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Directions: Using your definitions of linear and exponential functions, write whether each situation below could be best modeled with a linear function or an exponential function.

1. You get a new job! The starting salary is $20,000 per year, with a $650 yearly raise.

linear

2. Zombies attack! Every night, the number of people infected with the zombie virus triples!

exponential

3. While getting ready for Halloween, the M&M factory produced 7,000 bags of candy per hour.

linear

4. Bacteria are growing in a Petri dish. There are 5,000 the first hour, 10,000 after two hours, and 20,000 after three hours!

exponential

5. You buy a $100 iTunes gift card and then buy one hundred $1 songs to listen to.

linear

6. You got a new job! The starting salary is $20,000 per year, with a 4% yearly raise.

exponential

Directions: The exponential function that describes the BIG Deals Wireless phone plan is shown below. Complete the sentences describing the pieces of the equation.

$f(x) = 1 \cdot 2^x$

f(x) in this example is the cost of the monthly payment.

1 in this example is the starting cost of the plan ($1).

2 in this example is the factor by which the cost increases (it doubles).

x in this example is the number of months that have passed. (time)

Application: Write new equations that could be used to model the cost of the following phone plans.

1. $20 per month, quadruples every month

$f(x) = 20 \cdot 4^x$

2. $3 per month, doubles every month

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

3. $30 per month flat rate

$f(x) = 30x + 0$

4. $40 per month, increases 2% every month

$f(x) = 40 \cdot 1.02^x$

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Answer Key
Testname: 1.12 TRANSLATING ALG EXPRESSIONS 2

1) B
2) C
3) C
4) B
5) B
6) D
7) C
8) B
9) D
10) D

1.12 Translating Algebraic Expression 2

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write the phrase as a variable expression. Use x to represent "a number."

1) the difference of Five and a number 1) _____

A) $5x$ B) $5 - x$ C) $x - 5$ D) $\frac{5}{x}$

2) The quotient of 38 times a number and -4 2) _____

A) $38x + 4$ B) $38x - 4$ C) $\frac{38x}{-4}$ D) $\frac{1}{-152x}$

3) A number divided by -11 3) _____

A) $\frac{-11}{x}$ B) $-11x$ C) $\frac{x}{-11}$ D) $x - (-11)$

4) Negative thirteen decreased by 3 times a number 4) _____

A) $13 - 3x$ B) $-13 - 3x$ C) $-13 + 3x$ D) $13 + 3x$

5) The sum of -9 and a number 5) _____

A) $-9 - x$ B) $-9 + x$ C) $9 + x$ D) $-9x$

6) Eleven subtracted from a number 6) _____

A) $11 - x$ B) $11x - 11$ C) $\frac{x}{11}$ D) $x - 11$

7) The quotient of 40 and the product of a number and -8 7) _____

A) $\frac{40}{x} - 8$ B) $-320x$ C) $\frac{40}{-8x}$ D) $\frac{-8x}{40}$

8) Twice a number, decreased by 58 8) _____

A) $2(x - 58)$ B) $2x - 58$ C) $2x + 58$ D) $2(x + 58)$

9) A number subtracted from -20 9) _____

A) $-20x$ B) $-20 + x$ C) $x - (-20)$ D) $-20 - x$

10) Five times the sum of a number and -23 10) _____

A) $5+ x + (-23)$ B) $5x - (-23)$ C) $5x + (-23)$ D) $5[x + (-23)]$

Linear and Exponential EXPRESSIONS

Exponential Expressions:

$a \cdot b^x$

a multiplication

_____ represents the initial amount (y-intercept). In context of a problem, this represents the unchanging starting amount.

b

_____ represents the rate. It is not constant. Look for words like DOUBLE, HALF, TRIPLE, etc.

b > 1 it is a growth problem.

When b is between 0 and 1 it is a decay problem.

Example:

A population of mice starts with 2 mice. The population triples per month. $a \cdot b^x$

Identify the a: 2

Identify the b: 3

Expression: $2 \cdot 3^x$

X = # of months

Another time we use exponential expressions is when the problem has a repeated percent.

We use the formats below in this case:

Decay: $a \cdot (1 - \%)^x$

Growth: $a \cdot (1 + \%)^x$

Always change the % to a decimal

Example:

A bacterial sample starts with 130 bacteria cells. The cells are dying at 11% per day.

Identify the a: 130

Identify the b: $(1 - .\%) \rightarrow (1 - .11) \rightarrow (0.89)$

Expression: $130 \cdot (0.89)^x$

Expressions

NO TOTAL IS DISCUSSED IN THE PROBLEM

Expressions do not have an _____equal_____ sign.

Linear Expressions:

_____m_____ x + _____b_____

_____m_____ represents the slope. In context of a problem, this means the _____rate_____ of _____change_____.

_____b_____ represents the y-intercept. In context of a problem, this represents the unchanging _____starting_____ amount.

To recognize a linear expression, look for a _____constant_____ rate of change. For example, a rate of change of $24 per month.

Example: You are buying a computer on layaway. You make a $250 deposit and then make weekly payments of $50.

Identify the m: 50

Identify the b: 250

X = # of months paid

Write an expression to represent this scenario: 50x + 250