Properties of Real Numbers

~~$a - b = b - a$~~
~~$6 - 2 = 2 - 6$~~
~~$4 = -4$~~

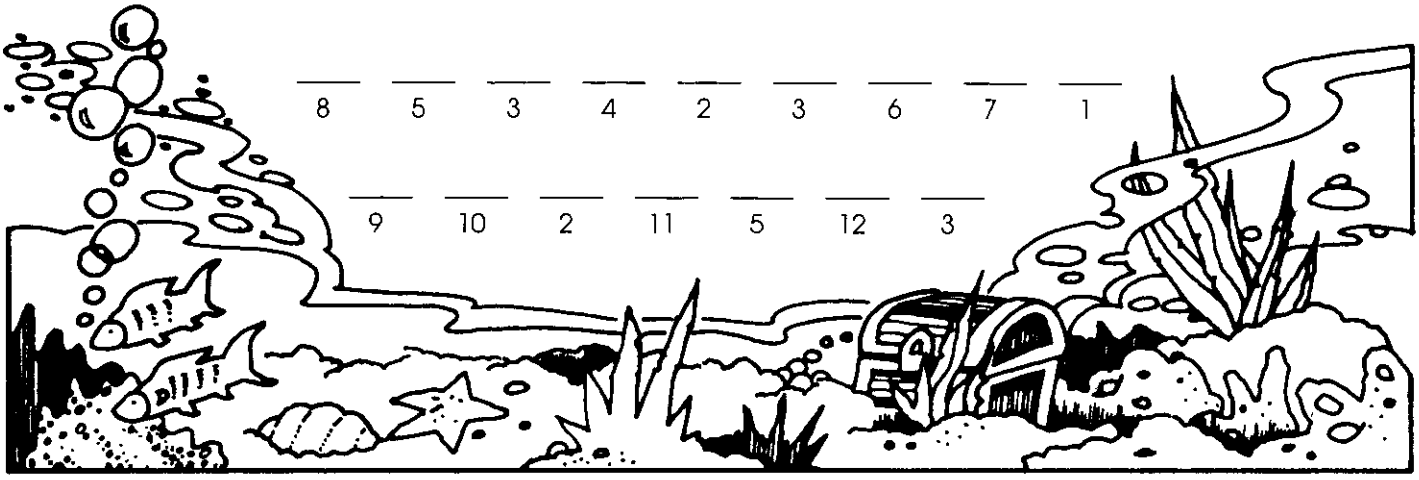
$a - b = b - a$
$a + -b = -b + a$
$6 + -2 = -2 + 6$
$4 = 4$

Tip

Understanding the properties of real numbers helps prevent careless errors.

Each of the following equations is an example of a real number property. Match the equation with the appropriate property. Use the code to uncover the name of one method of solving second degree equations.

1.	$a + b = b + a$	D	Symmetric Property
2.	$a = a$	T	Additive Identity
3.	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$	O	Associative Property of Addition
4.	If $a = b$, then $b = a$	M	Multiplicative Identity
5.	If $a = b$, and $b = c$, then $a = c$	I	Additive Inverse
6.	$a + 0 = 0 + a = a$	C	Commutative Property of Addition
7.	$a + (-a) = 0$	F	Multiplicative Inverse
8.	$ab + ba$	U	Transitive Property
9.	$a \cdot \frac{1}{a} = 1;\ a \neq 0$	L	Multiplicative Property of Zero
10.	$a + (b + c) = (a + b) + c$	R	Reflexive Property
11.	$a \cdot 1 = 1 \cdot a = a$	Q	Commutative Property of Multiplication
12.	$a \cdot 0 = 0 \cdot a = 0$	A	Associative Property of Multiplication



Multiplying Square Roots

$\sqrt{6} \cdot \sqrt{8} =$

48

$\sqrt{6} \cdot \sqrt{8} =$

$\sqrt{48} = \sqrt{16 \cdot 3} =$

$4\sqrt{3}$

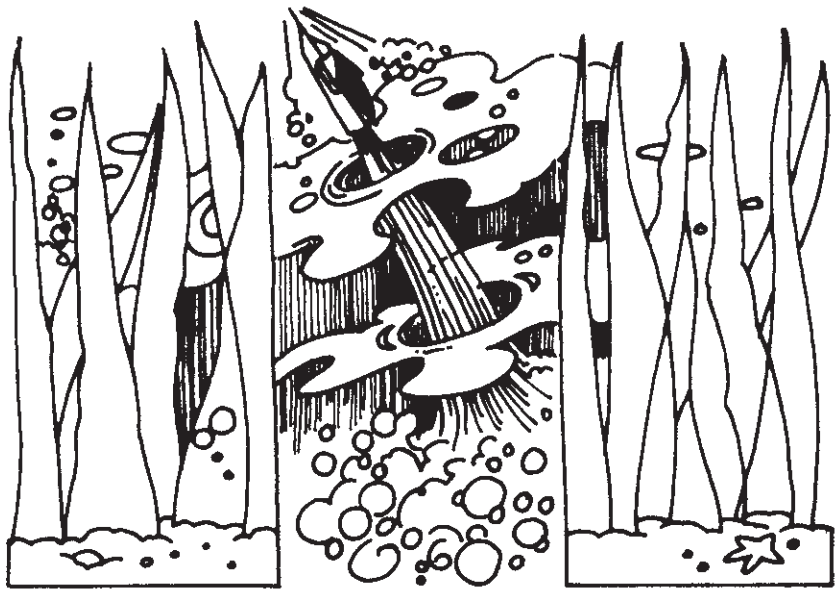
Tip

When multiplying unlike radicands, the $\sqrt{\ }$ does not go away. Don't forget to reduce the radical answer.

Multiply the following radicals and reduce the answers. Write the answers in the correct box. When you are finished, the sum of each row, column, and diagonal should be 62.

1. $\sqrt{2} \cdot \sqrt{11.5} \cdot \sqrt{23} =$
2. $\sqrt{3} \cdot \sqrt{27} =$
3. $\sqrt{5} \cdot \sqrt{20} =$
4. $\sqrt{8} \cdot \sqrt{50} =$
5. $\sqrt{6} \cdot \sqrt{24} =$
6. $\sqrt{12} \cdot \sqrt{27} =$
7. $\sqrt{2} \cdot \sqrt{17} \cdot \sqrt{8.5} =$
8. $\sqrt{9} \cdot \sqrt{25} =$
9. $\sqrt{8} \cdot \sqrt{32} =$
10. $\sqrt{4} \cdot \sqrt{49} =$
11. $\sqrt{4} \cdot \sqrt{13} \cdot \sqrt{3.25} =$
12. $\sqrt{5} \cdot \sqrt{3.8} \cdot \sqrt{19} =$
13. $\sqrt{2} \cdot \sqrt{5.5} \cdot \sqrt{11} =$
14. $\sqrt{9} \cdot \sqrt{49} =$
15. $\sqrt{4} \cdot \sqrt{121} =$
16. $\sqrt{4} \cdot \sqrt{16} =$

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16



Adding and Subtracting Monomials

~~$2a + 3b + 4ab = 9ab$~~

$2a + 3b + 4ab$ cannot be simplified.

Tip

To combine monomials, the variables must be exactly alike!

Simplify the following monomials. Use the code to learn which institute awards the Pulitzer Prize.

1. $3x + 5y - 2x + y =$
2. $-7y + 8x + -9x - y =$
3. $x + 3x - x - 2x + y =$
4. $xy + 2x - x - xy =$
5. $x^2y + xy^2 - x^2y + xy^2 =$
6. $2xy - 3x + 4xy + 8x =$
7. $4x^2y^2 + 2xy - x^2y - 3x^2y^2 + xy =$
8. $y + 3x - 5y - 5x + x =$
9. $5x^2y - 3xy^2 + 6x^2y - 3xy^2 =$
10. $3x - 2y - 5x + 2y + 2 =$
11. $-6x + 17 - 5x + 12 - x =$
12. $17x^2y - 3x^2y - 4xy + 5xy =$
13. $18x - 18 - x + 2x + 2 =$
14. $xy + x - xy - x + y =$
15. $7x - 8y + 5x + 8y - x =$
16. $4y - 5x - 5y + 6y - 3x =$
17. $13x^3y^2 + 4x^2y - 5x^3y^2 - 4x^2y + 2x =$
18. $5x^2y + 3x - x^2y - 5x + 2x^2y =$

I	$8x^3y^2 + 2x$
I	$11x$
C	$5x + 6xy$
U	$-8x + 5y$
L	$-x - 8y$
Y	$11x^2y - 6xy^2$
M	$-2x + 2$
V	$-12x + 29$
I	$x^2y^2 - x^2y = 3xy$
S	$x + 6y$
A	$x + y$
E	$2xy^2$
B	$-4y - x$
U	$6x^2y - 2x$
T	y
R	$19x - 16$
O	$14x^2y + xy$
N	x

	6	12	2	18	10	8	17	3	
16	4	15	11	5	13	1	7	14	9

More Word Problems

Solve the word problems.

1. The sum of twice a number and 37 is 129. What is the number?

2. Five times a number, decreased by 58, is –23. Find the number.

3. Eighty decreased by three times a number is 56. What is the number?

4. The width of a rectangle is 15 cm and the perimeter is 72 cm. Find the length.

5. The product of 7 and a number, less 85, is –29. What is the number?

6. The sum of 18 and four times a number is –6. Find the number.

7. Ming Lee spent $10.20 for a pizza and a soft drink. If the pizza cost eleven times as much as the beverage, how much was each?

8. Last season, Jake and Jerome scored a total of 16 touchdowns. Jerome scored one more than twice the number of Jake's touchdowns. How many did each score?

9. Kelly rode her bike 3 miles less than twice the number of miles Jon rode. Together they rode 48 miles. How many miles did they each ride?

10. The cost of the gold bracelet was $20.00 more than three times the silver one. Together they cost $320.00. How much did each cost?

Factoring $x^2 + bx + c$ where $c < 0$

~~$x^2 - 2x - 15 = (x + 5)(x - 3)$~~

$x^2 - 2x - 15 = (x - 5)(x + 3)$

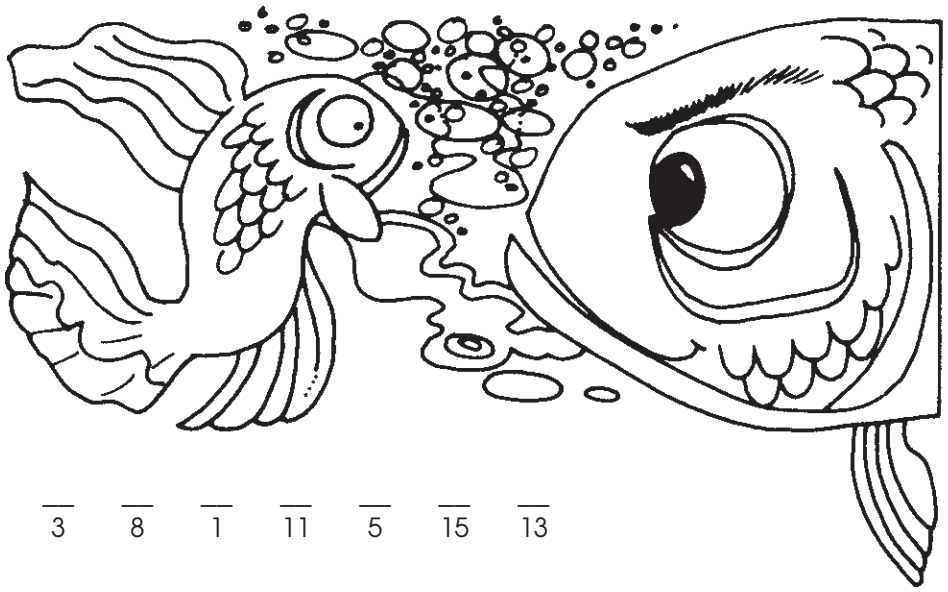
Tip

When the last term is negative, the factors will have opposite signs. The factor with the largest absolute value will carry the same sign as the middle term in the trinomial.

Factor each trinomial. Use the code to discover what famous politician coined the term "iron curtain" in 1946.

1. $x^2 + 2x - 3 =$
2. $x^2 - 2x - 63 =$
3. $x^2 + 5x - 50 =$
4. $x^2 + 4x - 60 =$
5. $x^2 + x - 72 =$
6. $x^2 - x - 72 =$
7. $x^2 - 5x - 24 =$
8. $x^2 - 4x - 21 =$
9. $x^2 - x - 30 =$
10. $x^2 + x - 56 =$
11. $x^2 + x - 42 =$
12. $x^2 - 2x - 35 =$
13. $x^2 + 3x - 88 =$
14. $x^2 + 4x - 45 =$
15. $x^2 - 11x - 26 =$
16. $x^2 + x - 12 =$

W	$(x + 10)(x - 5)$
T	$(x + 9)(x - 8)$
L	$(x - 8)(x + 3)$
I	$(x + 5)(x - 6)$
S	$(x + 7)(x - 6)$
N	$(x + 3)(x - 1)$
N	$(x + 11)(x - 8)$
H	$(x + 9)(x - 5)$
U	$(x - 7)(x + 5)$
O	$(x - 13)(x + 2)$
C	$(x - 9)(x + 7)$
C	$(x + 4)(x - 3)$
L	$(x + 10)(x - 6)$
H	$(x + 8)(x - 9)$
R	$(x + 8)(x - 7)$
I	$(x + 3)(x - 7)$



3	8	1	11	5	15	13

2	6	12	10	16	14	9	7	4

Word Problems with Quadratics

Check the validity of your answers. For example, the quadratic equation may present a negative root, but this cannot be a correct solution for a measure of distance or time.

1. Find two positive, consecutive, even integers whose product is 624.

2. Find two consecutive odd integers whose product is 1599.

3. The number of calories in a banana is 15 more than the number of calories in an orange. The product of the numbers is 6750. Find the number of calories in the orange.

4. The width of a painting is 4 inches less than the length, and the surface area is 320 square inches. Find the length.

5. The square of a number is 70 more than 9 times the number. Find the number.

6. A rectangle has a perimeter of 38 feet and an area of 88 square feet. Find the dimensions.

7. The sum of the squares of two positive consecutive integers is 145. Find the integers.

8. The length of a rectangle is 3 meters less than twice the width. If the area is 104 square meters, find the length.

9. A square has 2 inches added to its length and 1 inch added to its width, creating an area of 42 square inches. Find the length of a side of the original square.

10. The width of a rectangle is 5 centimeters less than the length. The area is 36 square centimeters. Find the length.

Plot the Dots

Graph the following ordered pairs and connect the points in order until you reach the word "LIFT." You will find a picture of a famous landmark in New York City.

Start
(–14, 10)
(–14, –14)
(–15, –14)
(–15, –15)
(–12, –15)
(–12, –14)
(–13, –14)
(–13, –10)
(–10, –10)
(–10, –14)
(–11, –14)
(–11, –15)
(–8, –15)
(–8, –14)
(–9, –14)
(–9, 11)
(–14, 10)
Lift

(11, –5)
(11, –14)
(10, –14)
(10, –15)
(13, –15)
(13, –14)
(12, –14)
(12, –10)
(13, –10)
(13, –15)
(15, –15)
(15, –14)
(14, –14)
(14, –5)
(13, –5)
(13, –9)
(12, –9)
(12, –5)
(11, –5)
Lift

(–13, –7)
(–13, 5)
(–12.5, 5.5)
(–11.5, 6)
(–10.5, 5.5)
(–10, 5)
(–10, –7)
(–13, –7)
Lift

(–9, –10)
(11, –10)
Lift

(–9, –9)
(11, –9)
Lift

(–7, 7)
(–7, –10)
Lift

(–4, 3)
(–4, –10)
Lift

(–1, –1)
(–1, –10)
Lift

(2, –4)
(2, –10)
Lift

(5, –7)
(5, –10)
Lift

(8, –9)
(8, –10)
Lift

(–9, 10)
(–7, 7)
(–4, 3)
(–1, –1)
(2, –4)
(5, –7)
(6, –8)
(8, –9)
(13, –6)
Lift

(–9, 5)
(–4, –2)
(2, –7)
(5, –8)
(8, –9)
(11, –8)

Can you name this landmark?