

Linear and Exponential Word Problem Practice

1. Lin is tracking the progress of her plant's growth. Today the plant is 5 cm high. The plant grows 1.5 cm per day.

a. Is this linear or exponential growth? Why?

Linear
b. Write a model that represents the height of the plant after d days.

$$y = 1.5d + 5$$

c. What will the height of the plant be after 20 days?

$$y = 1.5(20) + 5 = 30 + 5 = 35$$

2. Mr. Thompson is on a diet. He currently weighs 260 pounds. He loses 4 pounds per month.

a. Is this linear or exponential? Why?

Linear
b. Write a model that represents Mr. Thompson's weight after m months.

$$y = -4m + 260$$

c. After how many months will Mr. Thompson reach his goal weight of 220 pounds?

$$\begin{array}{r} 220 \\ -260 \\ \hline -40 \end{array} = \begin{array}{r} -4m \\ -260 \\ \hline -40 \end{array} \quad \begin{array}{r} -40 = -4m \\ \hline 4 \quad \quad 4 \\ \hline m = 10 \end{array}$$

3. Mrs. Thompson is also on a diet. She currently weighs 200 pounds. She loses 2% of her weight per month.

a. Is this linear or exponential? Why?

Exponential
b. Write a model that represents Mrs. Thompson's weight after m months.

$$y = 200(.98)^m$$

c. After how many months will Mrs. Thompson reach her goal weight of 160 pounds?

11 or 12 months

4. Paul opens a savings account with \$350. He saves \$150 per month. Assume that he does not withdraw money or make any additional deposits.

a. Is this linear or exponential? Why?

Linear
b. Write a model that represents the total amount of money Paul deposits into his account after m months.

$$y = 350 + 150m$$

c. After how many months will Paul have more than \$2,000?

$$2000 = 350 + 150m$$

$$\begin{array}{r} 1650 \\ \hline 150 \end{array} = \begin{array}{r} 150m \\ \hline 150 \end{array} \quad m = 11$$

5. Pauline opens a savings account with \$350. She earns 7% annual interest, compounded monthly. Assume that she does not withdraw money or make any additional deposits.

a. Is this linear or exponential? Why?

Exponential

b. Write a model that represents the total amount of money Pauline has in her account after x years.

$$y = 350(1.07)^x$$

c. After how long will Pauline have more than \$2,000?

26 months

6. The population of Bay Village is 35,000 today. Every year the population of Bay Village increases by 750 people.

a. Is this linear or exponential? Why?

Linear

b. Write a model that represents the population of Bay Village x years from today.

$$y = 35000 + 750x$$

c. In approximately how many years will the population of Bay Village exceed 50,000 people?

$$50000 = 35000 + 750x$$

$$\frac{15000}{750} = \frac{750x}{750} \quad x = 20$$

7. The population of Bay Town is 35,000 today. Every year the population of Bay Town increases by 1.5%.

a. Is this linear or exponential? Why?

Exponential

b. Write a model that represents the population of Bay Town x years from today.

$$y = 35000(1.015)^x$$

c. In approximately how many years will the population of Bay Town exceed 50,000 People?

24 years

8. When will Pauline have as much money as Paul? (see problems 4 and 5)

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9. When will the population of Bay Town exceed the population of Bay Village? (see problems 6 and 7)

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