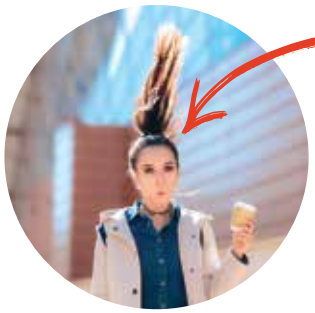
1. Coffee contains a drug called caffeine that stimulates your brain and makes you feel more alert.

   One shot of expresso coffee contains about 80mg of caffeine.



Teagan drinks three cups of expresso coffee (six shots) before she starts work at 8:00am.

Here is a table of data showing the amount of caffeine in her system over time, as measured from her drinking the coffee.

Time(hours)	0	1	2	3	4	5	6	7	8	9
Amount of caffeine (mg)	480	428	381	339	302			214		170

a. Use the grid to graph the relationship between time and amount of caffeine.

b. From the graph and the table estimate the half-life of caffeine.

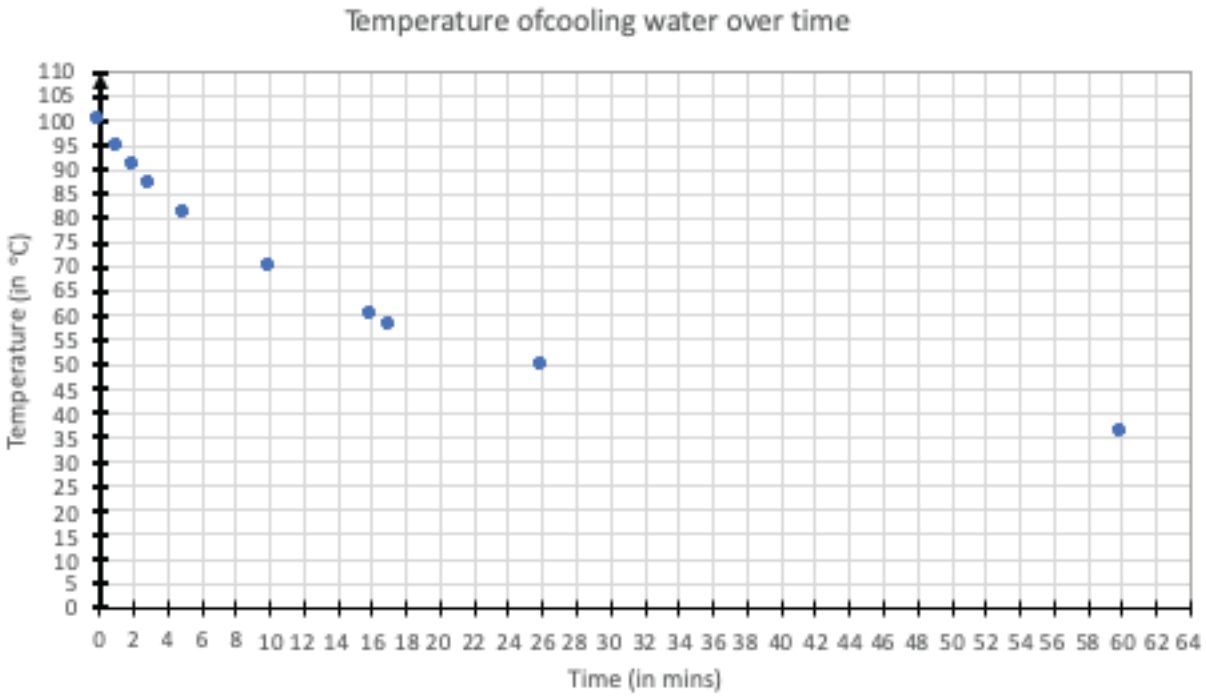
c. When Teagan finishes work at 5:00pm how many milligrams of caffeine will still be in her system?

2. An exponential decay model also applies to the cooling of objects.

   Issac and Tandi investigate the temperature of a 300mL cup of water as it cools.

   They begin with boiling hot water in the cup and take measurements every minute.

Here is a graph showing many of Issac and Tandi's data points.



a. Estimate the temperature of the water at these times;

   6 minutes

   20 minutes

   42 minutes

   75 minutes.

b. Will the curve going through the points ever reach the x-axis? Explain your answer.

c. Would the curve be the same for a 1 litre container of water as it cools? Explain the similarities and differences.

d. For a challenge use a digital graphing tool to find the equation of the curve.