

Name \_\_\_\_\_

Date \_\_\_\_\_

## Writing Products as Sums and Sums as Products

1. Write the expression below in standard form.

$$3h - 2(1 + 4h)$$

2. Write the expression below as a product of two factors.

$$6m + 8n + 4$$

1. Write each expression as the product of two factors.

- a.  $1 \cdot 3 + 7 \cdot 3$
- b.  $(1 + 7) + (1 + 7) + (1 + 7)$
- c.  $2 \cdot 1 + (1 + 7) + (7 \cdot 2)$
- d.  $h \cdot 3 + 6 \cdot 3$
- e.  $(h + 6) + (h + 6) + (h + 6)$
- f.  $2h + (6 + h) + 6 \cdot 2$
- g.  $j \cdot 3 + k \cdot 3$
- h.  $(j + k) + (j + k) + (j + k)$
- i.  $2j + (k + j) + 2k$

2. Write each sum as a product of two factors.

- a.  $6 \cdot 7 + 3 \cdot 7$
- b.  $(8 + 9) + (8 + 9) + (8 + 9)$
- c.  $4 + (12 + 4) + (5 \cdot 4)$
- d.  $2y \cdot 3 + 4 \cdot 3$
- e.  $(x + 5) + (x + 5)$
- f.  $3x + (2 + x) + 5 \cdot 2$
- g.  $f \cdot 6 + g \cdot 6$
- h.  $(c + d) + (c + d) + (c + d) + (c + d)$
- i.  $2r + r + s + 2s$

3. Use the following rectangular array to answer the questions below.

	?	?	?
?	15f	5g	45

- a. Fill in the missing information.
- b. Write the sum represented in the rectangular array.
- c. Use the missing information from part (a) to write the sum from part (b) as a product of two factors.

4. Write the sum as a product of two factors.

- a.  $81w + 48$
- b.  $10 - 25t$
- c.  $12a + 16b + 8$

5. Xander goes to the movies with his family. Each family member buys a ticket and two boxes of popcorn. If there are five members of his family, let  $t$  represent the cost of a ticket and  $p$  represent the cost of a box of popcorn. Write two different expressions that represent the total amount his family spent. Explain how each expression describes the situation in a different way.
6. Write each expression in standard form.
- $-3(1 - 8m - 2n)$
  - $5 - 7(-4q + 5)$
  - $-(2h - 9) - 4h$
  - $6(-5r - 4) - 2(r - 7s - 3)$
7. Combine like terms to write each expression in standard form.
- $(r - s) + (s - r)$
  - $(-r + s) + (s - r)$
  - $(-r - s) - (-s - r)$
  - $(r - s) + (s - t) + (t - r)$
  - $(r - s) - (s - t) - (t - r)$

1. Write the expression below in standard form.

$$3h - 2(1 + 4h)$$

$$3h + (-2(1 + 4h)) \quad \text{Subtraction as adding the inverse}$$

$$3h + (-2 \cdot 1) + (-2h \cdot 4) \quad \text{Distributive property}$$

$$3h + (-2) + (-8h) \quad \text{Apply integer rules}$$

$$-5h - 2 \quad \text{Collect like terms}$$

2. Write the expression below as a product of two factors.

$$6m + 8n + 4$$

The GCF for the terms is 2. Therefore, the factors are  $2(3m + 4n + 2)$ .

1. Write each expression as the product of two factors.

a.  $1 \cdot 3 + 7 \cdot 3$   
 $3(1 + 7)$

b.  $(1 + 7) + (1 + 7) + (1 + 7)$   
 $3(1 + 7)$

c.  $2 \cdot 1 + (1 + 7) + (7 \cdot 2)$   
 $3(1 + 7)$

d.  $h \cdot 3 + 6 \cdot 3$   
 $3(h + 6)$

e.  $(h + 6) + (h + 6) + (h + 6)$   
 $3(h + 6)$

f.  $2h + (6 + h) + 6 \cdot 2$   
 $3(h + 6)$

g.  $j \cdot 3 + k \cdot 3$   
 $3(j + k)$

h.  $(j + k) + (j + k) + (j + k)$   
 $3(j + k)$

i.  $2j + (k + j) + 2k$   
 $3(j + k)$

2. Write each sum as a product of two factors.

a.  $6 \cdot 7 + 3 \cdot 7$   
 $7(6 + 3)$

b.  $(8 + 9) + (8 + 9) + (8 + 9)$   
 $3(8 + 9)$

c.  $4 + (12 + 4) + (5 \cdot 4)$   
 $4(1 + 4 + 5)$

d.  $2y \cdot 3 + 4 \cdot 3$   
 $3(2y + 4)$

e.  $(x + 5) + (x + 5)$   
 $2(x + 5)$

f.  $3x + (2 + x) + 5 \cdot 2$   
 $4(x + 3)$

g.  $f \cdot 6 + g \cdot 6$   
 $6(f + g)$

h.  $(c + d) + (c + d) + (c + d) + (c + d)$   
 $4(c + d)$

i.  $2r + r + s + 2s$   
 $3(r + s)$

3. Use the following rectangular array to answer the questions below.

	?	?	?
?	15f	5g	45

a. Fill in the missing information.

	$3f$	$g$	$9$
	?	?	?
5 ?	15f	5g	45

b. Write the sum represented in the rectangular array.

$$15f + 5g + 45$$

c. Use the missing information from part (a) to write the sum from part (b) as a product of two factors.

$$5(3f + g + 9)$$

4. Write the sum as a product of two factors.

a.  $81w + 48$

$$3(27w + 16)$$

b.  $10 - 25t$

$$5(2 - 5t)$$

c.  $12a + 16b + 8$

$$4(3a + 4b + 2)$$

5. Xander goes to the movies with his family. Each family member buys a ticket and two boxes of popcorn. If there are five members of his family, let  $t$  represent the cost of a ticket and  $p$  represent the cost of a box of popcorn. Write two different expressions that represent the total amount his family spent. Explain how each expression describes the situation in a different way.

$$5(t + 2p)$$

*Five people each buy a ticket and two boxes of popcorn, so the cost is five times the quantity of a ticket and two boxes of popcorn.*

$$5t + 10p$$

*There are five tickets and 10 boxes of popcorn total. The total cost will be five times the cost of the tickets, plus 10 times the cost of the popcorn.*

6. Write each expression in standard form.

a.  $-3(1 - 8m - 2n)$

$$-3(1 + (-8m) + (-2n))$$

$$-3 + 24m + 6n$$

b.  $5 - 7(-4q + 5)$

$$5 + -7(-4q + 5)$$

$$5 + 28q + -35$$

$$28q - 35 + 5$$

$$28q - 30$$

c.  $-(2h - 9) - 4h$

$$-(2h + (-9)) + (-4h)$$

$$-2h + 9 + (-4h)$$

$$-6h + 9 \text{ or } 9 - 6h$$

d.  $6(-5r - 4) - 2(r - 7s - 3)$

$$6(-5r + -4) + -2(r - 7s + -3)$$

$$-30r + -24 + -2r + 14s + 6$$

$$-30r + -2r + 14s + -24 + 6$$

$$-32r + 14s - 18$$

7. Combine like terms to write each expression in standard form.

a.  $(r - s) + (s - r)$

$$0$$

b.  $(-r + s) + (s - r)$

$$-2r + 2s$$

c.  $(-r - s) - (-s - r)$

$$0$$

d.  $(r - s) + (s - t) + (t - r)$

$$0$$

e.  $(r - s) - (s - t) - (t - r)$

$$2r - 2s$$