

6.2 Interpreting Graphs

Math 9

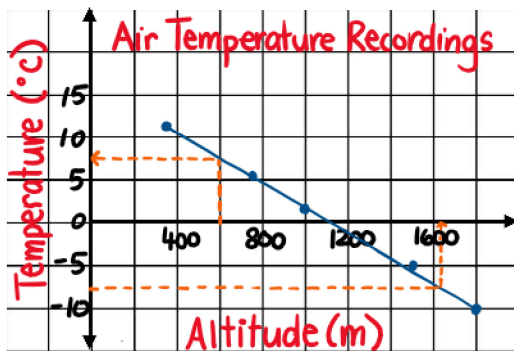
Interpreting Graphs

Estimating a value between two given values is referred to as **interpolation**. It should be used only when it makes sense to have values between given values.

Example: A weather balloon records the air temperature at various altitudes and the data (presented in the table below) approximately represents a linear relationship.

Altitude, a (m)	350	750	1000	1500	1800
Temperature, t ($^{\circ}\text{C}$)	11.4	5.7	2.1	-5.0	-10.00

Since the data is not given in consistent intervals, it is difficult to determine an equation without having covered a lesson on slope or rate of change. Therefore, we will graph these points to help answer the questions below.



Interpolate the approximate air temperature when the balloon was at a height of 600 m.

The temperature is about 7.5°C .

What was the approximate altitude of the balloon at an air temperature of -7.5°C ?

The altitude is about 1650 m.

Is it possible to interpolate the **exact** value of the temperature when the altitude is 1050.92 m?

No, the readings are not that precise.

Example: This graph shows a plane's altitude as it lands. The relationship between altitude and time is approximately linear.

What was the plane's approximate altitude at 50 s?

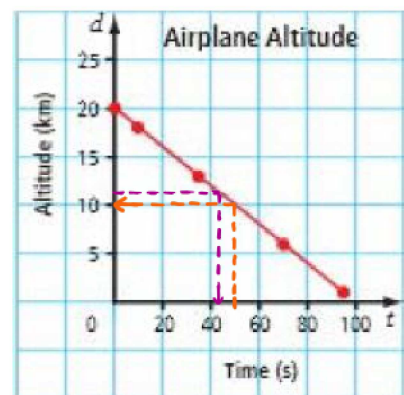
Its altitude is about 10 km.

At what time was the plane's altitude approximately 11 km?

Its altitude at 11 km at about 43 s.

Is it appropriate to join the points with a straight line? Explain.

Yes, the relation is approximately linear and both altitude & time are continuous.



Estimating a value **beyond** a given set of values is referred to as **extrapolation**. It should be used only when it makes sense to have values beyond the given values.

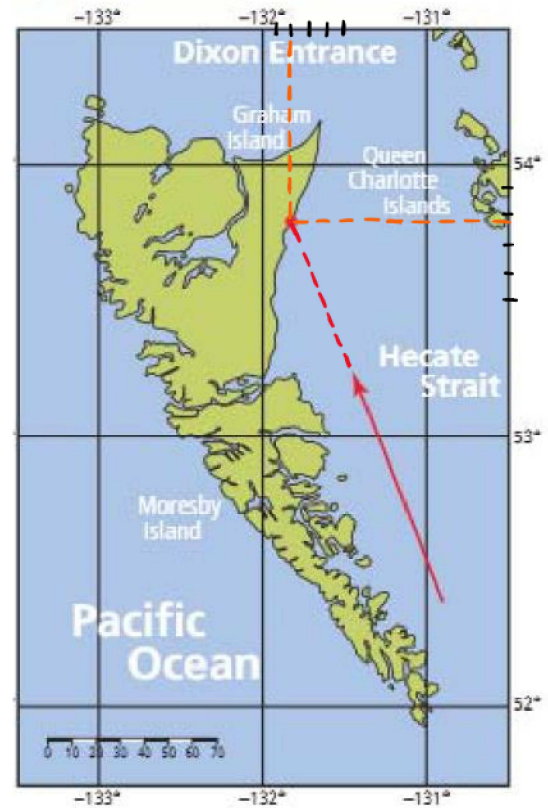
Example: Anna is kayaking up the east coast of Haida Gwaii toward Graham Island. Her course is shown by the red arrow on the map.

If Anna continues on her present course, **extrapolate** the values of the coordinates for latitude and longitude where she will land.

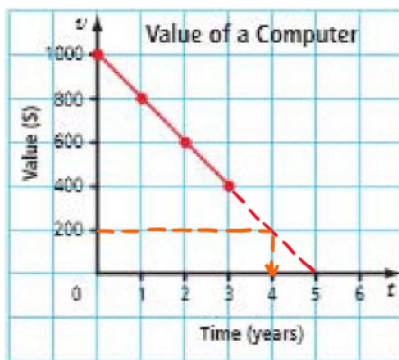
The coordinates are about -131.8° west longitude and about 53.8° north latitude.

Could you use extrapolation to estimate where Anna sailed from? Explain.

No, either we are not given enough of the map, or the beginning of her journey was not linear.



Example: The value of a computer decreases over time. The graph shows the value of a computer after it was bought.



After what approximate period of time does the computer have no value?

It has no value after 5 years.

After what period of time is the computer worth approximately \$200? Is it appropriate to join the points with a straight line? Explain.

It is worth \$200 after 4 year.

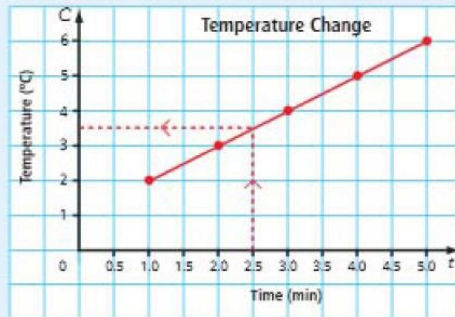
Yes, because the relationship is linear.

Assignment: p. 226 #4 – 6, 8 – 10, 13, 14, 16, 17

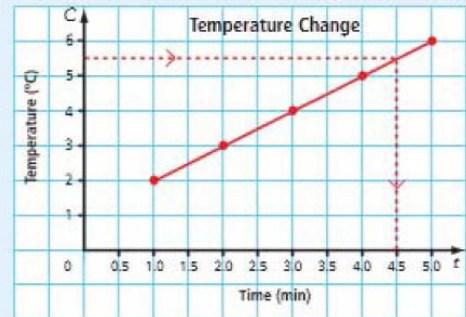
Key Ideas

- On a graph, you can use a line to interpolate values between known values.

- Start with a known value for x .



- Start with a known value for y .



- On a graph, you can extend a line to extrapolate values beyond known values.

- Use a dashed line to extend the line beyond the known x -value or y -value.

- Start with a known value for x .



- Start with a known value for y .



- Interpolation and extrapolation should be used only when it is reasonable to have values between or beyond the values on a graph.