Name _____   Date_____

Generating Equivalent Expressions

1. Write an equivalent expression to $2x + 3 + 5x + 6$ by combining like terms.

2. Find the sum of $(8a + 2b - 4)$ and $(3b - 5)$.

3. Write the expression in standard form: $4(2a) + 7(-4b) + (3 \cdot c \cdot 5)$.

For Problems 1–9, write equivalent expressions by combining like terms. Verify the equivalence of your expression and the given expression by evaluating each for the given values: $a = 2$, $b = 5$, and $c = -3$.

1. $3a + 5a$

2. $8b - 4b$

3. $5c + 4c + c$

4. $3a + 6 + 5a$

5. $8b + 8 - 4b$

6. $5c - 4c + c$

7. $3a + 6 + 5a - 2$

8. $8b + 8 - 4b - 3$

9. $5c - 4c + c - 3c$

Use any order, any grouping to write equivalent expressions by combining like terms. Then, verify the equivalence of your expression to the given expression by evaluating for the value(s) given in each problem.

10. $3(6a)$; for $a = 3$

11. $5d(4)$; for $d = -2$

12. $(5r)(-2)$; for $r = -3$

13. $3b(8) + (-2)(7c)$; for $b = 2$, $c = 3$

14. $-4(3s) + 2(-t)$; for $s = \frac{1}{2}$, $t = -3$

15. $9(4p) - 2(3q) + p$; for $p = -1$, $q = 4$

16. $7(4g) + 3(5h) + 2(-3g)$; for $g = \frac{1}{2}$, $h = \frac{1}{3}$

The problems below are follow-up questions to Example 1, part (b) from Classwork: Find the sum of $2x + 1$ and $5x$.

17. Jack got the expression $7x + 1$ and then wrote his answer as $1 + 7x$. Is his answer an equivalent expression? How do you know?

18. Jill also got the expression $7x + 1$, and then wrote her answer as $1x + 7$. Is her expression an equivalent expression? How do you know?

1. Write an equivalent expression to $2x + 3 + 5x + 6$ by combining like terms.

   $2x + 3 + 5x + 6$

   $2x + 5x + 3 + 6$

   $7x + 9$

2. Find the sum of $(8a + 2b - 4)$ and $(3b - 5)$.

   $(8a + 2b - 4) + (3b - 5)$

   $8a + 2b + (-4) + 3b + (-5)$

   $8a + 2b + 3b + (-4) + (-5)$

   $8a + (5b) + (-9)$

   $8a + 5b - 9$

3. Write the expression in standard form: $4(2a) + 7(-4b) + (3 \cdot c \cdot 5)$.

   $(4 \cdot 2)a + (7 \cdot (-4))b + (3 \cdot 5)c$

   $8a + (-28)b + 15c$

   $8a - 28b + 15c$

For Problems 1–9, write equivalent expressions by combining like terms. Verify the equivalence of your expression and the given expression by evaluating each for the given values: $a = 2$, $b = 5$, and $c = -3$.

1. $3a + 5a$

   $8a$
   $8(2)$
   16

   $3(2) + 5(2)$
   $6 + 10$
   16

2. $8b - 4b$

   $4b$
   $4(5)$
   20

   $8(5) - 4(5)$
   $40 - 20$
   20

3. $5c + 4c + c$

   $10c$
   $10(-3)$
   -30

   $5(-3) + 4(-3) + (-3)$
   $-15 + (-12) + (-3)$
   $-27 + (-3)$
   -30

4. $3a + 6 + 5a$

   $8a + 6$
   $8(2) + 6$
   $16 + 6$
   22

   $3(2) + 6 + 5(2)$
   $6 + 6 + 10$
   $12 + 10$
   22

5. $8b + 8 - 4b$

   $4b + 8$
   $4(5) + 8$
   $20 + 8$
   28

   $8(5) + 8 - 4(5)$
   $40 + 8 - 20$
   $48 - 20$
   28

6. $5c - 4c + c$

   $2c$
   $2(-3)$
   -6

   $5(-3) - 4(-3) + (-3)$
   $-15 + (-4(-3)) + (-3)$
   $-15 + (12) + (-3)$
   $-3 + (-3)$
   -6

7. $3a + 6 + 5a - 2$ 8. $8b + 8 - 4b - 3$ 9. $5c - 4c + c - 3c$

$8a + 4$

$8(2) + 4$

$16 + 4$

20

$3(2) + 6 + 5(2) - 2$

$6 + 6 + 10 + (-2)$

$12 + 10 + (-2)$

$22 + (-2)$

20

$4b + 5$

$4(5) + 5$

$20 + 5$

25

$8(5) + 8 - 4(5) - 3$

$40 + 8 + (-4(5)) + (-3)$

$40 + 8 + (-20) + (-3)$

$48 + (-20) + (-3)$

$28 + (-3)$

25

$-1c$

$-1(-3)$

3

$5(-3) - 4(-3) + (-3) - 3(-3)$

$-15 + (-4(-3)) + (-3) + (-3(-3))$

$-15 + (12) + (-3) + (9)$

$-3 + (-3) + 9$

$-6 + 9$

3

Use any order, any grouping to write equivalent expressions by combining like terms. Then, verify the equivalence of your expression to the given expression by evaluating for the value(s) given in each problem.

Problem	Your Expression	Given Expression
10. $3(6a)$; for $a = 3$ $18a$	$18a$ $18(3)$ 54	$3(6(3))$ $3(18)$ 54
11. $5d(4)$; for $d = -2$ $20d$	$20d$ $20(-2)$ -40	$5(-2)(4)$ $-10(4)$ -40
12. $(5r)(-2)$; for $r = -3$ $-10r$	$-10r$ $-10(-3)$ 30	$(5(-3))(-2)$ $(-15)(-2)$ 30
13. $3b(8) + (-2)(7c)$; for $b = 2, c = 3$ $24b - 14c$	$24b - 14c$ $24(2) - 14(3)$ $48 - 42$ 6	$3(2)(8) + (-2)(7(3))$ $6(8) + (-2)(21)$ $48 + (-42)$ 6
14. $-4(3s) + 2(-t)$; for $s = \frac{1}{2}, t = -3$ $-12s - 2t$	$-12s - 2t$ $-12\left(\frac{1}{2}\right) - 2(-3)$ $-6 + (-2(-3))$ $-6 + (6)$ 0	$-4\left(3\left(\frac{1}{2}\right)\right) + 2(-(-3))$ $-4\left(\frac{3}{2}\right) + 2(3)$ $-2(3) + 2(3)$ $-6 + 6$ 0
15. $9(4p) - 2(3q) + p$; for $p = -1, q = 4$ $37p - 6q$	$37p - 6q$ $37(-1) - 6(4)$ $-37 + (-6(4))$ $-37 + (-24)$ -61	$9(4(-1)) - 2(3(4)) + (-1)$ $9(-4) + (-2(12)) + (-1)$ $-36 + (-24) + (-1)$ $-60 + (-1)$ -61
16. $7(4g) + 3(5h) + 2(-3g)$; for $g = \frac{1}{2}, h = \frac{1}{3}$ $28g + 15h + (-6g)$ $22g + 15h$	$22g + 15h$ $22\left(\frac{1}{2}\right) + 15\left(\frac{1}{3}\right)$ $11 + 5$ 16	$7\left(4\left(\frac{1}{2}\right)\right) + 3\left(5\left(\frac{1}{3}\right)\right) + 2\left(-3\left(\frac{1}{2}\right)\right)$ $7(2) + 3\left(\frac{5}{3}\right) + 2\left(-\frac{3}{2}\right)$ $14 + 5 + (-3)$ $19 + (-3)$ 16

The problems below are follow-up questions to Example 1, part (b) from Classwork: Find the sum of $2x + 1$ and $5x$.

17. Jack got the expression $7x + 1$ and then wrote his answer as $1 + 7x$. Is his answer an equivalent expression? How do you know?

    Yes; Jack correctly applied any order (the commutative property), changing the order of addition.

18. Jill also got the expression $7x + 1$ and then wrote her answer as $1x + 7$. Is her expression an equivalent expression? How do you know?

    No, "any order" (the commutative property) does not apply to mixing addition and multiplication; therefore, the $7x$ must remain intact as a term.

    $1(4) + 7 = 11$ *and* $7(4) + 1 = 29$; *the expressions do not evaluate to the same value for* $x = 4$.