Name ______________________ Date ___________ Class ___________

LESSON 4-2

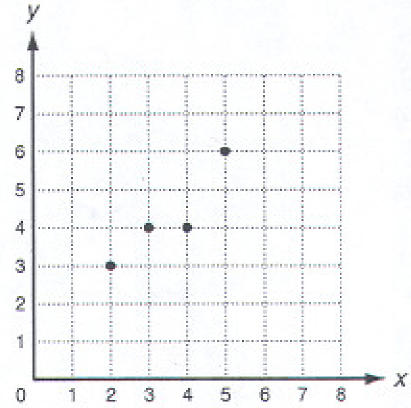
Reteach

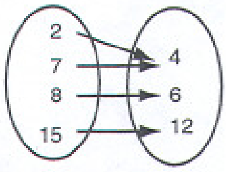
Relations and Functions (continued)

A **function** is a type of relation where each *x* value (domain) can be paired with only one *y* value (range).

Functions

x	2	3	4	5
y	3	4	4	6

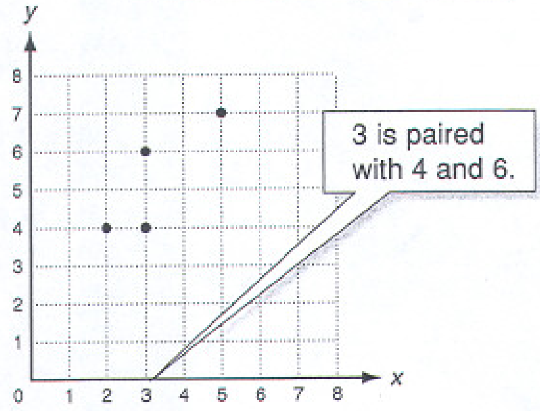


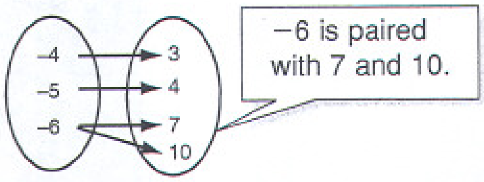


Not functions

6 is paired with 2 and 3.

x	5	6	6	7
y	1	2	3	4





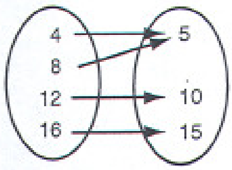
Tell whether the relation is a function. Explain.

7.

x	−2	−3	−3	−4
y	1	2	3	4

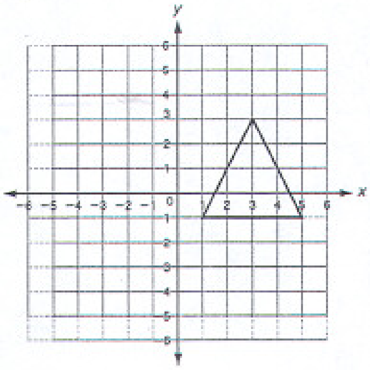
NO, the input −3 is paired with 2 outputs

8.



Yes, each input is paired with exactly 1 output.

9.



No, there are two points on most vertical lines

Name ______________________ Date ____________ Class ____________

LESSON 4-4

Reteach
Graphing Functions

There are three steps to graphing a function.

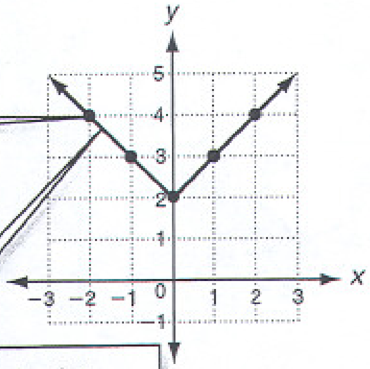
Graph $f(x) = |x| + 2$.

Remember that $f(x)$ is function notation for y, so rewrite the function as $y = |x| + 2$.

Step 1: Generate points. Unless a domain is given, you can pick any values of x.

Step 2: Plot points.

x	$y = \|x\| + 2$	(x, y)
−2	$y = \|-2\| + 2 = 2 + 2 = 4$	(−2, 4)
−1	$y = \|-1\| + 2 = 1 + 2 = 3$	(−1, 3)
0	$y = \|0\| + 2 = 0 + 2 = 2$	(0, 2)
1	$y = \|1\| + 2 = 1 + 2 = 3$	(1, 3)
2	$y = \|2\| + 2 = 2 + 2 = 4$	(2, 4)

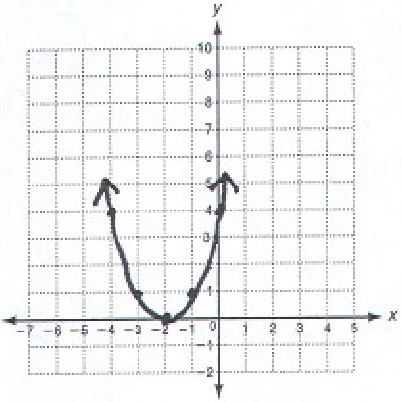


Step 3: Connect points. Connect the points with a smooth line or curve.

Graph each function.

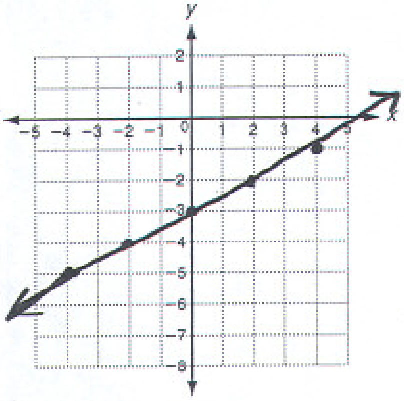
1. $y = (x + 2)^2$

x	$y = (x + 2)^2$	(x, y)
−4	$y = (-4 + 2)^2 = (-2)^2 = \underline{4}$	(-4,4)
−3	$y = (-3 + 2)^2 = (\underline{-1})^2 = \underline{1}$	(-3,1)
−2	$y = (\underline{-2} + 2)^2 = (\underline{0})^2 = \underline{0}$	(-2,0)
−1	$y = (\underline{-1+2})^2 = (\underline{1})^2 = \underline{1}$	(-1,1)
0	$y = \underline{(0+2)^2 = (2)^2 = 4}$	(0,4)



2. $f(x) = \frac{1}{2}x - 3$

x	$y = \frac{1}{2}x - 3$	(x, y)
-4	$\frac{1}{2}(-4) - 3 = -5$	(-4,-5)
-2	$\frac{1}{2}(-2) - 3 = -4$	(-2,-4)
0	$\frac{1}{2}(0) - 3 = -3$	(0,-3)
2	$\frac{1}{2}(2) - 3 = -2$	(2,-2)
4	$\frac{1}{2}(4) - 3 = -1$	(4,-1)



Name ______________________ Date __________ Class __________

LESSON 4-4

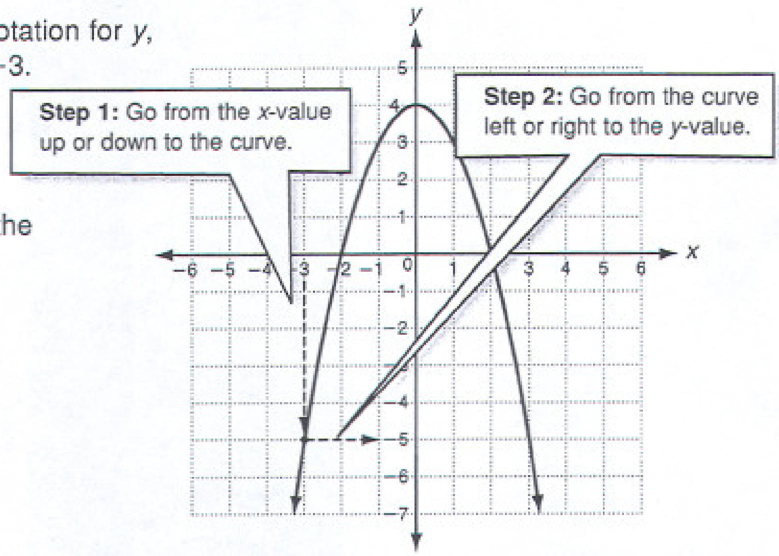
Reteach

Graphing Functions (continued)

You can use the graph of a function to find points that are generated by the function.

Use the graph of $f(x) = -x^2 + 4$ to find the value of $f(x)$ when $x = -3$.

Remember that $f(x)$ is function notation for y, so you need to find y when $x = -3$.

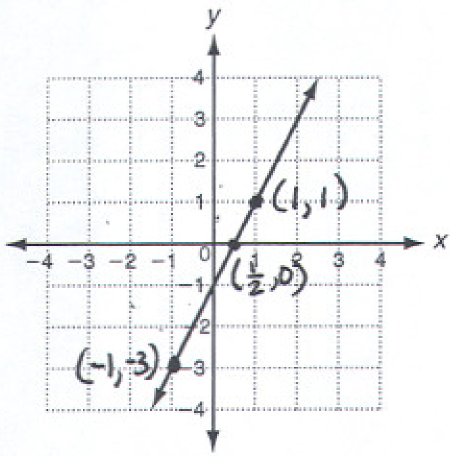


Because $(-3, -5)$ is a point on the graph of the function,

$f(x) = -5$ when $x = -3$.

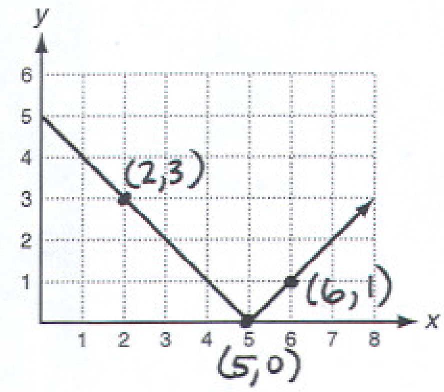
Use this graph of $f(x) = 2x - 1$ to find these values.

3. $f(x) =$ <u>-3</u> when $x = -1$
4. $f(x) =$ <u>1</u> when $x = 1$
5. $f(x) =$ <u>0</u> when $x = \frac{1}{2}$



Use this graph of $f(x) = |5 - x|$ to find these values.

6. $f(x) =$ <u>3</u> when $x = 2$
7. $f(x) =$ <u>1</u> when $x = 6$
8. $x =$ <u>5</u> when $f(x) = 0$

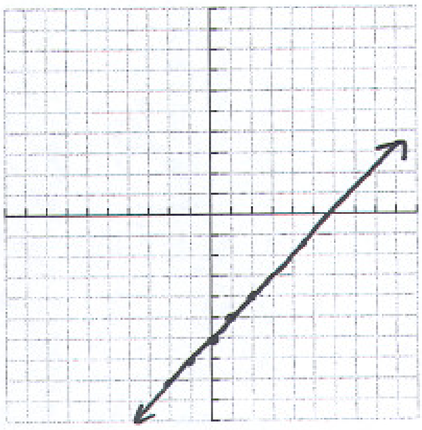


Study Guide Practice: Graphing Equations

1. Equation:
$y = x - 6$

Linear? Yes NO
Function? Yes NO

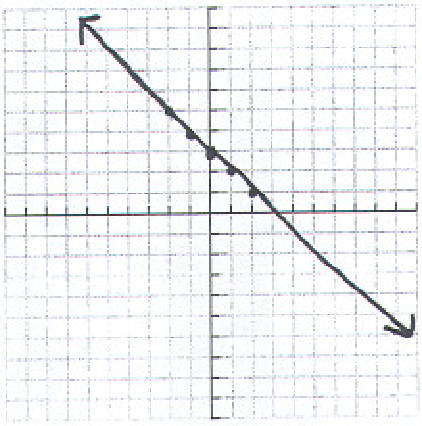
x	y
-2	-8
-1	-7
0	-6
1	-5
2	-4



2. Equation: $y = -x + 3$

Linear? Yes NO
Function? Yes NO

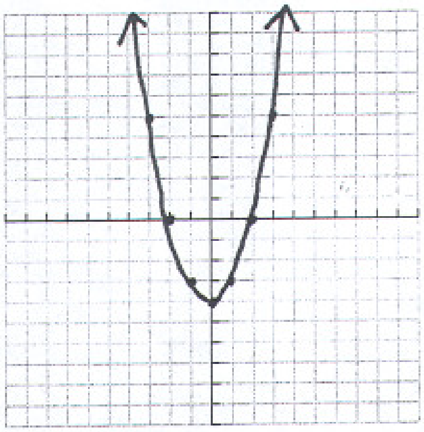
x	y
-2	5
-1	4
0	3
1	2
2	1



3. Equation: $y = x^2 - 4$

Linear? Yes NO
Function? Yes NO

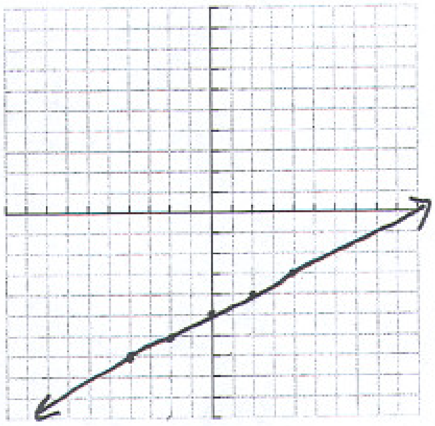
x	y
-2	0
-1	-3
0	-4
1	-3
2	0



4. Equation: $y=\frac{1}{2}x-5$

Linear? Yes NO
Function? Yes NO

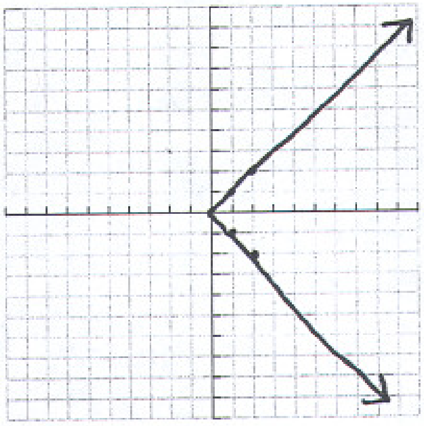
x	y
-4	-7
-2	-6
0	-5
2	-4
4	-3



5. Equation: $x=|y|$

Linear? Yes NO
Function? Yes NO

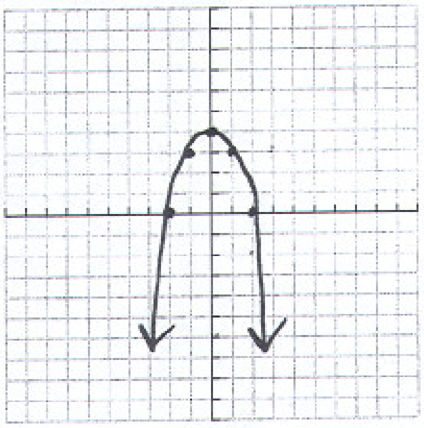
x	y
2	-2
1	-1
0	0
1	1
2	2



6. Equation: $y=-x^2+4$

Linear? Yes NO
Function? Yes NO

x	y
-2	0
-1	3
0	4
1	3
2	0



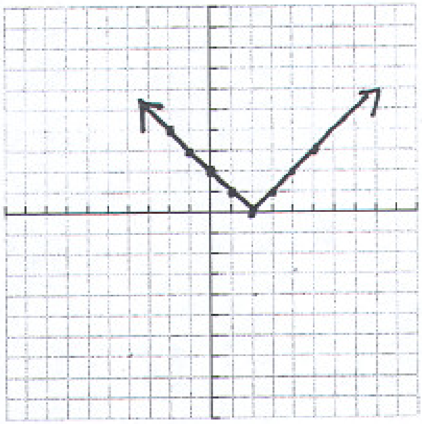
7. Equation:

$$y = |x-2|$$

Linear? Yes NO

Function? Yes NO

x	y
-2	4
-1	3
0	2
1	1
2	0
3	1

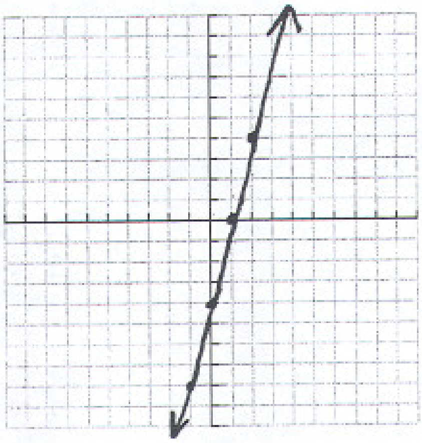


8. Equation: $y = 4x - 4$

Linear? Yes NO

Function? Yes NO

x	y
-2	-12
-1	-8
0	-4
1	0
2	4



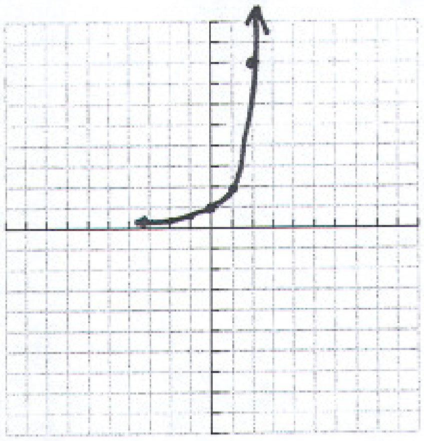
9. Equation:

$$y = 2^x$$

Linear? Yes NO

Function? Yes NO

x	y
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8
4	16

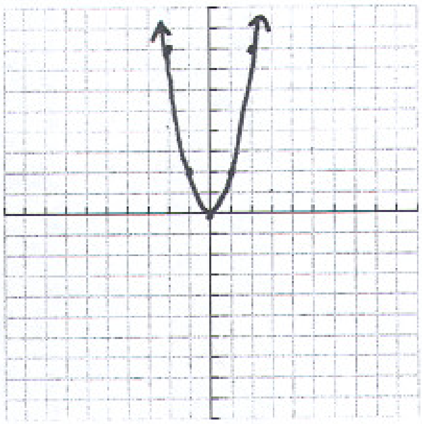


10. Equation:

$$y = 2x^2$$

Linear? Yes NO
Function? Yes NO

x	y
-2	8
-1	2
0	0
1	2
2	8



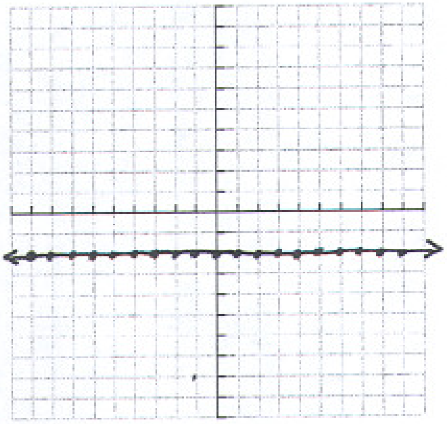
11. Equation:

$$y = -2$$

Linear? Yes NO
Function? Yes NO

any #

x	y
	-2
	-2
	-2
	-2
	-2



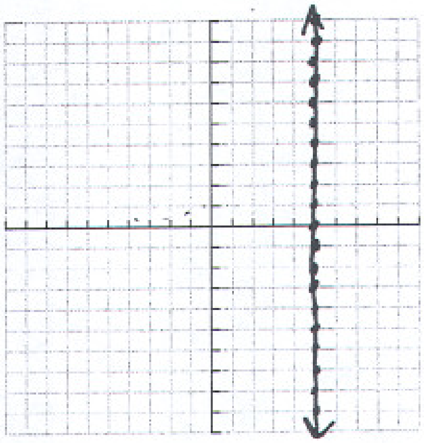
12. Equation:

$$x = 5$$

Linear? Yes NO
Function? Yes NO

x	y
5	
5	
5	
5	
5	

any #



Name ______________________ Date ____________ Class ____________

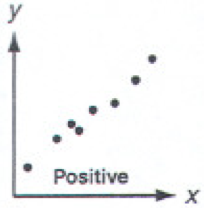
LESSON 4-5

Reteach
Scatter Plots and Trend Lines

Correlation is one way to describe the relationship between two sets of data.

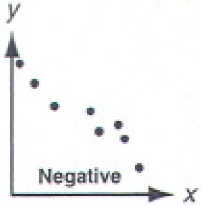
Positive Correlation

Data: As one set **increases**, the other set **increases**.
Graph: The graph **goes up** from left to right.



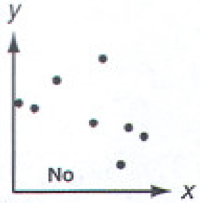
Negative Correlation

Data: As one set **increases**, the other set **decreases**.
Graph: The graph **goes down** from left to right.



No Correlation

Data: There is **no relationship** between the sets.
Graph: The graph has **no pattern**.



Identify the correlation you would expect to see between the number of grams of fat and the number of calories in different kinds of pizzas.

When you *increase* the amount of fat in a food, you also *increase* calories. So you would expect to see a positive correlation.

Identify the correlation you would expect to see between each pair of data sets. Explain.

1. the number of knots tied in a rope and the length of the rope

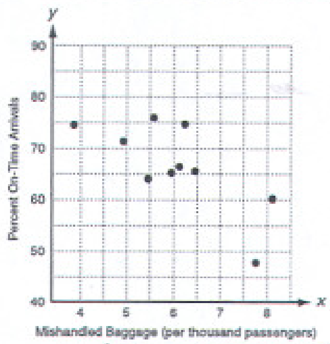
POSITIVE, as # knots ↑, length ↑

2. the height of a woman and her score on an algebra test

No Correlation, no relationship btwn height and intelligence

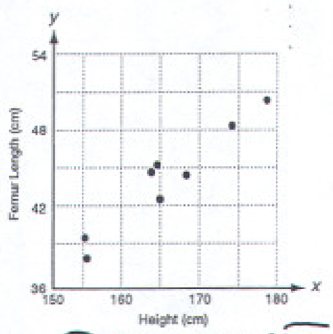
Describe the correlation illustrated by each scatter plot.

3.



NEGATIVE

4.



POSITIVE

Name ______________________ Date __________ Class __________

LESSON 4-5

Reteach

Scatter Plots and Trend Lines (continued)

By drawing a **trend line** over a graph of data, you can make predictions.

The scatter plot shows a relationship between a man's height and the length of his femur (thigh bone). Based on this relationship, predict the length of a man's femur if his height is 160 cm.

Step 1: Draw a trend line through the points.

Step 2: Go from 160 cm on the *x*-axis up to the line.

Step 3: Go from the line left to the *y*-axis.

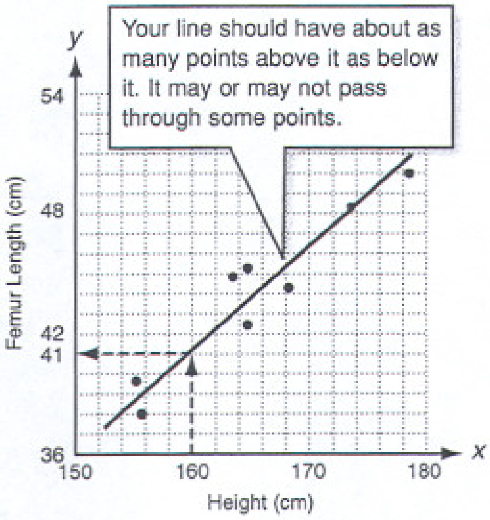
The point (160, 41) is on the line.

Height

Femur

A man that is 160 cm tall would have a femur about 41 cm long.

To find an *x*-value, go right from the *y*-value, and then down to the *x*-value. So, a man with a 42 cm femur would be about 162 cm tall.



The scatter plot shows a relationship between engine size and city fuel economy for ten automobiles.

5. Draw a trend line on the graph.

6. Based on the relationship, predict...

a. the city fuel economy of an automobile with an engine size of 5 L.

(btwn 6-9) ≈7

b. the city fuel economy of an automobile with an engine size of 2.8 L.

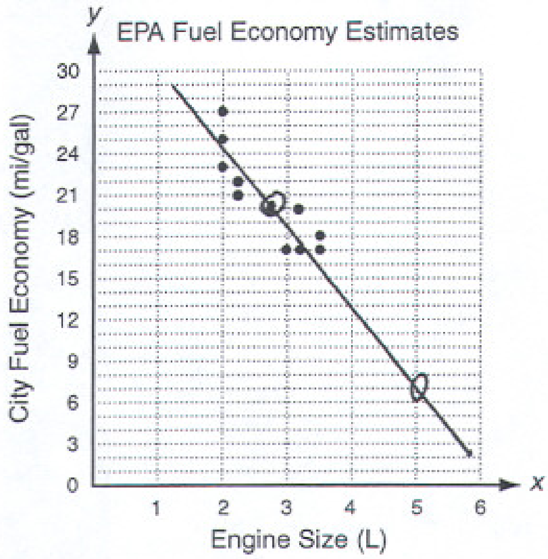
≈ 20

c. the engine size of an automobile with a city fuel economy of 11 mi/gal.

≈4.2

d. the engine size of an automobile with a city fuel economy of 28 mi/gal.

≈1.2



Name ______________________ Class ______________ Date ______________

Reteaching 11-1

Sequences

A *sequence* is a set of numbers that follows a pattern.

In an *arithmetic sequence,* each term is found by *adding* a fixed number to the previous term. The number that you add is called the *common difference.*

Example 1: Find the next three terms in the arithmetic sequence: 8, 5, 2, −1, −4, . . .

- The common difference is $5 - 8 = -3$.
- Add −3 for the next three terms.

$-4 + (-3) = -7$
$-7 + (-3) = -10$
$-10 + (-3) = -13$

The next three terms are −7, −10, and −13.

In a *geometric sequence,* each term is found by *multiplying* the previous term by a fixed number. The number that you multiply by is called the *common ratio.*

Example 2: Find the next three terms in the geometric sequence: 2, 6, 18, 54, . . .

- The common ratio is $\frac{18}{6} = 3$.
- Multiply by 3 for the next three terms.

$54 \times 3 = 162$
$162 \times 3 = 486$
$486 \times 3 = 1{,}458$

The next three terms are 162, 468, and 1,458.

The sequence: 1, 4, 9, 16, . . . is neither arithmetic nor geometric.

Its pattern is $1^2, 2^2, 3^2, 4^2, \ldots$

Its next three terms are $5^2, 6^2, 7^2$, or 25, 36, 49.

Find the common difference or ratio in each sequence.

1. 2, 6, 10, 14, . . .
CD +4

2. 30, 20, 10, 0, . . .
CD −10

3. −12, −4, 4, 12, . . .
CD +8

4. 6, 12, 24, 48, . . .
CR ·2

5. $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}$
CR ·1/3

6. 250, 25, 2.5, 0.25, . . .
CR ·1/10

Identify each sequence as *arithmetic, geometric,* or *neither.* Find the next three terms of the sequence.

7. $4, 2, 1, \frac{1}{2}, \ldots$ $\frac{1}{4}, \frac{1}{8}, \frac{1}{16}$
Geometric

8. 0.2, 0.4, 0.6, 0.8, . . . 1.0, 1.2, 1.4
Arithmetic

9. $1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}$ $\frac{1}{25}, \frac{1}{36}, \frac{1}{49}$
Neither

10. 70, 50, 30, 10, . . . −10, −30, −50
Arithmetic

11. 1, 2, 1, 2, 1, 2, . . . 1, 2, 1
Neither

12. 4, 8, 16, 32, . . . 64, 128, 256
Geometric

Name ______________________ Date __________ Class __________

LESSON 4-6

Reteach

Arithmetic Sequences

An **arithmetic sequence** is a list of numbers (or **terms**) with a **common difference** between each number. After you find the common difference, you can use it to continue the sequence.

Determine whether each sequence is an arithmetic sequence. If so, find the common difference and the next three terms.

1, 2, 4, 8,...

+1 +2 +4

Find how much you add or subtract to move from term to term.

The difference between terms is *not* constant.

This sequence is *not* an arithmetic sequence.

0, 6, 12, 18, ...

+6 +6 +6

Find how much you add or subtract to move from term to term.

The difference between terms is constant.

This sequence is an arithmetic sequence with a common difference of 6.

0, 6, 12, 18, 24, 30, 36

+6 +6 +6

Use the difference of 6 to find three more terms.

Fill in the blanks with the differences between terms. State whether each sequence is an arithmetic sequence.

1. 14, 12, 10, 8, ...

-2 -2 -2

Is this an arithmetic sequence? YES

2. 0.3, 0.6, 1.0, 1.5, ...

0.3 0.4 0.5

Is this an arithmetic sequence? NO

Use the common difference to find the next three terms in each arithmetic sequence.

3. 7, 4, 1, −2, -5, -8, -11, ...

−3 −3 −3 −3 −3 −3

4. −5, 0, 5, 10, 15, 20, 25, ...

+5 +5 +5

Determine whether each sequence is an arithmetic sequence. If so, find the common difference and the next three terms.

5. −1, 2, −3, 4, ... NOT Arithmetic

6. 1.25, 3.75, 6.25, 8.75, ... 11.25, 13.75, 16.25

Arithmetic +2.50

Arithmetic Sequences

You can write a rule for an arithmetic sequence that allows you to find any term in the sequence.

In the following sequence, n represents the term position (1st term, $n = 1$) and a_n represents the sequence value.

Given Sequence: 4, 7, 10, 13…

Make a Table:

n	1	2	3	4
a_n	4	7	10	13

Write a rule for the sequence to find the n^{th} term. The n^{th} term represents any term in the sequence. 10 is the 3rd term in the sequence, 13 is the 4th term in the sequence. Writing a rule for the n^{th} term allows us to find any term in the sequence like the 100th term or the 237th term by substituting the term number (position) for n.

To write a rule for an arithmetic sequence, determine the relationship between n and a_n.
Ask yourself the following:

- Is there a number I can add (subtract) to n to get to a_n that works for each pair?
- Is there a number I can multiply or divide to get a_n?
- If neither of the above works then it must be a combination of addition/subtraction and multiplication/division. You can use the common difference to tell you what you are multiplying n by and then determine what number must be added or subtracted in order to get to a_n.

The rule for the above example is $a_n = 3n + 1$ because we are adding 3 each time and when you multiply 1 by 3 you have to add 1 in order to get 4. When you multiply 2 times 3 you have to add 1 in order to get 7.

Now use your rule to find the 100th term: $a_{100} = 3(100) + 1$

$a_{100} = 301$

$a_{237} = 3(237) + 1$

$a_{237} = 712$

Now you try! Find the rule for the n^{th} term and then use your rule to find the 25th term.

1. 3,5,7,9...
2. 5,10,15,20...
3. 6,7,8,9,10...
4. $-2,-1,0,1...$
5. 2,5,8,11...
6. $\frac{1}{2},1,\frac{3}{2},2...$
7. 13,9,5,1...
8. $-3,-7,-11,-15...$
9. 5,9,13,17...
10. $-16,-12,-8,-4...$

Find the rule for the n^{th} term and then use your rule to find the 25^{th} term.

1) 3, 5, 7, 9

n	1	2	3	4
a_n	3	5	7	9

$a_n = 2n+1$ $\quad a_{25} = 51$

2) 5, 10, 15, 20

n	1	2	3	4
a_n	5	10	15	20

$a_n = 5n$ $\quad a_{25} = 125$

3) 6, 7, 8, 9, 10

n	1	2	3	4	5
a_n	6	7	8	9	10

$a_n = n+5$ $\quad a_{25} = 30$

4) −2, −1, 0, 1

n	1	2	3	4
a_n	−2	−1	0	1

$a_n = n-3$ $\quad a_{25} = 22$

5) 2, 5, 8, 11

n	1	2	3	4
a_n	2	5	8	11

$a_n = 3n-1$ $\quad a_{25} = 74$

6) $\frac{1}{2}, 1, \frac{3}{2}, 2$

n	1	2	3	4
a_n	1/2	1	3/2	2

$a_n = \frac{1}{2}n$ $\quad a_{25} = \frac{25}{2}$

7) 13, 9, 5, 1

n	1	2	3	4
a_n	13	9	5	1

$a_n = -4n+17$ $\quad a_{25} = -83$

8) −3, −7, −11, −15

n	1	2	3	4
a_n	−3	−7	−11	−15

$a_n = -4n+1$ $\quad a_{25} = -99$

9) 5, 9, 13, 17

n	1	2	3	4
a_n	5	9	13	17

$a_n = 4n+1$ $\quad a_{25} = 101$

10) −16, −12, −8, −4

n	1	2	3	4
a_n	−16,	−12	−8	−4

$a_n = 4n-20$ $\quad a_{25} = 80$