Illustrative Mathematics

Solutions

4.8 Exam: Exponential Functions and Equations Check Your Readiness

1. For which function k does the output increase by 20% every time the input increases by 1?

    a. $k(x) = 0.020^x$

    b. $k(x) = 0.20^x$

    c. $k(x) = 1.20^x$ *(circled)*

    d. $k(x) = 20^x$

    F.LE.2.ii

    Construct an exponential function given a description

2. The value of a stock in 1940 is \$1.25. Its value grows by 7% each year after 1940.

    a. Write an equation representing the value of the stock $V(t)$, in dollars, t years after 1940.

    $$V(t) = 1.25 \cdot 1.07^t$$

    b. What does $V(50)$ represent in this situation?

    the value of the stock after 50 years (in 1990)

3. The table shows the area $A(n)$, in square centimeters, of a piece of paper after it is folded in half n times.

n	$A(n)$
0	280
1	140
2	70
3	35
4	17.5

    F.BF.2

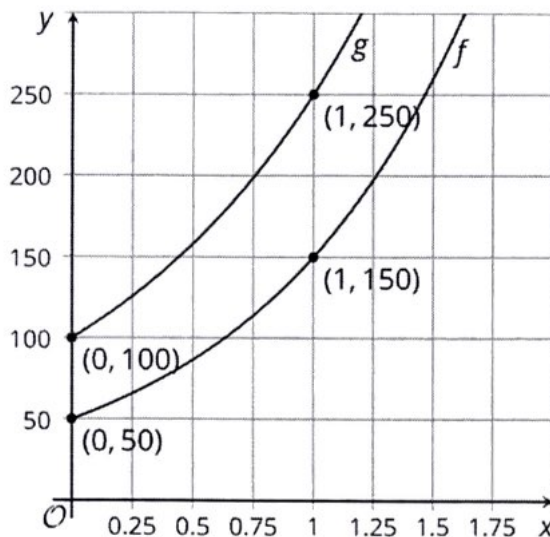   *Model with explicit formula of geometric sequences.*

    a. What is the area of the sheet of paper?

    $280 \ cm^2$

    b. Write an equation expressing the area A as a function of the number of folds n.

    $$A(n) = 280 \cdot \left(\frac{1}{2}\right)^n$$

4. Here are the graphs of two different exponential functions, f and g.

(1, 250)

(1, 150)

(0, 100)

(0, 50)

a. By what factor do the values of f grow when the input increases by 1? By 10?

$$\frac{150}{50} = 3 \qquad 3^{10}$$

b. By what factor do the values of g grow when the input increases by 1? By 10?

$$\frac{250}{100} = 2.5 \qquad 2.5^{10}$$

5. $2,000 is deposited in a bank account and no further deposits or withdrawals are made. The account receives 6% annual interest compounded monthly. Which expressions represent the account balance, in dollars, after 5 years?

$k = 12$
$n = 5$

a. $2,000 \cdot (1.06)^5$

b. $2,000 \cdot \left(1 + \frac{6}{12}\right)^5$

c. $2,000 \cdot \left(\left(1 + \frac{0.06}{12}\right)^{12}\right)^5$

d. $2,000 \cdot \left(1 + \frac{0.06}{12}\right)^{60}$

e. $2,000 \cdot \left(1 + \frac{0.06}{12}\right)^5$

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6. The value of a particular used car has been decreasing at the same rate each year since 2010. The equation $C(t) = 25,000 \cdot (0.78)^t$ represents the value of the car $C(t)$, in dollars, as a function of t, the number of years since 2010.

   a. What do the numbers 25,000 and 0.78 tell us about this situation?

   Initial Value was $25,000

   0.78 of the car's value remains each year

   b. What is the percent decrease of the value of the car each year?

   $1 - 0.78 = 0.22$

   22%

   c. Sketch a graph of C.