BECA / IB Math 01-Linear functions Name:
1 October 2021

1.12: I can model with direct variation

Equations of a straight line: $f(x) = mx + c$, $ax + by + d = 0$, $(y - y_1) = m(x - x_1)$

1. A linear function is such that $f(1) = 5$ and $f(5) = 1$.

   (a) Name two of the function's points as ordered pairs.

   (b) Find the gradient (slope) for the function f

   (c) Substitute the slope and one point into the formula $f(x) = mx + c$

   (d) Solve for the y-intercept

   (e) Find $f(-3)$

2. A runner begins training and her times are gradually improving with each week. Four weeks into her program she can run three miles in 22 minutes. After eight weeks it only takes her $20\frac{1}{2}$ minutes.

   (a) Model her running progress with a linear model.

   (b) If her goal is to beat 20 minutes, use your model to predict when she will achieve it.

3. Given the direct variation (and also a linear function) $f(x) = 2x$. [6]

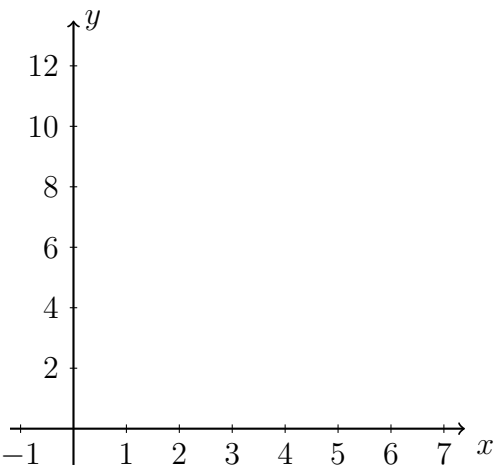
   (a) Find $f(3)$

   (b) $f(x) = 10$. Find x.

   (c) Plot the answers to the first two parts, (a) and (b), as points on the grid and label them as ordered pairs.

   (d) Draw a straight line through the points to represent the function.

   (e) What is the constant of proportionality?



4. The gasoline used by a car is the function of the distance driven in miles, as shown in the table.

Distance (miles)	10	20	40	50	200	500
Gas (gallons)	0.5	1	2	2.5	10	25

   (a) Is gas usage a linear function of distance driven? Explain.

   (b) Is it a direct variation?

   (c) What is the gradient?

   (d) What is the gas mileage in terms of miles per gallon?

   (e) Discuss which is the independent and dependent variables.