

[1] Warm water is poured in the bathtub as shown in the table below. Answer the following questions.

Time (min)	1	2	3	4
Amount of water (L)	20	40	60	80

[a] What is the rate of change?

$$\begin{aligned}\text{The rate of change} &= \frac{\text{amount of water } B - \text{amount of water } A}{\text{time } B - \text{time } A} \\ &= \frac{40 - 20}{2 - 1} \\ &= 20\end{aligned}$$

[b] Which element is the independent variable? Dependent variable? Answer either “Time” or “Amount of water”

Independent: Time

Dependent: Amount of water

[c] Give an equation for this data set using  $x$ ,  $y$ , and the rate of change.

$$y = 20x$$

[d] Using the equation created above, calculate the amount of water after 13 min.

$$\begin{aligned}y &= 20 \cdot 13 \\ &= 260\end{aligned}$$

A. 260L

[e] Is this a linear function or not? Explain why.

Yes, it is a linear function, because there is a constant rate of change.

[2] Cell phone company “HardBank” has a smartphone usage plan as shown in the table below. Answer the following questions.

Amount of data (Gb)	0	10	20	30
Price (\$)	10	40	70	100

[a] What is the rate of change?

$$\begin{aligned}
 \text{The rate of change} &= \frac{\text{price } B - \text{price } A}{\text{amount of data } B - \text{amount of data } A} \\
 &= \frac{40 - 10}{10 - 0} \\
 &= \frac{30}{10} \\
 &= 3
 \end{aligned}$$

[b] Which element is the independent variable? Dependent variable? Answer either “Amount of data” or “price”

Independent: Amount of data

Dependent: Price

[c] Give an equation for this data set using  $x$ ,  $y$ , the rate of change, and the initial value.

$$y = 3x + 10$$

[d] Using the equation created above, calculate the price when you have used 70Gb, assuming that there is not upper limit of the price.

$$\begin{aligned}
 y &= 3 \cdot 70 + 10 \\
 &= 220
 \end{aligned}$$

A. \$220

[e] Is this a linear function or not? Explain why.

Yes, it is a linear function, because there is a constant rate of change.

[3] Cell phone company “Bakuten Mobile” has a smartphone usage plan as shown in the table below. Answer the following questions.

Amount of data (Gb)	0	5	15	30
Price (\$)	5	25	65	125

[a] Is there a constant rate of change in this data set? If yes, calculate the rate of change.

$$\begin{aligned}
 \text{The rate of change} &= \frac{\text{price } B - \text{price } A}{\text{amount of data } B - \text{amount of data } A} \\
 &= \frac{25 - 5}{5 - 0} = \frac{20}{5} = 4
 \end{aligned}$$

Double checking with other data values

$$\begin{aligned}
 \text{The rate of change} &= \frac{125 - 65}{30 - 15} \\
 &= \frac{60}{15} = 4
 \end{aligned}$$

A. Yes, there is a constant rate of change, which is 4

[b] Give an equation for this data set using  $x$ ,  $y$ , the rate of change, and the initial value.

$$y = 4x + 5$$

[c] Using the equation created above, calculate the price when you have used 45Gb, assuming that there is not upper limit of the price.

$$\begin{aligned}
 y &= 4 \cdot 45 + 5 \\
 &= 185
 \end{aligned}$$

A. \$185

[d] Is this a linear function or not? Explain why.

Yes, it is a linear function, because there is a constant rate of change.