Simple Interest

The formula for simple interest is $I = C \times r \times n$, where
C is the capital (or principal)
r is the interest rate
n is the number of interest periods
I is the interest.

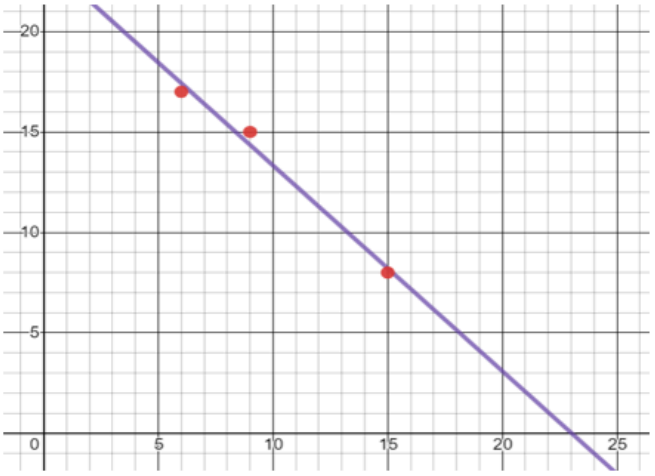
Calculate the simple interest on a loan of:

$6500 at a rate of 7% pa over 3 years and 5 months.

Find the amount of money borrowed if after seven years the simple interest charged is $9000 at a rate of 7.5% per annum.

Interpolation vs. Extrapolation

x_1	y_1
6	17
9	15
15	8



The three data points given in the table have been plotted. Since they are ***nearly*** linear, a linear model is a reasonable model for this data.
The linear model is: $y = -1.02x + 23.6$

domain: range:

interpolation:

extrapolation:

Problem 1:

In a chemistry experiment, a liquid is heated and the temperature is recorded at different times. Some results are shown in the table.

Time (x minutes)	4	6	8	10
Temperature (y °C)	130.0	209.8	290.3	369.2

a Plot a graph of this data on your GDC.

b Choose an appropriate model. Justify your decision.

c Determine a reasonable domain and range for your model.

d Find an equation for the model. Plot it on your graph.

e Comment on your model.

f Use your model to **estimate**:

i the temperature of the water 4.5 minutes after the experiment started

ii the temperature of the water 20 minutes after the experiment started.

g Comment on the predictions made in part **f**.

Problem 2:

Lucy is researching shipping companies for her business to use. She ships between 200 and 500 kg of products each week. Ted's Transport charges a flat rate of $15.99 per kg plus a flat fee. She knows that her friend used Ted's Transport and paid about $2800 to ship 170 kg of belongings.

1 Pose a real-world problem:

What question(s) might you ask here?

2 Develop a model:

a What are the independent and dependent variables in this situation?

b Explain why a linear model is appropriate for this situation.

c Find an equation for your linear model in gradient–intercept form.

3 Test the model:

The following week, Lucy makes her first shipment of 310 kg and pays $5031.90. Is this consistent with your model? If not, revise the model, giving reasons for how you choose to revise it.

4 Apply your model:

The following week, Lucy budgets $4500 for shipping. What is the maximum weight she can ship, to the nearest kilogram? (When applying a model, we **predict** the value of one variable given a known value for the other. It also allows us to make **decisions**, such as setting budgets.)

5 Reflect on your model:

a What is $C(0)$, and what is its meaning in the context of the problem?

b What is a reasonable practical domain and associated range if Lucy uses the model to predict weekly shipping costs?

6 **Conceptual** Why is modelling useful? What does a model allow us to do?