

Name \_\_\_\_\_

Date \_\_\_\_\_

The tables below each represent a different function. Use these functions to answer questions 1 – 5.

**f(x)**

x	-2	-1	0	1	2
f(x)	9	5	1	-3	-7

-4   -4   -4   -4

**g(x)**

x	-2	-1	0	1	2
f(x)	0.25	1	4	16	64

x4   x4   x4   x4

**h(x)**

x	-2	-1	0	1	2
f(x)	5	3	3	5	9

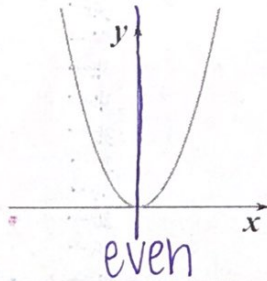
1. What is the equation of the exponential function?  $g(x) = 4(4)^x$
2. Which function is a quadratic?  $h(x)$
3. What is the equation of the linear function?  $f(x) = -4x + 1$
4. Which function has a common difference?  $f(x)$
5. Which function has a common ratio?  $g(x)$

Are the following functions even, odd, or neither?

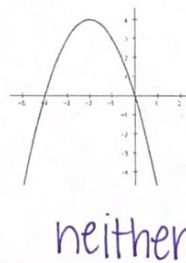
6.  $f(x) = 7x^2 + 5x^1$

neither

7.



8.



9.  $g(x) = 7x^4 - 1x^0$

even

Domain:  $(-\infty, \infty)$

Range:  $[-4, \infty)$

Increasing:  $(2, \infty)$

Decreasing:  $(-\infty, 2)$

A.O.S.:  $x = 2$

Vertex:  $(2, -4)$

x-intercept(s):  $(0, 0)$

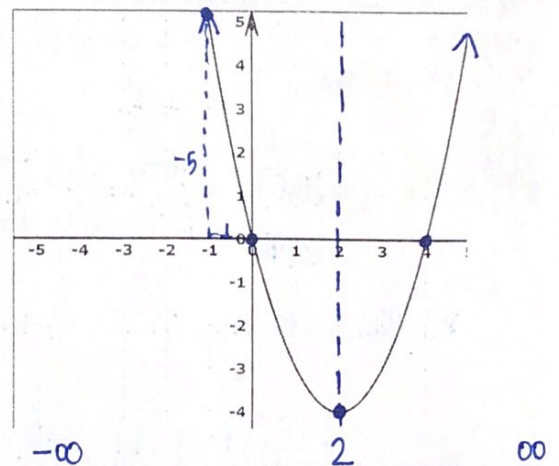
y-intercept(s):  $(0, 0)$

$(4, 0)$

End behavior:  $x \rightarrow -\infty, y \rightarrow \infty$

$x \rightarrow \infty, y \rightarrow \infty$

Rate of Change  $[-1, 1] = -5$



Explain which type of function (linear, exponential, or quadratic) or sequence (arithmetic or geometric) you would write for the following scenarios. Then, explain why that is the best

- a. On the first day of the week, Dexter rides his mountain bike for 5 miles. To prepare for his tournament this weekend, he adds 3 more miles to his ride each day.

arithmetic sequence

- b. Cameron starts the band season practicing 32 hours a week. As the season comes to an end, Mr. Erwin reduces practice time by half each week.

exponential function

- c. David is getting ready for soccer season. He asks Gabe to record the height of the ball after he kicks it into the air. After 2 seconds, it has reached a maximum height of 60 feet.

quadratic function

Jonathan is trying to decide how he wants to save for a new iPhone. His parents tell him that they will give him \$5 to start with, but he has two options for saving money.

Option 1: Every week the previous amount will double.

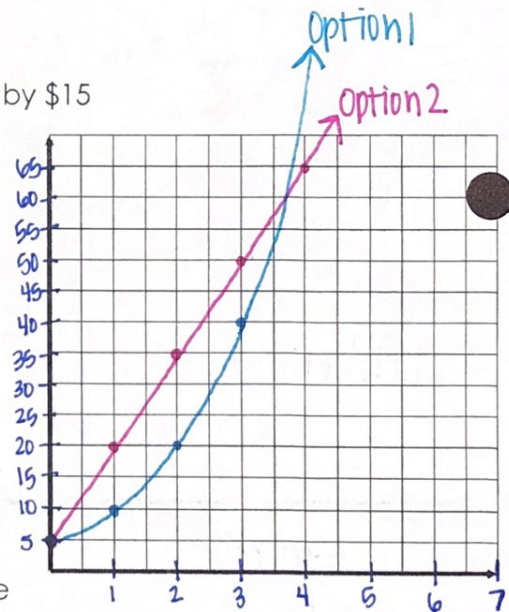
Option 2: Every week the previous amount will increase by \$15

10. Write a function for each option.

Option 1:  $D(x) = 5(2)^x$

Option 2:  $A(x) = 15x + 5$

11. Graph each function and label the two functions.  
(Hint: Scale the y's by fives)



12. Compare the rate of change for each option, for the following interval,  $[0, 3]$ .

Option 1:  $\frac{40-5}{3-0} = \frac{35}{3} \approx 11.67$

Option 2:  $\frac{50-5}{3-0} = \frac{45}{3} = 15$   
 Greater ROC on the interval  $[0, 3]$   
 OR solve by hand  
 $\frac{60-5}{3-0} = \frac{55}{3} \approx 18.33$   
 goal faster with Option 1

13. If the iPhone costs \$100, which option should he choose?

\* He will reach \$160 on day 5, and \$110 on day 7 for Option 1 so he will reach his goal faster with Option 1

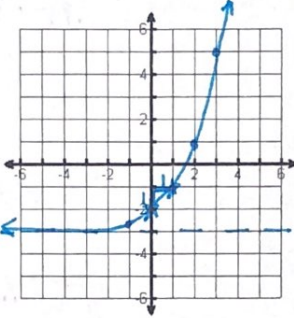
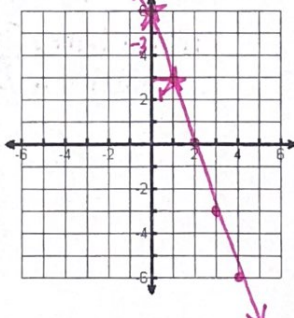
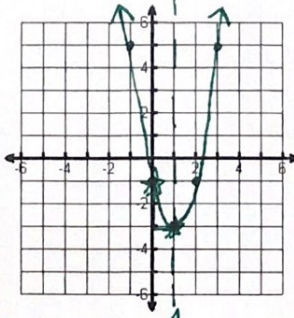
14. If Jonathan decides to save the money for college instead, how long would it take him to get to \$10,000 for Option 1?

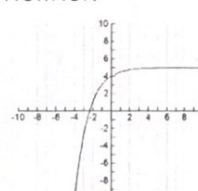
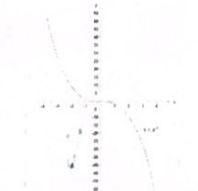
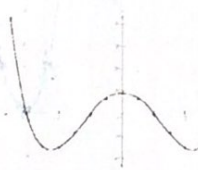
11 weeks (\$10,240)



Name: \_\_\_\_\_

Date: \_\_\_\_\_

What you need to know & be able to do	Things to remember	Problem	
<p><u>Characteristics of Functions</u></p> <ul style="list-style-type: none"> <li>• Domain (x-values)</li> <li>• Range (y-values)</li> <li>• Y-int (where it crosses the y-axis)</li> <li>• X-int (where it crosses the x-axis)</li> <li>• Asymptote</li> <li>• Rate of Change</li> <li>• Increasing/Decreasing</li> <li>• End behavior</li> </ul>		<p>1. Graph the function <math>f(x) = (2)^x - 3</math></p> 	<p>What type of function is this?  <u>exponential</u>                      Domain: <math>(-\infty, \infty)</math> Range: <math>(-3, \infty)</math>                      Asymptote: <math>y = -3</math>                      RoC from <math>x = 0</math> to <math>1</math>: <math>\frac{1}{1} = 1</math>                      X-Int: <math>(1.6, 0)</math> Y-Int: <math>(0, -2)</math>                      Inc: <math>(-\infty, \infty)</math> Dec: <u>N/A</u>                      End behavior:  <math>x \rightarrow -\infty, f(x) \rightarrow -3</math>  <math>x \rightarrow \infty, f(x) \rightarrow \infty</math></p>
		<p>2. Graph the function <math>y = -3x + 6</math></p> 	<p>What type of function is this?  <u>linear</u>                      Domain: <math>(-\infty, \infty)</math> Range: <math>(-\infty, \infty)</math>                      Asymptote: <u>N/A</u>                      RoC from <math>x = 0</math> to <math>1</math>: <math>\frac{-3}{1} = -3</math>                      X-Int: <math>(2, 0)</math> Y-Int: <math>(0, 6)</math>                      Inc: <u>N/A</u> Dec: <math>(-\infty, \infty)</math>                      End behavior:  <math>x \rightarrow -\infty, f(x) \rightarrow \infty</math>  <math>x \rightarrow \infty, f(x) \rightarrow -\infty</math></p> <p><i>same as "m"</i></p>
		<p>3. Graph the function <math>f(x) = 2(x-1)^2 - 3</math></p> 	<p>What type of function is this?  <u>quadratic</u>                      Domain: <math>(-\infty, \infty)</math> Range: <math>(-3, \infty)</math>                      AOS: <u>1</u> Vertex: <math>(1, -3)</math>                      RoC from <math>x = 0</math> to <math>1</math>: <math>\frac{2}{1} = 2</math>                      X-Int: <math>(0.25, 0)</math> and <math>(2.25, 0)</math> Y-Int: <math>(0, -1)</math>                      Inc: <math>(1, \infty)</math> Dec: <math>(-\infty, 1)</math>                      End behavior:  <math>x \rightarrow -\infty, f(x) \rightarrow \infty</math>  <math>x \rightarrow \infty, f(x) \rightarrow \infty</math></p>

<p><u>Comparing Functions and Sequences</u></p>	<ul style="list-style-type: none"> <li>Starting value = Function</li> <li>Linear <math>y = mx + b</math></li> <li>Exponential <math>y = ab^x</math></li> </ul> <ul style="list-style-type: none"> <li>First Time = Sequence</li> <li>Arithmetic: <math>a_n = a_1 + d(n-1)</math></li> <li>Geometric: <math>a_n = a_1(r)^{n-1}</math></li> </ul>	<p>4. Taylor and Jordan are competing to see who can run the most during a week. On <u>Day 1</u>, Taylor runs <u>3 miles</u> then increases his mileage each day by <u>4 miles</u>. On Day 1, Jonathan runs <math>\frac{1}{2}</math> a mile and doubles his miles each day.</p> <p>Write the rule for the <u>sequence</u> that represents how many miles each runner will run in terms of days.</p> <p>Taylor: <math>a_n = 3 + 4(n-1) \rightarrow 3 + 4n - 4 \rightarrow a_n = 4n - 1</math></p> <p>Jordan: <math>a_n = \frac{1}{2}(2)^{n-1}</math></p> <p>Who will reach 10 miles first? Taylor: Day 3, 11 mi Jordan: Day 6, 16 mi</p>
<p><u>Determine whether a function is even, odd, or neither</u></p>	<p>Graphically:</p> <ul style="list-style-type: none"> <li>Even = Symmetric about the y-axis</li> <li>Odd = 180 degree rotational symmetry + MUST go through origin (0,0)</li> </ul> <p>Algebraically:</p> <ul style="list-style-type: none"> <li>Remember constants have <math>x^0</math> - EVEN</li> <li>Even = all exponents are even</li> <li>Odd = all exponents are odd</li> <li>Neither = mix of even and odd exponents</li> </ul>	<p>5. Two companies are offering memberships for buying music. iTunes offers a \$20 a month membership with a registration fee of \$100. Amazon offers a \$40 a month membership with a registration fee of \$60.</p> <p>Write an equation for each company.</p> <p>iTunes: <math>y = 20x + 100</math></p> <p>Amazon: <math>y = 40x + 60</math></p> <p>Compare the rates of change and the y-intercepts.</p> <p>Amazon has a higher ROC (<math>40 &gt; 20</math>), but iTunes has a higher y-intercept (<math>100 &gt; 60</math>)</p> <p>Which company is better if you only want <u>2 months</u>? <u>12 months</u>?</p> <p>iTunes: (2, 140) (12, 340) Amazon (2, 140) (12, 440)</p> <p>Same at 2 months, iTunes is cheaper for 12 mo.</p> <p>Determine whether the function is even, odd or neither.</p>  <p><math>f(x) = 2x^3</math> odd</p>  <p><math>f(x) = -x^3 + x^1 + 5x^0</math> neither</p>  <p><math>f(x) = x^4 + 3x^1</math> neither</p> <p><math>f(x) = x^2 - 9x^0</math> odd</p>