

Algebra 1 – Topic 7 Review

Questions	WORK SPACE
<p>1. Mr. Smith invested <u>\$2,500</u> in a savings account that earns <u>3%</u> interest compounded annually. He made no additional deposits or withdrawals. Which expression can be used to determine the number of dollars in this account at the end of <u>4</u> years?</p> <p><input checked="" type="radio"/> A) $2500(1 + 0.03)^4$ <input type="radio"/> B) $2500(1 + 0.3)^4$ <input type="radio"/> C) $2500(1 + 0.04)^3$ <input type="radio"/> D) $2500(1 + 0.4)^3$</p>	<p>Exponential $y = A(d)^x$ $y = 2,500(1.03)^4$ <u>Growth</u> \swarrow $(1 + 0.03) = 1.03$</p>
<p>2. Is the equation $A = 21000(1 - 0.12)^t$ a model of exponential growth or exponential decay, and what is the rate (percent) of change per time period?</p> <p><input type="radio"/> A) exponential growth and 12% <input type="radio"/> B) exponential growth and 88% <input checked="" type="radio"/> C) exponential decay and 12% <input type="radio"/> D) exponential decay and 88%</p>	<p>$A = 21000(1 - 0.12)^t$ $0.12 \rightarrow$ 12% d is less than 1; therefore, DECAY</p>
<p>3. The value of a car purchased for <u>\$20,000</u> decreases at a rate of <u>12%</u> per year. What will be the value of the car after <u>3</u> years?</p> <p><input type="radio"/> A) \$12,800.00 <input checked="" type="radio"/> B) \$13,629.44 <input type="radio"/> C) \$17,600.00 <input type="radio"/> D) \$28,098.56</p>	<p>$y = A(d)^x$ $y = 20000(1 - 0.12)^3$ DECAY! $y = 20000(0.88)^3$ $y = 20000(0.6815)$ $y = 13,629.44$</p>
<p>4. Kathy plans to purchase a car that <u>depreciates</u> (loses value) at a rate of <u>14%</u> per year. The initial cost of the car is <u>\$21,000</u>. Which equation represents the value, v, of the car after <u>3</u> years?</p> <p><input type="radio"/> A) $v = 21,000(0.14)^3$ <input checked="" type="radio"/> B) $v = 21,000(0.86)^3$ <input type="radio"/> C) $v = 21,000(1.14)^3$ <input type="radio"/> D) $v = 21,000(0.86)(3)$</p>	<p>$y = 21000(1 + 0.14)^3$ $y = 21000(1 - 0.14)^3$ $y = 21000(0.86)^3$</p>
<p>5. The current population of a town is <u>10,000</u>. If the population, P, <u>increases</u> by <u>20%</u> each year, which equation could be used to find the population after t years?</p> <p><input type="radio"/> A) $P = 10,000(0.2)^t$ <input type="radio"/> B) $P = 10,000(0.8)^t$ <input checked="" type="radio"/> C) $P = 10,000(1.2)^t$ <input type="radio"/> D) $P = 10,000(1.8)^t$</p>	<p><u>Growth</u> $P = 10000(1 + 0.20)^t$ $P = 10000(1.20)^t$</p>

6. Daniel's Print Shop purchased a new printer for \$35,000. Each year it depreciates (loses value) at a rate of 5%. What will its approximate value be at the end of the fourth year?
 A) \$33,250.00
 B) \$30,008.13
 C) \$28,507.72
 D) \$27,082.33

$$y = A(d)^x$$

$$y = 35000(1 - .05)^4$$

$$y = 35000(.95)^4$$

$$y = 35000(.81451) = 28507$$

7. A car depreciates (loses value) at a rate of 4.5% annually. Greg purchased a car for \$12,500. Which equation can be used to determine the value of the car, V , after 5 years?
 A) $V = 12,500(0.55)^5$
 B) $V = 12,500(0.955)^5$
 C) $V = 12,500(1.045)^5$
 D) $V = 12,500(1.45)^5$

4.5% → .045

$$V = 12500(1 - .045)^5$$

$$V = 12500(.955)^5$$
~~$$V = 12500(1.045)^5$$~~

8. Compare the quantity in Column A with the quantity in Column B.
 the value of y when $x = 5$
 Column A Column B
 $y = a(0.4)^x$ $y = a(1.02)^x$
 [A] The quantity in Column A is greater.
 [B] The quantity in Column B is greater.
 [C] The two quantities are equal.
 [D] The relationship cannot be determined on the basis of the information supplied.

$$y = a(0.4)^x$$

↑
 d is less than 1!
 [DECAY]

$$y = a(1.02)^x$$

↑
 d is more than 1!
 [Growth]

9. The number of wolves in the wild in the northern section of the Cataragas County is decreasing at the rate of 3.5% per year. Your environmental studies class has counted 80 wolves in the area. After how many years will this population of 80 wolves drop below 70 wolves, if this rate of decrease continues?

4 years!

YEARS	WOLVES
X	$f(x)$
0	80
1	77.2
2	74.5
3	71.9
4	69.37

$f(x) = 80(0.965)^x$
 $f(1) = 77.2$
 $f(2) = 74.498$
 $f(3) = 71.89$
 $f(4) =$

10. Diego decided to invest his \$500 tax refund rather than spend it. He found a bank that would pay him 2% interest, every month. If he deposits the entire \$500 and does not deposit or withdraw any other amount, how much money will he have in his account after half a year?

half a year = 6 months!

↓
 $x = 6$ → $\$563.08$

y represents total \$
 x represents months, not years!

$$y = 500(1 + 0.02)^x$$

$$y = 500(1.02)^x$$

$$y = 500(1.02)^6$$

$$y = 500(1.1262) = 563.08$$

Questions

11. Write the function for the description below:

Parent function: $f(x) = 2^x$; translated up 5 units

$$f(x) + 5 = 2^x + 5$$

Questions

12. Write the function for the description below:

Parent function: $f(x) = 3^x$; up 5 units, right 3

$$f(x-3) + 5 = 3^{x-3} + 5$$

13. Identify the transformation from the parent function $f(x) = 2^x$ to $g(x) = 2^{x-10}$

10 units to the right

14. Identify the transformation from the parent function $f(x) = 7^x$ to $g(x) = 7^x + 5$

5 units up

15. Identify the transformation from the parent function $f(x) = 2^x$ to $g(x) = 2 \cdot 2^x$

↑ y-intercept = 1 ↑ y-intercept = 2
graph translated 1 unit up!

16. Identify the transformation from the parent function $f(x) = 2^x$ to $g(x) = 3(2^{x+1}) + 2$

↑ y-intercept = 1 ↑ graph went from (0,1) to (0,3) then to (0,5) and left 1 unit
translated up 4 units left 1 unit

17. Is the function linear or exponential? Explain.

x	f(x)
1	5
2	10
3	15
4	20
5	25
8	40
9	45
16	80

$f(x)$ is increasing by 4 for each increase in x by 1.

18. Identify each function as either linear or exponential. Which function is growing at a faster percent rate?

x	f(x)	g(x)
1	25	1
2	50	4
3	100	20
4	200	80
5	400	320

6 | 800 (1280)

g(x) is faster

19. Identify the y-intercept:

$$f(x) = 3(2^x)$$

↑
3

What is the new y-intercept of the function $4f(x)$?

$$4 \cdot f(x) = 4 \cdot 3(2^x)$$

$$4 \cdot f(x) = 12(2^x)$$

↑
y-int = 12

20. Identify the y-intercept:

$$f(x) = 3^x$$

↑
1

What is the new y-intercept of the function $2f(x)$?

$$2 \cdot f(x) = 2 \cdot 3^x$$

↑
y-int = 2

21. Identify the y-intercept:

$$f(x) = 10 \cdot 8^x$$

↑
10

What is the new y-intercept of the function $\frac{1}{2}f(x)$?

$$\frac{1}{2} \cdot f(x) = \frac{1}{2} \cdot 10 \cdot 8^x \rightarrow 5 \cdot 8^x$$

$$\frac{1}{2} \cdot f(x) = \frac{10}{2} \cdot 8^x$$

↑
y-int = 5

22. Identify the y-intercept:

$$f(x) = 4(2^x)$$

↑
4

What is the new y-intercept of the function $2f(x)$?

$$2 \cdot f(x) = 2 \cdot 4(2^x)$$

$$2 \cdot f(x) = 8(2^x)$$

↑
y-int = 8

23. Is the situation linear or exponential? Explain your answer.

Days	Amount Saved (in dollars)
1	725
2	765
3	805
4	845
5	885

+40
+40
+40
+40

Linear

24. When will $f(x)$ be less than 1.5 grams?

Days	Mass (in grams)
0	50
12	25
24	12.5
36	6.25

÷2
÷2
÷2
÷2
÷2

72 DAYS

25. What is the average rate of change (slope) for the function $f(x) = 3^x$ over the interval $[-2, 2]$?

$$f(-2) = 3^{-2}$$

$$f(2) = 3^2$$

$$f(-2) = \frac{1}{3^2} = \frac{1}{9}$$

$$f(2) = 9$$

$$\left(\overset{x_1}{-2}, \overset{y_1}{\frac{1}{9}} \right)$$

$$\left(\overset{x_2}{2}, \overset{y_2}{9} \right)$$

26. What is the average rate of change for the function $f(x) = \left(\frac{1}{4}\right)^x$ over the interval $[-2, 3]$?

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - \frac{1}{9}}{2 - (-2)} = \frac{\frac{81}{9} - \frac{1}{9}}{2 + 2} = \frac{\frac{80}{9}}{4} = \frac{80}{9} \cdot \frac{1}{4} = \frac{80}{36} = \boxed{2.\overline{22}}$$