

5.2 Interpreting Graphs

(pp. 166-172)

Name: _____

Date: May 4

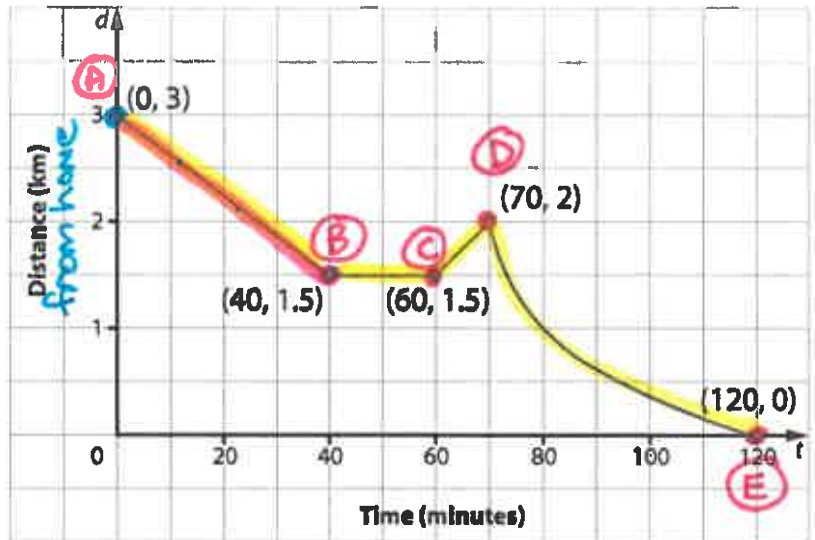
Learning Goals: I will learn to

- describe patterns and trends for given linear graphs
- estimate values between known values on a graph
- extend graphs to estimate values beyond known values on a graph

Explore and Analyze



Rowan is at the park with his dog. The graph shows the distance from home as he walks the dog back home.



1. Describe Rowan's walk home. When was he walking at a steady pace? When was he speeding up or slowing down? When did he stop and rest? How do you know? Add any other information about his walk home.

A-B walked towards home for 40 min, travelled 1.5 km at a steady pace (straight line)

B-C took a 20 min break

C-D walked away from home for 10 min, travelled 0.5 km at a steady pace

D-E walked towards home for 50 min, travelled 2 km started quickly and slowed down as he got close to home

2. Look at the section of the graph from zero to forty minutes. At what speed (in m/s) is Rowan walking?

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$= \frac{1500 \text{ m}}{2400 \text{ s}}$$

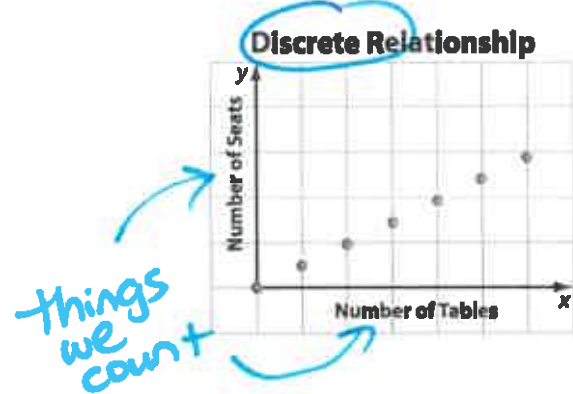
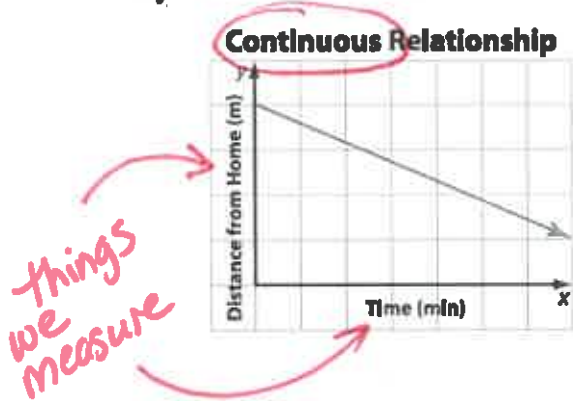
$$= \boxed{0.625 \text{ m/s}}$$

$$\text{distance: } 1.5 \text{ km} \times 1000 = 1500 \text{ m}$$

$$\text{time: } 40 \text{ min} \times 60 = 2400 \text{ s}$$

Develop Understanding

On a graph, points in a **continuous** relationship are joined with a straight line or curve. A line continues on if there are arrows on the ends of the line. With **discrete** relationships, the points may not be connected.



Example 1: Use Interpolation and Extrapolation to Analyze a Graph (p. 167)

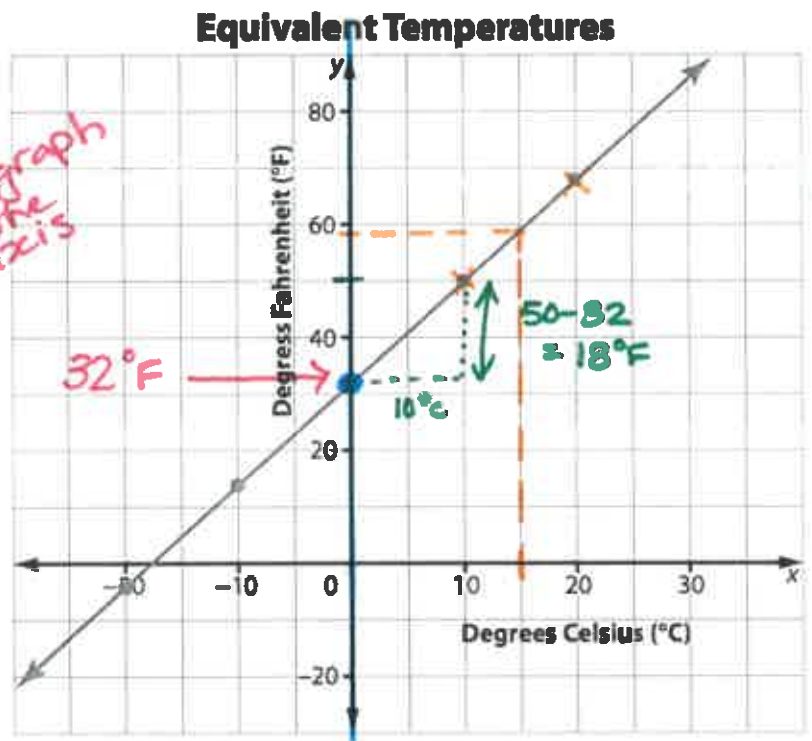
The graph shows the equivalent temperature in degrees Fahrenheit to the temperature in degrees Celsius.

- a) What is the freezing point of water in degrees Fahrenheit?

0°C
32°F
(y-intercept) where our graph crosses the y-axis

- b) Describe the relationship between degrees Fahrenheit and degrees Celsius.

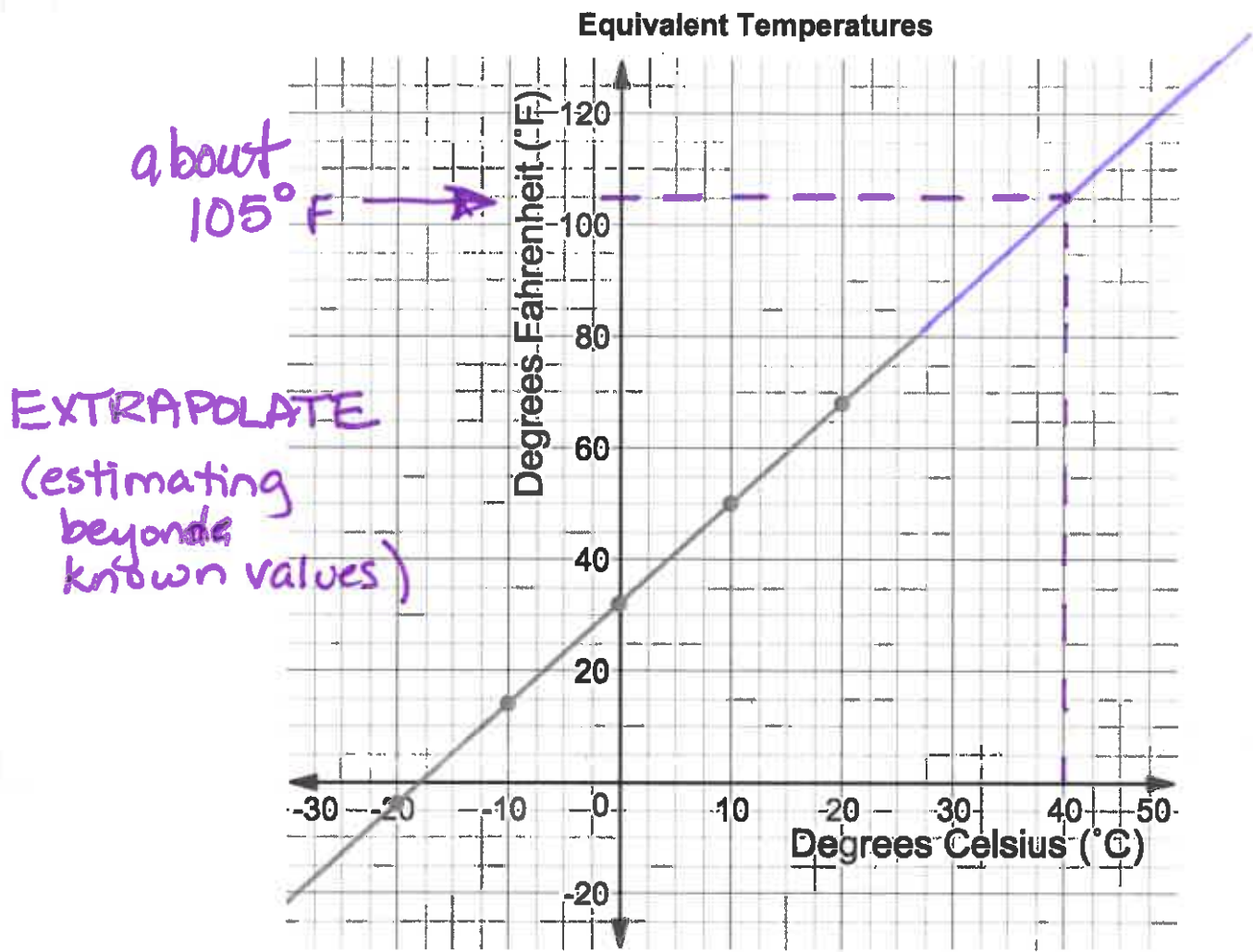
• linear relationship
every increase of 10°C is an increase of 18°F



- c) A weather report predicts a high of **15°C**. How could you use the graph to find the equivalent temperature in Fahrenheit?

about 58 or 59°F
INTERPOLATE
(estimate between known values)

d) Extend the graph to determine the Fahrenheit equivalent to 40°C = $^{\circ}\text{F}$



Example 2: Interpolating and Extrapolating Data (p. 172)

The table of values shows the height and velocity of a football after it is kicked until the moment it is caught.

Time (s)	Height (m)	Velocity (m/s)
0.0	1.0	12.0
0.4	5.0	8.1
0.8	7.5	4.2
1.2	8.3	0.3
1.6	7.7	-3.6
2.0	5.4	-7.5
2.4	1.6	-11.4

Handwritten notes:
- Above the columns: x x above Time, y above Height, y above Velocity.
- To the right of the table: "speed and direction" with an arrow pointing to the Velocity column.
- To the right of the table: "ball is travelling upwards" with a bracket covering the rows from 0.0 to 1.2.
- To the right of the table: "ball is travelling downwards" with a bracket covering the rows from 1.2 to 2.4.

- a) Plot height vs. time (done) and velocity vs. time on separate grids.
- b) Describe the pattern and type of relationship in each graph.

Height → started at 1m, increased to a maximum, then decreased
(non-linear)

Velocity → started at 12m/s then decreased by a consistent amount.
(linear)

- c) Estimate the height and velocity of the football after 1.0 s.

height ≈ 8.1 m

velocity ≈ 2.2 m/s

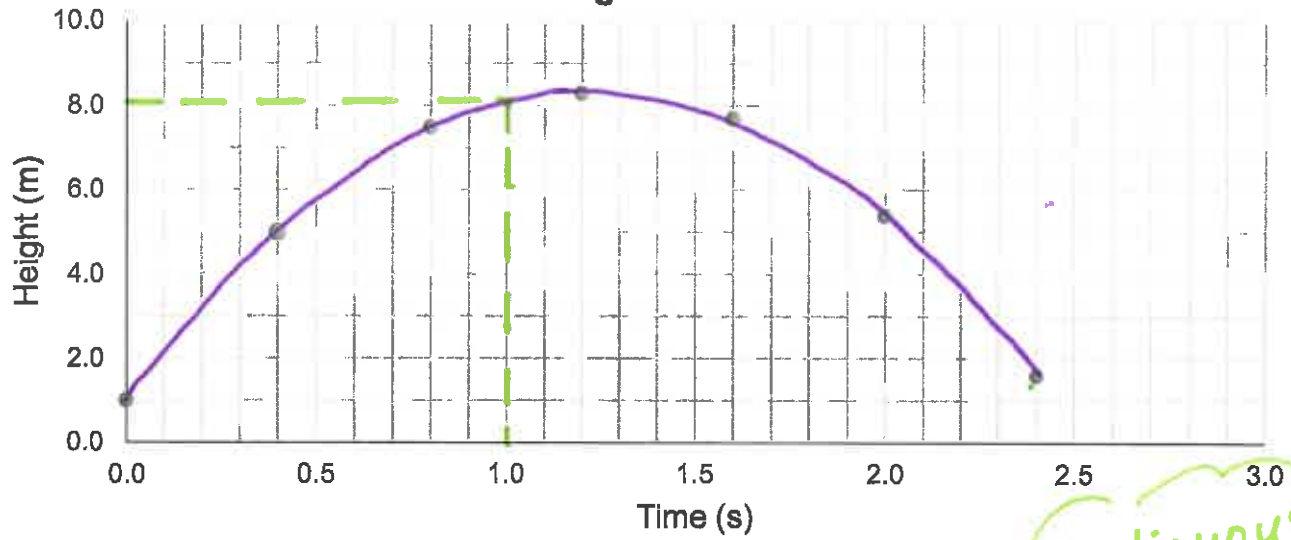
(see graphs)

INTERPOLATED

- d) Would it be accurate to extrapolate either the distance or velocity to a time of 2.8 s? Explain.

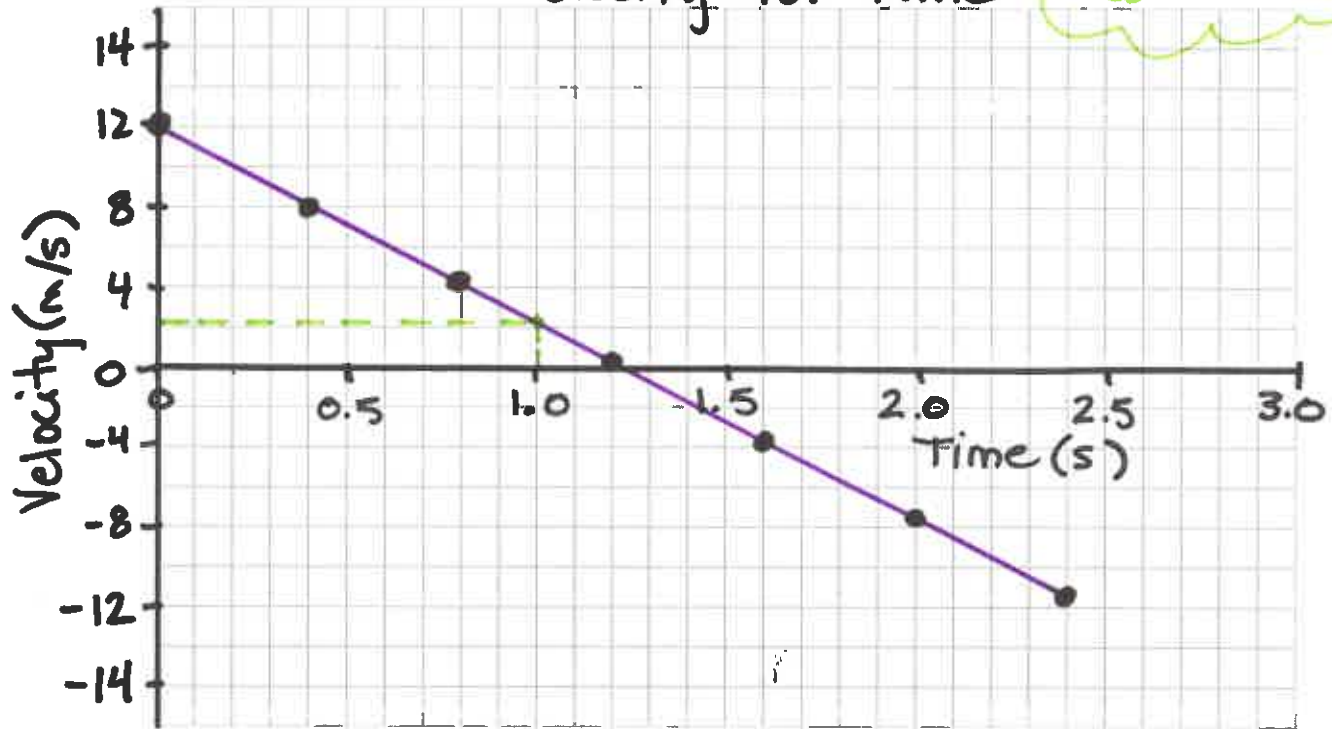
No → 2.8s is after the ball was caught.

y vs. x
Height vs. Time



continuous relationships (join points)

y vs. x
Velocity vs. Time



Key Ideas

- You can represent a relationship with a description, a table of values, or a graph.
- A relationship is linear when the graph forms a straight line and the changes in values are constant.
- On a graph, you can interpolate by estimating values between known values.
- On a graph, you can extrapolate by extending the line beyond known values.
- You should only use interpolation and extrapolation when it is reasonable to have values between or beyond the values on the graph.

How could a graph be more useful than a table of values?