

February 11, 2019, Monday

List 5 characteristics of the following graph.

1) $8x + 5y = 20$

x-intercept: 2.5 or (2.5, 0)
 y-intercept: 4 or (0, 4)
 rate of change (slope) = -
 Slope, $m = -\frac{3}{2}$
 point (3, -1)

(hint: x-intercept, y-intercept, end behavior, rate of change (slope)....)

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Algebra 1 - U2B Day 2, 2/9/2018 Characteristics of Linear Functions Notes

Words to know:

- Domain: the values where the graph exists for x
- Range: the values where the graph exists for y
- Interval of Increase (+ slope) & Decrease (- slope): as the x increases
- End Behavior: what the y value approaches as $x \rightarrow \infty$, then as $x \rightarrow -\infty$
- x-intercept(s): where the graph crosses the x-axis
- y-intercept: where the graph crosses the y-axis

Examples:

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Average Rate of Change (AROC) Notes

Today's Question: How do we find the rate of change of a function? (MS1A.1a)

Rate of Change, ROC, = slope, m

- The rate of change is the ratio of the change of one quantity to a change in another quantity.
- Positive - $m = 3$ $m = \frac{3}{1}$
- Negative - $m = -4$ $m = -\frac{4}{1}$
- Which function has a constant rate of change? A line!
- Horizontal Lines - \downarrow 0 is the roc, $m = 0$
- Vertical Lines - \downarrow Undefined is the roc, $m = \text{und}$

Constant Rate of Change

The slope of a non-vertical line is the ratio of the vertical (change in y) to the horizontal (change in x) between any two points on the line.

Example 1: Find the slope between (2, 4) and (4, 6).

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 4}{4 - 2} = \frac{2}{2} = 1$$

Example 2: The table shows the amount of water evaporating from a swimming pool on a hot day. Find the rate of change between 10:00 and 12:00 (Celsius evaporating).

Time (hours)	10:00	11:00	12:00
Water (liters)	100	135	170

$$m = \frac{135 - 100}{11 - 10} = \frac{35}{1} = 35$$

Example 3: Find all rates of change between the points, then determine which has the greatest rate of change?

What is the value?

- $x = -4 \rightarrow y = 4$ $m = \frac{4 - 0}{-4 - 0} = \frac{4}{-4} = -1$
- $x = -4 \rightarrow y = 3$ $m = \frac{3 - 0}{-4 - 0} = \frac{3}{-4} = -\frac{3}{4}$
- $x = 3 \rightarrow y = 6$ $m = \frac{6 - 0}{3 - 0} = \frac{6}{3} = 2$
- $x = 6 \rightarrow y = 8$ $m = \frac{8 - 0}{6 - 0} = \frac{8}{6} = \frac{4}{3}$

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Algebra 1 - Day 2, 2/9/2018 Characteristics of Linear Functions HW Name _____

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Average Rate of Change HW

Directions: Identify the average rate of change for the given intervals.

1) Using the given graph, identify the average rate of change over the given intervals.

- a) $x = -2$ to $x = -1$: $m = \frac{1 - 0.5}{-1 - (-2)} = \frac{0.5}{1} = 0.5$
- b) $x = -1$ to $x = 0$: $m = \frac{1 - 0}{-1 - 0} = \frac{1}{-1} = -1$
- c) $x = 0$ to $x = 1$: $m = \frac{4 - 2}{1 - 0} = \frac{2}{1} = 2$
- d) $x = -2$ to $x = -1$: $m = \frac{4 - 0.5}{-1 - (-2)} = \frac{3.5}{1} = 3.5$

2) Using the given table, identify the average rate of change over the given intervals.

x	-1	0	1	2
y	1	3	6	10

- a) $x = -1$ to $x = 1$: $m = \frac{6 - 1}{1 - (-1)} = \frac{5}{2} = 2.5$
- b) $x = 0$ to $x = 4$: $m = \frac{10 - 3}{4 - 0} = \frac{7}{4} = 1.75$
- c) $x = 2$ to $x = 3$: $m = \frac{10 - 6}{3 - 2} = \frac{4}{1} = 4$
- d) $x = -1$ to $x = 4$: $m = \frac{10 - 1}{4 - (-1)} = \frac{9}{5} = 1.8$

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February 12, 2019 Tuesday

Give an equation $y = -9x + 4$ identify the x & y intercepts, state the domain and range

x-intercept: 0.5
 y-intercept: 4
 domain: \mathbb{R}
 range: \mathbb{R}

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Algebra 1 - Even/Odd Functions in Class Assignment

1. Describe the symmetry of an **ODD** function.
 graph: **y axis symmetry**
 algebraic: **all exponents are odd**

2. Describe the symmetry of an **EVEN** function.
 graph: **has 180° origin symmetry**
 algebraic: **all exponents are even**

2. Describe each graph as **EVEN**, **ODD**, or **NEITHER**.

3. Describe each function below as **EVEN**, **ODD**, or **NEITHER**.

a. $f(x) = -x^2 + 2$ → **EVEN**
 b. $g(x) = x^3 - 2$ → **ODD**
 c. $h(x) = x^2 + 3$ → **EVEN**
 d. $m(x) = x^3 + 2x$ → **ODD**
 e. $p(x) = x^2 + 1$ → **EVEN**
 f. $q(x) = x^3 - 2x$ → **ODD**

If the partially graphed function below is **EVEN** then finish what the rest of the graph should look like.
 If the partially graphed function below is **ODD** then finish what the rest of the graph should look like.

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Test Review

28) $c + a = 90$: quantity
 $3c + 5a = 328$: price

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Even and Odd Functions Notes

GRAPHICALLY:
 A function is **even** if the $f(x)$ has **y axis reflect**
 A function is **odd** if the $f(x)$ has **180° rotational symmetry**

Draw an example of an odd and even function.

ODD **EVEN**

Neither Even nor Odd:

ALGEBRAICALLY
 A function is **even** all exponents are **even**
 A function is **odd** all exponents are **odd**
 A function is **neither** exponents are a **mixture of even and odd**

*BE CAREFUL! because -8 is an **EVEN EXPONENT**, (-8) can be written with a variable x^0 which makes it an even exponent!

Examples:

Even	Odd	Neither
$y = x^2$	$y = x^3$	$y = x^2 + x$

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Algebra 1 - Day 3, 2/12/2018 Arithmetic Sequences Notes

Arithmetic Sequences are **a function with a common difference**
 The recursive formula is $a_n = a_{n-1} + d$ & helps you find **small n's**
 The explicit formula is $a_n = a_1 + d(n-1)$ & helps you find **large n's**

Examples: Find the common difference, then write the recursive formula & the explicit formula.

Sequence	Common Difference	Recursive Formula	Explicit Formula
7, 31, 35, 39, ...	4	$a_n = a_{n-1} + 4$	$a_n = 27 + 4(n-1)$
4, -3, -10, -17, ...	-7	$a_n = a_{n-1} - 7$	$a_n = 4 + 7(n-1)$

Find the **first five terms** of the arithmetic sequence defined as follows:
 $a_1 = 2.7n + 0.5$
 $n=1: a_1 = 2.7(1) + 0.5 = 3.2$
 $n=2: a_2 = 2.7(2) + 0.5 = 5.9$
 $n=3: a_3 = 2.7(3) + 0.5 = 8.6$
 $n=4: a_4 = 2.7(4) + 0.5 = 11.3$
 $n=5: a_5 = 2.7(5) + 0.5 = 14$

Find the **first five terms** of the arithmetic sequence defined as follows:
 $a_n = 2n + 22$
 $n=1: a_1 = 2(1) + 22 = 24$
 $n=2: a_2 = 2(2) + 22 = 26$
 $n=3: a_3 = 2(3) + 22 = 28$
 $n=4: a_4 = 2(4) + 22 = 30$
 $n=5: a_5 = 2(5) + 22 = 32$

You have read 25 pages of a book. You plan to read an additional 10 pages each night.

a. List the first five terms of the sequence.
 $a_1 = 25$ $a_2 = 35$ $a_3 = 45$ $a_4 = 55$ $a_5 = 65$

b. Write the **explicit** formula to represent the number of pages you will read after n nights.
 $a_n = 10n + 15$
 $a_n = 25 + 10(n-1)$

You are going to read a book that has 105 pages to finish with you. You expect to spend \$15 each day. You want to buy \$30 remaining at the end of the vacation.

a. Write **explicit** formula to represent this scenario.
 $a_n = a_1 + d(n-1)$
 $a_1 = 105$ $d = -15$
 $a_n = 105 + (-15)(n-1)$

b. For how many days can you spend \$15 each day?
 $a_1 = 105$ $a_5 = 60 - 15 = 45$
 $a_2 = 105 - 15 = 90$ $a_6 = 45 - 15 = 30$
 $a_3 = 90 - 15 = 75$
 $a_4 = 75 - 15 = 60$
6 days

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Find the **first five terms** of the arithmetic sequence defined as follows:
 $a_n = a_{n-1} + 22$; $a_1 = 18$

our $a_1 = 18$

$n=2: a_2 = a_1 + 22 = 40$
 $n=3: a_3 = a_2 + 22 = 62$
 $n=4: a_4 = a_3 + 22 = 84$
 $n=5: a_5 = a_4 + 22 = 106$

$a_2 = 18 + 22 = 40$
 $a_3 = 40 + 22 = 62$
 $a_4 = 62 + 22 = 84$
 $a_5 = 84 + 22 = 106$

$a_2 = -4$ $a_3 = -26$ $a_4 = -48$

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February 13, 2019 Wednesday

even, odd or neither?

1) $f(x) = x^2$ → **Even**

2) $f(x) = x^3 - 4x$ → **Neither**

3) $f(x) = x^5 - 4x^3$ → **Neither**

Determine if the **sequence is arithmetic**. If it is, find the **common difference**.

1) 107, 1077, 10777, 107777, ...
 $1077 - 107 = 970$
 $10777 - 1077 = 9700$
NO

2) 35, 15, -5, -25, ...
 $15 - 35 = -20$
 $-5 - 15 = -20$
 $-25 - (-5) = -20$
Yes $d = -20$

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Algebra 1 - Day 3, 2/12/2018 Arithmetic Sequences HW Name _____

1. Write the recursive and explicit formula for the sequence: $a_1 = 4, a_n = a_{n-1} + 3, a_2 = 7, a_3 = 10, a_4 = 13, a_5 = 16, a_6 = 19, a_7 = 22, a_8 = 25$
 $a_1 = 4, a_n = a_{n-1} + 3, a_2 = 7, a_3 = 10, a_4 = 13, a_5 = 16, a_6 = 19, a_7 = 22, a_8 = 25$
 $d = 3, a_1 = 4$

2. What is the common difference for the following sequence?
 $a = 12, 5, -2, -9, -16, -23, -30$
 $d = -7, a_1 = 12$

3. The first three terms of a sequence are 12, 22, 32.
 a) What is the recursive formula for the sequence?
 $a_1 = 12, a_n = a_{n-1} + 10$
 b) Write an explicit formula for the sequence.
 $a_n = 2 + (n-1)10$
 $a_1 = 2 + (1-1)10 = 2$
 $a_2 = 2 + (2-1)10 = 12$
 $a_3 = 2 + (3-1)10 = 22$

4. You have donated \$50 to charity. You plan to donate an additional \$15 each month.
 a) Write the recursive formula for the sequence.
 $a_1 = 50, a_2 = 65, a_3 = 80, a_4 = 95$
 b) Write an explicit formula to represent the sequence.
 $a_n = 100 + (n-1)15$

5. An arithmetic sequence is given by the following table. Write the recursive and explicit formulas.

n	1	2	3	4	5
a _n	7	10	13	16	19

$d = 10 - 7 = 3, a_1 = 7$
 $a_n = a_{n-1} + 3, a_1 = 7$
 $a_n = 7 + (n-1)3$

6. An arithmetic sequence is given by the following formula: $a_n = a_1 + (n-1)d$. Write the first 5 terms of the sequence.
 $a_1 = 2, d = 7$
 $a_2 = 9, a_3 = 16, a_4 = 23, a_5 = 30$

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Even/Odd Functions HW/Practice Tell whether the function is even, odd, or neither.

 $f(x) = x^2 - x^2$ Even	 $f(x) = -x^2 + 2x$ Neither	 $f(x) = x^3 + 4x + 1$ Odd
 Neither	 Odd	 Neither
 $f(x) = \frac{1}{2}x^2 + 9$ Even	 $f(x) = 5x + 1$ Neither	 $f(x) = 5$ Even

Can a linear function ever be even or odd? If so, sketch an example.

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Algebra 1 Unit 2B Test - Study Guide Name _____

1. For the given function $f(x) = 2x + 7$, find $f(2)$ and $f(-2)$.
 $f(2) = 2(2) + 7 = 11$
 $f(-2) = 2(-2) + 7 = 3$

2. For the given function $f(x) = 4x - 3$, find the domain and the range.
 $a = 6, b = 9, c = 7, d = 30$
 $20 = 4x - 3$
 $23 = 4x$
 $5.75 = x$

3. In the following table, find the domain and the range.

x	1	2	3	4
f(x)	1	2	3	4

 a. 1, b. 4

Linear Characteristics
 $f(x) = 2x + 4$
 Domain: $-\infty < x < \infty$
 Range: $-\infty < y < \infty$
 x-intercept: $(-2, 0)$
 y-intercept: $(0, 4)$
 Increasing/Decreasing? Increasing
 Where? $(-\infty, \infty)$
 End Behavior: $x \rightarrow \infty, y \rightarrow \infty$
 $x \rightarrow -\infty, y \rightarrow -\infty$

Use the graph below to answer questions 5-8.

 5. What is x when $f(x) = 5$?
 $x = 3$
 6. What is the domain of the function?
 All real numbers
 7. What is the end behavior of the function model?
 $f(x) \rightarrow \infty$
 $f(x) = mx + b, m = 2, b = -4$
 $f(x) = 3x - 4$

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Rate of Change

9. Find the rate of change of the following ordered pairs: $(0, 1)$ and $(15, -9)$.
 $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-9 - 1}{15 - 0} = -\frac{10}{15} = -\frac{2}{3}$

10. Find the slope of the function $y = -6x + 12$.
 $m = -6$

11. The tables below model two linear functions.

x	1	2	3	4
f(x)	3	4	5	6

x	1	2	3	4
f(x)	1	2	3	4

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 3}{2 - 1} = 1$
 $m = \frac{4 - 1}{3 - 1} = \frac{3}{2}$

Which of the linear functions below has a slope greater than the slope for Function 1?
 a. $f(x) = 1.5x + 2$
 b. $f(x) = 2x + 3$
 c. $f(x) = 2x + 3$
 d. $f(x) = 3x + 6$

Arithmetic Sequences

12. The table to the right shows the relationship between the number of a term in a pattern and the value of that term. Write a formula to represent the table.

Term Number	1	2	3	4	5
Value of Term	2	5	8	11	14

$a_1 = 2, a_n = a_{n-1} + 3, a_2 = 5, a_3 = 8, a_4 = 11, a_5 = 14$
 $a_n = 2 + (n-1)3 = 3n - 1$

13. The second term of an arithmetic sequence is $a_2 = 24$. The common difference is $d = -3$. Find the first term of the sequence.
 $a_2 = 24, a_1 = 27, a_3 = 21, a_4 = 18, a_5 = 15$

14. Pizza King sells pizza for \$6 per pizza and a \$4 delivery fee.
 a. Write a function to model this situation.
 $f(x) = 6x + 4$
 $a_n = 6n + 4, a_1 = 6(1) + 4 = 10, a_2 = 6(2) + 4 = 16, a_3 = 6(3) + 4 = 22, a_4 = 6(4) + 4 = 28$
 b. Complete the table.

n	0	1	2	3	4
a _n	4	10	16	22	28

 c. How much money do you owe Pizza King for ordering 25 pizzas?
 $a_{25} = 6(25) + 4 = 154$

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February 14, 2019, Thursday

1&2) For $f(x) = 3x + 2$, find $f(x)$ when $x = 7$ and when $x = -4$.
 $f(7) = 3(7) + 2 = 23$
 $f(-4) = 3(-4) + 2 = -10$

3) Evaluate the following function when $x = 0$.
 $f(x) = 2x + 3$
 $f(0) = 2(0) + 3 = 3$

4) Evaluate the following function when $f(x) = 5$.
 $f(x) = 2x - 3$
 $5 = 2x - 3$
 $8 = 2x$
 $4 = x$

Common Difference for Arithmetic Sequence
 Find the Common Difference
 2, 4, 6, 8, ...
 Common difference: 2

Arithmetic Recursive Formula (for small n's)
 $a_1 = a$
 $a_n = a_{n-1} + d$

Arithmetic Explicit Formula (for large n's)
 $a_n = a_1 + (n-1)d$

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$a_5 = 2(5) + 5 = 35$
 $a_n = 2n + 5$
 $a_5 = 2(5) + 5 = 15$
 $a_5 = 2(5) + 5 = 15$
 $a_5 = 2(5) + 5 = 15$

Determine if the following are even, odd, or neither.
 16. $f(x) = 5x^2 - 3x - 12$ Neither
 17. $f(x) = 2x^3 + 4$ Odd
 18. $f(x) = 3x^4 + 7x^2$ Even
 19. $f(x) = x^2 + 1$ Even
 20. $f(x) = x^3 + 1$ Odd
 21. $f(x) = x^2 + 1$ Even

22. Jalen makes \$14 an hour babysitting plus a flat rate of \$5 for gas. Write the function. Name the slope and y-intercept.
 $a_n = 14x + 5, b = 5$

23. For the following table:

x	1	2	3	4
y	1	4	9	16

 a) Is the relation a function? Yes
 b) What is the domain? $\{1, 2, 3, 4, 5, 6\}$
 c) What is the range? $\{1, 4, 9, 16, 25, 36\}$

26. Determine if the following are functions:
 a) NOT a function
 b) not a function

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Algebra I Name _____ ID: 1
 Practice with Arithmetic Sequences Date _____ Period _____
 State if each sequence is arithmetic.
 1) 1, 5, 25, 125, ... 2) -1, -9, -17, -25, ...
 3) -1, -4, -16, -64, ... 4) -27, 3, 33, 63, ...
 5) -30, -14, -6, -2, ... 6) -7, -16, -25, -34, ...
 7) -40, -48, -56, -64, ... 8) -1, 1, 5, 13, ...
 Find the common difference.
 9) 35, 41, 47, 53, ... 10) 16, 13, 10, 7, ...
 11) 29, 33, 37, 41, ... 12) 7, 1, -5, -11, ...

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13) -7, 1, 9, 17, ... 14) -34, -39, -44, -49, ...
 15) 16, 6, -4, -14, ... 16) 8, 28, 48, 68, ...
 Determine if the sequence is arithmetic. If it is, find the three terms in the sequence after the last one given.
 17) -36, -32, -28, -24, ... 18) 42, 421, 4211, 42111, ...
 19) -5, -3, 0, 4, ... 20) 32, 34, 36, 38, ...
 21) 3, 1, -1, -3, ... 22) 1, 9, 25, 49, ...
 23) -1, -2, -4, -8, ... 24) 16, 12, 8, 4, ...

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Determine if the sequence is arithmetic. If it is, find the recursive formula.
 25) -16, -6, 4, 14, ... 26) -30, -50, -70, -90, ...
 27) 37, 30, 23, 16, ... 28) 17, k, -1, -10, ...
 29) -14, -8, -2, 4, ... 30) -40, -49, -58, -67, ...
 31) 1, 10, 19, 28, ... 32) -29, -22, -15, -8, ...
 Find the explicit formula.
 33) -23, -25, -27, -29, ... 34) -36, 64, 164, 264, ...
 35) -24, -33, -42, -51, ... 36) 4, 104, 204, 304, ...

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Determine if the sequence is arithmetic. If it is, find the recursive formula.
 25) -16, -6, 4, 14, ... 26) -30, -50, -70, -90, ...
 27) 37, 30, 23, 16, ... 28) 17, k, -1, -10, ...
 29) -14, -8, -2, 4, ... 30) -40, -49, -58, -67, ...
 31) 1, 10, 19, 28, ... 32) -29, -22, -15, -8, ...
 Find the explicit formula.
 33) -23, -25, -27, -29, ... 34) -36, 64, 164, 264, ...
 35) -24, -33, -42, -51, ... 36) 4, 104, 204, 304, ...

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Function Notation NAME: _____ DATE: _____
 1. Evaluate the following expressions given the functions below:
 $g(x) = -3x + 1$ $f(x) = x^2 + 7$ $h(x) = \frac{12}{x}$ $j(x) = 2x + 9$
 a. $g(10) =$ b. $f(3) =$ c. $h(-2) =$
 d. $f(7) =$ e. $h(6) =$ f. $g(6) =$
 h. Find x if $g(x) = 16$ i. Find x if $h(x) = -2$ j. Find x if $f(x) = 23$
 2. Change the following statements into coordinate points and then plot them!
 a. $f(-1) = 1$
 b. $f(2) = 7$
 c. $f(1) = -1$
 d. $f(3) = 0$

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3. Given this graph of the function $f(x)$:

Find:
 a. $f(-4) =$ b. $f(0) =$ c. $f(3) =$ d. $f(-5) =$
 e. x when $f(x) = -2$ f. x when $f(x) = 0$

APPLICATION
 4. Swine flu is attacking the North Pole. The function below determines how many elves have swine flu where t = time in days and S = the number of people in thousands.
 $S(t) = 9t - 4$
 a. Find $S(4)$.
 b. What does $S(4)$ mean?
 c. Find t when $S(t) = 23$.
 d. What does $S(t) = 23$ mean?
 e. Graph the function.

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February 15, 2019, Friday

1. Evaluate the following expressions given the functions below:

$g(x) = -3x + 1$ $f(x) = x^2 + 7$ $h(x) = \frac{12}{x}$ $j(x) = 2x + 9$

a. $g(10) = -29$
 $g(10) = -3(10) + 1$
 $g(10) = -29$

b. $f(3) = 16$
 $f(3) = 3^2 + 7$
 $f(3) = 16$

c. $h(-2) = -6$
 $h(-2) = \frac{12}{-2}$
 $h(-2) = -6$

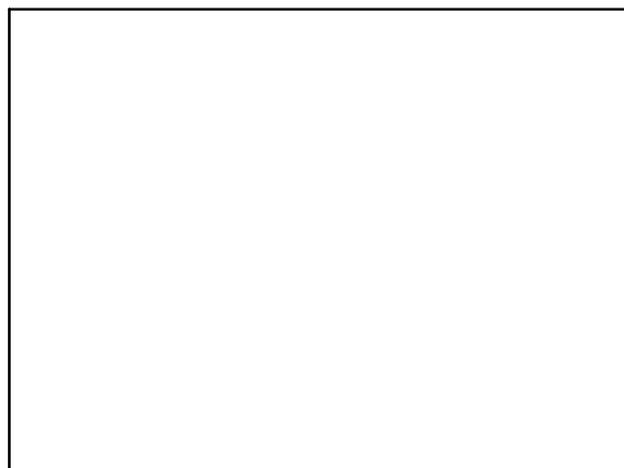
b. Find x if $g(x) = 16$
 $16 = -3x + 1$
 $-15 = -3x$
 $-5 = x$

i. Find x if $h(x) = -2$
 $-2 = \frac{12}{x}$
 $-2x = 12$
 $x = -6$

...test (buddy or notes?)



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