

CHAPTER 5 Modelling With Graphs
5.1 Direct Variation
Direct Variation: Equations and Graphs

Example:

a) Gus's Gas Station has an underground tank that holds 20 000 L of gasoline. A fuel truck filled the tank in 40 min. Find an equation that relates the amount of gasoline A , in litres, in the tank to the time t , in minutes.



b) Explain what is represented by the constant of variation.

c) How long would it take to fill a tank with a capacity of 12 000 L?

d) Sketch a graph of A versus t .

Solution:

a) The equation has the form $A = kt$.

$$\begin{aligned}k &= \frac{A}{t} \\ &= \frac{20\,000}{40} \\ &= 500\end{aligned}$$

The equation is $A = 500t$.

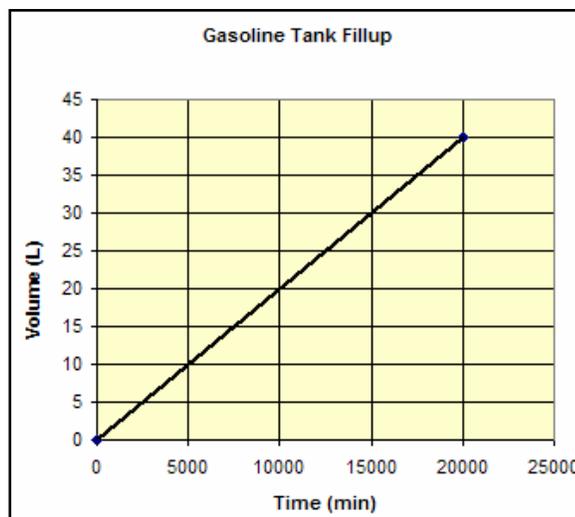
b) The constant of variation represents the rate at which the tank is being filled, 500 L per minute.

c) $12\,000 = 500t$

$$\begin{aligned}\frac{12\,000}{500} &= \frac{500t}{500} \\ 24 &= t\end{aligned}$$

It would take 24 min to fill a tank with a capacity of 12 000 L.

d) The graph is shown.



Practice:

1. a) Michelle manages a vegetable cannery. On the first day of the tomato season, the cannery processed 36 tonnes of tomatoes with 12 employees on the line. Find an equation that relates the mass of tomatoes processed m to the number of employees e .



b) Explain what is represented by the constant of variation.

c) Michelle has been advised to expect 48 tonnes of tomatoes on the following day. How many employees should she call in?

d) Sketch a graph of m versus e .

Answers:

1. a) $m = 3e$

b) The constant of variation represents the mass of tomatoes processed per employee, 3 t.

c) 16

d) The graph is shown.

