

U3 – Patterns

Name: _____

Instructions:

Using a pencil, complete the following questions as you work through the related lessons. Show ALL work as is explained in the lessons. Do your best and ask questions if you don't understand anything!

3.1 Reviewing Operations with Integers

1. Write the answers

a.	$(+14) - (+9) =$	b.	$(-6) + (+10) =$	c.	$(0) + (-9) =$
d.	$(-24) + (+14) =$	e..	$(+14) + (+9) =$	f.	$(+5) - (+3) =$
g.	$(+6) + (-25) =$	h.	$(+21) - (+3) =$	i.	$(-4) - (-9) =$
j.	$(-44) - (-19) =$	k.	$(+6) + (-13) =$	l.	$(+14) - (-4) =$
m.	$(+1) + (+24) =$	n.	$(+17) + (+14) =$	o.	$(+21) + (+21) =$

2. Write the answers

a.	$(-6) \times (-2) =$	b.	$(-4) \times (-6) =$	c.	$56 \div (-14) =$
d.	$4 \times (-6) =$	e..	$7 \times (-2) =$	f.	$72 \div (-12) =$
g.	$(-10) \times 3 =$	h.	$18 \times (-3) =$	i.	$(-12) \div 3 =$
j.	$5 \times (-12) =$	k.	$(-6) \times (-14) =$	l.	$16 \div (-8) =$
m.	$64 \div (-8) =$	n.	$(-48) \div (-12) =$	o.	$(-27) \div (-27) =$

3.2 Order of Operations with Integers

Complete. Show all steps.

1.	$(-37) - 5 \times 2$	2.	$30 - [11 \times (-6)] + 46$
3.	$10 + (-42) - 6 \times 2$	4.	$(-7) + (35 - 5)$
5.	$(-7) + (-34) \times (-2)$	6.	$42 \div (-7) + 5$
7.	$(-3) - (-5)^2$	8.	$\frac{-24 - 16 \times (-1)}{6^2 \div 9}$

Add brackets (parenthesis) to make the following equations true.

9.	$4 + 7 \times 3 = 33$	10.	$4 + 7 \times 3 = 25$
11.	$6 \times (-4) \div 4 + 7 = 1$	12.	$14 - 6 \div (-2) + 5 = 1$

13. Garth completed this expression as shown:

$$\begin{aligned} & (-20) \div 5 - (2 \times 3) \\ & = (-20) \div 5 - 6 = (-20) \div (-1) = 20 \end{aligned}$$

Is this solution correct? If yes, explain the steps Garth used. If no, what error did Garth make and what is the correct answer? Show your work.

14. Maria completed this expression as shown:

$$\begin{aligned} & 6 - (-2) + [3 \times (-3)] \\ & = 6 - (-2) + (-9) = 6 - (-11) = 17 \end{aligned}$$

Is this solution correct? If yes, explain the steps Maria used. If not, what error did Maria make and what is the correct answer? Show your work.

5.3 Variables

Evaluate each expression. Show all steps.

1.	$3x + y$ $x = -3, y = 2$	2.	$4fgh + 5$ $f = -1, g = 2, h = 3$
3.	$-2s - t$ $s = -5, t = 2$	4.	$-8x + 3y$ $x = 4, y = -2$

5.	$3a - 2b + c$ $a = 5, b = 3, c = 7$	6.	$12(s + t)$ $s = -4, t = 2$

3.4 Table of Values

Complete each table and describe the pattern in words. Write an equation that you could use to calculate the value of y from the value of x. Write out the ordered pairs.

1.

x	y
1	2
2	3
3	4
4	5
5	
6	
7	

Pattern: _____

Equation: _____

Ordered Pairs: _____

2.

x	y
2	0
3	1
4	2
5	3
6	
7	
8	

Pattern: _____

Equation: _____

Ordered Pairs: _____

3.

x	y
1	3
2	5
3	7
4	9
5	
6	
7	

Pattern: _____

Equation: _____

Ordered Pairs: _____

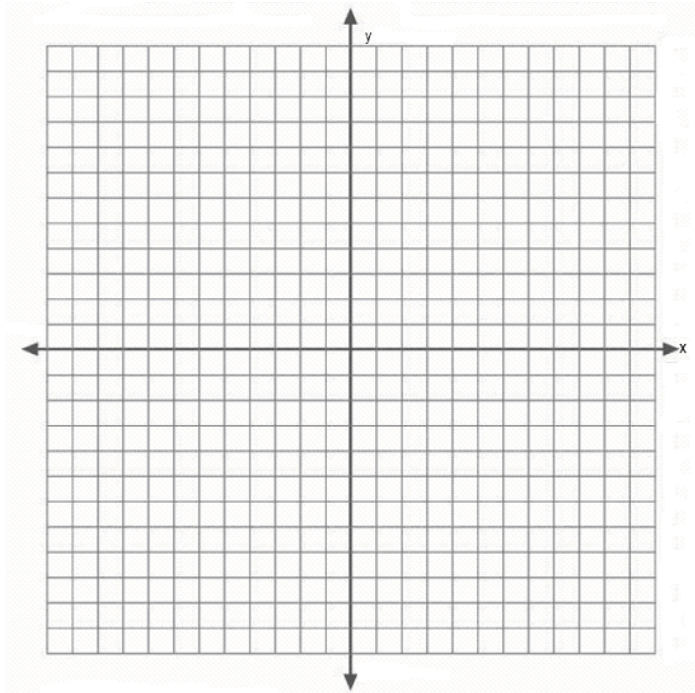
3.5 Graphing Linear Relations

Describe the relation in words and create a table of values and graph the following relations.

1. $y = x - 5$

x	y
1	
2	
3	
4	
5	

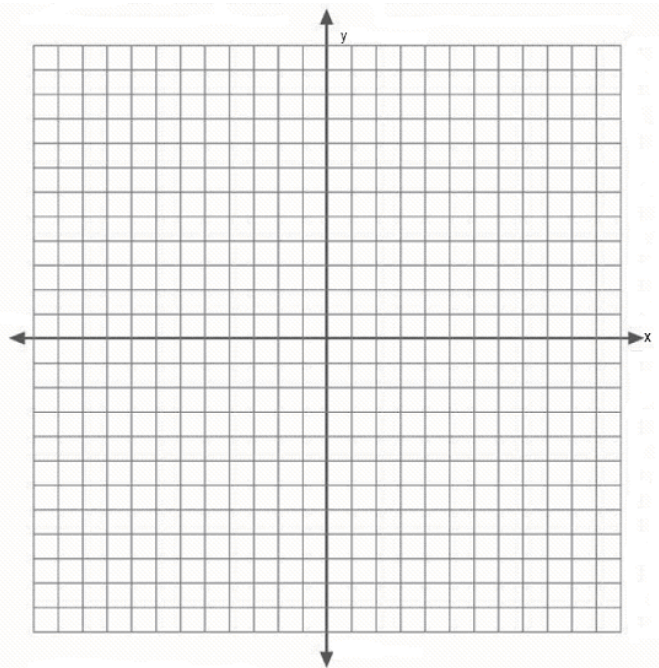
Relation:



2. $y = 2x + 1$

x	y
1	
2	
3	
4	
5	

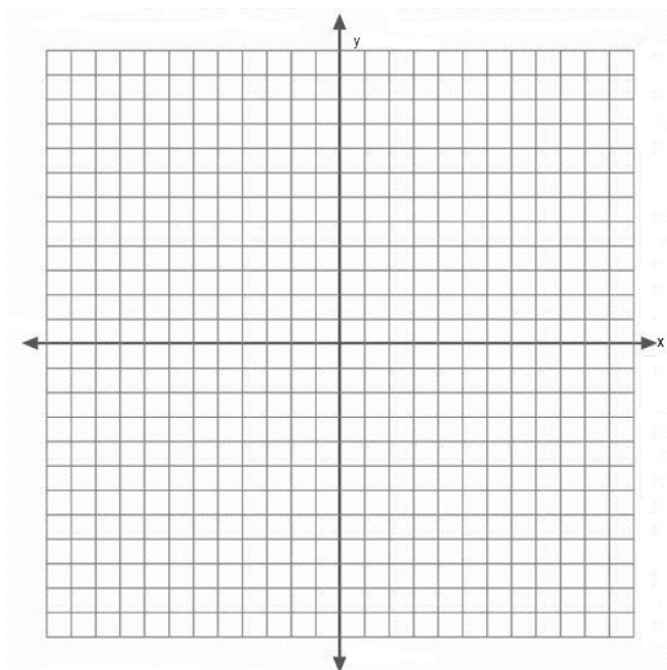
Relation:



3. $y = 3x - 2$

x	y
0	
1	
2	
3	
4	

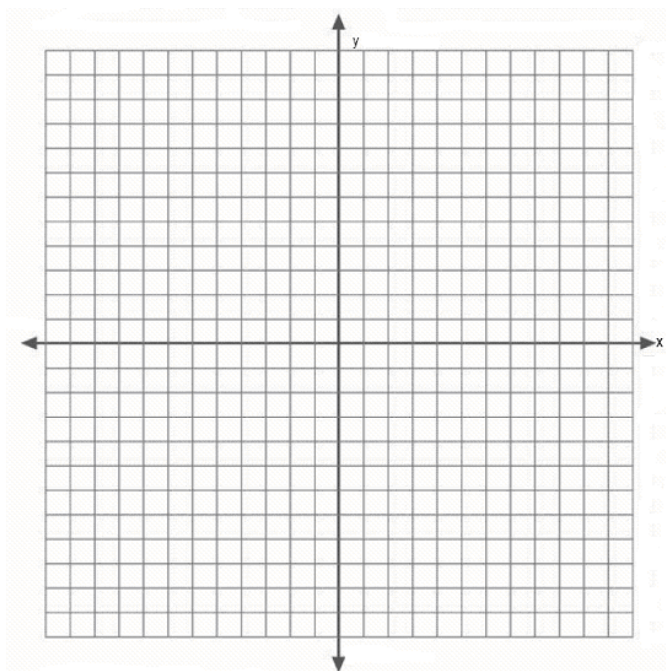
Relation:



4. $x + y = 2$

x	y
1	
2	
3	
4	
5	

Relation:



For the given equation find the missing value in each ordered pair.

5. $x - y = 1$

a) (6, ___)

b) (2, ___)

c) (___, 3)

d) (___, 7)

e) (-1, ___)

f) (___, -2)

6. $y = x + 2$

a) (2, ___)

b) (3, ___)

c) (-1, ___)

d) (0, ___)

e) (___, 5)

f) (___, 0)

For each relation write 5 ordered pairs. Remember, x value always comes first.

7. $x + y = 7$

8. $x - y = 2$

9. $y = x + 4$

10. $y = 2x + 3$

Write an equation for each relation.

11.

x	y
6	4
5	3
4	2
3	1
2	0

12.

x	y
8	4
7	3
6	2
5	1
4	0

13.

x	y
4	5
3	4
2	3
1	2
0	1

14. Hockey tickets cost \$35 each. Complete the table and write an equation that relates the cost of tickets to the number of tickets purchased.

Number of Tickets (n)	Cost (\$)
1	
2	
3	
4	

15. Printing the school yearbook has a one-time cost of \$150 for the design of the book plus \$30 per yearbook. To determine the cost of an order of yearbooks, the following formula is used, where n is the number of yearbooks and C is the cost; $C = 150 + 30n$. Complete the following table.

Number of Yearbooks (n)	Cost (\$)
10	
20	
50	
100	

3.6 Solving Equations Using Algebra

Solve and check. SHOW ALL YOUR STEPS.

1. $x - 5 = 10$

2. $z + 5 = 12$

3. $3 = x - 3$

4. $x - 4 = -7$

5. $3x = 6$

6. $9y = 27$

7. $4x = -8$

8. $2x + 1 = 5$

9. $\frac{y}{2} = 4$

10. $\frac{x}{3} = 15$

11. $16 = 3x + 7$

12. $\frac{x}{3} = 15$

3.7 Distributive Property

Apply the distributive property to simplify the following expressions.

Example: $3(x + 2) = 3x + 6$

1. $2(x + 5)$

4. $2(x + 4)$

2. $5(x - 3)$

5. $-3(x - 2)$

3. $-4(3 - z)$

6. $-(3x - 7)$

Solve and check. SHOW ALL YOUR STEPS.

7. $2(x + 1) = 6$

8. $2(y - 1) = -6$

9. $3(m - 1) = 9$

10. $2(x + 1) = -4$

Determine whether the number in brackets is a solution of the given equation.

11. $n + 5 = 11$ (6)

12. $y - 8 = 12$ (20)

13. $4n = 12$ (4)

14. $\frac{x}{2} = 4$ (12)

15. Matt used the distributive property and solved the equation $2(x - 4) = 14$. Here are the steps he used. Was Matt's solution correct? If not, what step has the error, then correct the error and complete the solution correctly.

Step 1: $2x - 4 = 14$

Step 2: $2x - 4 + 4 = 14 + 4$

Step 3: $2x = 18$

Step 4: $x = 9$

3.8 Solving Problems using Equations

Write an equation for each of the following sentences. Then solve the equation

1. A number divided by 5 is 15.

3. A number added to 12 is 17.

2. A number multiplied by 7 is 28.

4. Two times a number added to 3 is 17.

First **write the equations** you are using, and then solve. Make sure you first determine what the unknown value (variable) is.

5. One quarter of the apples sold at the Farmer's Market were Spartans. There were 8 dozen Spartans sold. How many dozen apples were sold altogether? Write an equation to represent this question, then solve the equation.

6. Skipping ropes were given to the 15 students who attended the gym session. At the end there were 12 left over in the box. How many were there to begin with? Write the equation, then solve the equation.

7. John has 2 more CDs than Mike. Together, they have 30 CD's. How many CD's does John have?

8. A store has a total of 108 full time staff **and** part time staff. There are three times as many full time staff as part time staff. How many full time and part time staff does the store employ?

9. James has \$5.00 more than three times what Catherine has. Together they have \$41.00. How much does EACH student have?

10. Write a word problem to represent $2n + 4 = 12$.

3.9 Logic Puzzles

1. Zookeeper George was in charge of feeding all of the animals in the morning. He had a regular schedule that he followed every day. Can you figure it out from the clues

- The giraffes were fed before the zebras but after the monkeys.
- The bears were fed 15 minutes after the monkeys.
- The lions were fed after the zebras.

	6:30 AM	6:45 AM	7:00 AM	7:15 AM	7:30 AM
Bears					
Giraffes					
Lions					
Monkeys					
Zebras					

2. Sally and three of her friends decided to plant a new tree in their yard to celebrate Arbor Day. The new trees would each be put in a different area of their yards. As it happened each friend bought a different kind of tree and planted the new tree on a different day of the week. From the clues below, determine the full names of each friend, what kind of tree each bought, where in the yard it was planted, and on what day of the week each tree was planted.

- Wanda, whose last name wasn't Frost, didn't plant her spruce tree by the patio.
- Tracy planted her tree before Mrs. Dart but after the woman who planted the ash tree.
- Mrs. Best, whose first name wasn't Sally, planted her tree in the front yard, but not on Friday.
- Rhonda didn't plant her tree on Monday.
- Mrs. Grand planted her tree before the woman who planted her tree in the back yard. Rhonda didn't plant the cherry tree.
- The trees were planted, in chronological order, as follows: Mrs. Frost, in the garden, Wanda, the maple tree.

Use the grids to help solve the puzzle!

First name	Last name	Type of tree	Location	Day of the week

	Best	Dart	Frost	Grand	ash tree	cherry tree	maple tree	spruce tree	by the garden	by the patio	in the back yard	in the front yard	Monday	Wednesday	Thursday	Friday	
Rhonda																	
Sally																	
Tracy																	
Wanda																	
Monday																	
Wednesday																	
Thursday																	
Friday																	
by the garden																	
by the patio																	
in the back yard																	
in the front yard																	
ash tree																	
cherry tree																	
maple tree																	
spruce tree																	

Answers to selected problems:

3.1 Reviewing Operations with Integers

1. a)5 b)4 c) -9 d)-10 e)23 f)2 g)-19 h)19 i)5 j)-25 k)-7 l)18 m)25 n)31 o)42
 2. a) 12 b)24 c) -4 d)-24 e) -14 f) -6 g)-30 h)-54 i)-4 j)-60 k)84 l)-2 m)-8 n)4 o)1

3.2 Order of Operations with Integers

1. -47 2. 142 3. -44 4. 23 5. 61 6. -1 7. -28 8. -2 9. $(4+7) \times 3=33$ 10. $4+(7 \times 3)=25$
 11. $6 \times ((-4) \div 4) + 7 = 1$ 12. $(14-6) \div (-2) +5=1$
 13. Garth did subtraction first -10 14. Solution is correct

3.3 Variables

1. -7 2. -19 3. 8 4. -38 5. 16 6. -24

3.4 Table of Values

1. PATTERN: as x increases by 1, y increases by 1 EQUATION: $y = x+1$ ORDERED PAIRS: (2,0) (3,1) (4,2) (5,3) (6,4) (7,5) (8,6)
 2. PATTERN: as x increases by 1, y increases by 1 EQUATION: $y = x-2$
 3. PATTERN: as x increases by 1, y increases by 2 EQUATION: $y = 2x+1$

3.5 Graphing Linear Relations

1. Y= -4, -3, -2, -1, 0

Relation: as x increases by 1, y increases by 1

2. Y= 3, 5, 7, 9, 11

Relation: as x increases by 1, y increases by 2

3. Y= -2, 1, 4, 7, 10

Relation: as x increases by 1, y increases by 3

4. Y= 1, 0, -1, -2, -3

Relation: as x increases by 1, y decreases by 1

5. a)5 b)1 c)2 d)8 e)0 f)-1 6. a)4 b)5 c)1 d)2 e)3 f)-2 7. (1, 6) 8. (1,-1) 9. (1,5) 10. (1.5)

11. $Y = x-2$ 12. $Y = x-4$ 13. $Y = x+1$ 14. 35, 70, 105, 140 15. 450, 750, 1650, 3150

3.6 Solving Equations Using Algebra

1. 15 2. 7 3. 6 4. -3 5. 2 6. 3 7. -2 8. 2 9. 8 10. 45 11. 3 12. 21

3.7 Distributive Property

1. $2x + 10$ 2. $5x-15$ 3. $-12 + 4x$ 4. $2x+8$ 5. $-3x + 6$ 6. $-3x+21$ 7. 2 8. -2 9. 4 10. -3 11. 6 12. 20 13. 3 14. 8 15. The solution is correct

3.8 Solving Problems using Equations

1. $n/5 = 15$ $n=75$ 2. $7x=28$ $x=4$ 3. $X+12=17$ $x=5$ 4. $2x+3=17$ $x=7$ 5. $x/4=8$ $x=96$ 6. $a-15 = 12$ $a = 27$ 7. $2(x-2)=30$ $x=17$ 8. 81 full time and 27 part time 9. Catherine has \$9, James has \$32

3. 9 Logic Puzzles

1. Bears= 6:45 Giraffes= 7:00 Lions= 7:30 Monkeys= 6:30 Zebras= 7:15

2.

Wanda	Best	Spruce	Front Yard	Thursday
Sally	Frost	Ash	Patio	Monday
Tracy	Grand	Cherry	Garden	Wednesday
Rhonda	Dart	Maple	Back yard	Friday