Intervention for Algebra I

Module 2: Teacher Masters

The Meadows Center
FOR PREVENTING EDUCATIONAL RISK

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The Meadows Center
FOR PREVENTING EDUCATIONAL RISK
THE UNIVERSITY OF TEXAS AT AUSTIN
COLLEGE OF EDUCATION

Mathematics Institute for Learning Disabilities and Difficulties

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Engage Prior Knowledge Practice

Recall the Order of Operations:

P _____

E _____

M/D _____

A/S _____

Engage Prior Knowledge Practice Key

Recall the Order of Operations:

P Parenthesis

E Exponents

M/D Multiplication / Division (left to right)

A/S Addition / Subtraction (left to right)

Demonstration Practice

Expressions

Definition: An **expression** is

_____

_____

_____

_____

Circle the terms in the following expression:

$$4x - 5 + 3x + 3$$

Expressions can be either numerical or algebraic.

Numerical Expressions	Algebraic Expressions

Evaluating Numerical Expressions

To **evaluate** an expression means to find the number that the expression is equal to.

Evaluate the following expressions.

$13 - 2(5)$ $3(2) + 5(11)$ $\frac{15}{3}$ $(5)(5)(2) - 1$

Demonstration Practice Key

Expressions

Definition: An **expression** is a mathematical phrase that combines numbers and/or variables using the operations of addition, subtraction, multiplication, or division. An expression does not contain an equal sign and it represents one single quantity.

Circle the terms in the following expression:

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

Expressions can be either numerical or algebraic.

Numerical Expressions	Algebraic Expressions
$7(15) - 5$	$7x - 5$

Evaluating Numerical Expressions

To **evaluate** an expression means to find the number that the expression is equal to.

Evaluate the following expressions.

$13 - 2(5)$

$13 - 10$

3

$3(2) + 5(11)$

$6 + 55$

61

$\frac{15}{3}$

5

$(5)(5)(2) - 1$

$25(2) - 1$

$50 - 1$

49

Practice

Guided Practice

Circle the terms in each expression and tell whether the expression is a numerical expression or algebraic expression.

1. $3 + 4 - 5(2)$

_____

2. $2y + 3 - 4y$

_____

3. $9 - \frac{40}{8} + 1$

_____

4. $3a$

_____

Evaluate the following expressions.

5. $16 \div (6 - 2) + 3$

6. $2(7) - 13 + \frac{6}{2}$

Practice (cont.)

Pair Practice

Create a numerical expression. Trade with your partner and have him/her evaluate the expressions.

Numerical Expressions	Evaluate Expressions
Example: **1.** $3(10) + 3(3)$	$3(10) + 3(3)$ $30 + 9$ 39
2. _____	
3. _____	
4. _____	

Practice Key

Guided Practice

Circle the terms in each expression and tell whether the expression is a numerical expression or algebraic expression.

1. (3) + (4) − (5(2))

numerical expression

2. (2*y*) + (3) − (4y)

algebraic expression

3. (9) − ($\frac{40}{8}$) + (1)

numerical expression

4. (3*a*)

algebraic expression

Evaluate the following expressions.

5. 16 ÷ (6 – 2) + 3

16 ÷ (4) + 3

4 + 3

7

6. 2(7) − 13 + $\frac{6}{2}$

14 − 13 + 3

1 + 3

4

Practice Key (cont.)

Pair Practice

Create a numerical expression. Trade with your partner and have him/her evaluate the expressions.

Numerical Expressions	Evaluate Expressions
Example: **1.** $3(10) + 3(3)$	$3(10) + 3(3)$ $30 + 9$ 39
2. answers may vary	
3. answers may vary	
4. answers may vary	

Error Correction Practice

3 different students evaluated the following problem. Each student got a different answer.

With a partner, determine why the students got different answers. Write your reasoning in the space provided below each student work.

Student 1	Student 2	Student 3
$24 \div (6 - 2) + 5(2)$	$24 \div (6 - 2) + 5(2)$	$24 \div (6 - 2) + 5(2)$
$4 - 2 + 5(2)$ $2 + 5(2)$ $7(2)$ 14	$24 \div 4 + 5(2)$ $6 + 10$ 16	$24 \div 4 + 5(2)$ $6 + 5(2)$ $11(2)$ 22

Error Correction Practice Key

3 different students evaluated the following problem. Each student got a different answer.

With a partner, determine why the students got different answers. Write your reasoning in the space provided below each student work.

Student 1	Student 2	Student 3
24 ÷ (6 − 2) + 5(2)	24 ÷ (6 − 2) + 5(2)	24 ÷ (6 − 2) + 5(2)
4 − 2 + 5(2) 2 + 5(2) 7(2) 14	24 ÷ 4 + 5(2) 6 + 10 16	24 ÷ 4 + 5(2) 6 + 5(2) 11 (2) 22
Student 1 divided 24 by 6 first, rather than subtract 2 from 6.	Student 2 performed the operations correctly.	Student 3 added 6 and 5 rather than multiply 5 and 2.

Name: _____

Independent Practice

Score:____ / 5 correct

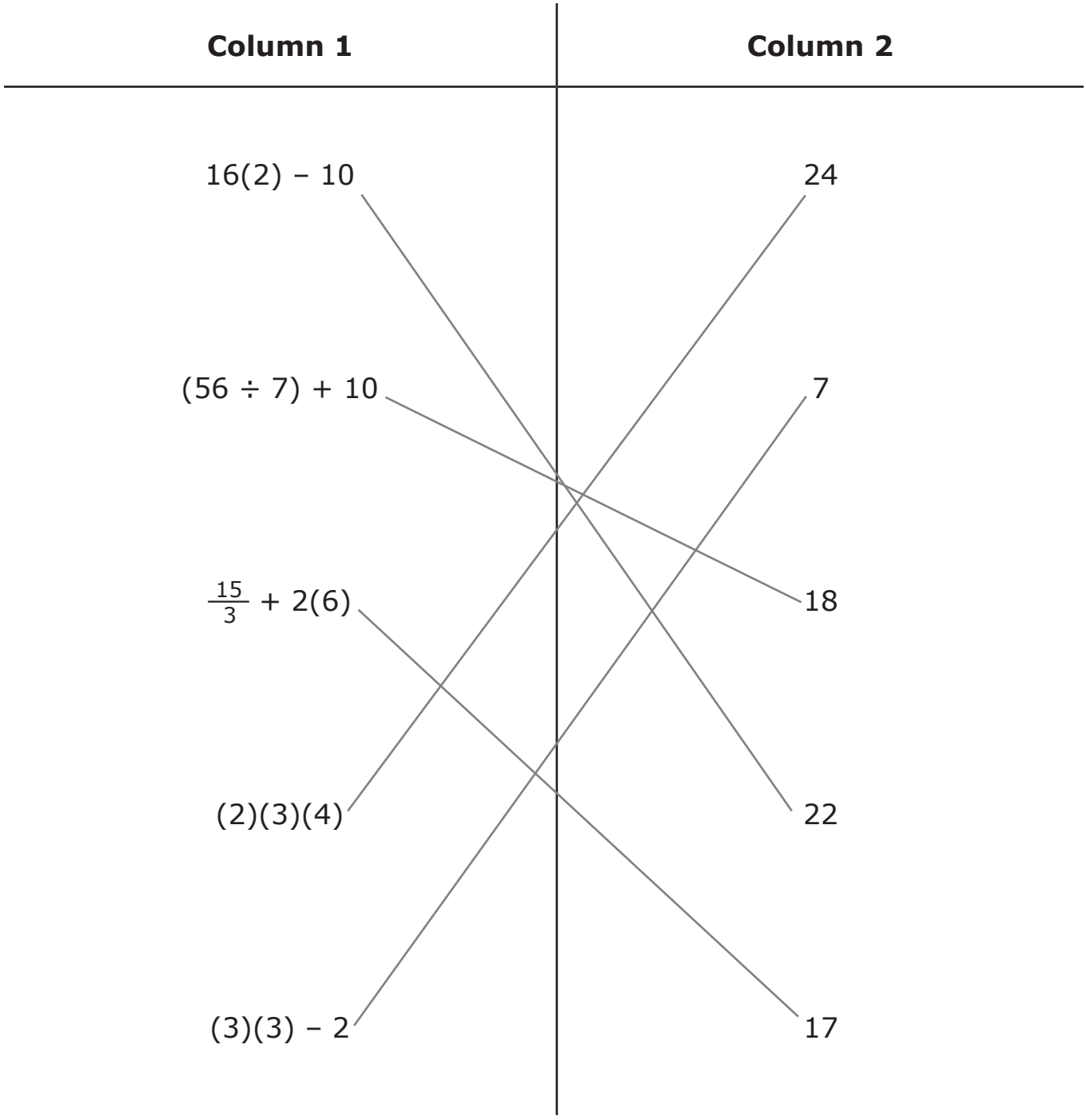
Matching: Evaluate the expressions in Column 1 and draw a line to matching equivalent expression in the second Column. Each matching is worth 1 point.

Column 1	Column 2
$16(2) - 10$	24
$(56 \div 7) + 10$	7
$\frac{15}{3} + 2(6)$	18
$(2)(3)(4)$	22
$(3)(3) - 2$	17

Independent Practice Key

Score:____ / 5 correct

Matching: Evaluate the expressions in column 1 and draw a line to matching equivalent expression in the second column. Each matching is worth 1 point.



Cumulative Review Practice

Score:____ / 4 correct

Circle the terms in the expression and tell whether the expression is a numerical expression or algebraic expression (2 pts).

1. $\frac{27}{9} + 4y - 16$

_____

Evaluate the expression (2 pts).

2. $14(2) - \frac{30}{3}$

Cumulative Review Practice Key

Score:____ / 4 correct

Circle the terms in the expression and tell whether the expression is a numerical expression or algebraic expression (2 pts).

1. $\frac{27}{9} + 4y - 16$

algebraic expression

Scoring Key:

1 point for correctly circling terms

1 point for algebraic expression

Evaluate the expression (2 pts).

2. $14(2) - \frac{30}{3}$

$28 - 10$

18

Scoring Key:

1 point for correctly multiplying first and then dividing

1 point for correctly subtracting

Demonstration Practice

Evaluating Expressions

Evaluate the following expressions.

$20 - 2$ $9(2)$ $\frac{36}{2}$ $\frac{[5(7) + 1]}{2}$

Definition: Equivalent expressions are

_____

_____

_____

Definition: An **Equation** is

_____

_____

_____

If two expressions are equivalent, we can write them as an equation.	$11(2) + 4(2) \square 2(15)$
If two expressions are not equivalent, they do not form an equation and we say that they are not equal.	$11(2) + 4(2) \square 4(20 - 10)$

Demonstration Practice (cont.)

Are They Equivalent?

Fill in each box below with a = or ≠ to show whether the expressions are equivalent.

1. $16 - 2(5) \square 36 \div 6 - 1$

2. $0 - 2(5)(1) \square 14 - 24$

3. $17 - 7 + 3 \square \frac{12}{2} + 5$

4. $2(8) + 2(4) \square 2(8 + 3)$

Creating Equivalent Expressions

1. Create 4 different expressions that represent the quantity 30.

_____ _____

_____ _____

2. Create 4 different expressions that represent the quantity 17.

_____ _____

_____ _____

Demonstration Practice Key

Evaluating Expressions

Evaluate the following expressions.

$20 - 2$	$9(2)$	$\frac{36}{2}$	$\frac{[5(7) + 1]}{2}$
18	18	18	36/2 18

Definition: Equivalent expressions are

two expressions whose values are equal for ALL replacements of the variable or variables.

Definition: An **Equation** is

a math sentence stating that 2 expressions are equivalent.

expression = expression

If two expressions are equivalent, we can write them as an equation.	$11(2) + 4(2) \boxed{=} 2(15)$
If two expressions are not equivalent, they do not form an equation and we say that they are not equal.	$11(2) + 4(2) \boxed{\neq} 4(20 - 10)$

Demonstration Practice Key (cont.)

Are They Equivalent?

Fill in each box below with a = or ≠ to show whether the expressions are equivalent.

1. $16 - 2(5)$ [≠] $36 \div 6 - 1$

$16 - 10$ $\quad$ $6 - 1$

6 $\quad$ 5

2. $0 - 2(5)(1)$ [=] $14 - 24$

$0 - 10\ (1)$

$0 - 10$ $\quad$ -10

-10 $\quad$ -10

3. $17 - 7 + 3$ [≠] $\frac{12}{2} + 5$

$10 + 3$ $\quad$ $6 + 5$

13 $\quad$ 11

4. $2(8) + 2(4)$ [≠] $2(8 + 3)$

$16 + 8$ $\quad$ $2(11)$

24 $\quad$ 22

Creating Equivalent Expressions

1. Create 4 different expressions that represent the quantity 30.

answers may vary

_____ _____

_____ _____

2. Create 4 different expressions that represent the quantity 17.

answers may vary

_____ _____

_____ _____

Practice

Pair Practice

Create any 2 expressions. Make sure there is at least 1 set of expressions that are equivalent and 1 set that are not equivalent. Trade with your partner to determine whether the expressions that your partner created are equivalent.

Rewrite the expressions with a = or ≠ to show whether the expressions are equivalent.

Create 2 Expressions	Partner Check: Are They Equivalent?
Example: **1.** 5(10) + 5(20) and 25(50)	Not equivalent 5(10) + 5(20) ≠ 25(50) 50 + 100 500 150
2. _____ and _____	
3. _____ and _____	
4. _____ and _____	

Practice Key

Pair Practice

Create any 2 expressions. Make sure there is at least 1 set of expressions that are equivalent and 1 set that are not equivalent. Trade with your partner to determine whether the expressions that your partner created are equivalent.

Rewrite the expressions with a = or ≠ to show whether the expressions are equivalent.

Create 2 Expressions	Partner Check: Are They Equivalent?
Example: **1.** 5(10) + 5(20) and 25(50)	Not equivalent 5(10) + 5(20) ≠ 25(50) 50 + 100 500 150
2. answers may vary and answers may vary	
3. answers may vary and answers may vary	
4. answers may vary and answers may vary	

Name: _____

Independent Practice

Score:____ / 5 correct

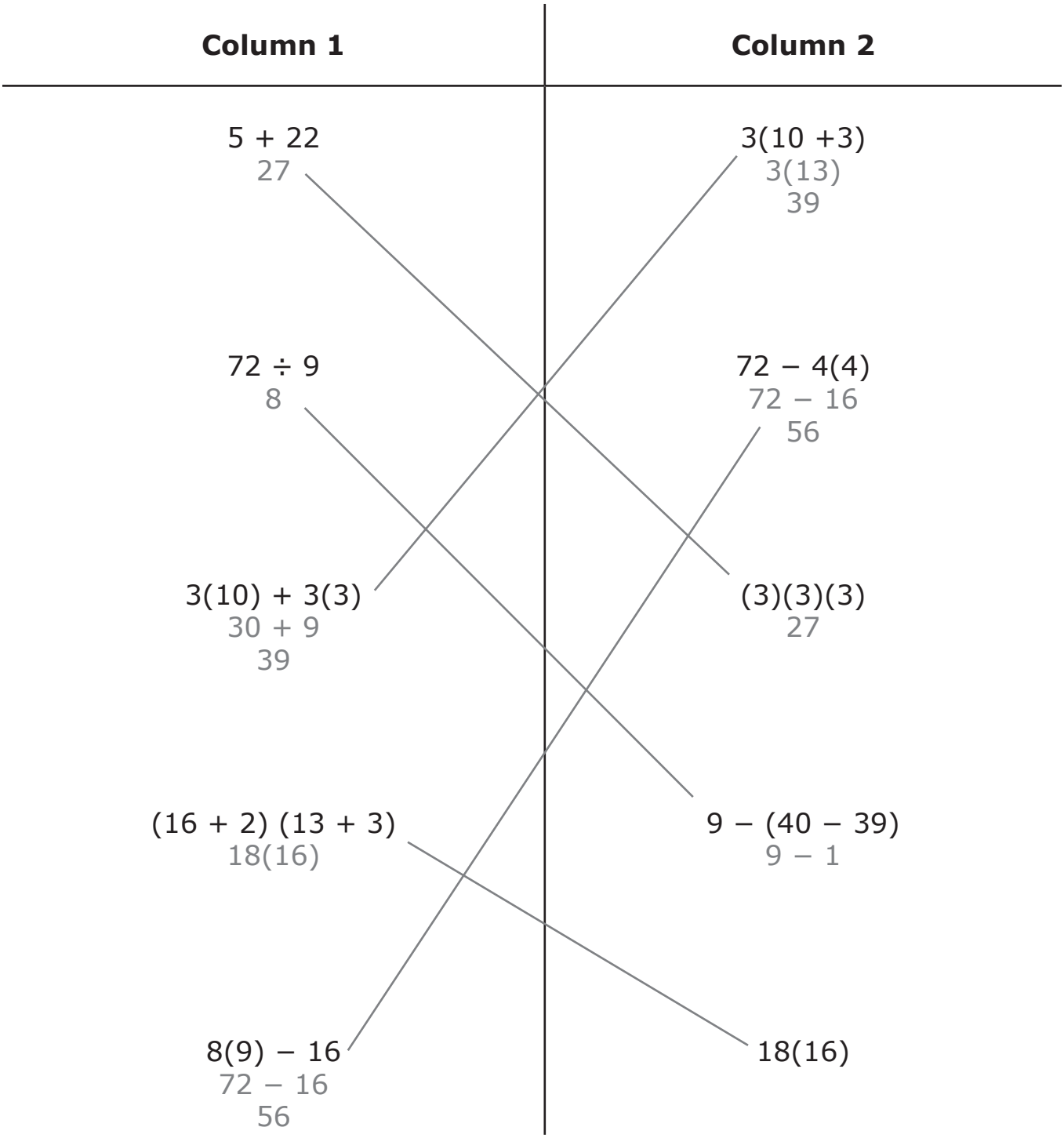
Matching: Determine which of the expressions are equivalent. Draw a line to match each expression in the first column to the equivalent expression in the second column. Each matching is worth 1 point.

Column 1	Column 2
5 + 22	3(10 +3)
72 ÷ 9	72 – 4(4)
3(10) + 3(3)	(3)(3)(3)
(16 + 2) (13 + 3)	9 – (40 – 39)
8(9) – 16	18(16)

Independent Practice Key

Score:____ / 5 correct

Matching: Determine which of the expressions are equivalent. Draw a line to match each expression in the first column to the equivalent expression in the second column. Each matching is worth 1 point.



Cumulative Review Practice

Score:____ / 4 correct

Evaluate the following numeric expression (2 pts).

1. $\frac{12}{2} + 4(4)$

Determine which expressions are equivalent. Fill in the letter of the equivalent expression. Each problem is worth 1 point.

2. $5(4) - 5(3 - 1)$ _____

3. $\frac{2 + 7}{3}$ _____

A $2(3 + 5)$

B $4 - (-2)(3)$

C $2 + (19 - 18)$

Cumulative Review Practice Key

Score:____ / 4 correct

Evaluate the following numeric expression (2 pts).

1. $\frac{12}{2} + 4(4)$

$6 + 16$

22

Scoring Key:

1 point for dividing and multiplying correctly first

1 point for adding correctly

Determine which expressions are equivalent. Fill in the letter of the equivalent expression. Each problem is worth 1 point.

2. $5(4) - 5(3 - 1)$ **B**

A $2(3 + 5)$

B $4 - (-2)(3)$

3. $\frac{2 + 7}{3}$ **C**

C $2 + (19 - 18)$

Demonstration Practice

Evaluate each expression for the given value of the variable.

1. Evaluate **3*x* + 2** when $x = 5$.

3( ) + 2

2. What is the value of ***x* – 3 + 4*x***, when $x = 2$?

3. Evaluate **-*x* + 6** for the following values of x.

x	**Process**	**-*x* + 6**
-2		
0		
2		
4		

4. Evaluate **7 + *x* – 2 + 3*x*** for the following values of x.

x	**Process**	**7 + *x* – 2 + 3*x***
-1		
0		
1		
2		

Demonstration Practice Key

Evaluate each expression for the given value of the variable.

1. Evaluate **3*x* + 2** when $x = 5$.

$3(5) + 2$
$15 + 2$
17

2. What is the value of ***x* – 3 + 4*x***, when $x = 2$?

$(2) - 3 + 4(2)$
$2 - 3 + 8$
$-1 + 8$
7

3. Evaluate **-*x* + 6** for the following values of x.

x	**Process**	**-*x* + 6**
-2	-1(-2) + 6	8
0	-1(0) + 6	6
2	-1(2) + 6	4
4	-1(4) + 6	2

4. Evaluate **7 + *x* – 2 + 3*x*** for the following values of x.

x	**Process**	**7 + *x* – 2 + 3*x***
-1	7 + (-1) – 2 + 3(-1) 7 – 1 – 2 – 3	1
0	7 + (0) – 2 + 3(0) 7 – 2	5
1	7 + (1) – 2 + 3(1) 8 – 2 + 3	9
2	7 + (2) – 2 + 3(2) 7 + 2 – 2 + 6	13

Practice

Evaluate the expression for each x value and match to the correct value. Some of the Matching Values are **not** used. You must show the substitution of the value into the expression to evaluate.

EXPRESSION: $-5x + 3 + 2x - 7$

1. When $x = -2$, the value of the expression is _____.

2. When $x = 4$, the value of the expression is _____.

3. When $x = -1$, the value of the expression is _____.

4. When $x = 3$, the value of the expression is _____.

5. When $x = -3$, the value of the expression is _____.

Matching Values:

A -7

B -1

C 5

D -13

E -18

F -16

G 2

Practice Key

Evaluate the expression for each x value and match to the correct value. Some of the Matching Values are **not** used. You must show the substitution of the value into the expression to evaluate.

EXPRESSION: $-5x + 3 + 2x - 7$

Matching Values:

1. When $x = -2$, the value of the expression is **G**.

$-5(-2) + 3 + 2(-2) - 7$
$10 + 3 - 4 - 7$
$13 - 4 - 7$
$9 - 7$
2

2. When $x = 4$, the value of the expression is **F**.

$-5(4) + 3 + 2(4) - 7$
$-20 + 3 + 8 - 7$
$-17 + 8 - 7$
$-9 - 7$
-16

3. When $x = -1$, the value of the expression is **B**.

$-5(-1) + 3 + 2(-1) - 7$
$5 + 3 - 2 - 7$
$8 - 2 - 7$
$6 - 7$
-1

4. When $x = 3$, the value of the expression is **D**.

$-5(3) + 3 + 2(3) - 7$
$-15 + 3 + 6 - 7$
$-12 + 6 - 7$
$-6 - 7$
-13

5. When $x = -3$, the value of the expression is **C**.

$-5(-3) + 3 + 2(-3) - 7$
$15 + 3 - 6 - 7$
$18 - 6 - 7$
$12 - 7$
5

A -7

B -1

C 5

D -13

E -18

F -16

G 2

Name: _____

Independent Practice

Score:____ / 10 correct

Evaluate the expression for each x value and match to the correct value. Some of the Matching Values are **not** used. Write all steps to evaluate the expression for the given x value. Each problem is worth 2 points.

EXPRESSION: $4x - 5 - 6x + 1$

Matching Values:

1. When x = -3, the value of the expression is _____.

2. When x = -1, the value of the expression is _____.

3. When x = 0, the value of the expression is _____.

4. When x = 2, the value of the expression is _____.

5. When x = -2, the value of the expression is _____.

A -10

B -8

C -7

D -4

E -2

F 0

G 2

Independent Practice Key

Score:____ / 10 correct

Evaluate the expression for each x value and match to the correct value. Some of the Matching Values are **not** used. Write all steps to evaluate the expression for the given x value. Each problem is worth 2 points.

EXPRESSION: $4x - 5 - 6x + 1$

Matching Values:

1. When x = -3, the value of the expression is **G**.

$4(-3) - 5 - 6(-3) + 1$
$-12 - 5 + 18 + 1$
$-17 + 18 + 1$
$1 + 1$
2

2. When x = -1, the value of the expression is **E**.

$4(-1) - 5 - 6(-1) + 1$
$-4 - 5 + 6 + 1$
$-9 + 6 + 1$
$-3 + 1$
-2

3. When x = 0, the value of the expression is **D**.

$4(0) - 5 - 6(0) + 1$
$0 - 5 - 0 + 1$
$-5 + 1$
-4

4. When x = 2, the value of the expression is **B**.

$4(2) - 5 - 6(2) + 1$
$8 - 5 - 12 + 1$
$3 - 12 + 1$
$-9 + 1$
-8

5. When x = -2, the value of the expression is **F**.

$4(-2) - 5 - 6(-2) + 1$
$-8 - 5 + 12 + 1$
$-13 + 12 + 1$
$-1 + 1$
0

A -10

B -8

C -7

D -4

E -2

F 0

G 2

Scoring Key:
1 point for correct substitution and
1 point for correct evaluation.

Cumulative Review Practice

Score:____ / 3 correct

Circle the equivalent numeric expression (1 pt).

1. $6(7) + \frac{22}{11}$

A $2(23 - 2)$

B $4(3 + 8)$

C $13 + 2$

Evaluate the algebraic expression for the following x value (2 pts).

2. $6x - 7 + 9 - 3x + 1$

When $x = -2$, the value of the expression is _____.

Cumulative Review Practice Key

Score:____ / 3 correct

Circle the equivalent numeric expression (1 pt).

1. $6(7) + \frac{22}{11}$

A $2(23 - 2)$

B $4(3 + 8)$

C $13 + 2$

Evaluate the algebraic expression for the following x value (2 pts).

2. $6x - 7 + 9 - 3x + 1$

When $x = -2$, the value of the expression is ___-3___.

$$6(-2) - 7 + 9 - 3(-2) + 1$$
$$-12 - 7 + 9 + 6 + 1$$
$$-19 + 9 + 6 + 1$$
$$-10 + 6 + 1$$
$$-4 + 1$$
$$-3$$

Scoring Key:
1 point for correct substitution
1 point for correct solution

Demonstration Practice

Draw a pictorial representation of each algebraic expression using algebra tiles to determine if they are equivalent.

1. $3x + 2$ $x + 1 + x + 1 + x$

Algebraically: _____ ☐ _____

2. $x + 2 + x + 1 + 1$ $2x + 3$

Algebraically: _____ ☐ _____

3. $h + 3 + h + 2 + h + 1$ $2h + 4$

Algebraically: _____ ☐ _____

Demonstration Practice (cont.)

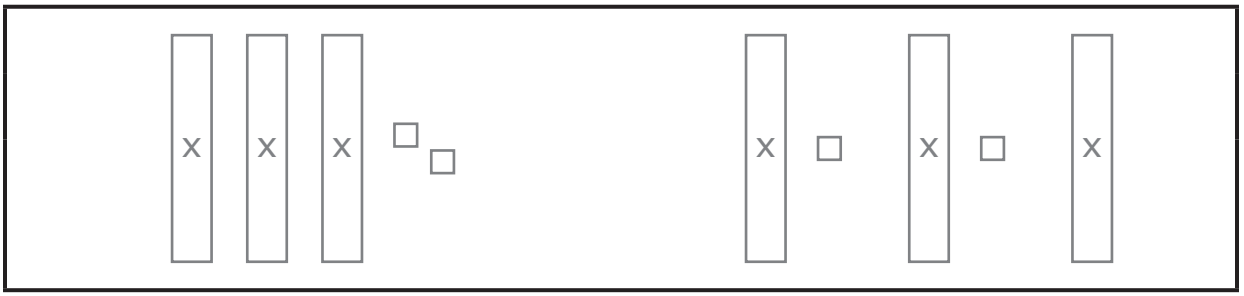
4. $m + m + m + m + m + m$ $6m$

Algebraically: _____ ☐ _____

Demonstration Practice Key

Draw a pictorial representation of each algebraic expression using algebra tiles to determine if they are equivalent.

1. $3x + 2$ $\qquad$ $x + 1 + x + 1 + x$

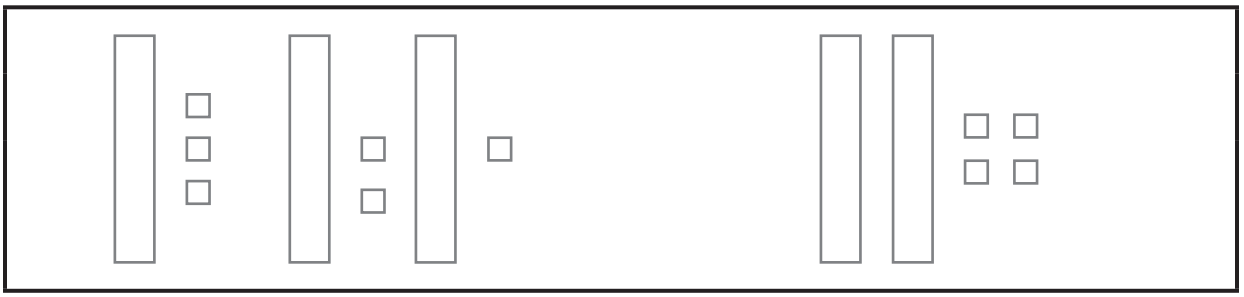


Algebraically: $3x + 2$ $\boxed{=}$ $x + 1 + x + 1 + x$

2. $x + 2 + x + 1 + 1$ $\qquad$ $2x + 3$

Algebraically: $x + 2 + x + 1 + 1$ $\boxed{\neq}$ $2x + 3$

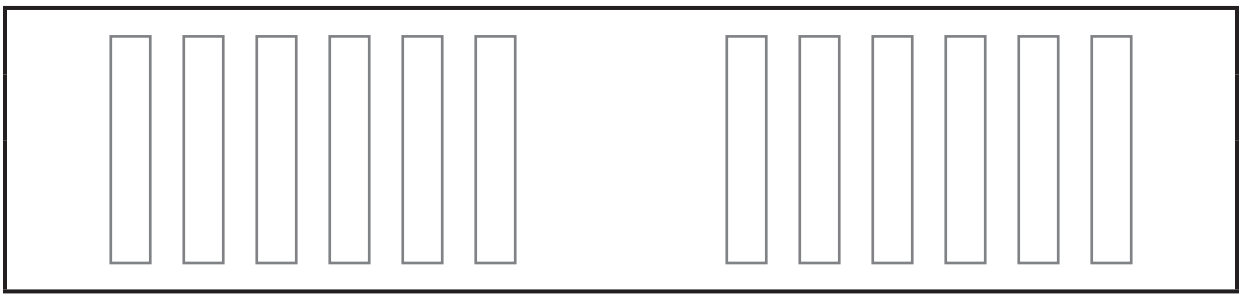
3. $h + 3 + h + 2 + h + 1$ $\qquad$ $2h + 4$



Algebraically: $h + 3 + h + 2 + h + 1$ $\boxed{\neq}$ $2h + 4$

Demonstration Practice Key (cont.)

4. $m + m + m + m + m + m$ $6m$



Algebraically: $m+m+m+m+m+m$ = $6m$

Practice

For each algebraic expression, sketch the pictorial representation and then write an equivalent algebraic expression.

1. $b + b + 2 + 3 + b + b$

Sketch Algebraic Expression:

Equivalent Algebraic Expression:

_____

2. $1 + b + b + 1$

Sketch Algebraic Expression:

Equivalent Algebraic Expression:

_____

3. $4b + 7$

Sketch Algebraic Expression:

Equivalent Algebraic Expression:

_____

4. $3b + 3$

Sketch Algebraic Expression:

Equivalent Algebraic Expression:

_____

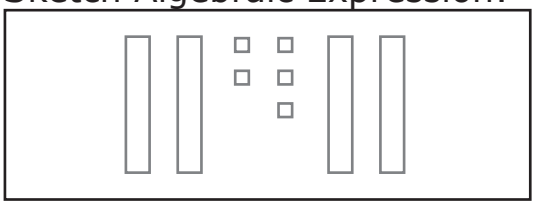
Practice Key

For each algebraic expression, sketch the pictorial representation and then write an equivalent algebraic expression.

answers may vary

1. $b + b + 2 + 3 + b + b$

Sketch Algebraic Expression:

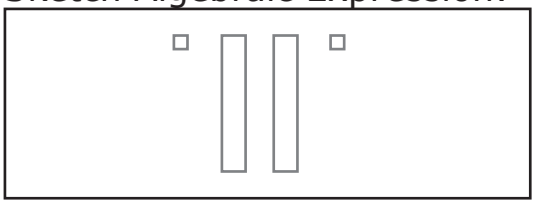


Equivalent Algebraic Expression:

$4b + 5$

2. $1 + b + b + 1$

Sketch Algebraic Expression:

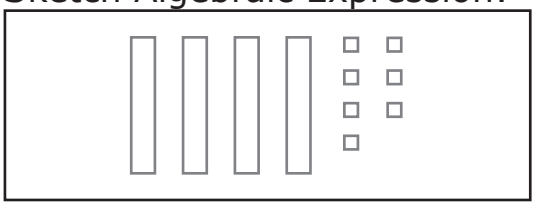


Equivalent Algebraic Expression:

$2b + 2$

3. $4b + 7$

Sketch Algebraic Expression:

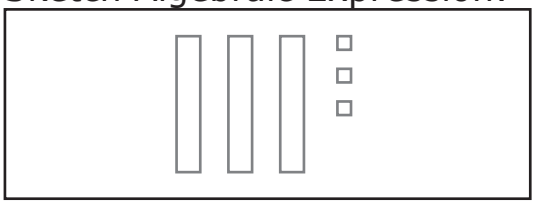


Equivalent Algebraic Expression:

$b + b + 3 + b + 3 + 1 + b$

4. $3b + 3$

Sketch Algebraic Expression:



Equivalent Algebraic Expression:

$b + b + 1 + b + 2$

Name: _____

Independent Practice

Score:____ / 12 correct

For each algebraic expression, sketch the pictorial representation and then match to an equivalent algebraic expression. Each problem is worth 3 points.

1. $j + j + 1 + j + 1$

Sketch Algebraic Expression:

Equivalent Algebraic Expression:

_____

A $3j + z$

2. $j + j + 2 + j + j$

Sketch Algebraic Expression:

_____

B $j + 2 + 2 + j$

3. $2j + 4$

Sketch Algebraic Expression:

_____

C $1 + j + j + 2 + j + 1$

4. $3j + 4$

Sketch Algebraic Expression:

_____

D $4j + 2$

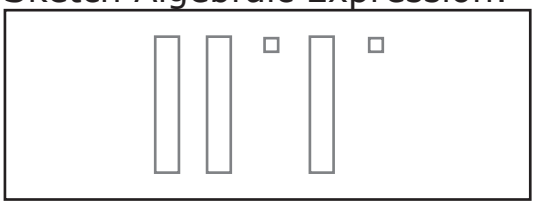
Independent Practice Key

Score:____ / 12 correct

For each algebraic expression, sketch the pictorial representation and then match to an equivalent algebraic expression. Each problem is worth 3 points.

1. $j + j + 1 + j + 1$

Sketch Algebraic Expression:



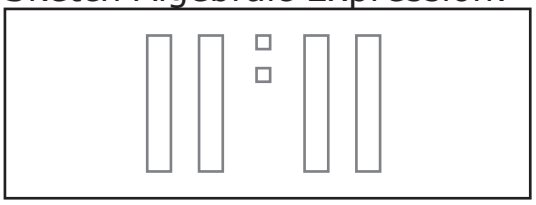
Equivalent Algebraic Expression:

A $3j + z$

A

2. $j + j + 2 + j + j$

Sketch Algebraic Expression:

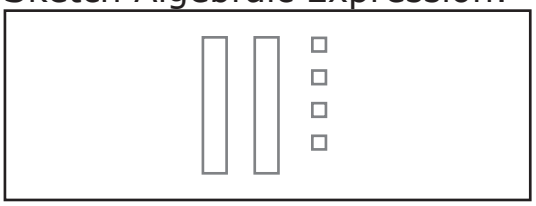


D

B $j + 2 + 2 + j$

3. $2j + 4$

Sketch Algebraic Expression:

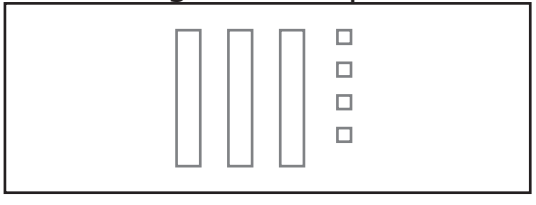


B

C $1 + j + j + 2 + j + 1$

4. $3j + 4$

Sketch Algebraic Expression:



C

D $4j + 2$

Cumulative Review Practice

score: ____/ 3 correct

Evaluate the following expression for the given value of x.

EXPRESSION: $2x + 7 - 5x - 3$

1. When $x = -2$, the value of the expression is _____. (2 pts)

Draw the given algebraic expression and circle the equivalent algebraic expression. (1 pt)

2. $y + 1 + y + 2 + y + 3 + y$

A $4y + 6$

B $4y + 5$

C $2y + 5$

D $y + 6$

Cumulative Review Practice Key

score: _____/ 3 correct

Evaluate the following expression for the given value of x.

EXPRESSION: $2x + 7 - 5x - 3$

1. When $x = -2$, the value of the expression is __10__. (2 pts)

$2(-2) + 7 - 5(-2) - 3$
$-4 + 7 + 10 - 3$
$3 + 10 - 3$
$13 - 3$
10

Scoring Key:
1 pt for correct substitution
1 pt correct value

Draw the given algebraic expression and circle the equivalent algebraic expression. (1 pt)

2. $y + 1 + y + 2 + y + 3 + y$

A $4y + 6$

B $4y + 5$

C $2y + 5$

D $y + 6$

Demonstration Practice

Simplifying Algebraic Expressions

To simplify any expression you…

1. _____

2. _____

What makes terms like or unlike…

$$a + 3 - 5 + 2a - 4a$$

Algebra Tiles:

Collected Algebra Tiles:

How do we combine like terms…

Rewrite: $a + 3 - 5 + 2a - 4a$

Simplified form: _____

Simplify: _____

_____

1. $7y + 2 - y + 1$ **2.** $x + 4 - 9x - 3$

Demonstration Practice (cont.)

What if there is a multiplier… …Distribute Property!

$4 + 2(b - 1)$

Algebra Tiles:

Collected Algebra Tiles:

$4 + 2(b - 1)$

_____

This means $4 + 2(b - 1)$ is equivalent to _____.

1. $3(x - 2) + 4(2x + 1)$

_____

This means $3(x - 2) + 4(2x + 1)$ is equivalent to _____

2. $5(3 + h) - 7 + 2(h - 4)$

_____

This means $5(3 + h) - 7 + 2(h - 4)$ is equivalent to _____

Guiding Questions to Simplify Algebraic Expressions:

1. _____
2. _____
3. _____
4. _____

Demonstration Practice Key

Simplifying Algebraic Expressions

To simplify any expression you…

1. Distribute

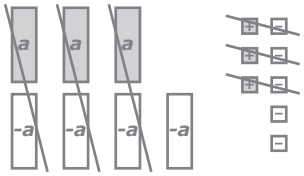
2. Collect then combine like terms

What makes terms like or unlike…

$a + 3 - 5 + 2a - 4a$

Algebra Tiles:

Collected Algebra Tiles:



How do we combine like terms…

Rewrite: $a + 3 - 5 + 2a - 4a$

$a + 2a - 4a + 3 - 5$

Simplified form: $-a - 2$

Simplify: perform all indicated operations to find an equivalent algebraic expression.

1. $7y + 2 - y + 1$

$7y - y + 2 + 1$

$6y + 3$

2. $x + 4 - 9x - 3$

$x - 9x + 4 - 3$

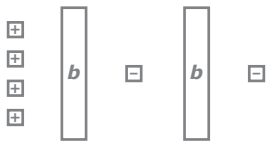
$-8x + 1$

Demonstration Practice Key (cont.)

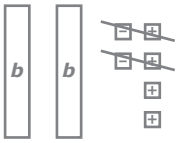
What if there is a multiplier… …Distribute Property!

$$4 + 2(b - 1)$$

Algebra Tiles:



Collected Algebra Tiles:



$4 + 2(b - 1)$

$4 + 2b - 2$ $\quad$ $4 + 2b - 2$

$2b + 4 - 2$ $\quad$ $4 - 2 + 2b$

$2b + 2$ or $2 + 2b$

This means $4 + 2(b - 1)$ is equivalent to $2b + 2$.

1. $3(x - 2) + 4(2x + 1)$

$3x - 6 + 8x + 4$

$3x + 8x - 6 + 4$

$11x - 2$

This means $3(x - 2) + 4(2x + 1)$ is equivalent to $11x - 2$

2. $5(3 + h) - 7 + 2(h - 4)$

$15 + 5h - 7 + 2h - 8$

$5h + 2h + 15 - 7 - 8$

$7h$

This means $5(3 + h) - 7 + 2(h - 4)$ is equivalent to $7h$

Guiding Questions to Simplify Algebraic Expressions:

1. Is there a value that needs to be distributed?
2. What are the like terms?
3. How do I collect like terms?
4. What operation do I perform to combine like terms?

Practice

Pair Practice

Create an algebraic expression that will need to be simplified. Trade with your partner and have him/her simplify the expressions. At least one expression must use distribution to simplify.

Created Algebraic Expressions	Partner Work: Simplified Expression
Example: $-3k + 5 + 7(k - 1)$	$-3k + 5 + 7(k - 1)$ $-3k + 5 + 7k - 7$ $-3k + 7k + 5 - 7$ $4k - 2$
1._____	
2._____	
3._____	
4._____	

Practice Key

Pair Practice

Create an algebraic expression that will need to be simplified. Trade with your partner and have him/her simplify the expressions. At least one expression must use distribution to simplify.

Created Algebraic Expressions	Partner Work: Simplified Expression
Example: $-3k + 5 + 7(k - 1)$	$-3k + 5 + 7(k - 1)$ $-3k + 5 + 7k - 7$ $-3k + 7k + 5 - 7$ $4k - 2$
1. answers will vary	
2. answers will vary	
3. answers will vary	
4. answers will vary	

Error Correction Practice

The given situations are work completed by three different students. Determine which student is correct and explain the errors of the other students.

Simplify the following algebraic expressions.

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

Student 1:	Student 2:	Student 3:
$4(m + 2) - 3(2m + 1)$ $4m + 2 - 6m + 1$ $4m - 6m + 2 + 1$ $-2m + 3$	$4(m + 2) - 3(2m + 1)$ $4m + 8 - 6m - 3$ $4m - 6m + 8 - 3$ $-2m + 5$	$4(m + 2) - 3(2m + 1)$ $4m + 8 - 6m + 3$ $4m - 6m + 8 + 3$ $-2m + 11$

Error Correction Practice Key

The given situations are work completed by three different students. Determine which student is correct and explain the errors of the other students.

Simplify the following algebraic expressions.

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

Student 1:	Student 2:	Student 3:
$4(m + 2) - 3(2m + 1)$ $4m + 2 - 6m + 1$ $4m - 6m + 2 + 1$ $-2m + 3$	$4(m + 2) - 3(2m + 1)$ $4m + 8 - 6m - 3$ $4m - 6m + 8 - 3$ $-2m + 5$	$4(m + 2) - 3(2m + 1)$ $4m + 8 - 6m + 3$ $4m - 6m + 8 + 3$ $-2m + 11$

Student 2 is correct. Student 1 did not distribute the 4 to the second term 2 and the -3 to the second term 1. Student 3 did not distribute the negative with the 3.

Name: _____

Independent Practice

Score:____ / 7 correct

Matching: Simplify the expressions in Column 1 and draw a line to the matching equivalent expression in the second Column. Each simplified expression with work shown is worth 1 or 2 points.

Column 1	Column 2
Example: $3(b - 3) - 5b + 2$ $3b - 9 - 5b + 2$ (1 pt) $3b - 5b - 9 + 2$ $-2b - 7$ (1 pt)	$-b + 8$
$-b + 2(b + 5) - 8 + 3b$	$4b - 18$
$5 + 6b - 7b + 3$	$-2b - 7$
$-2b + 3 + b + 4(1 - b)$	$4b + 2$
$6(2b + 1) - 8(3 + b)$	$-5b + 7$

Independent Practice Key

Score:____ / 7 correct

Matching: Simplify the expressions in column 1 and draw a line to the matching equivalent expression in the second column. Each simplified expression with work shown is worth 1 or 2 points.

Column 1	Column 2
Example: $3(b - 3) - 5b + 2$ $3b - 9 - 5b + 2$ (1 pt) $3b - 5b - 9 + 2$ $-2b - 7$ (1 pt)	$-b + 8$
$-b + 2(b + 5) - 8 + 3b$ $-b + 2b + 10 - 8 + 3b$ (1 pt) $-b + 2b + 3b + 10 - 8$ $4b + 2$ (1 pt)	$4b - 18$
$5 + 6b - 7b + 3$ $6b - 7b + 5 + 3$ $-b + 8$ (1 pt)	$-2b - 7$
$-2b + 3 + b + 4(1 - b)$ $-2b + 3 + b + 4 - 4b$ (1 pt) $-2b + b - 4b + 3 + 4$ $-5b + 7$ (1 pt)	$4b + 2$
$6(2b + 1) - 8(3 + b)$ $12b + 6 - 24 - 8b$ (1 pt) $12b - 8b + 6 - 24$ $4b - 18$ (1 pt)	$-5b + 7$

Cumulative Review Practice

Score:____ / 7 correct

Draw the following algebraic expression and circle the letter of the equivalent expression. (1 pt)

1. $3h + 4$

A $h + 1 + h + 1 + 1 + h$

B $1 + h + 1 + h + h + 2 + h$

C $h + 2 + h + 1 + 1$

D $1 + h + 2 + h + h + 1$

2. Simplify the following algebraic expression (6 pts):

$-3a - 6 + 2(a - 1)$

This means that $-3a - 6 + 2(a - 1)$ is equivalent to _____

and I can write the equation:

_____ = _____

Cumulative Review Practice Key

Score:____ / 7 correct

Draw the following algebraic expression and circle the letter of the equivalent expression. (1 pt)

1. $3h + 4$

A $h + 1 + h + 1 + 1 + h$

B $1 + h + 1 + h + h + 2 + h$

C $h + 2 + h + 1 + 1$

D $1 + h + 2 + h + h + 1$

2. Simplify the following algebraic expression (6 pts):

$-3a - 6 + 2(a - 1)$

$-3a - 6 + 2(a - 1)$
$-3a - 6 + 2a - 2$
$-3a + 2a - 6 - 2$
$-a - 8$ (3 pts)

This means that $-3a - 6 + 2(a - 1)$ is equivalent to $-a - 8$ (1 pt)

and I can write the equation:

$-3a - 6 + 2(a - 1)$ (1 pt) = $-a - 8$ (1 pt)

Demonstration Practice

Testing for Equivalent Algebraic Expressions

Using a Calculator to Create a Graph

We can use a calculator to create a graph to determine if 2 expressions are equivalent.

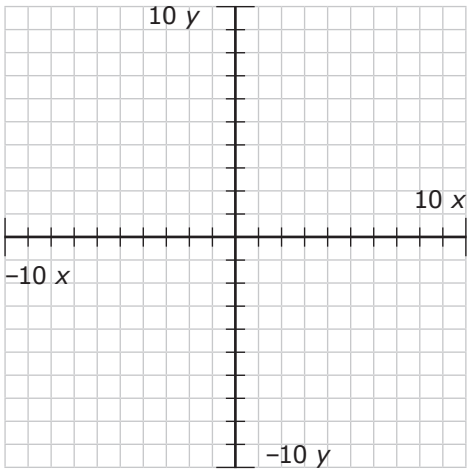
- Using your graphing calculator, press Y=
- Type the first expression into Y_1 and the second expression into Y_2.
- Move your cursor to the front of the second expression to highlight the backslash. Press ENTER once to change the type of line the second expression will graph.
- Press ZOOM, 6 to graph the standard 10 by 10 window.

Using a graphing calculator, check to see if each expression is equivalent.

1. $x - 3 - 3x + 5x + 1 \quad \square \quad 3x - 2$

Sketch the image of the graphs:

```
Plot1  Plot2  Plot1
\Y1=   x-3-3x+5x+1
\Y2=   3x-2
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```



5 table values to support your evaluation:

X	Y_1	Y_2

Look at the table of values by pressing 2ND, GRAPH.

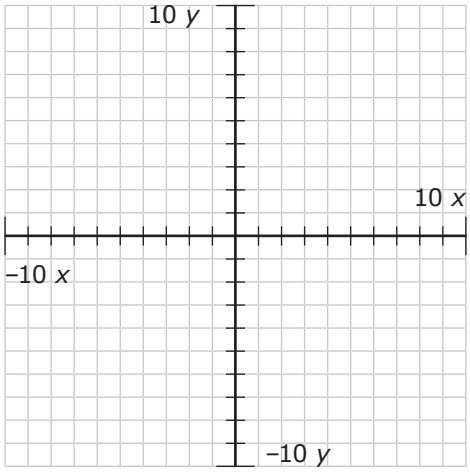
Do the tables of value match for ALL values of *x* that you see? _____

Demonstration Practice (cont.)

2. $-(4x + 2) + 2x - 8 \square 3x + 5$

Sketch the image of the graphs:

```
Plot1  Plot2  Plot3
\Y1=   -(4x+2)+2x-8
\Y2=   3x+5
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```



5 table values to support your evaluation:

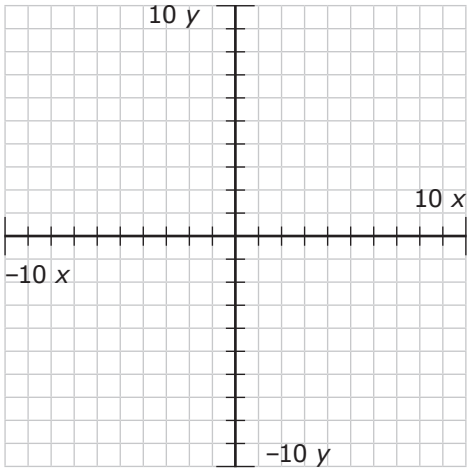
X	Y_1	Y_2

Do the tables of value match for ALL values of *x* that you see? _____

3. $2(x - 3) - 3x + 5 \square -x - 1$

Sketch the image of the graphs:

```
Plot1  Plot2  Plot3
\Y1=   2(x-3)-3x+5
\Y2=   -x-1
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```



5 table values to support your evaluation:

X	Y_1	Y_2

Do the tables of value match for ALL values of *x* that you see? _____

Demonstration Practice (cont.)

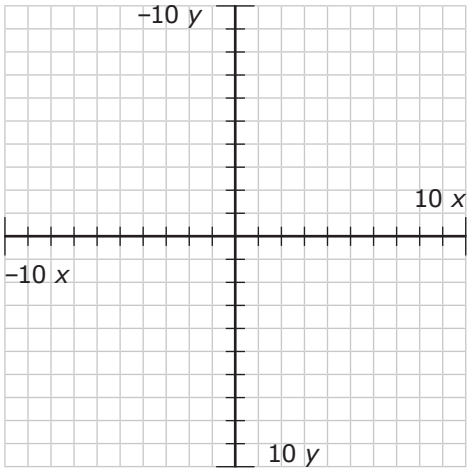
4. Henry and his business partner Enrique own a t-shirt print shop. The sale price for a printed t-shirt is represented by the expression $10x + 3$, where x represents the number of t-shirts in an order. The cost of printing t-shirts is represented by the expression $4x + 5$, where x represents the number of t-shirts in an order.

Sale price: $10x + 3$ Cost: $4x + 5$

The profit they make is represented by the expression $10x + 3 - (4x + 5)$. Enrique believes that the expression $6x - 2$ is an equivalent way to express the profit. Is Enrique correct? Use your graphing calculator to test Enrique's hypothesis. Does Enrique's hypothesis appear to be true or false?

$10x + 3 - (4x + 5)$ ☐ $6x - 2$

Sketch the image of the graphs:



List 5 x-values (t-shirt quantities) and their corresponding y-values (profit amounts) to support your determination.

X (Number of T-Shirts)	**Y_1** (Profit 1)	**Y_2** (Profit 2)

Demonstration Practice Key

Testing for Equivalent Algebraic Expressions

Using a Calculator to Create a Graph

We can use a calculator to create a graph to determine if 2 expressions are equivalent.

- Using your graphing calculator, press Y=
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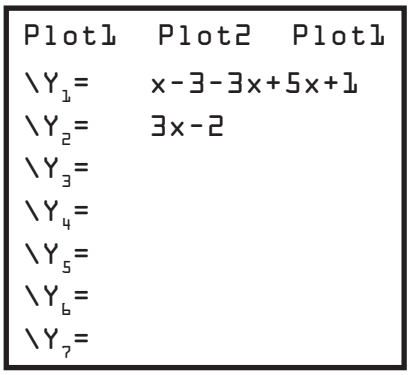
- Press ZOOM, 6 to graph the standard 10 by 10 window.

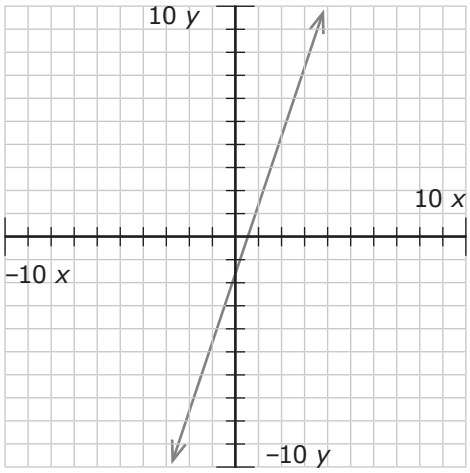
Using a graphing calculator, check to see if each expression is equivalent.

Y1 Y2

1. $x - 3 - 3x + 5x + 1$ [=] $3x - 2$

Sketch the image of the graphs:





5 table values to support your evaluation:

X	Y_1	Y_2
-2	-8	-8
-1	-5	-5
0	-2	-2
1	1	1
2	4	4

Look at the table of values by pressing 2ND, GRAPH.

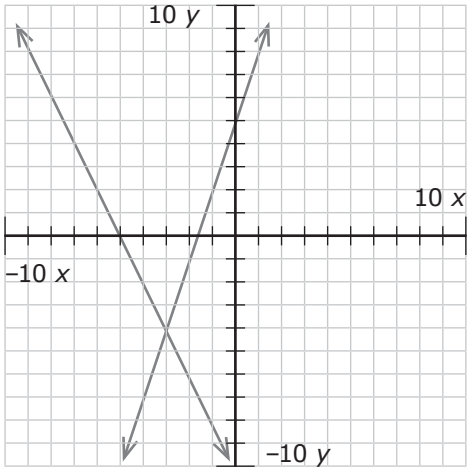
Do the tables of value match for ALL values of *x* that you see? Yes

Demonstration Practice Key (cont.)

2. $\underset{Y_1}{-(4x + 2) + 2x - 8}$ $\boxed{\neq}$ $\underset{Y_2}{3x + 5}$

Sketch the image of the graphs:

```
Plot1  Plot2  Plot1
\Y1=   -(4x+2)+2x-8
\Y2=   3x+5
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```



5 table values to support your evaluation:

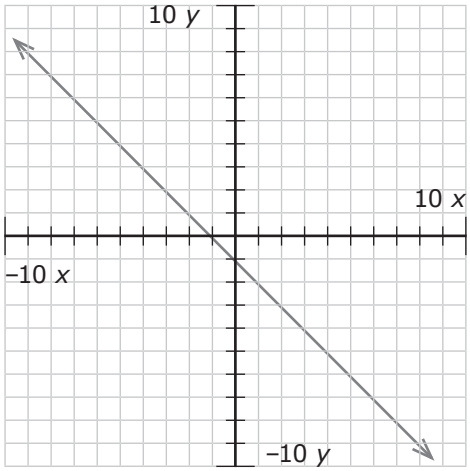
X	Y_1	Y_2
-4	-2	-7
-3	-4	-4
-2	-6	-1
-1	-8	2
0	-10	5

Do the tables of value match for ALL values of *x* that you see? No

3. $\underset{Y_1}{2(x - 3) - 3x + 5}$ $\boxed{=}$ $\underset{Y_2}{-x - 1}$

Sketch the image of the graphs:

```
Plot1  Plot2  Plot1
\Y1=   2(x-3)-3x+5
\Y2=   -x-1
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```



5 table values to support your evaluation:

X	Y_1	Y_2
-3	2	2
-2	1	1
-1	0	0
0	-1	-1
1	-2	-2

Do the tables of value match for ALL values of *x* that you see? Yes

Demonstration Practice Key (cont.)

4. Henry and his business partner Enrique own a t-shirt print shop. The sale price for a printed t-shirt is represented by the expression $10x + 3$, where x represents the number of t-shirts in an order. The cost of printing t-shirts is represented by the expression $4x + 5$, where x represents the number of t-shirts in an order.

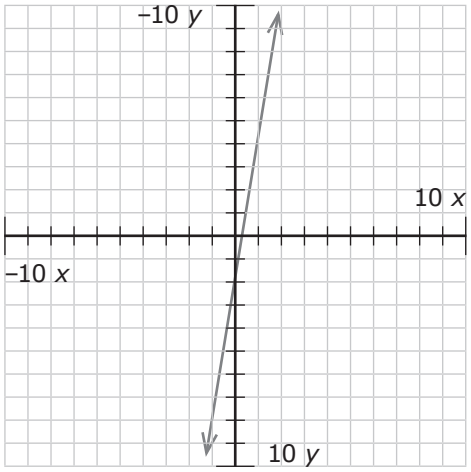
Sale price: $10x + 3$ Cost: $4x + 5$

The profit they make is represented by the expression $10x + 3 - (4x + 5)$. Enrique believes that the expression $6x - 2$ is an equivalent way to express the profit. Is Enrique correct? Use your graphing calculator to test Enrique's hypothesis. Does Enrique's hypothesis appear to be true or false?

Y1 Y2

$10x + 3 - (4x + 5)$ | = | $6x - 2$

Sketch the image of the graphs:



List 5 x-values (t-shirt quantities) and their corresponding y-values (profit amounts) to support your determination.

X (Number of T-Shirts)	**Y_1** (Profit 1)	**Y_2** (Profit 2)
1	4	4
2	10	10
3	16	16
4	22	22
5	28	28

Practice

For each of the following problems, using a graphing calculator determine whether the expressions are equivalent by using an = or ≠. Sketch the graph to support your answer. List 5 *x*-values and their corresponding *y*-values from the table that support your determination.

Example: $6x + 4 - 3x + 6$ [≠] $3x + 6$

Graph:

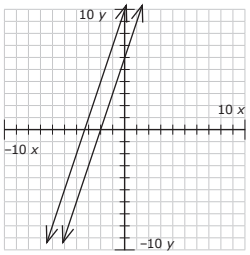


Table:

X	Y_1	Y_2
-2	4	0
-1	7	3
0	10	6
1	13	9
2	16	12

1. $9x + 4 - 3x - 2x + 2$ [ ] $4x + 6$

Graph:

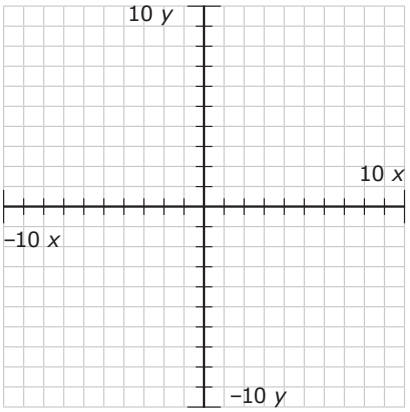


Table:

X	Y_1	Y_2

2. $-5x - 1 + 3x + 3$ [ ] $-2x + 1$

Graph:

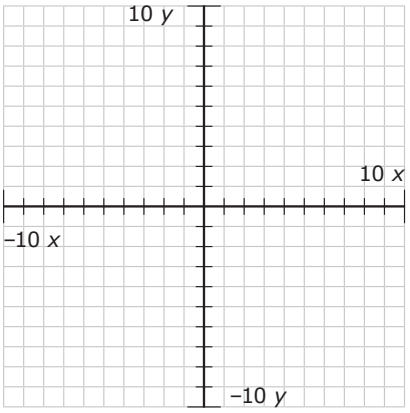


Table:

X	Y_1	Y_2

Practice Key

For each of the following problems, using a graphing calculator determine whether the expressions are equivalent by using an = or ≠. Sketch the graph to support your answer. List 5 *x*-values and their corresponding *y*-values from the table that support your determination.

Example: $6x + 4 - 3x + 6$ ≠ $3x + 6$

Graph:

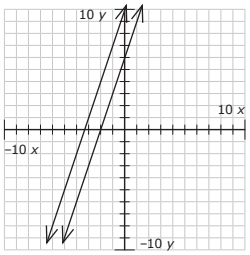


Table:

X	Y_1	Y_2
-2	4	0
-1	7	3
0	10	6
1	13	9
2	16	12

1. $9x + 4 - 3x - 2x + 2$ = $4x + 6$

Graph:

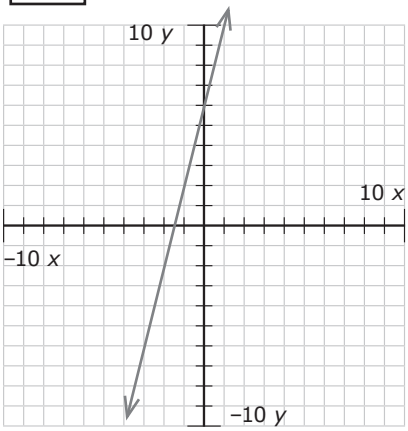


Table:

X	Y_1	Y_2
-1	2	2
0	6	6
1	10	10
2	14	14
3	18	18

2. $-5x - 1 + 3x + 3$ ≠ $-2x + 1$

Graph:

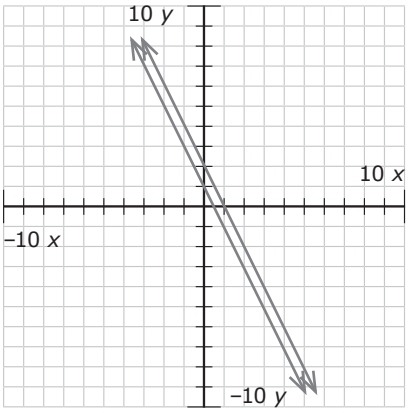


Table:

X	Y_1	Y_2
-2	6	5
-1	4	3
0	2	1
1	0	-1
2	-2	-3

Name: _____

Independent Practice

Score:____ / 12 correct

For each of the following problems, use a graphing calculator to sketch the graph. Determine whether the expressions are equivalent and list 5 *x*-values and their corresponding *y*-values to support your determination. Circle either EQUIVALENT or NOT EQUIVALENT.

1.

$3 + 7x - 13 - 3x + 5$

$4x - 5$

Graph (2 pts):

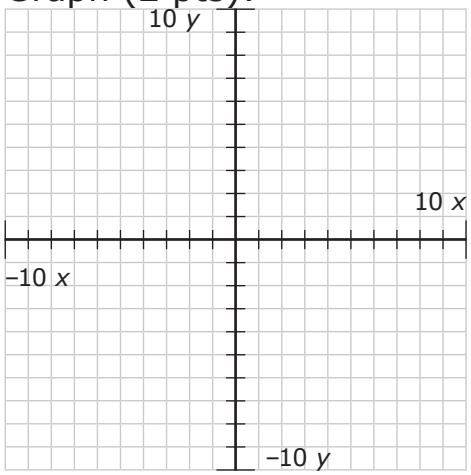


Table (2 pts):

X	Y_1	Y_2

Circle one (2 pts): EQUIVALENT [=] NOT EQUIVALENT [≠]

2.

$-12 + 4x + 6 - 2x + 9$

$-6x + 3$

Graph (2 pts):

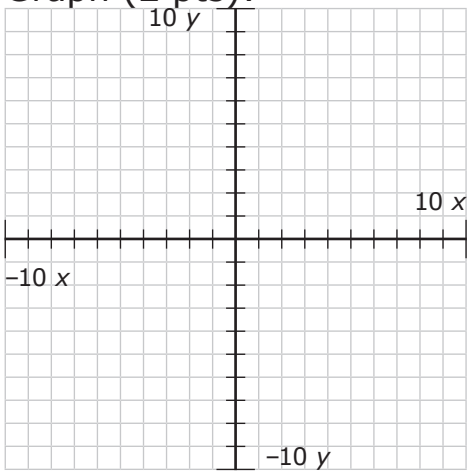


Table (2 pts):

X	Y_1	Y_2

Circle one (2 pts): EQUIVALENT [=] NOT EQUIVALENT [≠]

Independent Practice Key

Score:____ / 12 correct

For each of the following problems, use a graphing calculator to sketch the graph. Determine whether the expressions are equivalent and list 5 *x*-values and their corresponding *y*-values to support your determination. Circle either EQUIVALENT or NOT EQUIVALENT.

1.

$3 + 7x - 13 - 3x + 5$

$4x - 5$

Graph (2 pts):

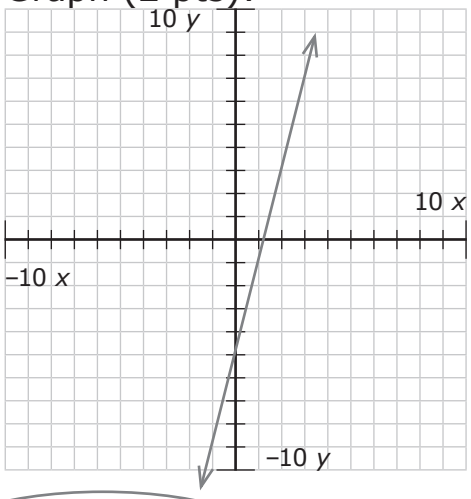


Table (2 pts):

X	Y_1	Y_2
-2	-13	-13
-1	-9	-9
0	-5	-5
1	-1	-1
2	3	3

Circle one (2 pts): EQUIVALENT [=] NOT EQUIVALENT [≠]

2.

$-12 + 4x + 6 - 2x + 9$

$-6x + 3$

Graph (2 pts):

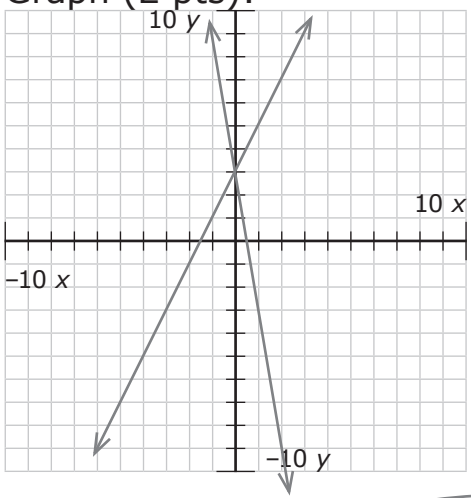


Table (2 pts):

X	Y_1	Y_2
-1	1	9
0	3	3
1	5	-3
2	7	-9
3	9	-15

Circle one (2 pts): EQUIVALENT [=] NOT EQUIVALENT [≠]

Cumulative Review Practice

Score:____ / 8 correct

1. Simplify the following algebraic expression: (3 pts.)

$5a - 6 + 3(a + 4)$

This means that $5a - 6 + 3(a + 4)$ is equivalent to _____

and I can write the equation:

_____ = _____

Using a graphing calculator, graph the expressions, fill in the table of values and determine whether the expressions are equivalent. Circle either EQUIVALENT or NOT EQUIVALENT.

2. $10 + 3x - 6 + 2x - 7$

$5x - 13$

Graph (2 pts):

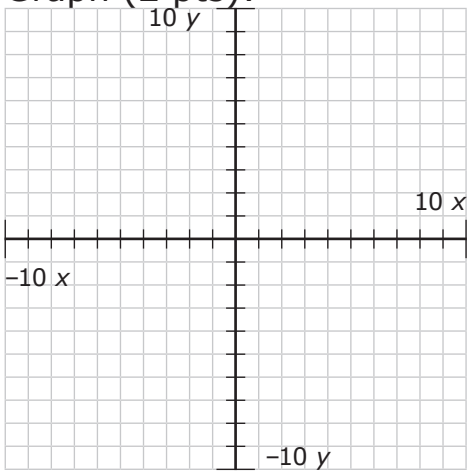


Table (1 pt):

X	Y_1	Y_2

Circle one (2 pts): EQUIVALENT [=] NOT EQUIVALENT [≠]

Cumulative Review Practice Key

Score:____ / 8 correct

1. Simplify the following algebraic expression: (3 pts.)

$5a - 6 + 3(a + 4)$

$5a - 6 + 3a + 12$

$5a + 3a - 6 + 12$

$8a + 6$

Scoring Key:
2 pts for correct simplification
1 pt for correct statement

This means that $5a - 6 + 3(a + 4)$ is equivalent to $8a + 6$

and I can write the equation:

$5a - 6 + 3(a + 4) = 8a + 6$ (3pts)

Using a graphing calculator, graph the expressions, fill in the table of values and determine whether the expressions are equivalent. Circle either EQUIVALENT or NOT EQUIVALENT.

2. $10 + 3x - 6 + 2x - 7$

$5x - 13$

Graph (2 pts):

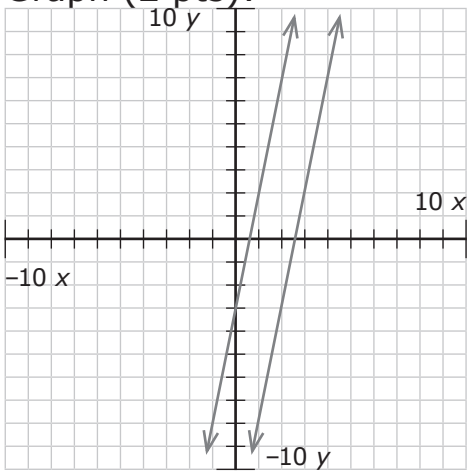


Table (1 pt):

X	Y_1	Y_2
0	-3	-13
1	2	-8
2	7	-3
3	12	2

Circle one (2 pts): EQUIVALENT [=] NOT EQUIVALENT [≠]

Demonstration Practice

Properties of Equality and Inverse Operations

$$2(5) + 4 \square 10 + 4$$

If we add a number to both expressions, will the expressions remain equivalent?

Add the **same** number to both expressions.	Add **different** numbers to both expressions.
$2(5) + 4 \square 10 + 4$	$2(5) + 4 \square 10 + 4$

Multiply both expressions by the **same number**	Multiply both expressions by **different numbers**
$2(5) + 4 \square 10 + 4$	$2(5) + 4 \square 10 + 4$

Properties of Equality

Addition and Subtraction

_____

_____

Multiplication and Division

_____

_____

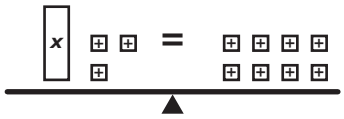
Inverse Operations

_____

Demonstration Practice (cont.)

Use the properties of equality and inverse operations to solve the algebraic equation.

1. $x + 3 = 8$



$x =$ _____

2. $n - 2 = 10$

$n =$ _____

What operation is being performed on the variable, n? _____

What is the inverse of this operation? _____

3. $28 = 14y$

_____ $= y$

What operation is being performed with the variable, y? _____

What is the inverse of this operation? _____

4. $\frac{m}{8} = 7$

$m =$ _____

What operation is being performed with the variable, m? _____

What is the inverse of this operation? _____

Demonstration Practice Key

Properties of Equality and Inverse Operations

$$2(5) + 4 \boxed{=} 10 + 4$$

If we add a number to both expressions, will the expressions remain equivalent?

Add the **same** number to both expressions.	Add **different** numbers to both expressions.
$2(5) + 4 \boxed{=} 10 + 4$ $+ 3 \quad + 3$ $10 + 4 + 3 = 17 \quad 10 + 4 + 3 = 17$	$2(5) + 4 \boxed{\neq} 10 + 4$ $+ 2 \quad + 4$ $10 + 4 + 2 = 16 \quad 10 + 4 + 4 = 18$

Multiply both expressions by the **same number**	Multiply both expressions by **different numbers**
$3(2(5) + 4) \boxed{=} 3(10 + 4)$ $3(10 + 4) \quad 30 + 12$ $30 + 12 \quad 42$ 42	$2(2(5) + 4) \boxed{\neq} 4(10 + 4)$ $2(10 + 4) \quad 40 + 16$ $20 + 8 \quad 56$ 28

Properties of Equality

Addition and Subtraction

add or subtract the same number to both expressions in an equation.

Multiplication and Division

multiply or divide by the same number to both expressions in an equation.

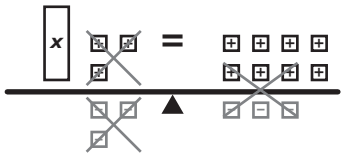
Inverse Operations

An operation that reverses the effect of another operation.

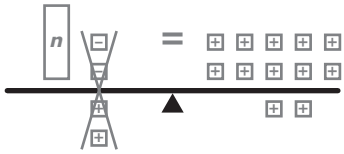
Demonstration Practice Key (cont.)

Use the properties of equality and inverse operations to solve the algebraic equation.

1. $x + 3 = 8$
$-3 \quad -3$
$x = 5$



2. $n - 2 = 10$
$+2 \quad +2$
$n = 12$



What operation is being performed on the variable, *n*? subtract 2

What is the inverse of this operation? add 2

3. $\frac{28}{14} = \frac{14y}{14}$
$2 = 1y$
$2 = y$

What operation is being performed with the variable, *y*? multiply by 14

What is the inverse of this operation? divide by 14

4. $8 \cdot \frac{m}{8} = 7 \cdot 8$
$1m = 56$

$m = 56$

What operation is being performed with the variable, *m*? divide by 8

What is the inverse of this operation? multiply by 8

Practice

Guided Practice

Use the properties of equality and inverse operations to solve the algebraic equation.

1. $11c = 66$

$c =$ _____

What operation is being performed with the variable, c? _____

What is the inverse of this operation? _____

2. $300 = 150 + x$

_____ $= x$

What operation is being performed with the variable, x? _____

What is the inverse of this operation? _____

3. $72 = 8b$

_____ $= b$

What operation is being performed with the variable, b? _____

What is the inverse of this operation? _____

Practice Key

Guided Practice

Use the properties of equality and inverse operations to solve the algebraic equation.

1. $\frac{11c}{11} = \frac{66}{11}$

$1c = 6$

$c =$ 6

What operation is being performed with the variable, c? multiply by 11

What is the inverse of this operation? divide by 11

2. $300 = 150 + x$

$-150 \quad -150$

$150 = x$

$150 = x$

What operation is being performed with the variable, x? add 150

What is the inverse of this operation? subtract 150

3. $\frac{72}{8} = \frac{8b}{8}$

$9 = 1b$

$9 = b$

What operation is being performed with the variable, b? multiply by 8

What is the inverse of this operation? divide by 8

Error Correction Practice

The following situation is work completed by a student. Explain the error(s) the student made in the work.

Use the properties of equality and inverse operations to solve the algebraic equation.

$$52 = 21x$$

What operation is being performed with the variable, x?_____

What is the inverse of this operation?_____

$$52 = 21x$$

$x =$_____

Write your analysis of this student's work here:

Error Correction Practice Key

The following situation is work completed by a student. Explain the error(s) the student made in the work.

Use the properties of equality and inverse operations to solve the algebraic equation.

$$52 = 21x$$

What operation is being performed with the variable, x? multiply by 21

What is the inverse of this operation? subtract 21

$$52 = 21x$$

$$-21 \quad -21$$

$$x = 31$$

Write your analysis of this student's work here:

The inverse operation is division not subtraction.

Name: _____

Independent Practice

Score:____ / 12 correct

Use the properties of equality and inverse operations to solve the algebraic equation.

1. $36 = 4y$

_____ $= y$ (2 pts)

What operation is being performed with the variable, y? _____ (1 pt)

What is the inverse of this operation? _____ (1 pt)

2. $\frac{w}{15} = 6$

$w =$ _____ (2 pts)

What operation is being performed with the variable, w? _____ (1 pt)

What is the inverse of this operation? _____ (1 pt)

3. $n + 27 = 57$

$n =$ _____ (2 pts)

What operation is being performed with the variable, n? _____ (1 pt)

What is the inverse of this operation? _____ (1 pt)

Independent Practice Key

Score:____ / 12 correct

Use the properties of equality and inverse operations to solve the algebraic equation.

1. $\frac{36}{4} = \frac{4y}{4}$

$9 = 1y$

$9 = y$ (2 pts)

What operation is being performed with the variable, y? multiply by 4 (1 pt)

What is the inverse of this operation? divide by 4 (1 pt)

2. $15 \cdot \frac{w}{15} = 6 \cdot 15$

$1w = 90$

$w = 90$ (2 pts)

What operation is being performed with the variable, w? divide by 15 (1 pt)

What is the inverse of this operation? multiply by 15 (1 pt)

3. $n + 27 = 57$

$-27 \quad -27$

30

$n = 30$ (2 pts)

What operation is being performed with the variable, n? add 27 (1 pt)

What is the inverse of this operation? subtract 27 (1 pt)

Cumulative Review Practice

Using a graphing calculator, graph the expressions and determine whether the expressions are equivalent. Circle either EQUIVALENT or NOT EQUIVALENT.

1. $1 - 3x + 5 + x - 3$

$-2x + 3$

Graph (2 pts):

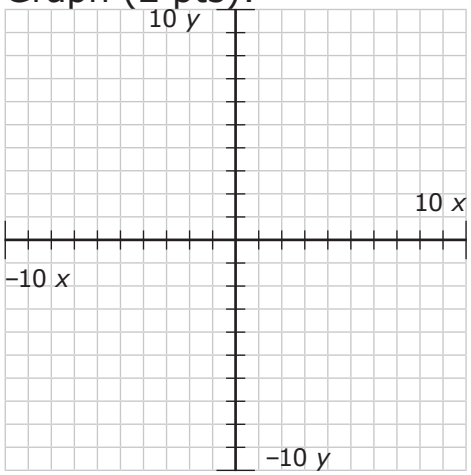


Table (1 pt):

X	Y_1	Y_2

Circle one (2 pts): EQUIVALENT [=] NOT EQUIVALENT [≠]

2. Solve: $3b = 15$ (3 pts.)

$b =$ _____

What operation is being performed on b? _____

The inverse operation is _____

Cumulative Review Practice Key

Score:_____ / 8 correct

Using a graphing calculator, graph the expressions and determine whether the expressions are equivalent. Circle either EQUIVALENT or NOT EQUIVALENT.

1. $1 - 3x + 5 + x - 3$

$-2x + 3$

Graph (2 pts):

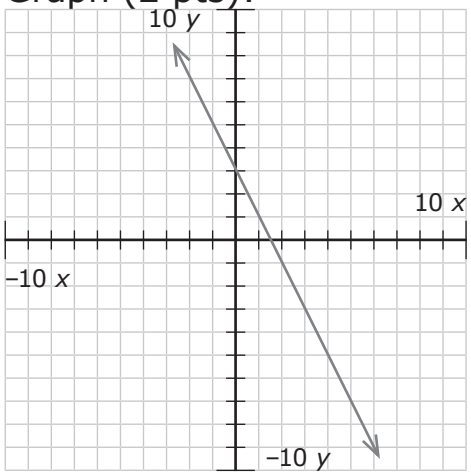


Table (1 pt):

X	Y_1	Y_2
-2	7	7
-1	5	5
0	3	3
1	1	1

Circle one (2 pts): (EQUIVALENT =) NOT EQUIVALENT ≠

2. Solve: $\frac{3b}{3} = \frac{15}{3}$ (3 pts.)

(1 pt) $1b = 5$

$b =$ 5

3(5)=15

What operation is being performed on *b*? multiply by 3 (1pt)

The inverse operation is divide by 3 (1 pt)

Demonstration Practice

Use the properties of equality and inverse operations to solve the algebraic equation.

1. Solve: $2x + 3 = 11$

$x =$ _____

What operations are being performed on the variable, x?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

2. Solve: $3 = \frac{a}{2} - 4$

_____ $= a$

What operations are being performed on the variable, a?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

Demonstration Practice (cont.)

3. Solve: $20 = 3n - 4$

_____ $= n$

What operations are being performed on the variable, n?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

4. Solve: $\frac{k}{4} + 2 = 5$

$k =$ _____

What operations are being performed on the variable, k?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

Demonstration Practice Key

Use the properties of equality and inverse operations to solve the algebraic equation.

1. Solve: $2x + 3 = 11$

$-3 \quad -3$

$\frac{2x}{2} = \frac{8}{2}$

$1x = 4$

$x =$ 4 $\qquad 2(4) + 3 = 11$

What operations are being performed on the variable, *x*?

1st multiply by 2 2nd add 3

What order will you apply the inverse operations?

1st subtract 3 2nd divide by 2

2. Solve: $3 = \frac{a}{2} - 4$

$+4 \quad +4$

$2 \cdot 7 = \frac{a}{2} \cdot 2$

$14 = 1a$

$14 = a$

What operations are being performed on the variable, *a*?

1st divide by 2 2nd subtract 4

What order will you apply the inverse operations?

1st add 4 2nd multiply by 2

Demonstration Practice Key (cont.)

3. Solve: $20 = 3n - 4$

$+4 \quad +4$

$\frac{24}{3} = \frac{3n}{3}$

$8 = 1n$

$8 = n$

What operations are being performed on the variable, *n*?

1st multiply by 3 2nd subtract 4

What order will you apply the inverse operations?

1st add 4 2nd divide by 3

4. Solve: $\frac{k}{4} + 2 = 5$

$-2 \quad -2$

$4 \cdot \frac{k}{4} = 7 \cdot 4$

$1k = 28$

$k = 28$

What operations are being performed on the variable, *k*?

1st divide by 4 2nd add 2

What order will you apply the inverse operations?

1st subtract 2 2nd multiply by 4

Practice

Pair Practice

With a partner, use the properties of equality and inverse operations to solve the algebraic equations. Be prepared to justify your work.

1. Solve: $5 = 3m - 4$

_____ $= m$

What operations are being performed on the variable, m?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

2. Solve: $\frac{p}{3} + 2 = 7$

$p =$ _____

What operations are being performed on the variable, p?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

Practice Key

Pair Practice

With a partner, use the properties of equality and inverse operations to solve the algebraic equations. Be prepared to justify your work.

1. Solve: $5 = 3m - 4$

$+4 \quad +4$

$\frac{9}{3} = \frac{3m}{3}$

$3 = 1m$

$3 = m$

What operations are being performed on the variable, m?

1st multiply by 3 2nd subtract 4

What order will you apply the inverse operations?

1st add 4 2nd divide by 3

2. Solve: $\frac{p}{3} + 2 = 7$

$-2 \quad -2$

$3 \cdot \frac{p}{3} = 5 \cdot 3$

$1p = 15$

$p = 15$

What operations are being performed on the variable, p?

1st divide by 3 2nd add 2

What order will you apply the inverse operations?

1st subtract 2 2nd multiply by 3

Error Correction Practice

With a partner, examine the following work. The given situation is work completed by a student. Explain the error(s) the student made in the work.

Use the properties of equality and inverse operations to solve the algebraic equation.

$$1 = 3x - 14$$

What operations are being performed on the variable, x?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

Error Correction Practice Key

With a partner, examine the following work. The given situation is work completed by a student. Explain the error(s) the student made in the work.

Use the properties of equality and inverse operations to solve the algebraic equation.

$$1 = 3x - 14$$
$$-14 \qquad -14$$
$$-13 = 3x$$

$$-13 \cdot 3 = 3x \cdot 3$$
$$-39 = x$$

What operations are being performed on the variable, x?

1st multiply by 3 2nd subtract 14

What order will you apply the inverse operations?

1st subtract 14 2nd multiply by 3

The students inverse operations were incorrect.

The student should have added 14 then divided by 3.

Name: _____

Independent Practice

Score:____ / 14 correct

Use the properties of equality and inverse operations to solve the algebraic equation.

1. Solve: $11 = \frac{y}{5} + 2$ (7 pts.)

_____ = y

What operations are being performed on the variable, y?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

2. Solve: $6x - 3 = 45$ (7 pts.)

x = _____

What operations are being performed on the variable, x?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

Independent Practice Key

Score:____ / 14 correct

Use the properties of equality and inverse operations to solve the algebraic equation.

1. Solve: $11 = \frac{y}{5} + 2$ (7 pts.)

$-2 \quad -2$

$5 \cdot 9 = \frac{y}{5} \cdot 5$

$45 = 1y$

$45 = y$

What operations are being performed on the variable, *y*?

1st divide by 5 2nd add 2

What order will you apply the inverse operations?

1st subtract 2 2nd multiply by 5

2. Solve: $6x - 3 = 45$ (7 pts.)

$+3 \quad +3$

$\frac{6x}{6} = \frac{48}{6}$

$1x = 8$

$x = 45$

What operations are being performed on the variable, *x*?

1st multiply by 6 2nd subtract 3

What order will you apply the inverse operations?

1st add 3 2nd divide by 6

Cumulative Review Practice

Score:____ / 10 correct

1. Solve: $7 = \frac{b}{4}$ (3 pts.)

$b =$ _____

What operation is being performed on b? _____

The inverse operation is _____

2. Solve: $10 = 6r + 4$ (7 pts.)

_____ $= r$

What operations are being performed on the variable, r?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

Cumulative Review Practice Key

Score:____ / 10 correct

1. Solve: $7 = \frac{b}{4}$ (3 pts.)

$4 \cdot 7 = \frac{b}{4} \cdot 4$

$28 = 1b$

$b =$ 28

Scoring Key
1 pt for solving
2 pts for blanks

What operation is being performed on *b*? divided by 4, ÷ 4

The inverse operation is multiplied by 4, • 4

2. Solve: $10 = 6r + 4$ (7 pts.)

$-4 \quad -4$

$6 = 6r$

$1 = 1r$

$1 = r$

Scoring Key
3 pts for solving
1 pt per blank

What operations are being performed on the variable, *r*?

1st • 6 2nd + 4

What order will you apply the inverse operations?

1st – 4 2nd + 6

Demonstration Practice

1. Solve: $2x + 3 = 5x$

Check using substitution:

2( )+ 3 = 5( )

_____ = x

Collect the variables on 1 side by: _____

What operation is being performed? _____

What is the inverse operation? _____

Questions to ask when solving:

1. _____
2. _____
3. _____

2. Solve: $-9y = -7 + 4$

Check using substitution:

-9( )= -7( )+ 4

y = ____

Collect the variables on 1 side by: _____

Demonstration Practice (cont.)

3. Solve: $2m = 6m + 4$ Check using substitution:

$2(\quad) = 6(\quad) + 4$

$m =$ ____

Collect the variables on 1 side by: _____

4. Solve: $4n - 5 = 3n$ Check using substitution:

$4(\quad) - 5 = 3(\quad)$

_____ $= n$

Collect the variables on 1 side by: _____

Demonstration Practice Key

1. Solve: $2x + 3 = 5x$

$-2x \quad -2x$

$3 = 3x$

$\frac{3}{3} = \frac{3x}{3}$

$1 = 1x$

$1 = x$

Check using substitution:

$2(1) + 3 = 5(1)$

$2 + 3 = 5$

$5 = 5$ *true*

Collect the variables on 1 side by: subtracting $2x$, $-2x$

What operation is being performed? multiply by 3, • 3

What is the inverse operation? divide by 3, ÷ 3

Questions to ask when solving:

1. What operations are being performed on the variable?
2. What inverse operations are needed?
3. What order do we perform the inverse operations?

2. Solve: $-9y = -7 + 4$

$+7y \quad +7y$

$\frac{-2y}{-2} = \frac{4}{-2}$

$1y = -2$

$y = -2$

Check using substitution:

$-9(-2) = -7(-2) + 4$

$18 = 14 + 4$

$18 = 18$ *true*

Collect the variables on 1 side by: add $7y$, $+7y$

Demonstration Practice Key (cont.)

3. Solve: $2m = 6m + 4$

$-6m \quad -6m$

$\frac{-4m}{-4} = \frac{4}{-4}$

$1m = -1$

$m = -1$

Check using substitution:

$2(-1) = 6(-1) + 4$

$-2 = -6 + 4$

$-2 = -2$ *true*

Collect the variables on 1 side by: subtract $6m$, $-6m$

4. Solve: $4n - 5 = 3n$

$-4n \quad -4n$

$\frac{-5}{-1} = \frac{-1n}{-1}$

$5 = 1n$

$5 = n$

Check using substitution:

$4(5) - 5 = 3(5)$

$20 - 5 = 15$

$15 = 15$ *true*

Collect the variables on 1 side by: subtract $4n$, $-4n$

Practice

Pair Practice

With a partner, use the properties of equality and inverse operations to solve the algebraic equations. Check all answers and be prepared to justify your answer.

1. Solve: $2a - 16 = 4a$ Check using substitution:

2( )–16 = 4( )

____ = *a*

Collect the variables on 1 side by: _____

2. Solve: $2c = 3c - 4$ Check using substitution:

2( )= 3( ) – 4

c = ____

Collect the variables on 1 side by: _____

Practice Key

Pair Practice

With a partner, use the properties of equality and inverse operations to solve the algebraic equations. Check all answers and be prepared to justify your answer.

1. Solve: $2a - 16 = 4a$

$-2a \quad -2a$

$\frac{-16}{2} = \frac{2a}{2}$

$-8 = 1a$

$-8 = a$

Check using substitution:

$2(-8)-16 = 4(-8)$

$-16 - 16 = -32$

$-32 = -32$ *true*

Collect the variables on 1 side by: $-2a$

2. Solve: $2c = 3c - 4$

$-3c \quad -3c$

$\frac{-1c}{-1} = \frac{-4}{-1}$

$1c = 4$

$c = 4$

Check using substitution:

$2(4) = 3(4) - 4$

$8 = 12 - 4$

$8 = 8$ *true*

Collect the variables on 1 side by: $-3c$

Error Correction Practice

The given situation is work completed by a student. Explain the error(s) the student made in the work.

$$3a - 5 = 2a$$

Collect the variables on 1 side by: _____

Once the variable is separated–
what operation is being performed? _____

What is the needed inverse operation? _____

$3a - 5 = 2a$

Check using substitution:

3( ) – 5 = 2( )

____ = a

_____

_____

_____

_____

Error Correction Practice Key

The given situation is work completed by a student. Explain the error(s) the student made in the work.

$$3a - 5 = 2a$$

Collect the variables on 1 side by: subtracting $3a$

Once the variable is separated–
what operation is being performed? multiplication

What is the needed inverse operation? divide by +1

$3a - 5 = 2a$
$-3a \quad -3a$
$\frac{-5}{1} = \frac{-1a}{1}$

$-5 = a$

Check using substitution:

$3(-5) - 5 = 2(-5)$
$-15 - 5 = -10$
$-10 = -10$

The student divided by 1 insteading of dividing by -1.

The solution is $a = 5$. In checking the work, the student subtracted incorrectly. -15 – 5 = -20 not -10.

Name: _____

Independent Practice

Score:____ / 14 correct

Use the properties of equality and inverse operations to solve the algebraic equation. Check your answer to justify your work.

1. Solve: $3x - 18 = 6x$ (7 pts) Check using substitution:

3( )– 18 = 4( )

____ = x

Collect the variables on 1 side by: _____

2. Solve: $3r = r + 8$ (7 pts) Check using substitution:

3( ) = ( ) + 8

r = ____

Collect the variables on 1 side by: _____

Independent Practice Key

Score:____ / 14 correct

Use the properties of equality and inverse operations to solve the algebraic equation. Check your answer to justify your work.

1. Solve: $3x - 18 = 6x$ (7 pts)

$-3x \quad -3x$

$\frac{-18}{3} = \frac{3x}{3}$

$-6 = 1x$

$-6 = x$ (4 pts)

Check using substitution:

$3(-6) - 18 = 4(-6)$

$-18 - 18 = -36$

$-36 = -36$ *true* (2 pts)

Collect the variables on 1 side by: $-3x$ (1 pt)

2. Solve: $3r = r + 8$ (7 pts)

$-r \quad -r$

$\frac{-2r}{2} = \frac{8}{2}$

$1r = 4$

$r = 4$ (4 pts)

Check using substitution:

$3(4) = (4) + 8$

$12 = 4 + 8$

$12 = 12$ *true* (2 pts)

Collect the variables on 1 side by: $-r$ (1 pt)

Cumulative Review Practice

Score:____ / 12 correct

1. Solve: $7x - 18 = 10$ (7 pts.)

$x =$ _____

What operations are being performed on the variable, x?

1st _____ 2nd _____

What order will you apply the inverse operations?

1st _____ 2nd _____

2. Solve: $-4x = 3x + 14$ (5 pts) Check using substitution:

-4( ) = 3( ) + 14

$x =$ _____

Collect the variables on 1 side by: _____

Cumulative Review Practice Key

Score:____ / 12 correct

1. Solve: $7x - 18 = 10$ (7 pts.)

$+18 \quad +18$

$\frac{7x}{7} = \frac{28}{7}$

$1x = 4$

$x = 4$

Scoring Key
3 pts for solving
1 pt per blank

What operations are being performed on the variable, x?

1st • 7 2nd – 18

What order will you apply the inverse operations?

1st + 18 2nd ÷ 7

2. Solve: $-4x = 3x + 14$ (5 pts)

$-3x \quad -3x$

$\frac{-7x}{-7} = \frac{14}{-7}$

$1x = -2$

$x = -2$ (3 pts)

Check using substitution:

$-4(-2) = 3(-2) + 14$

$8 = -6 + 14$

$8 = 8$ (1 pt)

Collect the variables on 1 side by: -3x (1 pt)

Demonstration Practice

1. Solve: $2b + 16 = 6b - 8$ Check using substitution:

2( ) + 16 = 6( ) – 8

_____ = *b*

Collect the variables on 1 side by: _____

List operations performed on the variable:

1st _____ 2nd _____

List inverse operations that will be required:

1st _____ 2nd _____

2. Solve: $2b + 16 = 6b - 8$ Check using substitution:

2( ) + 16 = 6( ) – 8

b = _____

Collect the variables on 1 side by: _____

Demonstration Practice (cont.)

3. Solve: $4a - 6 = 5a + 21$

Check using substitution:

2( ) – 6 = 5( ) + 21

_____ = *a*

4. Solve: $-m + 24 = -5m - 40$

Check using substitution:

-( ) + 24 = -5( ) – 40

m = _____

Demonstration Practice Key

1. Solve: $2b + 16 = 6b - 8$

$-2b \quad -2b$

$16 = 4b - 8$

$+8 \quad +8$

$\frac{24}{4} = \frac{4b}{4}$

$6 = 1b$

$6 = b$

Check using substitution:

$2(6) + 16 = 6(6) - 8$

$12 + 16 = 36 - 8$

$28 = 28$ *true*

Collect the variables on 1 side by: subtracting $2b$

List operations performed on the variable:

1st $\cdot 4$ 2nd $- 8$

List inverse operations that will be required:

1st $+ 8$ 2nd $\div 4$

2. Solve: $2b + 16 = 6b - 8$

$-6b \quad -6b$

$-4b + 16 = -8$

$-16 \quad -16$

$\frac{-4b}{-4} = \frac{-24}{-4}$

$1b = 6$

$b = 6$

Check using substitution:

$2(6) + 16 = 6(6) - 8$

$12 + 16 = 36 - 8$

$28 = 28$ *true*

Collect the variables on 1 side by: subtracting $6b$

Demonstration Practice Key (cont.)

3. Solve: $4a - 6 = 5a + 21$

$-4a \quad -4a$

$-6 = 1a + 21$

$-6 = a + 21$

$-21 \quad -21$

$-27 = a$

$-27 = a$

Check using substitution:

$2(-27) - 6 = 5(-27) + 21$

$-108 - 6 = -135 + 21$

$-114 = -114$ *true*

4. Solve: $-m + 24 = -5m - 40$

$+5m \quad +5m$

$4m + 24 = -40$

$-24 \quad -24$

$\frac{4m}{4} = \frac{-64}{4}$

$1m = -16$

$m = -16$

Check using substitution:

$-(-16) + 24 = -5(-16) - 40$

$16 + 24 = 80 - 40$

$40 = 40$ *true*

Practice

Pair Practice

With a partner, discuss the process and solve the algebraic equations using inverse operation. Each partner will be labeled, one A and the other B. Alternate the steps to solve the equations.

1. Solve: $-1p - 27 = 2p - 9$ $+1p \quad +1p$ $-27 = 3p - 9$	*Example*
$-27 = 3p - 9$	Partner A
	Partner B
Check solution:	Partner A
Answer:	Partner B

2. Solve: $7x - 6 = 4x + \underline{18}$	Partner A
	Partner B
	Partner A
Check solution:	Partner B
Answer:	Partner A

Practice Key

Pair Practice

With a partner, discuss the process and solve the algebraic equations using inverse operation. Each partner will be labeled, one A and the other B. Alternate the steps to solve the equations.

1. Solve: $-1p - 27 = 2p - 9$ $+1p \quad +1p$ $-27 = 3p - 9$	*Example*
$-27 = 3p - 9$ $+9 \quad +9$ $-18 = 3p$	Partner A
$\frac{-18}{3} = \frac{3p}{3}$ $-6 = 1p$	Partner B
Check solution: $-1(-6) - 27 = 2(-6) - 9$ $6 - 27 = -12 - 9$ $-21 = -21$ *true*	Partner A
Answer: $p = -6$	Partner B

2. Solve: $7x - 6 = 4x + 18$ $-4x \quad -4x$ $3x - 6 = 18$	Partner A
$3x - 6 = 18$ $+6 \quad +6$ $3x = 24$	Partner B
$\frac{3x}{3} = \frac{24}{3}$ $1x = 8$	Partner A
Check solution: $7(8) - 6 = 4(8) + 18$ $56 - 6 = 32 + 18$ $50 = 50$ *true*	Partner B
Answer: $x = 8$	Partner A

Error Correction Practice

The given situation is work completed by a student. Explain the error(s) the student made in the work.

Solve: $-7x - 6 = 4x + 9$

Collect the variables on 1 side by: _____

List operations performed on the variable:

1st _____ 2nd _____

List inverse operations that will be required:

1st _____ 2nd _____

$-7x - 6 = 4x + 9$

Check using substitution:

$-7(\quad) - 6 = 4(\quad) + 9$

_____ $= x$

_____

_____

_____

_____

Error Correction Practice Key

The given situation is work completed by a student. Explain the error(s) the student made in the work.

Solve: $-7x - 6 = 4x + 9$

Collect the variables on 1 side by: subtracting $7x$

List operations performed on the variable:

1st • 3 2nd + 9

List inverse operations that will be required:

1st − 9 2nd ÷ 3

$-7x - 6 = 4x + 9$
$-7x \quad -7x$
$6 = 3x + 9$
$-9 \quad -9$
$\frac{-3}{3} = \frac{3x}{3}$

$-1 = x$

Check using substitution:

$-7(-1) - 6 = 4(-1) + 9$
$1 = 5$

The student should have added $7x$ to collect variables on the right side. The checking proves there was an error in solving because $1 = 5$ is not a true statement.

Name: _____

Independent Practice

Score:____ / 15 correct

Use the properties of equality and inverse operations to solve the algebraic equation. Check your answer to justify your work.

1. Solve: $-2r + 15 = 2r - 5$ (5 pts) Check using substitution:

$-2(\quad) + 15 = 2(\quad) - 5$

_____ $= r$

2. Solve: $4z + 11 = z + 29$ (5 pts) Check using substitution:

$4(\quad) + 11 = (\quad) + 29$

$z =$ _____

3. Solve: $-6b - 20 = -3b - 11$ (5 pts) Check using substitution:

$-6(\quad) - 20 = -3(\quad) - 11$

_____ $= b$

Independent Practice Key

Score:_____ / 15 correct

Use the properties of equality and inverse operations to solve the algebraic equation. Check your answer to justify your work.

1. Solve: $-2r + 15 = 2r - 5$ (5 pts)

$+2r \quad +2r$

$15 = 4r - 5$

$+5 \quad +5$

$\frac{20}{4} = \frac{4r}{4}$

$5 = 1r$

$5 = r$ (4 pts)

Check using substitution:

$-2(5) + 15 = 2(5) - 5$

$-10 + 15 = 10 - 5$

$5 = 5$ *true*

(1 pt)

2. Solve: $4z + 11 = z + 29$ (5 pts)

$-z \quad -z$

$3z + 11 = 29$

$-11 \quad -11$

$\frac{3z}{3} = \frac{18}{3}$

$1z = 6$

$z = 6$ (4 pts)

Check using substitution:

$4(6) + 11 = (6) + 29$

$24 + 11 = 6 + 29$

$35 = 35$ *true*

(1 pt)

3. Solve: $-6b - 20 = -3b - 11$ (5 pts)

$+6b \quad +6b$

$-20 = 3b - 11$

$+11 \quad +11$

$\frac{-9}{3} = \frac{3b}{3}$

$-3 = 1b$

$-3 = b$ (4 pts)

Check using substitution:

$-6(-3) - 20 = -3(-3) - 11$

$18 - 20 = 9 - 11$

$-2 = -2$ *true*

(1 pt)

Cumulative Review Practice

Score:____ / 9 correct

1. Solve: $8x = 6x - 16$ (4 pts) Check using substitution:

$8(\quad) = 6(\quad) - 16$

$x =$ _____

2. Solve: $v + 8 = 3v - 4$ (5 pts) Check using substitution:

$(\quad) + 8 = 3(\quad) - 4$

_____ $= v$

Cumulative Review Practice Key

Score:____ / 9 correct

1. Solve: $8x = 6x - 16$ (4 pts)

$-6x \quad -6x$

$\frac{2x}{2} = \frac{-16}{2}$

$1x = -8$

$x = -8$ (3 pts)

Check using substitution:

$8(-8) = 6(-8) - 16$

$-64 = -48 - 16$

$-64 = -64$ *true* (1 pt)

2. Solve: $v + 8 = 3v - 4$ (5 pts)

$-v \quad -v$

$8 = 2v - 4$

$+4 \quad +4$

$\frac{12}{2} = \frac{2v}{2}$

$6 = 1v$

$6 = v$ (4 pts)

Check using substitution:

$(6) + 8 = 3(6) - 4$

$6 + 8 = 18 - 4$

$14 = 14$ *true* (1 pt)

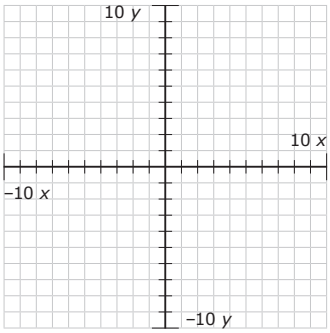
Demonstration Practice

1. Solve: $x - 6 = 3x - 4$ $Y_1 =$ _____ $Y_2 =$ _____

1 – Use ◊ to enter the expressions into the calculator
(remember to make the second graph bold)

2 – Press GRAPH to see if and where the two expressions are equal.

3 – Sketch what you see here:



Estimated ordered pair of intersection _____

4 – Press 2nd and then TRACE to access the "CALC" menu.
Select option 5:intersect.
Answer the questions posed by the calculator by pressing ENTER.

Calculated ordered pair of intersection _____

5 – Use the table to verify – press 2nd and GRAPH

Fill in the table here using what is displayed on your calculator:

X	Y_1	Y_2
-3		
-2		
-1		
0		
1		

What do you notice about the relationship between the *y*-values in each column?

_____

_____

_____

6 – Check using substitution:
( ) – 6 = 3( ) – 4

Solution: $x =$ _____

Demonstration Practice (cont.)

2. Solve: $-2b + 8 = 6b - 8$

Y_1 = _____

Y_2 = _____

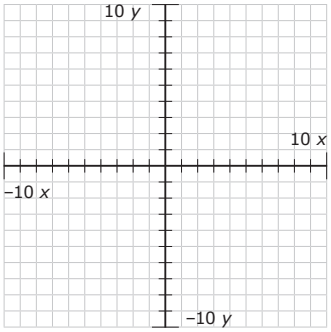
Estimated Ordered Pair:

_____

Calculated Ordered Pair:

_____

Sketch the graph:



Fill in the table:

X	Y_1	Y_2
0		
1		
2		
3		
4		

Circle the row where $Y_1 = Y_2$

In the graph and the table,

x = _____

therefore b must equal: _____

Check using substitution:

-2( ) + 8 = 6( ) – 8

Solution:

b = _____

3. Solve: $3a + 3 = 5a + 1$

Y_1 = _____

Y_2 = _____

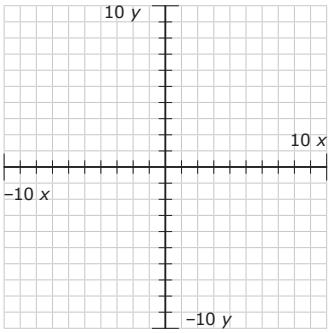
Estimated Ordered Pair:

_____

Calculated Ordered Pair:

_____

Sketch the graph:



Fill in the table:

X	Y_1	Y_2
-1		
0		
1		
2		
3		

Circle the row where $Y_1 = Y_2$

In the graph and the table,

x = _____

therefore a must equal: _____

Check using substitution:

3( ) + 3 = 5( ) + 1

Solution:

a = _____

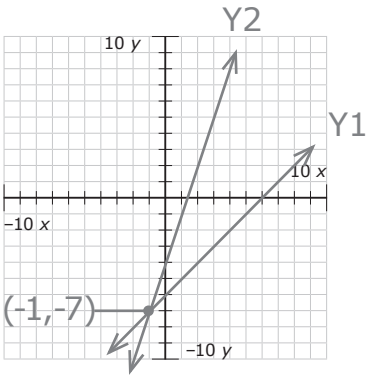
Demonstration Practice Key

1. Solve: $x - 6 = 3x - 4$ $Y_1 =$ *x – 6* $Y_2 =$ *3x – 4*

1 – Use ◊ to enter the expressions into the calculator
(remember to make the second graph bold)

2 – Press GRAPH to see if and where the two expressions are equal.

3 – Sketch what you see here:



Estimated ordered pair of intersection *answers will vary*

4 – Press 2nd and then TRACE to access the "CALC" menu.
Select option 5:intersect.
Answer the questions posed by the calculator by pressing ENTER.

Calculated ordered pair of intersection *(-1, -7)*

5 – Use the table to verify – press 2nd and GRAPH

Fill in the table here using what is displayed on your calculator:

X	Y_1	Y_2
-3	-9	-13
-2	-8	-10
-1	-7	-7
0	-6	-4
1	-5	-1

What do you notice about the relationship between the *y*-values in each column?

When x = -1, then Y_1 is equal to Y_2.

If x = -1, $Y_1 = Y_2$.

When x = -1, then x – 6 = 3x – 4.

6 – Check using substitution:
(-1) – 6 = 3(-1) – 4
-1 – 6 = -3 – 4
-7 = -7 *true*

Solution: *x* = *-1*

Demonstration Practice Key (cont.)

2. Solve: $-2b + 8 = 6b - 8$ (Y1 = $-2b + 8$, Y2 = $6b - 8$)

Y_1 = -2x + 8

Y_2 = 6x – 8

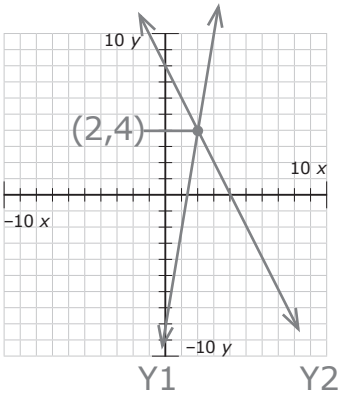
Estimated Ordered Pair:

answers will vary

Calculated Ordered Pair:

(2, 4)

Sketch the graph:



Fill in the table:

X	Y_1	Y_2
0	8	-8
1	6	-2
2	4	4
3	2	10
4	0	16

Circle the row where $Y_1 = Y_2$

In the graph and the table,

x = 2

therefore *b* must equal: 2

Check using substitution:

-2(2) + 8 = 6(2) – 8
-4 + 8 = 12 – 8
4 = 4 *true*

Solution:

b = 4

3. Solve: $3a + 3 = 5a + 1$ (Y1 = $3a + 3$, Y2 = $5a + 1$)

Y_1 = 3x + 3

Y_2 = 5x + 1

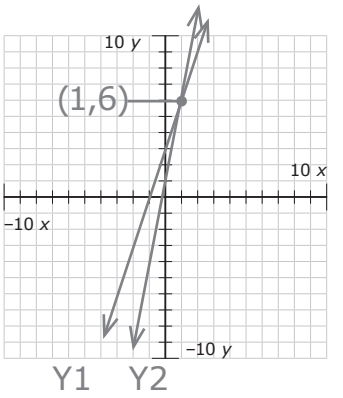
Estimated Ordered Pair:

answers will vary

Calculated Ordered Pair:

(1, 6)

Sketch the graph:



Fill in the table:

X	Y_1	Y_2
-1	0	-4
0	3	1
1	6	6
2	9	11
3	12	16

Circle the row where $Y_1 = Y_2$

In the graph and the table,

x = 1

therefore *a* must equal: 1

Check using substitution:

3(1) + 3 = 5(1) + 1
3 + 3 = 5 + 1
6 = 6 *true*

Solution:

a = 1

Practice

Guided Practice

Solve each equation using the indicated method.

1. Solve using the table:

$-1p - 27 = 2p - 9$

Y_1 = _____

Y_2 = _____

Circle the row where $Y_1 = Y_2$

According to this row in the table, x = _____

therefore p must equal: _____

Fill in the table:

X	Y_1	Y_2
-8		
-7		
-6		
-5		
-4		

Solution:

p = _____

Check using substitution:

-1( ) – 27 = 2( ) – 9

2. Solve using a graph:

$4n - 7 = -4n + 9$

Y_1 = _____

Y_2 = _____

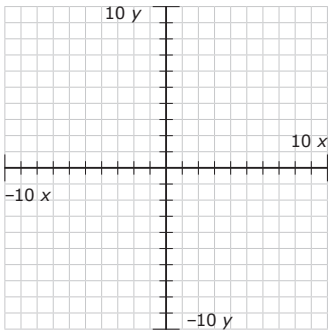
Estimated ordered pair _____ *

Calculated ordered pair _____

According to intersection of the graphs, x = _____,

therefore n must equal: _____

Sketch the graphs here:



Solution:

n = _____

Check using substitution:

4( ) – 7 = -4( ) + 9

Practice (cont.)

Pair Practice

With a partner, solve each equation using the indicated method. Be prepared to justify your answer.

1. Solve using the table:

$-4u - 7 = 4u + 9$

Y_1 = _____

Y_2 = _____

According to the table, the solution is when x = _____

therefore u must equal: _____

Fill in the table:

X	Y_1	Y_2
-4		
-3		
-2		
-1		
0		

Check using substitution:

-4( ) – 7 = 4( ) + 9

Solution:

u = _____

2. Solve using a graph:

$3w + 2 = -9w + 2$

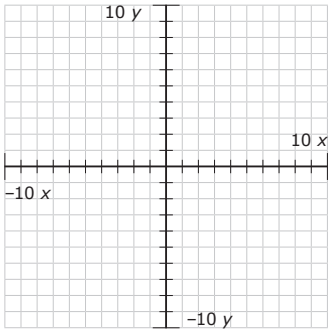
Y_1 = _____

Y_2 = _____

According to intersection of the graphs, x = _____,

therefore w must equal: _____

Sketch the graphs here:



Check using substitution:

3( ) + 2 = -9( ) + 2

Solution:

w = _____

Practice Key

Guided Practice

Solve each equation using the indicated method.

1. Solve using the table:

$\overset{Y1}{-1p - 27} = \overset{Y2}{2p - 9}$

Y_1 = -1x – 27

Y_2 = 2x – 9

Circle the row where $Y_1 = Y_2$

According to this row in the table, x = -6

therefore p must equal: -6

Fill in the table:

X	Y_1	Y_2
-8	-19	-25
-7	-20	-23
-6	-21	-21
-5	-22	-19
-4	-23	-17

Solution:

p = -6

Check using substitution:

-1(-6) – 27 = 2(-6) – 9
6 – 27 = -12 – 9
-21 = -21 *true*

2. Solve using a graph:

$\overset{Y1}{4n - 7} = \overset{Y2}{-4n + 9}$

Y_1 = 4x – 7

Y_2 = -4x + 9

Estimated ordered pair *

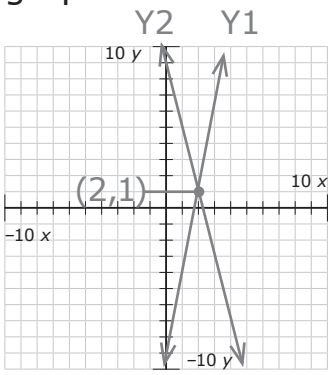
Calculated ordered pair (2, 1)

According to intersection of the graphs, x = 2,

therefore n must equal: 2

*answers will vary

Sketch the graphs here:



Solution:

n = 2

Check using substitution:

4(2) – 7 = -4(2) + 9
8 – 7 = -8 + 9
1 = 1 *true*

Practice Key (cont.)

Pair Practice

With a partner, solve each equation using the indicated method. Be prepared to justify your answer.

1. Solve using the table:

$-4u - 7 = 4u + 9$ ($Y1$ = $-4u - 7$, $Y2$ = $4u + 9$)

$Y_1 =$ $-4x - 7$

$Y_2 =$ $4x + 9$

According to the table, the solution is when $x =$ -2

therefore u must equal: -2

Fill in the table:

X	Y_1	Y_2
-4	9	-7
-3	5	-3
-2	1	1
-1	-3	5
0	-7	9

Solution:

$u =$ -2

Check using substitution:

$-4(-2) - 7 = 4(-2) + 9$
$8 - 7 = -8 + 9$
$1 = 1$ *true*

2. Solve using a graph:

$3w + 2 = -9w + 2$ ($Y1$ = $3w + 2$, $Y2$ = $-9w + 2$)

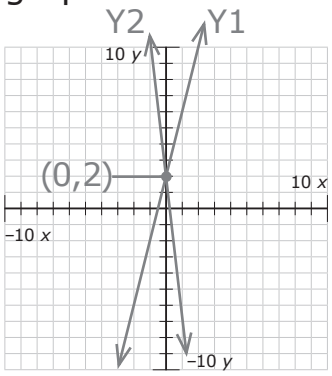
$Y_1 =$ $3x + 2$

$Y_2 =$ $-9x + 2$

According to intersection of the graphs, $x =$ 0,

therefore w must equal: 0

Sketch the graphs here:



Solution:

$w =$ 0

Check using substitution:

$3(0) + 2 = -9(0) + 2$
$0 + 2 = 0 + 2$
$2 = 2$ *true*

Name: _____

Independent Practice

Score:____ / 14 correct

Solve each equation using the indicated method.

1. Solve using the table: (7 pts.)

$5x - 4 = -2x - 4$

Y_1 = _____

Y_2 = _____

Fill in the table:

X	Y_1	Y_2
-2		
-1		
0		
1		
2		

According to the table, the solution is when x = _____

therefore x must equal: _____

Check using substitution:

5( ) – 4 = -2( ) – 4

Solution:

x = _____

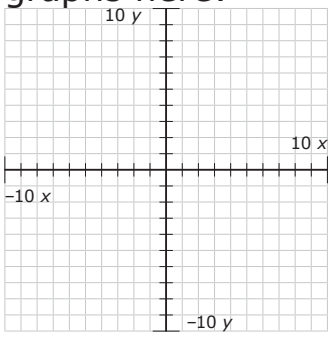
2. Solve using a graph: (7 pts.)

$2c + 4 = -2c - 4$

Y_1 = _____

Y_2 = _____

Sketch the graphs here:



According to intersection of the graphs, x = _____,

therefore c must equal: _____

Check using substitution:

2( ) + 4 = -2( ) – 4

Solution:

c = _____

Independent Practice Key

Score:____ / 14 correct

Solve each equation using the indicated method.

1. Solve using the table: (7 pts.)

Y1 Y2
$5x - 4 = -2x - 4$

Y_1 = $5x - 4$

Y_2 = $-2x - 4$ (1 pt)

Fill in the table:

X	Y_1	Y_2
-2	-14	0
-1	-9	-2
0	-4	-4
1	1	-6
2	6	-8

(2 pts)

According to the table, the solution is when x = 0

therefore x must equal: 0 (1 pt)

Check using substitution:

$5(0) - 4 = -2(0) - 4$
$0 - 4 = 0 - 4$
$-4 = -4$ *true*
(2 pts)

Solution:

x = 0 (1 pt)

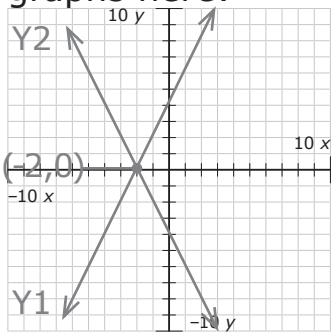
2. Solve using a graph: (7 pts.)

Y1 Y2
$2c + 4 = -2c - 4$

Y_1 = $2x + 4$

Y_2 = $-2x - 4$ (1 pt)

Sketch the graphs here:



(2 pts)

According to intersection of the graphs, x = -2,

therefore c must equal: -2 (1 pt)

Check using substitution:

$2(-2) + 4 = -2(-2) - 4$
$-4 + 4 = 4 - 4$
$0 = 0$ *true*
(2 pts)

Solution:

c = -2 (1 pt)

Cumulative Review Practice

Score:____ / 20 correct

1. Solve: $2r + 7 = 8r + 19$ (5 pts)

Check using substitution:

2( ) + 7 = 8( ) + 19

_____ = *r*

2. Solve using the table: (7 pts.)

$2p - 7 = 3p + 1$

X	Y_1	Y_2
-11		
-10		
-9		
-8		
-7		

Y_1 = _____

Y_2 = _____

According to the table, the solution is when *x* = _____

therefore *p* must equal: _____

Check using substitution:

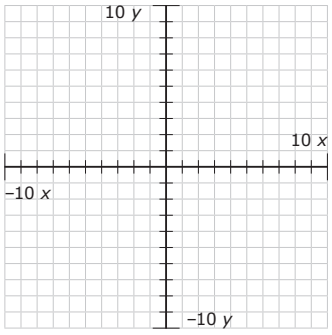
2( ) – 7 = 3( ) + 1

Solution:

p = _____

3. Solve using a graph: (8 pts.)

$2q + 4 = -3q - 1$



Y_1 = _____

Y_2 = _____

According to intersection of the graphs, *x* = _____,

therefore *q* must equal: _____

Check using substitution:

2( ) + 4 = -3( ) – 1

Solution:

q = _____

Cumulative Review Practice Key

Score:____ / 20 correct

1. Solve: $2r + 7 = 8r + 19$ (5 pts)

$-2r \quad -2r$

$7 = 6r + 19$

$-19 \quad -19$

$\frac{-12}{6} = \frac{6r}{6}$

$-2 = 1r$

$-2 = r$ (4 pts)

Check using substitution:

$2(-2) + 7 = 8(-2) + 19$

$-4 + 7 = -16 + 19$

$3 = 3$ *true*

(1 pt)

2. Solve using the table: (7 pts.)

$2p - 7 = 3p + 1$

$Y_1 =$ $2x - 7$

$Y_2 =$ $3x + 1$ (1 pt)

X	Y_1	Y_2
-11	-29	-32
-10	-27	-29
-9	-25	-26
-8	-23	-23
-7	-21	-20

(2 pts)

According to the table, the solution is when $x =$ -8

therefore p must equal: -8 (2 pts)

Check using substitution:

$2(-8) - 7 = 3(-8) + 1$

$-16 - 7 = -24 + 1$

$-23 = -23$ *true*

(1 pt)

Solution:

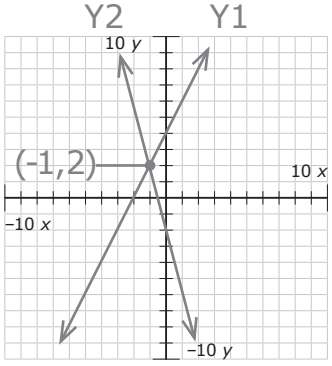
$p =$ -8 (1 pt)

3. Solve using a graph: (8 pts.)

$2q + 4 = -3q - 1$

$Y_1 =$ $2x + 4$

$Y_2 =$ $-3x - 1$ (2 pts)



(2 pts)

According to intersection of the graphs, $x =$ -1,

therefore q must equal: -1 (2 pts)

Check using substitution:

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

$-2 + 4 = 3 - 1$

$2 = 2$ *true*

(1 pt)

Solution:

$q =$ -1 (1 pt)

Demonstration Practice

1. Solve using **Algebra:**

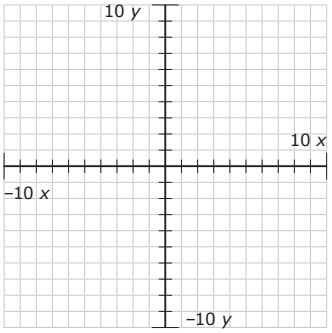
$2x + 3 = 9$

$x =$ _____

Check using subsitution:

2( ) + 3 = 9

Use **Graphs:**



Intersection_____

Use **Tables:**

X	Y_1	Y_2
-1		
0		
1		
2		
3		

Which of the 3 methods is the most direct for solving problems like this?

(Which method required the fewest number of steps?)_____

2. Solve using **Algebra:**

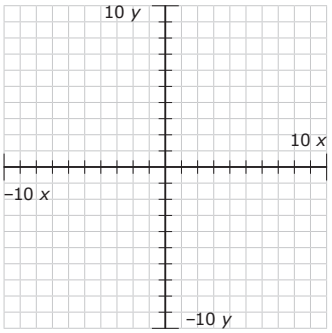
$4b - 21 = b + 9$

$b =$ _____

Check using subsitution:

4( ) – 21 = ( ) + 9

Use **Graphs:**



Intersection

_____

Use **Tables:**

X	Y_1	Y_2

Which of the 3 methods is the most direct for solving problems like this equation?

_____

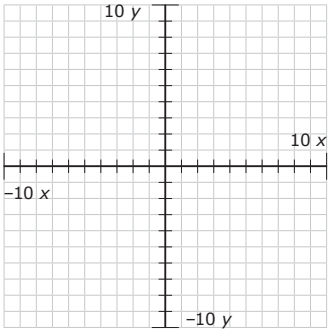
Demonstration Practice (cont.)

3. Solve using **Algebra:**

$-1m - 2 = 3m + 10$

_____ = *m*

Use **Graphs:**



Use **Tables:**

X	Y_1	Y_2

Check using subsitution:

-1( ) – 2 = 3( ) + 10

Intersection_____

Which of the 3 methods is the most direct

for solving problems like this equation?_____

Demonstration Practice Key

1. Solve using **Algebra:**

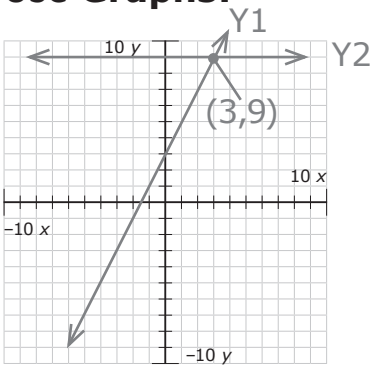
Y1 Y2
$2x + 3 = 9$
$-3 \quad -3$
$\frac{2x}{2} = \frac{6}{2}$
$1x = 3$

$x = 3$

Check using subsitution:

$2(3) + 3 = 9$
$6 + 3 = 9$
$9 = 9$ *true*

Use **Graphs:**



Intersection (3, 9)

Use **Tables:**

X	Y_1	Y_2
-1	1	9
0	3	9
1	5	9
2	7	9
3	9	9

Which of the 3 methods is the most direct for solving problems like this?

(Which method required the fewest number of steps?) algebraic

2. Solve using **Algebra:**

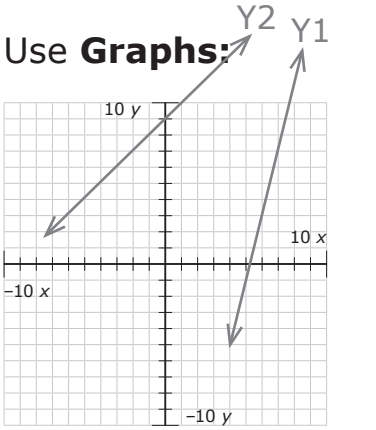
Y1 Y2
$4b - 21 = b + 9$
$-b \quad -b$
$3b - 21 = 9$
$+21 \quad +21$
$\frac{3b}{3} = \frac{30}{3}$
$1b = 10$

$b = 10$

Check using subsitution:

$4(10) - 21 = (10) + 9$
$40 - 21 = 10 + 9$
$19 = 19$ *true*

Use **Graphs:**



Intersection

greater than $x = 5$

Use **Tables:**

X	Y_1	Y_2
6	3	15
7	7	16
8	11	17
9	15	18
10	19	19

Which of the 3 methods is the most direct for solving problems like this equation?

answers will vary, algebraic or tables are most likely

Demonstration Practice Key (cont.)

3. Solve using **Algebra:**

Y1 = Y2

$-1m - 2 = 3m + 10$

$+1m \quad +1m$

$-2 = 4m + 10$

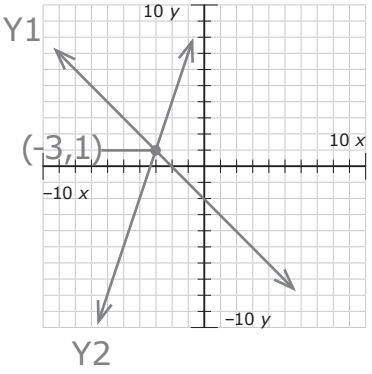
$-10 \quad -10$

$\frac{-12}{4} = \frac{4m}{4}$

$-3 = 1m$

$-3 = m$

Use **Graphs:**



Use **Tables:**

X	Y_1	Y_2
-6	4	-8
-5	3	-5
-4	2	-2
-3	1	1
-2	0	4

Check using subsitution:

$-1(-3) - 2 = 3(-3) + 10$

$3 - 2 = -9 + 10$

$1 = 1$ *true*

Intersection (-3, 1)

Which of the 3 methods is the most direct

for solving problems like this equation? answers will vary

Practice

Guided Practice

For each of the following, list your preferred method and justify your reasoning.

1. $6r = 2r + 16$

Method: _____

Reason: _____

2. $6r = 18$

Method: _____

Reason: _____

3. $-6r - 8 = 2r + 16$

Method: _____

Reason: _____

4. $4 = 2r + 8$

Method: _____

Reason: _____

Practice (cont.)

Pair Practice

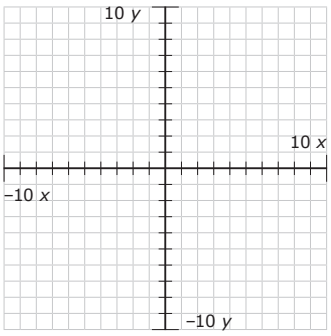
Solve each of the following using the method you selected on the previous page.

1. $6r = 2r + 16$ $r =$ _____ Check:
$6(\quad) = 2(\quad) + 16$

X	Y_1	Y_2

2. $6r = 18$ $r =$ _____ Check:
$6(\quad) = 18$

3. $-6r - 8 = 2r + 16$ $r =$ _____ Check:
$-6(\quad) - 8 = 2(\quad) + 16$



4. $4 = 2r + 8$ $r =$ _____ Check:
$4 = 2(\quad) + 8$

Practice Key

Guided Practice

For each of the following, list your preferred method and justify your reasoning.

1. $6r = 2r + 16$

Method: algebraic, table

Reason: 2 steps to solve algebraically, 3 steps to solve with table

2. $6r = 18$

Method: algebraic

Reason: 1 step to solve

3. $-6r - 8 = 2r + 16$

Method: graph

Reason: intersection point is shown in graph.

4. $4 = 2r + 8$

Method: algebraic

Reason: 2 steps to solve.

Practice Key (cont.)

Pair Practice

Solve each of the following using the method you selected on the previous page.

1. $6r = 2r + 16$

$r =$ 4

Check:
6 (4) = 2(4) + 16
24 = 8 + 16
24 = 24 *true*

X	Y_1	Y_2
1	6	18
2	12	20
3	18	22
4	24	24
5	30	26

2. $\frac{6r}{6} = \frac{18}{6}$
$1r = 3$
$r = 3$

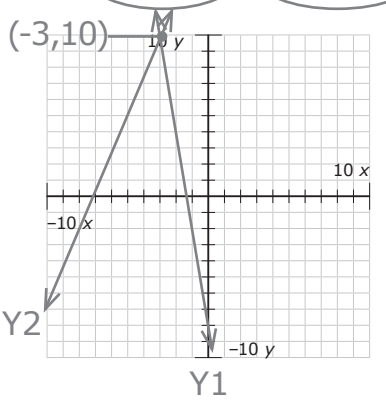
$r =$ 3

Check:
6 (3) = 18
18 = 18 *true*

3. Y1 $-6r - 8 =$ Y2 $2r + 16$

$r =$ -3

Check:
-6 (-3) – 8 = 2(-3) + 16
18 – 8 = -6 + 16
10 = 10 *true*



4. $4 = 2r + 8$
$\frac{-8}{} \quad \frac{}{-8}$
$\frac{-4}{2} = \frac{2r}{2}$
$-2 = 1r$
$-2 = r$

$r =$ -2

Check:
4 = 2(-2) + 8
4 = -4 + 8
4 = 4 *true*

Name: _____

Independent Practice

Score:____ / 12 correct

Solve each of the following. First select a method and explain your reasoning, then use the method you selected to obtain a solution.

1. $4x = 2x - 4$ (4 pts.) Method: _____

Reason: _____

show your work/graph/table here: Check: 4( ) = 2( ) – 4

Solution: $x =$ _____

2. $7x - 4 = 10$ (4 pts.) Method: _____

Reason: _____

show your work/graph/table here: Check: 7( ) – 4 = 10

Solution: $x =$ _____

3. $3x - 2 = x + 8$ (4 pts.) Method: _____

Reason: _____

show your work/graph/table here: Check: 3( ) – 2 = ( ) + 8

Solution: $x =$ _____

Independent Practice Key

Score:____ / 12 correct

Solve each of the following. First select a method and explain your reasoning, then use the method you selected to obtain a solution.

1. $4x = 2x - 4$ (4 pts.) Method: answers will vary.

Reason: answers will vary.

Show your work/graph/table here: Check: $4(-2) = 2(-2) - 4$

$-8 = -4 - 4$

$-8 = -8$ *true*

Solution: $x =$ -2

2. $7x - 4 = 10$ (4 pts.) Method: answers will vary.

Reason: answers will vary.

Show your work/graph/table here: Check: $7(2) - 4 = 10$

$14 - 4 = 10$

$10 = 10$ *true*

Solution: $x =$ 2

3. $3x - 2 = x + 8$ (4 pts.) Method: answers will vary.

Reason: answers will vary.

Show your work/graph/table here: Check: $3(5) - 2 = (5) + 8$

$15 - 2 = 5 + 8$

$13 = 13$ *true*

Scoring Key:
1 pt for method & reason
2 pts for work
1 pt for solution

Solution: $x =$ 5