $6(2g + y) =$

7. $4(3 + k) =$

8. $6(3v + 5c) =$

9. $2(t - 6q) =$

10. $^{-}5(3w + 5e) =$

11. $^{-}5[7h + (^{-}3p)] =$

12. $^{-}3(8g + 13a) =$

13. $3(10e + 3f) =$

14. $3d(^{-}nm + 7) =$

Name _____ Date _____

Equations

Simplifying Expressions

$2(x + 3y) = 2x + 2 \cdot 3y = 2x + 6y$

Expand each expression using the distributive property.

1. $4(2r + 6y) =$

2. $2(3p - 3p) =$

3. $^{-}6(2b + 3c) =$

4. $7(^{-}c + 6d) =$

5. $2(x - 12) =$

6. $12(2y + 5w) =$

7. $3(2 + r) =$

8. $3(w - 4) =$

9. $8[y + (^{-}2x)] =$

10. $5(2 + 13y) =$

11. $2k[^{-}xy + (^{-}8)] =$

12. $^{-}7(2x + 9) =$

13. $5(2y + 5x) =$

14. $3(x + 2y + z) =$

Solving Equations*
(Multiplication and Division)

Name _____

Date _____

Write an equation for each. Then solve it.

1. Four times a number is negative 55. _____
2. A number divided by negative 3 is positive 7. _____
3. A number times negative 9 is negative 36. _____
4. Seven times a number is negative 56. _____

Solve.

5. $7x = {}^{+}49$; $x =$ _____
6. $^{-}5a = {}^{-}45$; $a =$ _____
7. $9r = {}^{+}81$; $r =$ _____
8. $^{-}3s = {}^{-}36$; $s =$ _____
9. $^{-}8t = {}^{+}0.64$; $t =$ _____
10. $^{+}1.4x = {}^{-}42$; $x =$ _____
11. $10y = {}^{-}850.1$; $y =$ _____
12. $^{-}0.12a = {}^{+}144$; $a =$ _____
13. $21c = \frac{^{-}1}{3}$; $c =$ _____
14. $8d = \frac{4}{5}$; $d =$ _____
15. $^{-}23b = {}^{+}20.7$; $b =$ _____
16. $9r = {}^{-}7.65$; $r =$ _____
17. $\frac{1}{4}t = {}^{-}400$; $t =$ _____
18. $13n = {}^{+}91$; $n =$ _____
19. $8x = {}^{-}6$; $x =$ _____
20. $\frac{f}{^{+}4} = {}^{+}16$; $f =$ _____
21. $\frac{a}{^{+}9} = {}^{-}8$; $a =$ _____
22. $\frac{b}{^{-}3} = {}^{+}41$; $b =$ _____
23. $\frac{c}{^{+}8} = {}^{-}36$; $c =$ _____
24. $\frac{d}{^{+}20} = \frac{^{-}1}{5}$; $d =$ _____
25. $\frac{e}{^{-}1} = {}^{+}12.5$; $e =$ _____
26. $\frac{h}{^{-}1} = {}^{-}4.7$; $h =$ _____
27. $\frac{a}{^{-}0.7} = {}^{-}8$; $a =$ _____
28. $\frac{n}{^{+}10} = {}^{-}36\frac{1}{5}$; $n =$ _____
29. $\frac{t}{0.5} = {}^{+}26$; $t =$ _____
30. $\frac{c}{^{-}4} = {}^{-}10\frac{1}{2}$; $c =$ _____
31. $\frac{n}{^{+}3} = {}^{+}64$; $n =$ _____
32. $\frac{x}{^{-}2} = {}^{+}5.8$; $x =$ _____

*Use with Lesson 4-8, text pages 114–115.

Equations: Two-Step Solutions*

Name _____

Date _____

Find the LCM for each equation, when needed. Then solve.

1. $^-3.5 + 2x = {}^-13.5$

2. $2k - 6 = 8$

3. $24.1 + 6x = 38.5$

4. $\frac{n}{2} - 5 = 15$

5. $\frac{y}{10} + 4 = 16$

6. $\frac{y}{3.5} + 15 = 17$

7. $\frac{s}{3} - 15 = 15$

8. $0.5n + 3 = 8.5$

9. $3y - 11 = 25$

10. $4y - {}^-3 = {}^-25$

11. $3.6y + 3.2 = 15.8$

12. $\frac{{}^-s}{3} - 4 = {}^-10$

Combine like terms. Then solve.

13. $3c + 1\frac{1}{4} - 5c = {}^-5$

14. $3a + 2.1 + 4a = {}^-0.7$

15. $5r + 2r - 1 = {}^-36$

16. $2.1x - 6 + 1.6x = 12.5$

17. $5y - 1 - 3y = {}^+5\frac{1}{5}$

18. $9d - 2.3 - 10d = 6$

19. $7x + 1.5 - 8x = {}^-2.1$

20. $10c - 20c = 90$

21. $40t - 19t = 231$

Solve equations, using grouping symbols if needed.

22. $\frac{2x - 5 + x - 5}{10} = 8.3$ _____

23. $\frac{n + 4}{4} = 3$ _____

24. $\frac{7}{2.1} = \frac{3}{a}$ _____

25. $5x - 3x - 3 = 4.2$ _____

*Use with Lesson 4-9, text pages 116–117.

Multiplication and Division Equations*

Name _____

Date _____

Solve and check each equation.

1. $6q = 36$ _____
2. $3a = 9$ _____
3. $7d = 98$ _____
4. $4r = 28$ _____
5. $12a = 60$ _____
6. $8x = 24$ _____
7. $\frac{b}{8} = 7$ _____
8. $\frac{z}{2} = 16$ _____
9. $\frac{r}{11} = 6$ _____
10. $\frac{k}{5} = 3$ _____
11. $\frac{m}{2} = 72$ _____
12. $\frac{h}{7} = 31$ _____
13. $6t = 48$ _____
14. $6 = \frac{v}{8}$ _____
15. $4n = 3.2$ _____
16. $50 = \frac{c}{20}$ _____
17. $12a = 60$ _____
18. $9d = 27$ _____
19. $0.07m = 70$ _____
20. $15 = 5r$ _____
21. $\frac{d}{0.1} = 40$ _____
22. $\frac{c}{100} = 0.15$ _____
23. $\frac{n}{10} = 1.6$ _____
24. $98 = 14x$ _____

Write an equation for each. Solve and check.

25. Seven times a number is 49. What is the number? _____

26. How many times 9 is 27? _____

27. A number divided by 6 is 9. What is the number? _____

28. Each of 12 students received an equal part of $48. How much did each student receive? _____

29. If one book costs $3.75, how many can a person buy for $67.50? _____

30. A certain kind of designer jeans cost 2.4 times as much as an ordinary pair of jeans. If the designer jeans cost $23.88, what is the price of the ordinary pair of jeans? _____

Properties and Order of Operations*

Name _____

Date _____

Match the name of the property or element with an example of its application.

1.	_____ Commutative Property of Addition	a.	(5 + 7.6) + 8.4 = 5 + (7.6 + 8.4)
2.	_____ Associative Property of Multiplication	b.	7(400 + 7) = 7(400) + 7(7)
3.	_____ Distributive Property	c.	9276 × 1 = 9276
4.	_____ Identity Element of Addition	d.	4.6 × 14 = 14 × 4.6
5.	_____ Commutative Property of Multiplication	e.	12 + 97 + 8 = 97 + 12 + 8
6.	_____ Associative Property of Addition	f.	8 × (5 × 3) = (8 × 5) × 3
7.	_____ Identity Element of Multiplication	g.	265 + 0 = 265

Compute. Simplify by using the number properties wherever possible.

8. 24.7 + 8.6 + 5.3 = _____

9. 18 × (200 + 2) = _____

10. 18.5 × (0.2 + 0.8) = _____

11. (23.86 + 0.74) + 0.26 = _____

12. 25 × 76 × 4 = _____

13. 4.9 + 8.3 + 2.3 + 1.1 + 2.7 = _____

14. 9 + 3 + 4 + 7 + 6 + 1 = _____

15. 8(2.9) + 8(7.1) = _____

16. 8 × 6 × 5 × 5 = _____

17. 36.29 × 1 = _____

Compute. Use the correct order of operations.

18. 5 + (8 × 3) + 9 − (7 × 1) = _____

19. (42 − 3) × 12 ÷ 6 − (4 + 1) = _____

20. (5 + 8) × 3 + (9 − 7) × 1 = _____

21. 5 + 4 × 7 − 6 = _____

22. 5 + 8 × (3 + 9) − 7 × 1 = _____

23. (5 + 4) × 7 − 6 = _____

24. 42 − 3 × 12 ÷ 6 − 4 + 1 = _____

25. 5 + 4 × (7 − 6) = _____

Addition and Subtraction of Polynomials

Name _____

Date _____

$9a - 3b + 5a = ?$

$9a - 3b$

$+5a$

$14a - 3b$

$(4x^2 + 3xy - 9y^2) - (5xy - 4y^2) = ?$

$4x^2 + 3xy - 9y^2$

$-5xy \quad +4y^2$

$4x^2 - 2xy - 5y^2$

Add or subtract.

1. $16x^2y^3 + 19x^2y^3$

2. $(16ab + c) + (12ab - 4c)$

3. $(17c - 4d) - (11c + 4d)$

4. $(x^2 - 23x + 14) + (6x^2 - 8)$

5. $(\frac{1}{4}pq - \frac{2}{3}cd) + (\frac{3}{8}pq - \frac{4}{9}cd)$

6. $(-\frac{5}{6}rs + \frac{7}{11}m^2n^2) - (-\frac{2}{3}rs + \frac{3}{22}m^2n^2)$

7. $(2b^2 - 1.3n^2) - (3.5n^2 + b^2)$

8. $(3rs + 1.5s^2) - (2.3s - 5rs)$

Add.

9. $-23a^2 + 17a + 6$
$\quad 18a^2 + 11a - 7$

10. $8xy + 1$
$\quad -xy - 10y^2$

11. $47m^2 - 36mn + 11n^2$
$\quad 16m^2 - 9n^2$

12. $11.3x^2 - 13.9x + 15.8$
$\quad -9.6x^2 + 12.7x - 6.5$

13. $10d^2 - 3d$
$\quad 7d^2 + 3d - 9$

14. $57.6c^2d^2 + 19.7cd - 64.5$
$\quad 16.1cd - 11.3$

Subtract.

15. $98a^2 - 121b^2$
$\quad 24a^2 - 35b^2$

16. $11c^3 - 13$
$\quad 7c^3 - 15$

17. $125x^2y + 57xy^2 - 13xy$
$\quad 90x^2y - 13xy^2$

18. $16r - 12p$
$\quad 27p + 19$

19. $-9xy$
$\quad -9xy - y^2$

20. $96.7m^2n^2 + 13.7mn - 105.1n^2$
$\quad 14.3m^2n^2 - 11.3mn - 13.9n^2$

Addition and Subtraction of Polynomials* (con't)

Name _____

Date _____

Write an algebraic expression to represent the perimeter of each geometric figure.

21. square: length of a side = $5x - 2$ _____

22. square: length of a side = $x^2 - 2x + 3$ _____

23. rectangle: length = $9x + 1$; width = $3x - 2$ _____

24. rectangle: length = $3x^2 - 4x + 1$; width = $8x + 3$ _____

Arrange in ascending powers of a.

25. $a + 10 - 3a^2$

_____

26. $5a^3 + a - 6a^2 + 11$

_____

27. $4ab + 10 - 7a^2b^2 + 9a^3b^3$

_____

Arrange in descending powers of x.

28. $10x^5 + 9x^3 + 3 - x^4 + x^2$

_____

29. $x^3y^2 - 15x^5 + 3 - x^4y + x^2y$

_____

30. $-x^4y + 10y + x^8 + 4x^3y^2 - x^6y^5$

_____

Solve. Show your work.

31. The sum of two polynomials is $8a^2 - 7$. If one of the polynomials is $3a^2 - 2b - 1$, what is the other polynomial? _____

32. From the sum of $3a^2 - 3b$ and $7 - 11b$ subtract $3a^2 - 17$. _____

33. The lengths of the sides of a triangle are represented by $x^2 + 8x - 17$, $3x + 11$, and $3x^2 - 25$. Find the perimeter. _____

34. The length of each side of a square is $\frac{2a}{3} + 1$. Find the perimeter of the square. _____

*Use with Lesson 15-2, text pages 418–419.

5-5 Subtract Polynomials

Name _____ Date _____

To subtract polynomials, add the opposite of the subtrahend. You can subtract polynomials horizontally or vertically.

Subtract: $(x^2 + 4x + 7) - (-2x^2 - 3)$

Subtract polynomials horizontally.

$(x^2 + 4x + 7) - (-2x^2 - 3)$

$= (x^2 + 4x + 7) + (2x^2 + 3)$ ← Add the opposite.

$= (x^2 + 2x^2) + 4x + (7 + 3)$ ← Group like terms.

$= 3x^2 + 4x + 10$ ← Combine like terms.

So the difference is $3x^2 + 4x + 10$.

Subtract: $(x^2 + 4xy - 5y^2) - (-2x^2 - 3xy + 4y^2)$

Subtract polynomials vertically.

$$\begin{array}{r} x^2 + 4xy - 5y^2 \\ -(-2x^2 - 3xy + 4y^2) \\ \hline \end{array}$$

To subtract, add the opposite.

$$\begin{array}{rl} x^2 + 4xy - 5y^2 & \leftarrow \text{Arrange in columns.} \\ + 2x^2 + 3xy - 4y^2 & \\ \hline 3x^2 + 7xy - 9y^2 & \leftarrow \text{Add.} \end{array}$$

So the difference is $3x^2 + 7xy - 9y^2$.

Find the difference horizontally or vertically. Write the difference in standard form.

1. $(7k + 6) - (-2k + 3)$

$(7k + 6) - (-2k + 3) = (7k + 6) + [-(-2k + 3)]$

$(7k + 6) + (2k - 3) = 7k + 2k + 6 - 3$

$9k + 3$

2. $(-3v^2 + 7) - (2v^2 + 4)$

3. $(17k^2 - 23) - (9k^2 - 25)$

4. $(x^2 + 6) - (3x^2 - 2)$

5. $(7x^2 - 12) - (4x^2 - 21)$

6. $(x^2 - 8x) - (4x - 5x^2)$

7. $(3x^2 + 2x) - (4x - 6x^2)$

8. $(7x^2 - 24y^2) - (-11x^2 - 12y^2)$

9. $(-5p^2 + 13q^2) - (9q^2 - 22p^2)$

10. $(4a^2 + 9ab) - (-4ab + 2a^2)$

11. $(4a^2b^2 + 6a) - (9a^2b^2 - 3a)$

12. $(4ab^2 - 3a^2) - (9ab^2 + 2a^2)$

13. $(2x^2 + 6x - 14) - (8x^2 + 11x + 12)$

14. $(x^2 + 19x - 4) - (6x^2 - 8x + 13)$

difference horizontally or vertically. Write the difference in standard form.

$f^2 - f + 4) - (-8f^2 + 3f - 2)$

$(f^2 - f + 4) + (8f^2 - 3f + 2)$

$(f^2 + 8f^2) + (-f - 3f) + (4 + 2)$

$9f^2 - 4f + 6$

16. $(3x^2 - 9x + 13) - (7x^2 - x + 11)$

17. $(4x^2 + 7x - 3) - (2x^2 - 7x - 2)$

18. $(2x^2 + 9x - 6) - (3x^2 - 3x + 6)$

19. $(3x^2 - 2x + 4) - (-3x^2 + 4x - 2)$

20. $(5x^3 - 9x - 22) - (7x^3 - 4x - 9)$

21. $(3t^2 - 6t - 8) - (13t^2 - 10t)$

22. $(2z^2 - 9z + 5) - (3z^2 + 17)$

23. $(-3xy^2 + 4xy - x^2) - (5xy^2 - 6xy + x^2)$

24. $(-6c^2 + 4d^2) - (3c^2 + 11cd - 2d^2)$

25. $(-2x^2 - 8xy + 3y^2) - (7x^2 - 12y^2)$

26. $(7wv^2 - 9w - 6wv) - (4wv^2 + 2w + 6wv)$

27. $(7cd^2 + 4d - 2c) - (3cd^2 - 6d - 2c)$

28. $(2x^2 + 4xy - 7) - (4x^2 + 3xy - 11)$

Problem Solving

Write a polynomial in simplified form to represent each situation.

29. Kina sold 4 more than three times as many tickets as Layla. Tori sold 7 less than twice as many as Layla. If Layla sold t tickets, how many more tickets did Kina sell than Tori?

30. Mrs. Vargas is 4 years less than 4 times her daughter Ana's age. Mrs. Vargas' son Leo is 3 years more than two times Ana's age. If Ana is a years old, what is the difference between Mrs. Vargas' age and her son's age.

MENTAL MATH

31. The sum of two polynomials is $3x^2 - 2xy + 6$. One of the polynomial addends is $x^2 + 3xy + 4$. What is the other addend?

Multiplication of Polynomials*

Name _____

Date _____

To multiply polynomials:

- Distribute each term of the first polynomial across each term of the second.
- Simplify the products by combining any similar terms.

$(x - 7)(x + 8) = ?$

$= (x \cdot x) + (x \cdot 8) + (-7)(x) + (-7)(8)$

$= x^2 + 8x - 7x - 56$

$= x^2 + 1x - 56$

$= x^2 + x - 56$

Multiply.

1. $(x + 3)(x + 4)$
2. $(y + 11)(y + 2)$
3. $(x - 7)(x - 6)$
4. $(y - 10)(y - 8)$
5. $(a + 13)(a - 5)$
6. $(b - 9)(b + 8)$
7. $(c + 12)(c - 7)$
8. $(d - 15)(d + 3)$
9. $(m + 8)(m + 5)$
10. $(n + 14)(n + 7)$
11. $(a - 10)(a + 10)$
12. $(b + 16)(b - 16)$
13. $(c + 12)(c + 12)$
14. $(a + 13)(a + 13)$
15. $(x - 11)^2$
16. $(y - 17)^2$
17. $(3x + 5)(2x + 3)$
18. $(7x + 2)(6x - 5)$
19. $(2x - 9)(3x - 4)$
20. $(2x + 11)(x - 9)$
21. $(8x - 3)(3x + 7)$
22. $(9x + 2)(8x - 5)$
23. $(4x + 3)(x - 6)$
24. $(5x - 2)(7x - 5)$
25. $(6x + 11)(6x - 11)$
26. $(11x + 3)(11x - 3)$
27. $(7x + 5)(7x + 5)$
28. $(8x + 7)(8x + 7)$
29. $(10x - 1)^2$
30. $(15x - 2)^2$
31. $(7a - 2b)(11a + 3b)$
32. $(4a + 13b)(2a - b)$
33. $(13a - 5b)(13a + 5b)$

Multiplication of Polynomials* (con't)

Name _____

Date _____

Multiply. Simplify the expressions.

34. $(m + 2n)(11m - 3n)$ _____

35. $(8a + 15b)(6a - 7b)$ _____

36. $(5a + 7b)^2$ _____

37. $(m + 3n)(m - 3n)$ _____

38. $(6c + d)(6c - d)$ _____

39. $(11a - 6b)^2$ _____

40. $(x + 2)(x^2 - 2x + 4)$ _____

41. $(c - 14d)^2$ _____

42. $(y + 4)(y^2 - 4y + 16)$ _____

43. $(a - 5)(a^2 + 5a + 25)$ _____

44. $(b - 6)(b^2 + 6b + 36)$ _____

45. $(x + 2)(x^2 + 4x + 4)$ _____

46. $(y - 4)(y^2 - 8y + 16)$ _____

47. $(a + 6)(a^2 - 3a + 1)$ _____

48. $(a - 7)(a^2 + 2a - 3)$ _____

49. $(a + 1)(6 - 5a - a^2)$ _____

50. $(3 - b)(b^2 - 6b + 5)$ _____

51. $(x + 3)(x + 5) - x^2$ _____

52. $9x^2 - (2x + 5)(3x - 4)$ _____

53. $x[(x + 4)(x - 4) + 5]$ _____

54. $(a + 5)^2 - (a - 2)^2$ _____

Solve.

55. Find the area of a rectangle if its length is $(3x - 7)$ in. and its width is $(x + 9)$ in. _____

56. A car travels at the rate of $(2x - 5)$ miles per hour. How far can it travel in $(6x - 7)$ hours? _____

57. Find the area of a square if the lengthof a side is $(11x - 2)$ cm. _____

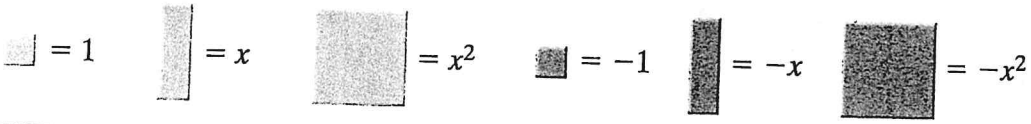
58. Find the area of a circle in terms of π i its radius is $(5x - 4)$ cm. _____

*Use with Lisson 15-5, text pages 422–423.

5-3 Modeling Polynomials

Name _____ Date _____

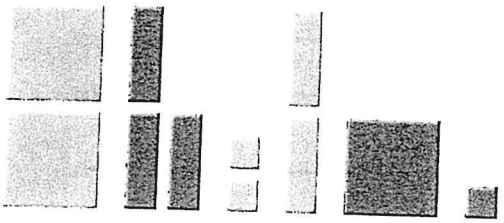
Polynomials can be modeled using algebra tiles.



Algebra tiles can be used to model combining like terms of polynomials.

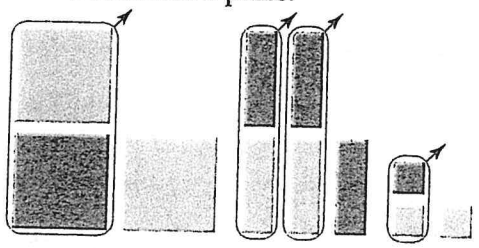
Model $2x^2 - 3x + 2 + 2x - x^2 - 1$

1. First model the terms.



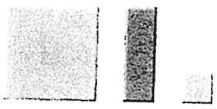
$2x^2 \quad -3x \quad +2 \quad +2x \quad -x^2 \quad -1$

2. Then form zero pairs.



$2x^2 - x^2 \qquad -3x + 2x \qquad +2 - 1$

3. Remove the zero pairs, and write the resulting polynomial.



$x^2 \quad -x + 1$

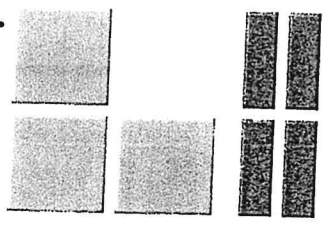
So $2x^2 - 3x + 2 + 2x - x^2 - 1 = x^2 - x + 1$.

Model each polynomial. Simplify if needed.

1. $3x^2 - 4x + 2$
2. $6x - 7$
3. $4x^2 + 3x$
4. $-2x^2 + 7x - 5$
5. $x^2 - 3x + 8$
6. $6 + 3x^2$
7. $-7x + 5$
8. $7x - 4$
9. $-3x^2 + 8$
10. $-4x^2 + 3x - 2$
11. $3x^2 - 3x + 3$
12. $6x - 7$
13. $7x^2 - 4x^2 + 2x - x + 2 + 1$
14. $3x^2 - 4x^2 + 2x - 3x - 6 + 1$
15. $-x^2 + 3x^2 - (-5x) + 2x - (-9)$
16. $-x^2 - (-2x^2) + x - (-4x) - 3 - (-2)$

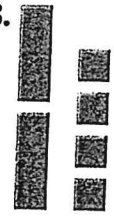
Name the polynomial modeled by the algebra tiles.

17.



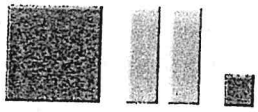
$3x^2 - 4x$

18.



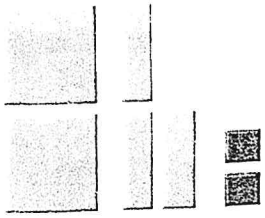
_____

19.



_____

Name the polynomial modeled by the algebra tiles.

20. 

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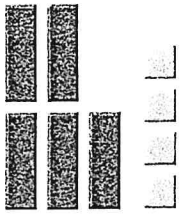
21. 

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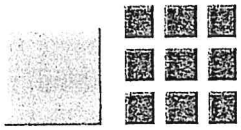
22. 

_____

Use algebra tiles to help you combine like terms.

23. $2x + 7 - 6x + 2$

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

$-4x + 9$

_____

24. $2x^2 - 7x + 3 + 4x^2 - 7 + 2x$

_____

25. $-10x + 4 + x^2 + 2x - 6$

_____

26. $4x - 3 - 9x + 7$

_____

27. $x^2 + 11x + 4 - 9x + 2$

_____

28. $3x^2 - 2x + 4 - x^2 + 6x$

_____

29. $12 - 9x + 3x^2 - x - 6$

_____

30. $4x^2 + 3x - 4x - x^2$

_____

31. $2x + 3 - 6 - 4x$

_____

32. $x^2 + 4x - 6 - 5x^2 - 2x + 3$

_____

33. $3x^2 + 4x - x^2 - 3x + 3$

_____

34. $-5x + 9x^2 - 7x + 2 - 4x^2$

_____

35. $2x^2 + 3x - 6x^2 + 10x + 8$

_____

36. $2x^2 + 3x + 4 - 4x^2 - 2x + 4$

_____

37. $6x^2 + 4x - 3 - 3x^2 - 2x + 1$

_____

Problem Solving

Write a polynomial to represent each situation. Use algebra tiles to help simplify each polynomial.

38. The length of a rectangle is $3x + 2$, and its width is $4x - 6$. What is the perimeter of the rectangle?

_____

39. Sheila is x years old. Cara is 2 years older than 3 times Sheila's age. Flo's age is the square of Sheila's age. What is the sum of their ages?

_____

WRITE ABOUT IT

40. Henry is having trouble with combining like terms in his math class. He is also a very visual person when trying to learn new skills. Using algebra tiles, or your own model, how could you show Henry how to simplify the polynomial $4x^2 - 6 + 3x^2 - 5x + 9 - 2x - 3x^2 + 6$?

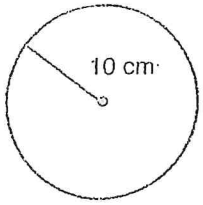
_____

Area: Circle*

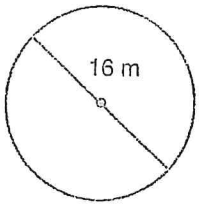
Name _____

Date _____

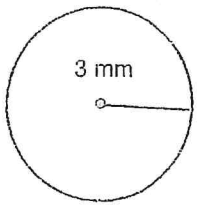
Find the area. (Use 3.14 for π.)

1. 

$A \approx$ _____

2. 

$A \approx$ _____

3. 

$A \approx$ _____

Complete the chart. Round each answer to the nearest whole number.

	Radius	Diameter	Area
4.	7 in.		
5.		42 mm	
6.		22 mm	
7.	6.3 m		
8.		40 km	
9.	4 cm		
0.		10 cm	

olve.

1. Find the area of a race track that is 0.6 km in diameter. _____

2. The circumference of a circle is 44 in. What is the area? (Use $\frac{22}{7}$ for π.) _____

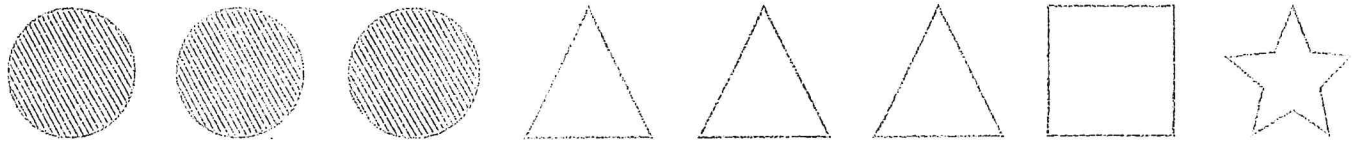
3. The floor of a skating rink is circular and has a radius of 14 meters. What is the area of the floor? _____

. A radio transmitter sends signals 40 km in every direction. Over what area do these signals reach? _____

Ratio

Name _____

Date _____



Use the picture to determine each ratio. Then write each ratio in three different ways.

1. The number of unshaded figures to the total number of figures. _____
2. The number of shaded figures to unshaded figures. _____
3. The number of squares to unshaded figures. _____
4. The number of stars to the number of triangles. _____
5. The number of squares to the number of triangles. _____
6. The number of stars to the number of circles. _____
7. The total number of figures to the number of squares. _____
8. The number of squares to the number of stars. _____

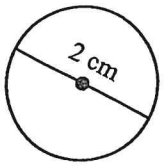
Express each ratio as a fraction in lowest terms. To express the ratio of two measures as a fraction, both units must be the same.

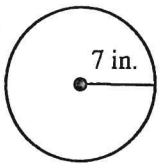
9. 4 hours to $4\frac{1}{2}$ hours _____
10. 3 quarts to 4 pints _____
11. 1 dollar to 2 dimes _____
12. 9 pints to 2 quarts _____
13. 6 days to 3 weeks _____
14. 5 m to 200 cm _____
15. 400 m to 3 km _____
16. 6 dimes to 3 quarters _____
17. 5 km to 100 m _____
18. 3 L to 400 mL _____
19. 8 quarts to 3 gallons _____
20. 2 quarters to 1 dollar _____
21. 3 feet to 2 yards _____
22. 50 cm to 1 m _____
23. 5 weeks to 2 days _____
24. 250 mL to 5 L _____
25. 6 months to 4 years _____
26. 4 days to 4 weeks _____
27. 1 yard to 7 feet _____
28. 20 minutes to 4 hours _____

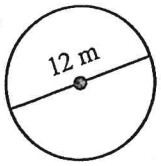
Name _____ Date _____

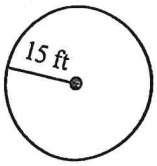
Circumference of Circles

Find each circumference. Use 3.14 for π.

1. 

2. 

3. 

4. 

_____ _____ _____ _____

Find each circumference to the nearest whole number.

5. $d = 9$ m _____

6. $d = 2.1$ cm _____

7. $r = 6.1$ cm _____

8. $r = 7.3$ mm _____

9. $d = 56$ m _____

10. $d = 63$ m _____

11. $r = 2.8$ cm _____

12. $r = 4\frac{1}{5}$ cm _____

Find each circumference to the nearest tenth. Use 3.14 for π.

13. $d = 6.4$ mm _____

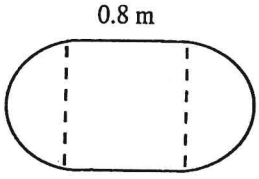
14. $r = 0.8$ cm _____

15. $r = 5.6$ cm _____

16. $d = 21.1$ cm _____

MIXED APPLICATIONS

17. A tabletop is shaped like a square with half-circles on two ends. One side of the square is 0.8 m. To the nearest meter, what is the perimeter of the tabletop?



_____

18. A sundial in a park has a circumference of 57 ft. Find the radius to the nearest foot.

_____

NUMBER SENSE

9. When a number is divided by -3, the result is 12 more than the number. What is the number?

_____

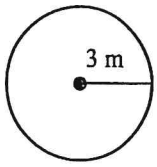
Name _____ Date _____

Exploring Circumference of a Circle

Find the circumference. Use $\frac{22}{7}$ for π.

1. diameter = 14 in. _____
2. diameter = 42 in. _____
3. diameter = 28 in. _____
4. radius = 14 in. _____
5. radius = 7 cm _____
6. radius = 21 ft _____

Find each circumference. Use 3.14 for π. Round your answer to the nearest tenth. You may want to use a calculator.

7. 

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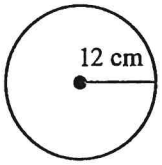
8. 

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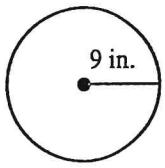
9. 

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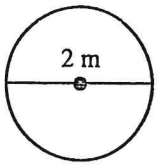
10. 

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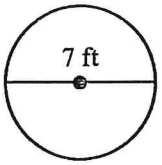
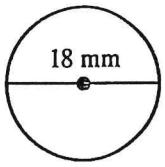
11. 

_____

12. 

_____

13. diameter = 4 cm _____
14. diameter = 9 in. _____
15. radius = 15 m _____
16. radius is 9 cm _____
17. radius is 18 ft _____
18. radius is 20 mm _____

CALCULATOR

19. How could you find the circumference of many different circles with a calculator without punching in 3.14 for every problem?

_____

_____

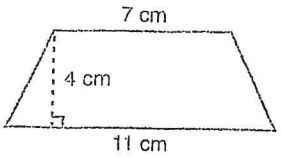
Area: Trapezoids, Mixed Polygons*

Name _____

Date _____

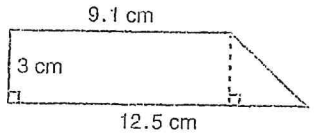
Find the area of each.

1.



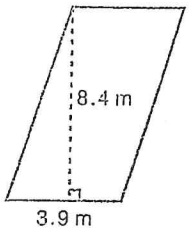
A = _____

2.



A = _____

3.



A = _____

Find the area of each trapezoid. Write the area in the unit of measure indicated. Change units where necessary.

4. bases: 9 cm, 23 mm
height: 8 cm

Area: _____ cm^2

5. bases: 4 ft, 2 yd
height: 2 ft

Area: _____ yd^2

6. bases: 4 m, 600 cm
height: 30 m

Area: _____ m^2

Solve:

7. A tabletop shaped like a trapezoid has parallel bases of 40 cm and 62 cm and a height of 34 cm. Find the area.

_____

8. Lauren placed a square lamp, measuring 25 cm on each edge, on a table shaped like a trapezoid. The table had parallel bases of 32 cm and 48 cm and a height of 34 cm. Find the number of square centimeters not covered by the lamp.

_____

9. A bulletin board is shaped like a trapezoid. If the bases are 45 cm and 65 cm and the height is 40 cm, what is the area?

_____

10. Find the area of a trapezoid having a height of 32 in. and parallel bases measuring 49 in. and 61 in.

_____

11. A trapezoid has a height of 3 yd and parallel bases of 7 ft and 10 ft. What is its area?

_____

12. A line segment drawn parallel to the 12-cm height of a right triangle divides the base into segments of 3 cm and 6 cm and the hypotenuse into segments of 5 cm and 10 cm. This produces a new right triangle and a trapezoid. Find the area of each. (Hint: Use proportion to find the length of the missing side/base. Two sets of answers to the area problem are possible.)

_____

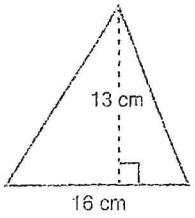
*Use with Lesson 11-4, text pages 310–311.

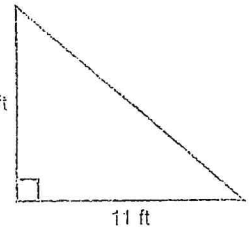
Area: Triangles*

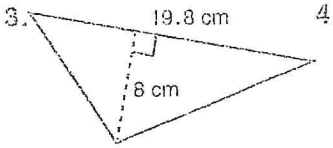
Name _____

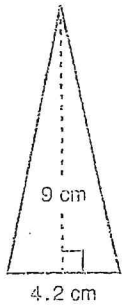
Date _____

Find the area of each triangle.

1. 

2. 

3. 

4. 

A = _____ A = _____ A = _____ A = _____

Complete the chart for each triangle.

	base	height	Area
5.	4 m	3 m	
6.	18 cm	31 cm	
7.	3 dm	5.6 dm	
8.	40 m	28 m	
9.	52 cm	90 cm	
10.	3 km	1.6 km	
11.	$6\frac{1}{3}$ yd	15 yd	
12.	15 ft	18 ft	

Solve.

13. Find the area of a triangular sail if the base is 3 m and the height is 5 m.

_____

14. How many square meters of decorative paper would be used for a design made of 6 triangles, each of which has a base of 60 cm and a height of 42 cm?

_____

15. A gardener planted flowers in a triangular corner of his garden. What is the area of the flower bed if its base is 20 ft and its height is 16.5 ft?

_____

16. The perimeter of an equilateral triangle is 18 cm and the height is 5.2 cm. What is the area of the triangle?

_____

*Use with Lesson 11-3, text pages 308–309

5-16 Solve Two-Step Equations with Fractions

Name _____ Date _____

To solve a two-step equation with fractions, solve as with integers. First apply the Addition or Subtraction Property of Equality to isolate the term with the variable. Then apply the Multiplication or Division Property of Equality to isolate the variable.

Solve: $\frac{1}{2}p - 16\frac{1}{2} = 15$

$\frac{1}{2}p - 16\frac{1}{2} + 16\frac{1}{2} = 15 + 16\frac{1}{2}$

$\frac{1}{2}p = 31\frac{1}{2}$

$\left(\frac{1}{2}\right)\left(\frac{2}{1}\right)p = \frac{63}{2}\left(\frac{2}{1}\right)$

$p = \frac{63}{1} = 63$

Check: Use substitution.

$\frac{1}{2}(63) - 16\frac{1}{2} \stackrel{?}{=} 15$

$31\frac{1}{2} - 16\frac{1}{2} \stackrel{?}{=} 15$

$15 = 15$ True

Translate and write a two-step equation.

1. Twice n diminished by $8\frac{3}{4}$ is 16.

$2n - 8\frac{3}{4} = 16$

2. 1 is $\frac{1}{5}$ more than 7 multiplied by x.

_____

3. 26 is 4 less than $\frac{4}{7}$ times a number, k.

_____

4. $\frac{9}{10}$ increased by w times 6 is equal to $-\frac{9}{10}$.

_____

5. Half m increased by $7\frac{1}{2}$ is 14.

_____

6. 43 is 11 less than $\frac{5}{8}$ times a number p.

_____

Solve. Use substitution to check.

7. $\frac{1}{2}m + 12 = 16$

$\frac{1}{2}m = 4$; $m = 8$

Check: $\frac{1}{2}(8) + 12 = 16$; $16 = 16$ True

8. $1\frac{2}{5}b + 3\frac{1}{2} = 31\frac{1}{2}$

_____

9. $\frac{1}{4}g - (-3) = -1\frac{1}{4}$

_____

10. $-1\frac{1}{4}z - \frac{1}{6} = 2\frac{1}{3}$

_____

11. $-4 = -\frac{3}{10}t + \left(-2\frac{4}{7}\right)$

_____

12. $-15\frac{4}{5} = -3\frac{3}{5}y + \left(-3\frac{2}{10}\right)$

_____

13. $-2\frac{2}{7} = \frac{2}{3}v - \left(-\frac{5}{7}\right)$

_____

14. $\frac{k}{1\frac{1}{4}} + 8 = 28$

_____

15. $1\frac{1}{2} = 2\frac{1}{4}h + \left(-\frac{3}{4}\right)$

_____

Solve. Check to justify your answer.

16. $59 = \frac{d}{2\frac{1}{4}} - (-17)$

$42 = \frac{d}{2\frac{1}{4}}$; $d = 94\frac{1}{2}$

Check: $59 = \frac{94\frac{1}{2}}{2\frac{1}{4}} - (-17)$

$59 = 42 + 17$; $59 = 59$ True

17. $-4 = \frac{m}{8} - 2\frac{1}{2}$

18. $\frac{1}{x} - 8\frac{1}{6} = -2\frac{1}{12}$

Combine like terms, then solve. Check to justify your answer.

19. $-5s + 1\frac{1}{4} + 3s = -5$

$-2s + 1\frac{1}{4} = -5$; $s = 3\frac{1}{8}$

Check: $-5\left(3\frac{1}{8}\right) + 1\frac{1}{4} + 3\left(3\frac{1}{8}\right) = -5$; $-5 = -5$ True

20. $-4 = \frac{m}{8} - 2\frac{1}{2} - \frac{0}{4}$

21. $4 = \frac{h}{3} - 1\frac{1}{4} + \frac{2}{3}$

22. $-3q + \frac{1}{8} - 5q = \frac{7}{8}$

Problem Solving

23. Henry made 39 birdhouses. Fifteen will remain unpainted. He wants to paint the rest. On Saturday he painted $\frac{1}{3}$ of the birdhouses. How many birdhouses, k, are left to be painted?

24. Seventy-eight students are in a chamber orchestra. Thirty-two members play wind instruments. Half of the other members play percussion instruments. About what fraction of the students play a percussion instrument?

MENTAL MATH

Visualize each equation rewritten as an addition equation. Then write the number you would add to each side, and what number you would multiply on both sides to isolate the variable. (*Hint:* Think about opposites, the Subtraction Principle, and multiplicative inverses.)

25. $8 = \frac{1}{3}f - 7$ add _____ to both sides, then multiply _____ on both sides

26. $-\frac{1}{5}a - 21 = 29$ add _____ to both sides, then multiply _____ on both sides

27. $\frac{g}{\frac{1}{5}} + 9 = 49$ add _____ to both sides, then multiply _____ on both sides

14-8 Solve Multistep Equations

Name _____ Date _____

You may need to use more than one operation or property to solve an equation. Multistep equations may also have variables on both sides. To solve these, you need to isolate the variable on the same side of the equal sign.

Solve.

$5a - 12 + 6a + 13 = 34$

$11a + 1 = 34$ ← Combine like terms.

$11a + 1 - 1 = 34 - 1$ ← Subtract 1 from both sides.

$11a = 33$ ← Simplify.

$\frac{11a}{11} = \frac{33}{11}$ ← Divide both sides by 11.

$a = 3$ ← Simplify.

Solve.

$3(-5x + 3) = 34 - 10x$

$-15x + 9 = 34 - 10x$ ← Apply the Distributive Property.

$-15x + 9 + 10x = 34 - 10x + 10x$ ← Add $10x$ to both sides.

$-5x + 9 = 34$ ← Simplify.

$-5x + 9 - 9 = 34 - 9$ ← Subtract 9 from both sides.

$-5x = 25$ ← Simplify.

$\frac{-5x}{-5} = \frac{25}{-5}$ ← Divide both sides by -5.

$x = -5$ ← Simplify.

Solve the equation. Check to justify your answer.
(*Hint:* Combine like terms then follow the order of operations.)

1. $4c + 6c + 5 + 2c = 17$

$12c + 5 = 17$
$12c = 12$
$c = 1$

2. $-2a - 8 + 5a = 19$

3. $t + 9 + 5t - 2t = -51$

4. $3x + 6 + 7x - 2 + 5x = -26$

5. $3y - 10 + 5y + 3y = 45$

6. $4p - 7 - 5p + 2p = -3$

7. $8s + 5 - 5s = -1$

8. $-10m + 6 + 4m - 10 = 14$

9. $4g - 8 + 6g + 6 = 22$

Solve the equation. Check to justify your answer. (*Hint:* Use the Distributive Property, then follow the order of operations.)

10. $-2(x + 5) = 6$

$-2x - 10 = 6$
$-2x = 16$
$x = -8$

11. $-4(c - 3) = 48$

12. $2(3z + 4) = 20$

13. $3(2d + 3) = 39$

14. $9 - 5(p + 2) = -16$

15. $-2 + 6(r - 7) = 10$

Solve the equation. Check to justify your answer. (*Hint:* Use properties to move and combine like terms on opposite sides of the equation.)

16. $5x + 10 = -9x - 4$

$14x + 10 = -4$
$14x = -14$
$x = -1$

17. $-3t + 7 = 2t + 32$

18. $8p - 6 = 54 - 2p$

19. $9 + 2a = 4a + 15$

20. $-5(3n + 2) = -12n + 8$

21. $2(b + 3) = 3b + 6$

22. $3(2m + 1) + 4 = 4m + 21$

23. $-(9 - 5n) + n = -4n + 71$

24. $-4(5x + 7) + 11x = x + 4$

Problem Solving

25. The drama club is making signs for its play. Cindy made a total of 18 signs, which was 2 more than 4 times the number that Jane made. Jane made 3 more signs than Sam. How many signs did Sam make?

26. Margaret's class is running a car wash. It costs \$85 to rent the space. Supplies cost \$0.75 for each car the students wash. The students will make \$5 for each car they wash. How many cars does the class need to wash for their total cost to equal the total amount they make?

27. Marlene is going on a camping trip with a group of friends. She brings 3 boxes of granola bars, plus 3 extra bars. Robyn brings 2 boxes of granola bars and Wendy brings one box. They have a total of 57 granola bars. If each box contains the same number of bars, how many bars are in each box?

28. Mr. Robinson bought 3 boxes of crayons for an art class he teaches, but had to throw 7 crayons away because they were broken. He received two donations from parents: Mrs. Bruce gave 2 boxes of crayons and Mrs. Rockwood gave 5 boxes. Mr. Robinson had a total of 153 crayons. If each box had contained the same number of crayons, how many were in a box?

CHALLENGE

Solve.

29. $\frac{5}{x^2}(2x^3 + 3x^2) = -5$

30. $\frac{1}{3x^2}(6x^3 - 33x^2) = -1$