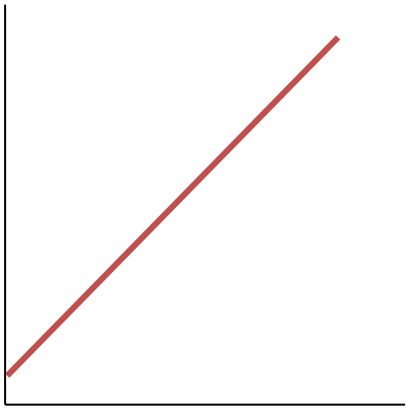
Gradients

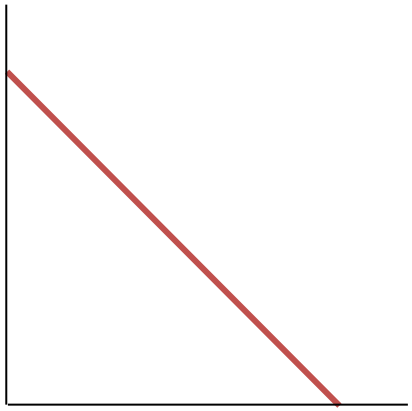
Lesson 10 – How Science Works

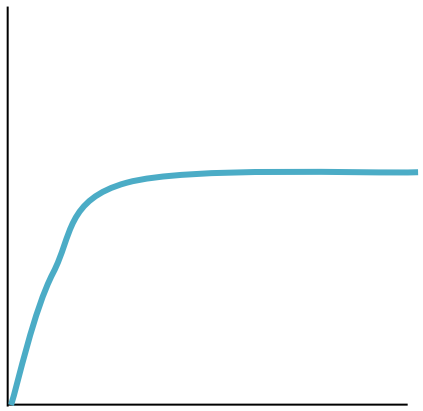
Scatter Graphs

Scatter graphs are used to show whether there is a **relationship** between **two** sets of data.

The relationship between the data can be described as either **linear** or **non-linear**







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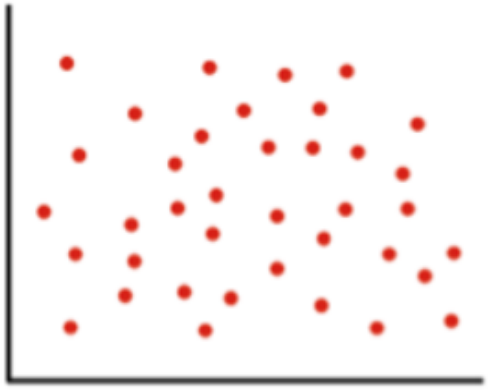

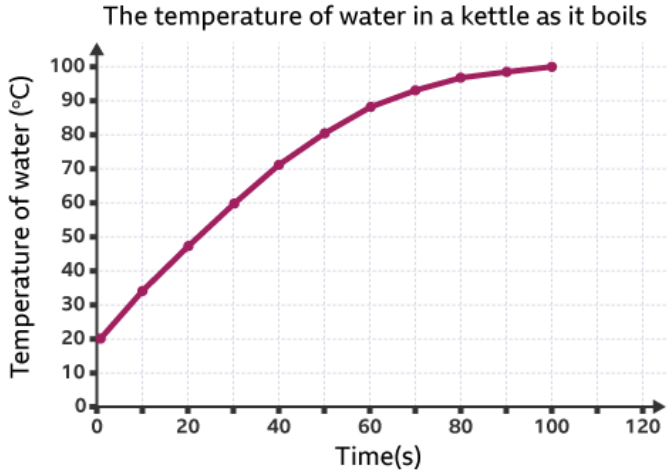

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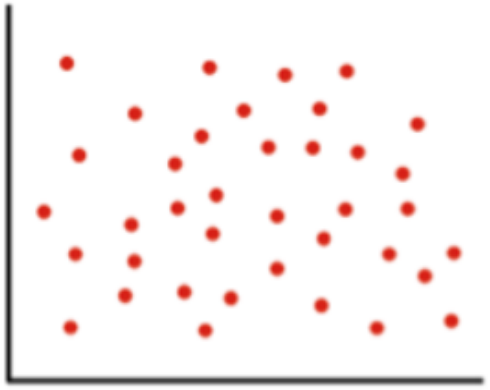
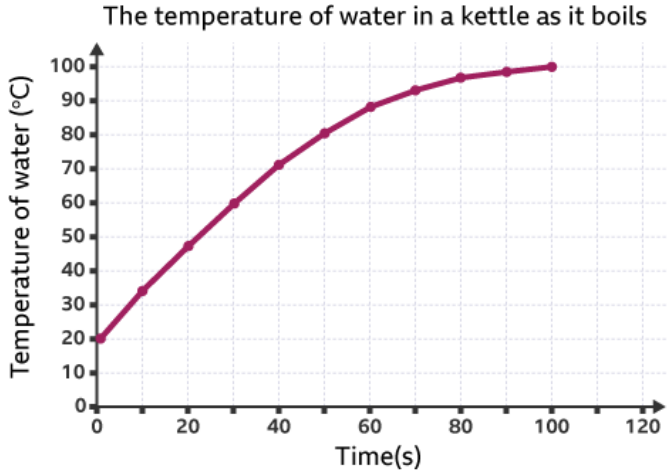


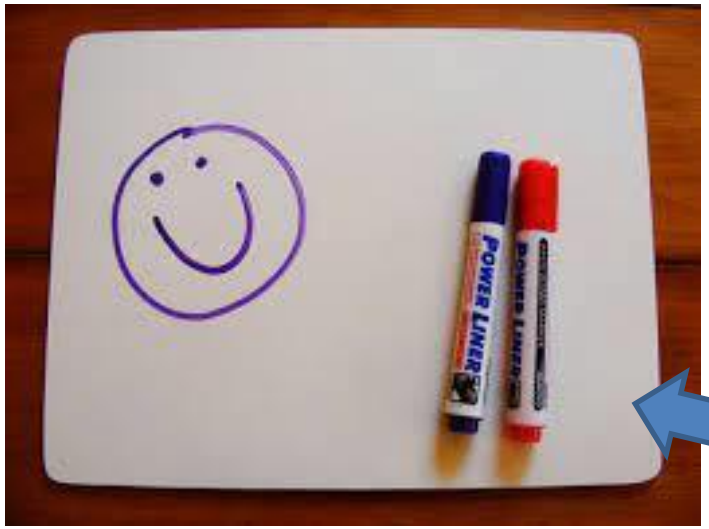
No correlation



Positive, non-linear correlation

Mini Whiteboard Quiz

- Collect a min whiteboard, pen and a paper towel



- Keep a tally of correct answers in the bottom right corner

Testing Your Knowledge

Q. The catagoric variable...

A. is what you keep the same.

B. isn't a thing!

C. is what you change.

D. is how we keep it a fair test.

Testing Your Knowledge

Q. The catagoric variable...

A. is what you keep the same.

B. isn't a thing!

C. is what you change.

D. is how we keep it a fair test.

Testing Your Knowledge

Q. The independent variable...

A. is always continuous.

B. is plotted on the y-axis.

C. is what you change.

D. is how we keep it a fair test.

Testing Your Knowledge

Q. The independent variable...

A. is always continuous.

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Testing Your Knowledge

Q. Where in a results table do you put units?

A. In the headings.

B. After your data.

C. It doesn't matter.

D. Trick question! We don't need units.

Testing Your Knowledge

Q. Where in a results table do you put units?

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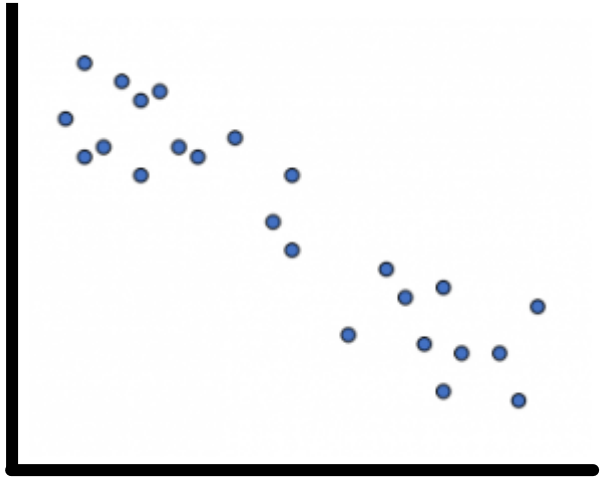
Testing Your Knowledge

Q. What type of relationship does the graph show?

A. Positive, linear relationship.
B. Positive, non-linear relationship.
C. Negative, non-linear relationship.
D. Negative, linear relationship.



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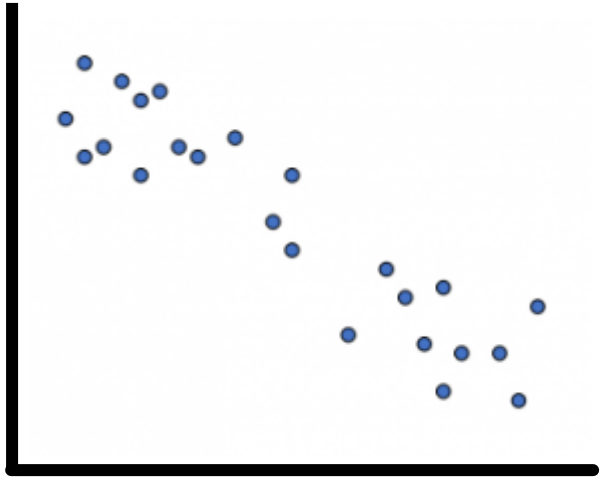


Testing Your Knowledge

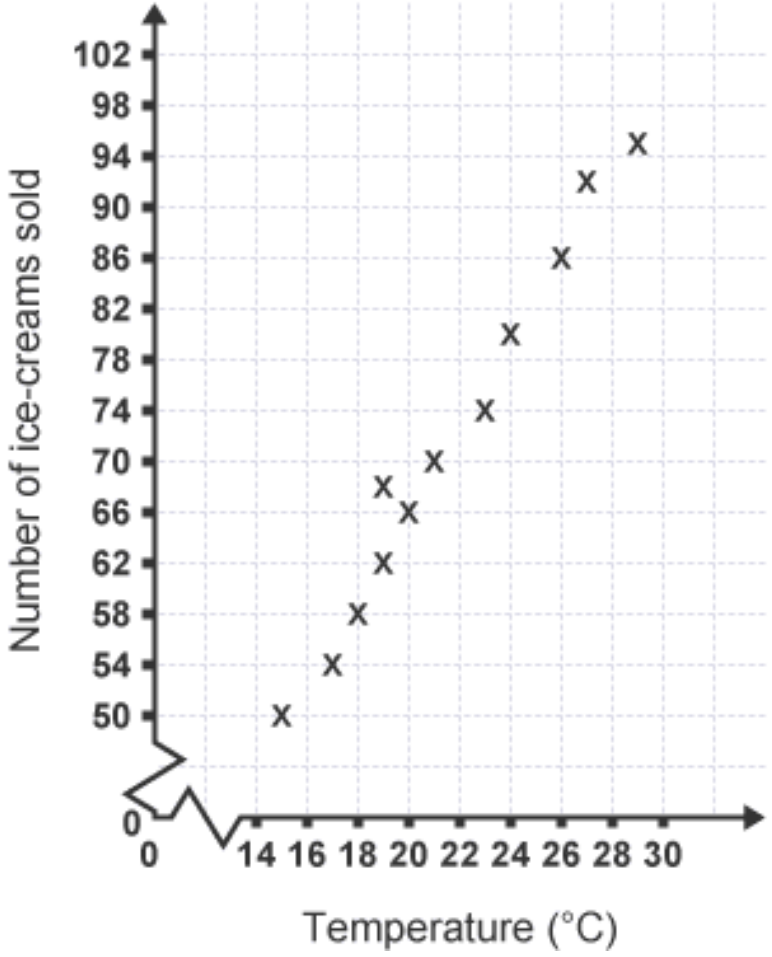
Q. What does the graph show?

A. No ice creams were sold at 0 °C.

B. The correlation is negative.

C. The relationship is non-linear.

D. More ice creams were sold in hot weather.



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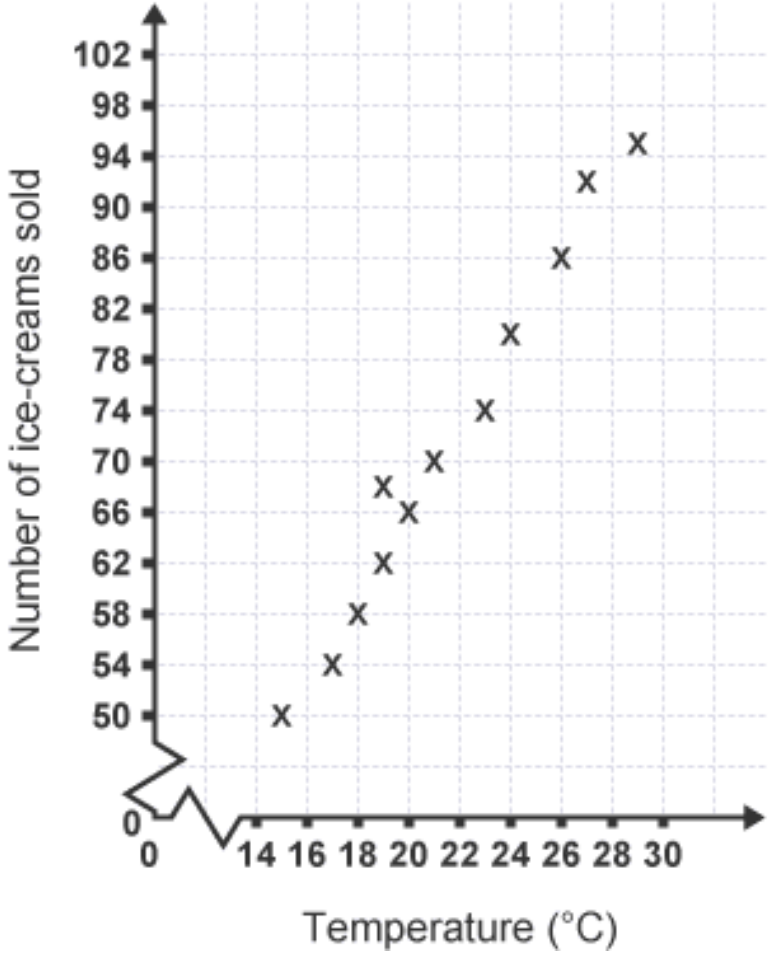
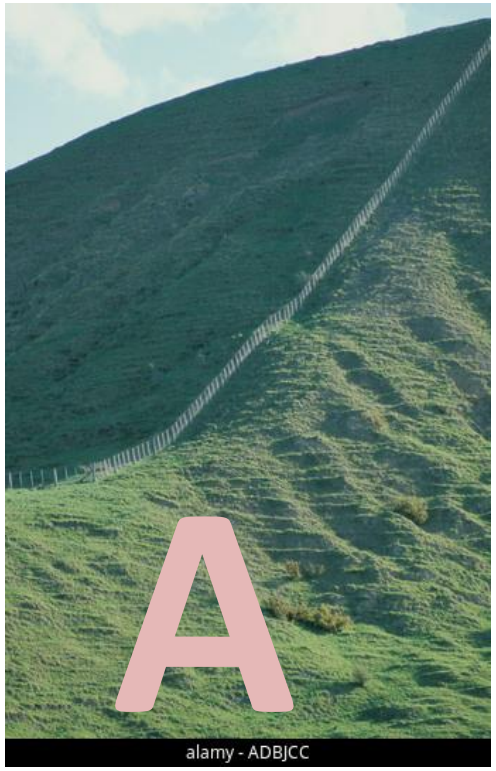
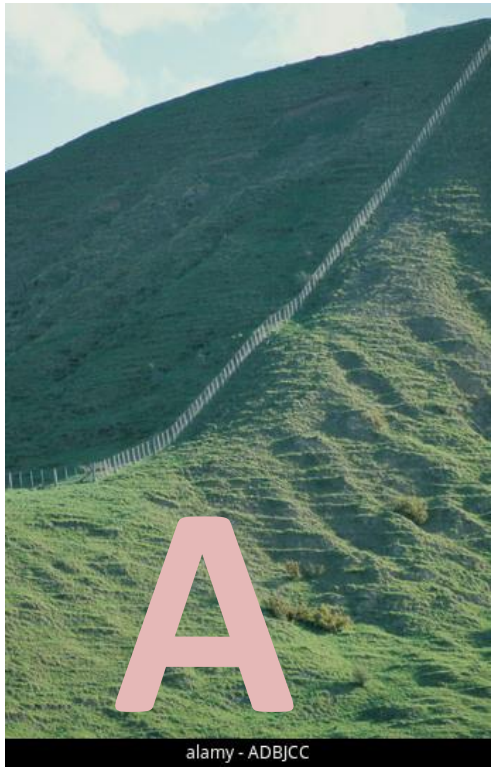


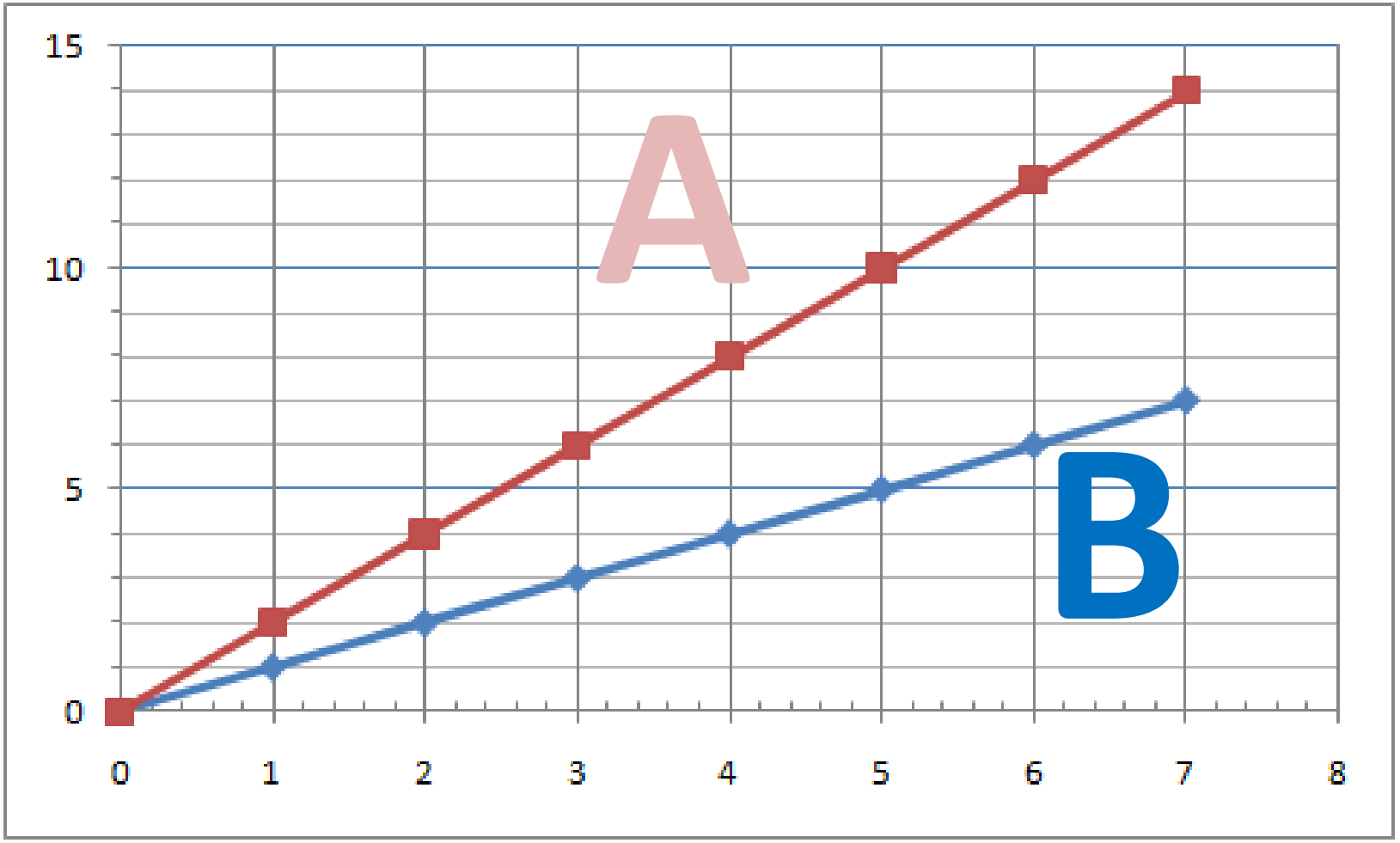
Which is the steepest hill? A or B



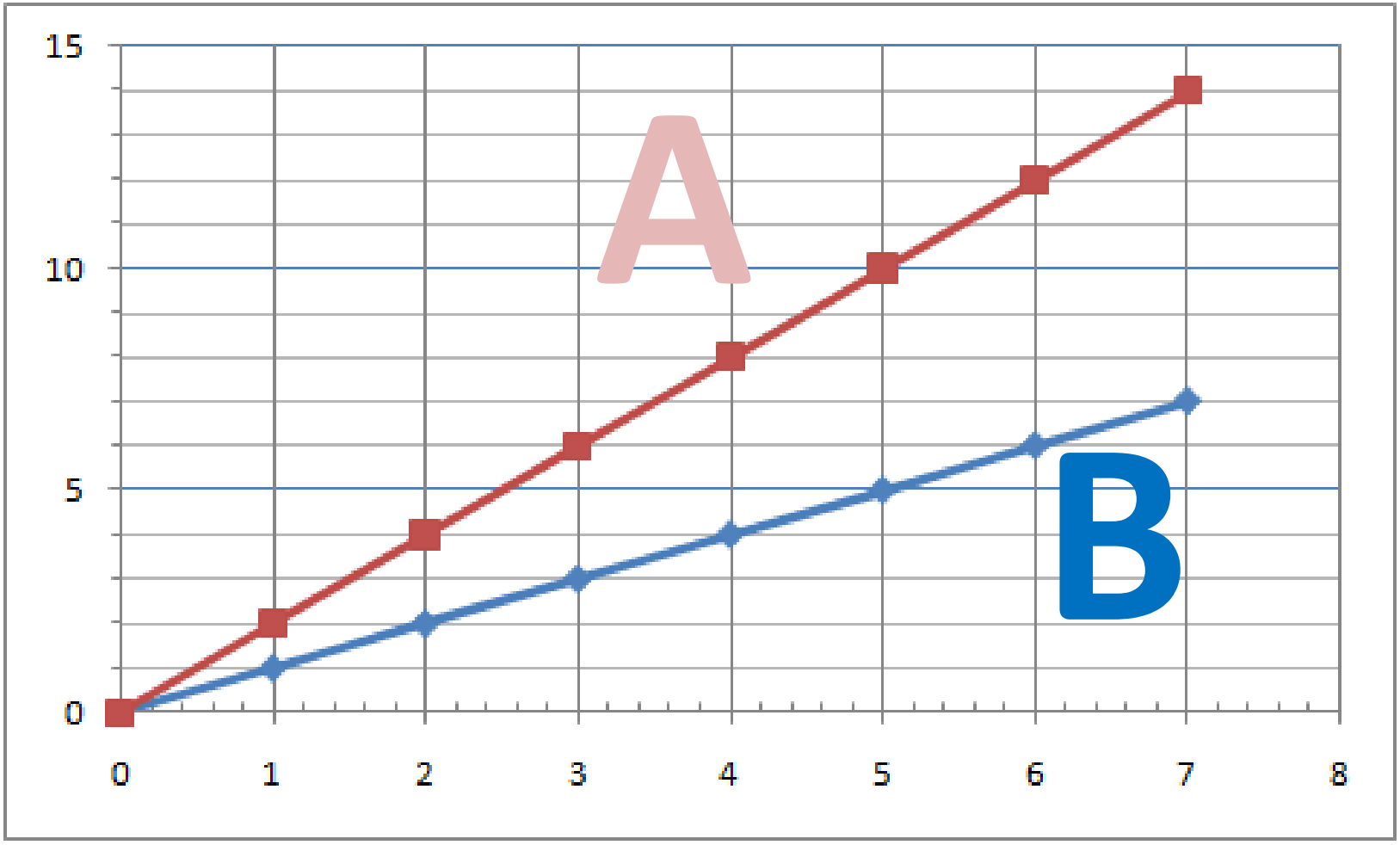
Which has the largest gradient? A or B



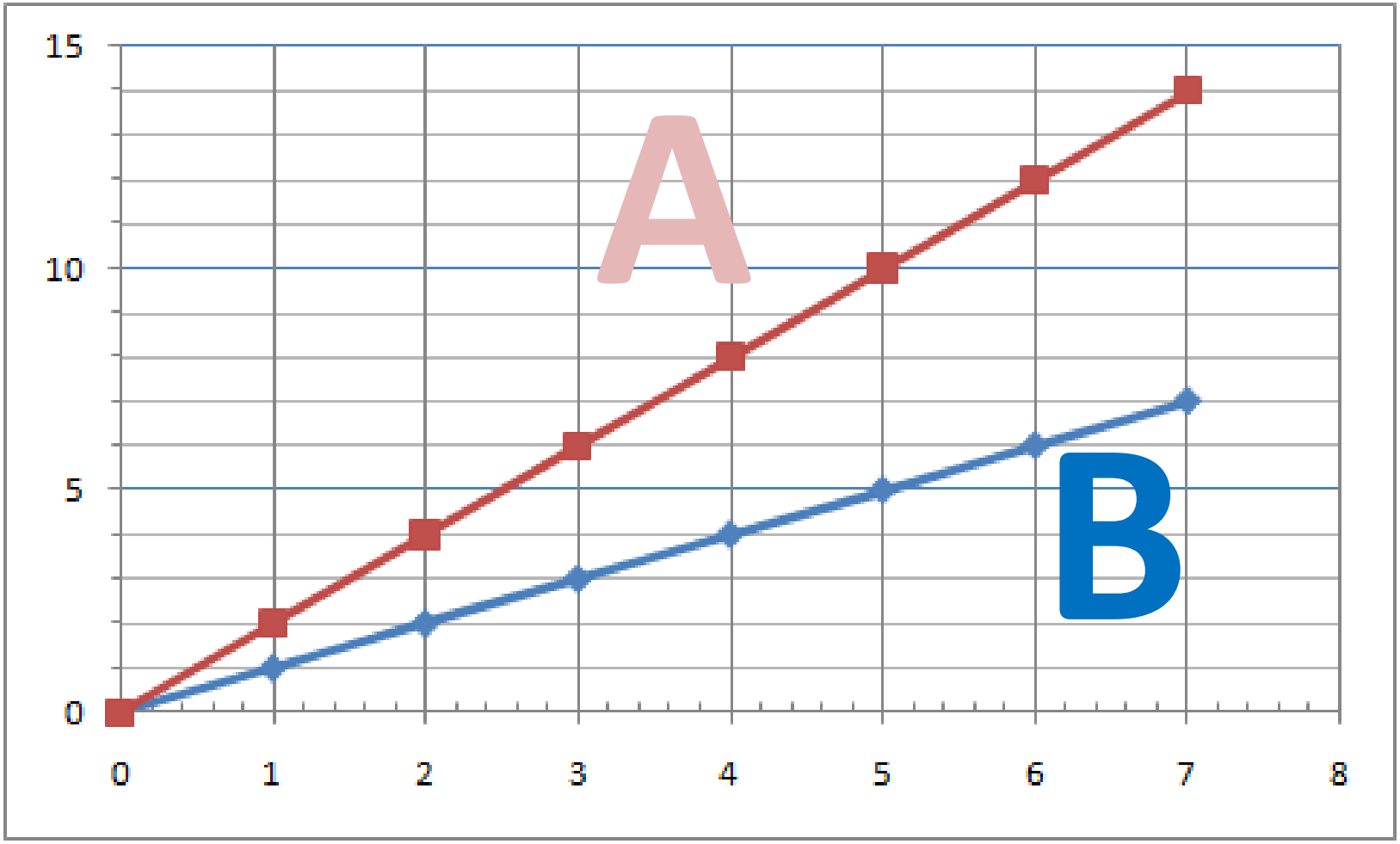
Which is the steepest line, A or B?



Which of A or B has the largest gradient?



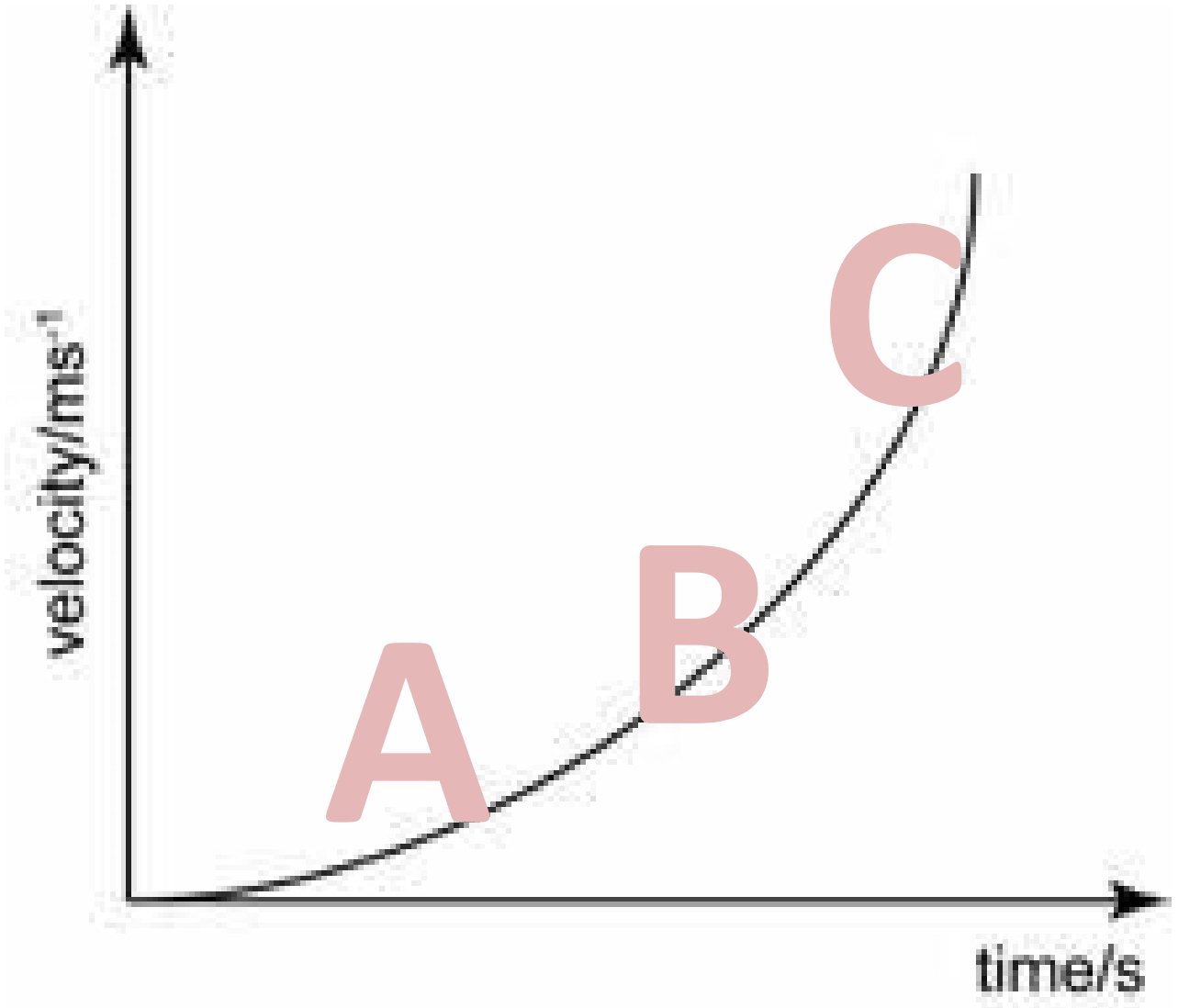
Which is the lowest gradient, A or B?



Which slide has the steepest gradient?

Where is the gradient largest?

Where is the gradient largest

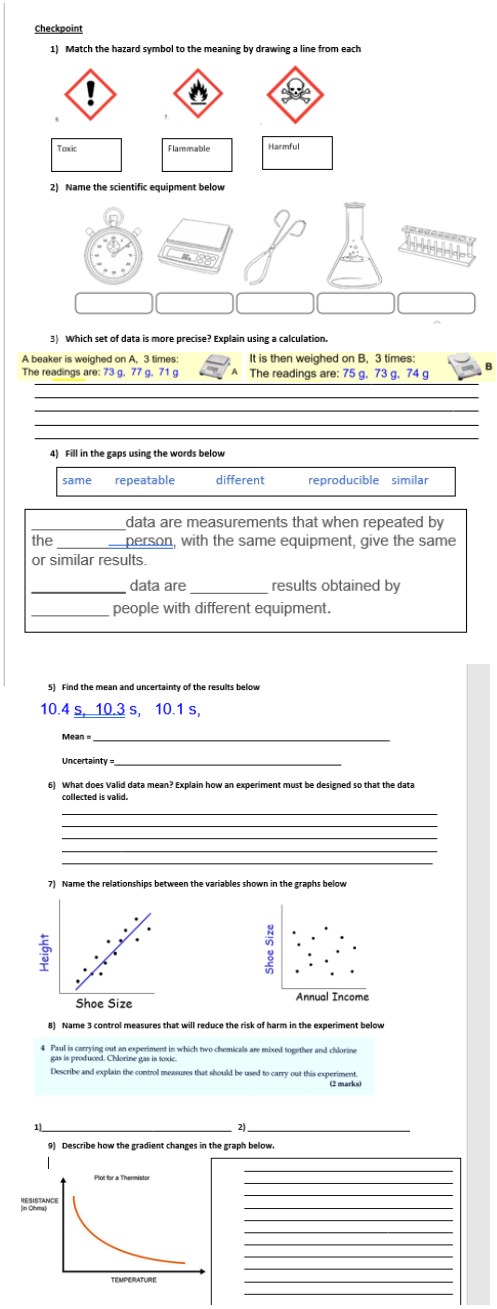


Recap from Y7

- The gradient of a slope is **how much the height (y) increases as the horizontal distance (x) increases**.
- The gradient of a graph shows you how quickly the variable on the y axis changes
- A steep slope has a large increase in height over a short horizontal distance. it has a large gradient
- A shallow slope has a small gradient
- The gradient is the **rate** at which the variable on the y-axis changes with a change on the x-axis.

Checkpoint – 20mins

- Each question is worth 2 marks
- You can use your notes
- Individual in silence



Checkpoint

1) Match the hazard symbol to the meaning by drawing a line from each

Toxic | Flammable | Harmful

2) Name the scientific equipment below

3) Which set of data is more precise? Explain using a calculation.

A beaker is weighed on A, 3 times: The readings are: 73 g, 77 g, 71 g

It is then weighed on B, 3 times: The readings are: 75 g, 73 g, 74 g

4) Fill in the gaps using the words below

same repeatable different reproducible similar

_____data are measurements that when repeated by the _____person, with the same equipment, give the same or similar results.

_____ data are _____ results obtained by _____ people with different equipment.

5) Find the mean and uncertainty of the results below

10.4 s, 10.3 s, 10.1 s,

Mean = _____

Uncertainty = _____

6) What does Valid data mean? Explain how an experiment must be designed so that the data collected is valid.

7) Name the relationships between the variables shown in the graphs below

Height — Shoe Size

Shoe Size — Annual Income

8) Name 3 control measures that will reduce the risk of harm in the experiment below

4 Paul is carrying out an experiment in which two chemicals are mixed together and chlorine gas is produced. Chlorine gas is toxic.

Describe and explain the control measures that should be used to carry out this experiment. (2 marks)

1)_____ 2) _____

9) Describe how the gradient changes in the graph below.

Plot for a Thermistor

RESISTANCE (in Ohms)

TEMPERATURE

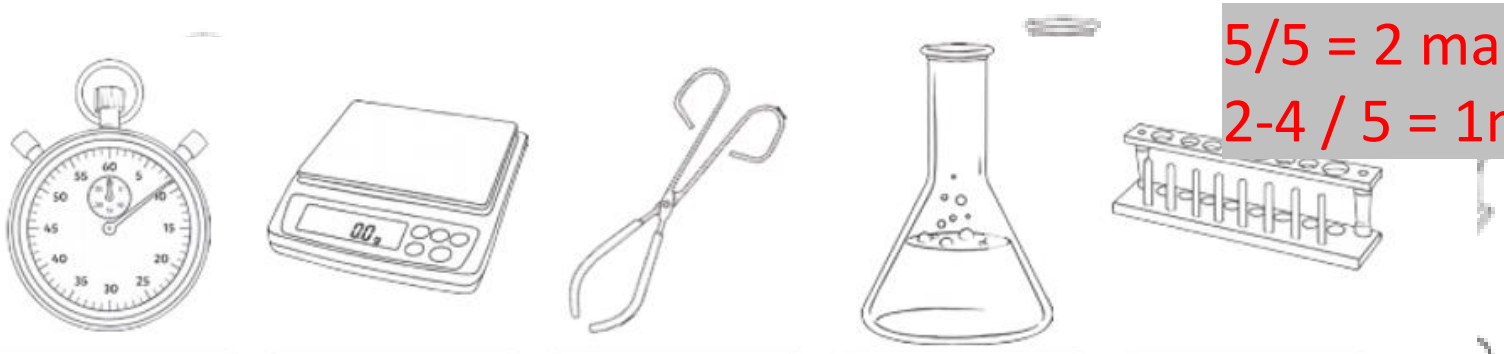
Marking

1) Match the hazard symbol to the meaning by drawing a line from each

Toxic | Flammable | Harmful

3/3 = 2 marks,
1 correct = 1 mark

2) Name the scientific equipment below



stopwatch | top-pan balance | tongs | conical flask | test tube rack

5/5 = 2 marks
2-4 / 5 = 1mark

3) Which set of data is more precise? Explain using a calculation.

A beaker is weighed on A, 3 times:
The readings are: 73 g, 77 g, 71 g

It is then weighed on B, 3 times:
The readings are: 75 g, 73 g, 74 g

Set B is more precise(1 mark)

Set A Range = 6g Set B Range = 2g (1 mark)

4) **Fill in the gaps using the words below**

same	repeatable	different	reproducible	similar

_____data are measurements that when repeated by the _____ person, with the same equipment, give the same or similar results.

_____ data are _____ results obtained by _____ people with different equipment.

Repeatable
Same
Reproducible
Similar
Different

5/5 = 2marks , 2-4/5=1 mark

5) **Find the mean and uncertainty of the results below**

10.4 s, 10.3 s, 10.1 s,

Mean = 10.4+10.3+10.1 = 30.8.
30.8/3 = 10.3 1 mark
Uncertainty = +/- 0.15

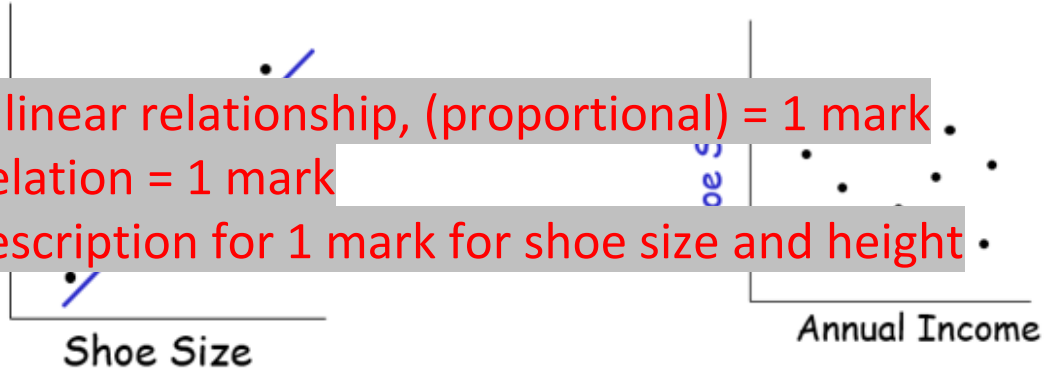
Mean = _____

Uncertainty = _____

6) **What does Valid data mean? Explain how an experiment must be designed so that the data collected is val**

Only change the independent variable (1)
Repeat and find the mean (1)
Measure the dependent variable (1)
Control all variables you are not investigating (1)
Other valid suggestion (1) MAX 2 MARKS

7) **Name the rela**

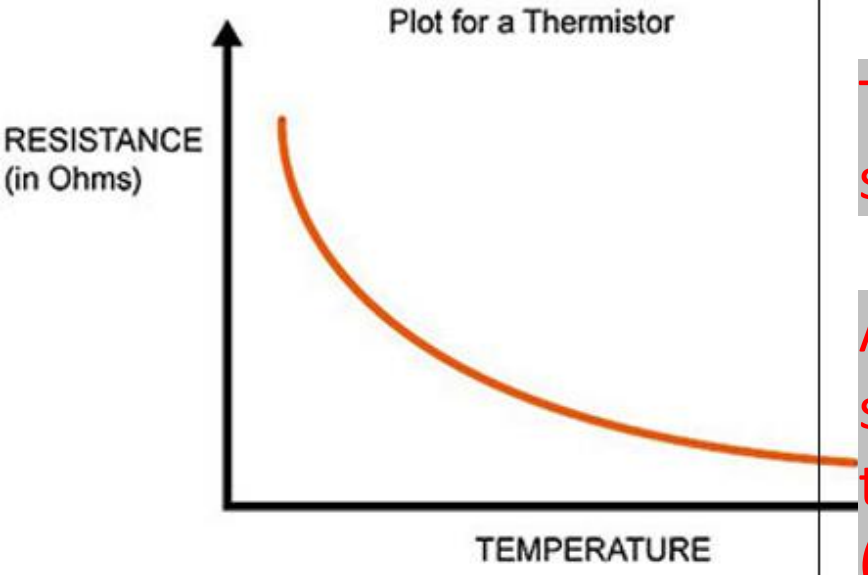


Positive linear relationship, (proportional) = 1 mark
No correlation = 1 mark
Allow description for 1 mark for shoe size and height

8) **Name 3 control measures that will reduce the risk of harm in the experiment below**

4 Paul is c Googles/Apron/Tongs = 1 mark together and chlorine gas is pr
Describe Fume cupboard = 1 mark used to carry out this experiment.
(2 marks)

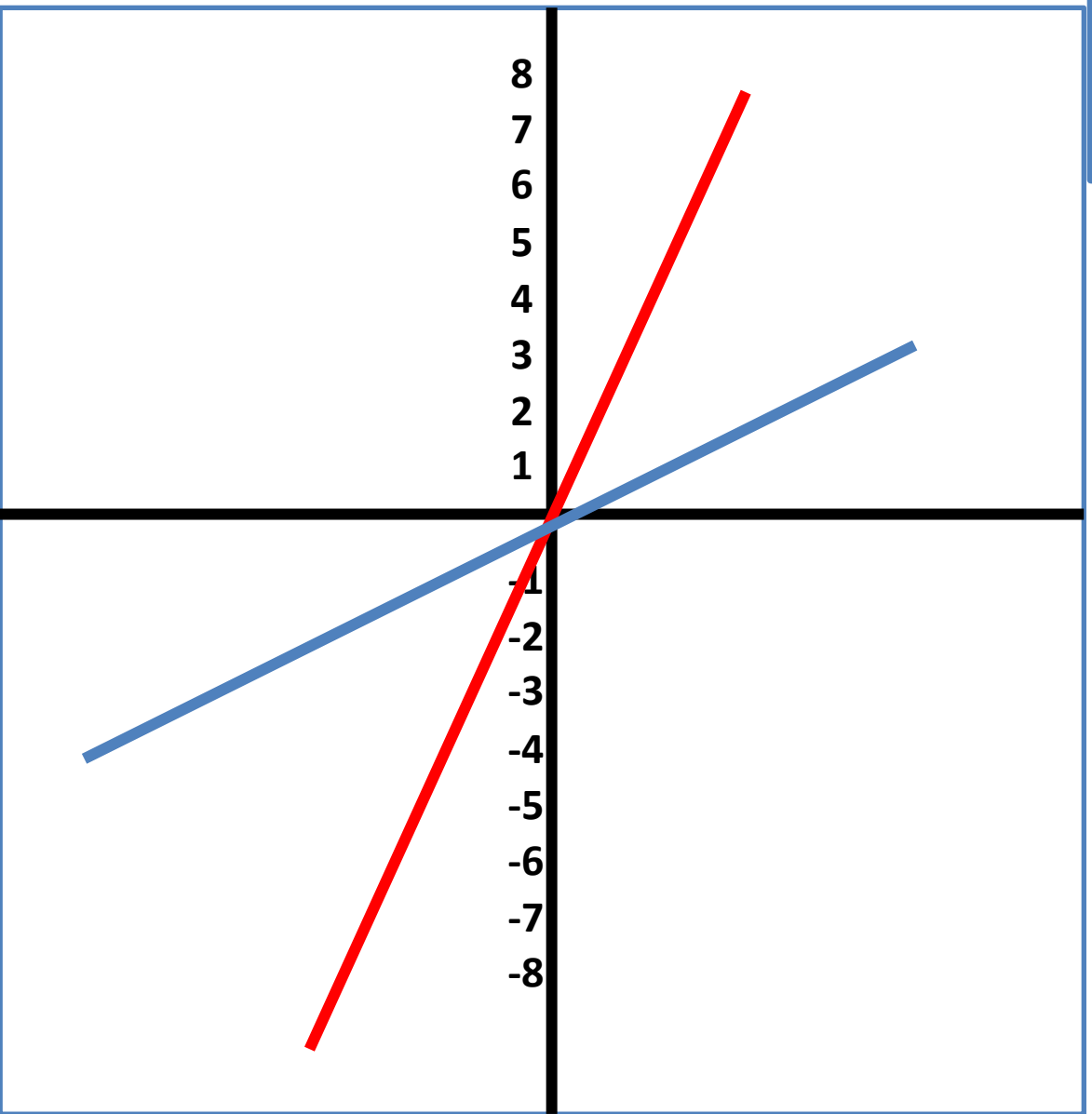
9) **Describe how the gradient changes in the graph below.**



The gradient starts off steep and gets shallower (1 mark)

At low temperatures the gradient is steep/large/big, at high temperatures the gradient is shallow/low/small (2marks)

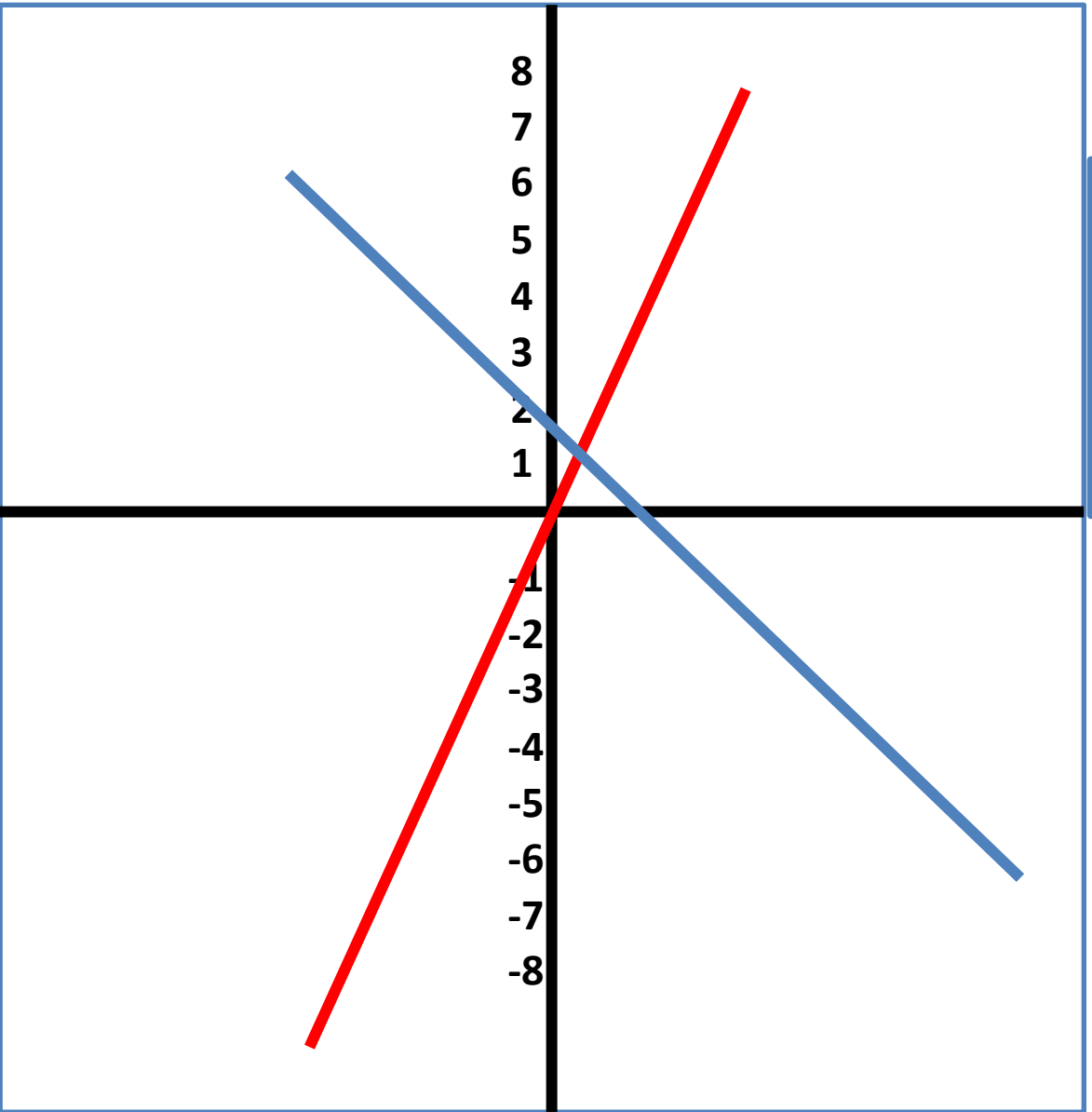
The rate of change decreases with temperature (2), Inverse proportion (2)



The RED line has a larger gradient than the BLUE line.

A big gradient gives a STEEP line

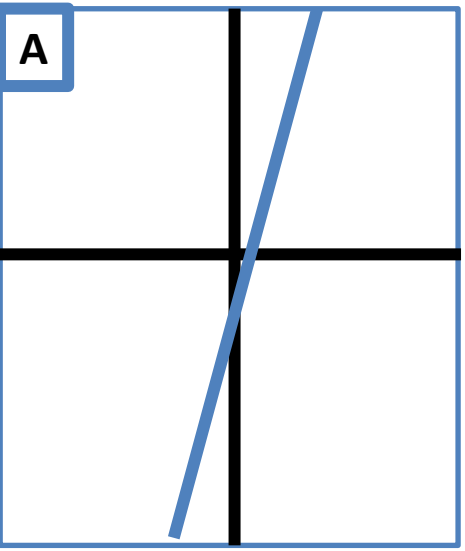
A small gradient gives a SHALLOW line



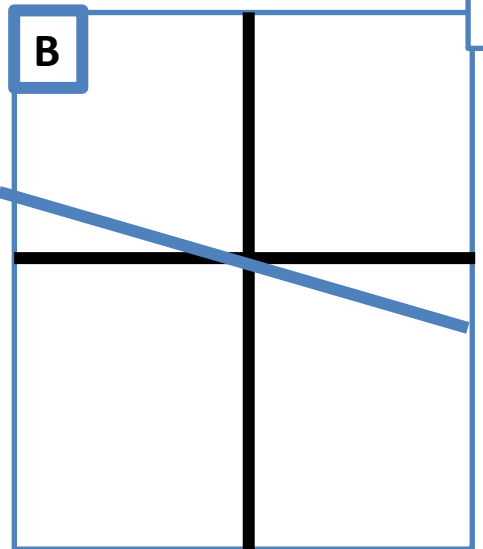
The RED line has a positive gradient, the BLUE line has a negative gradient

Which of these lines has the smallest negative gradient?

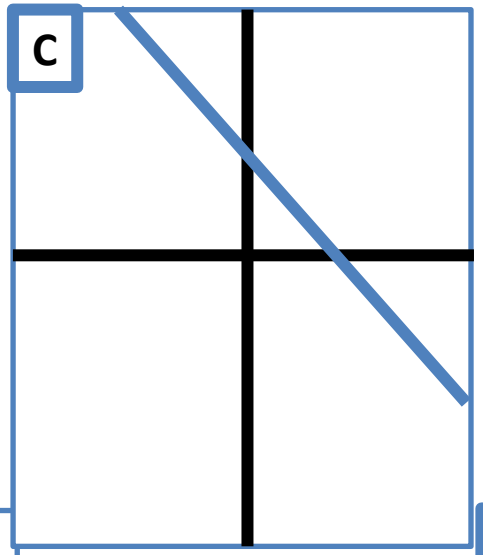
A



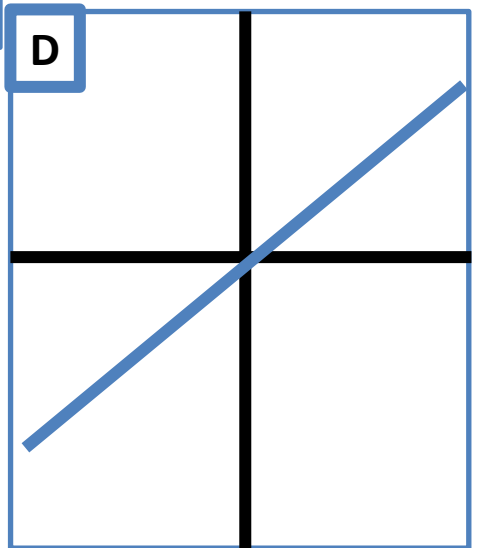
B



C

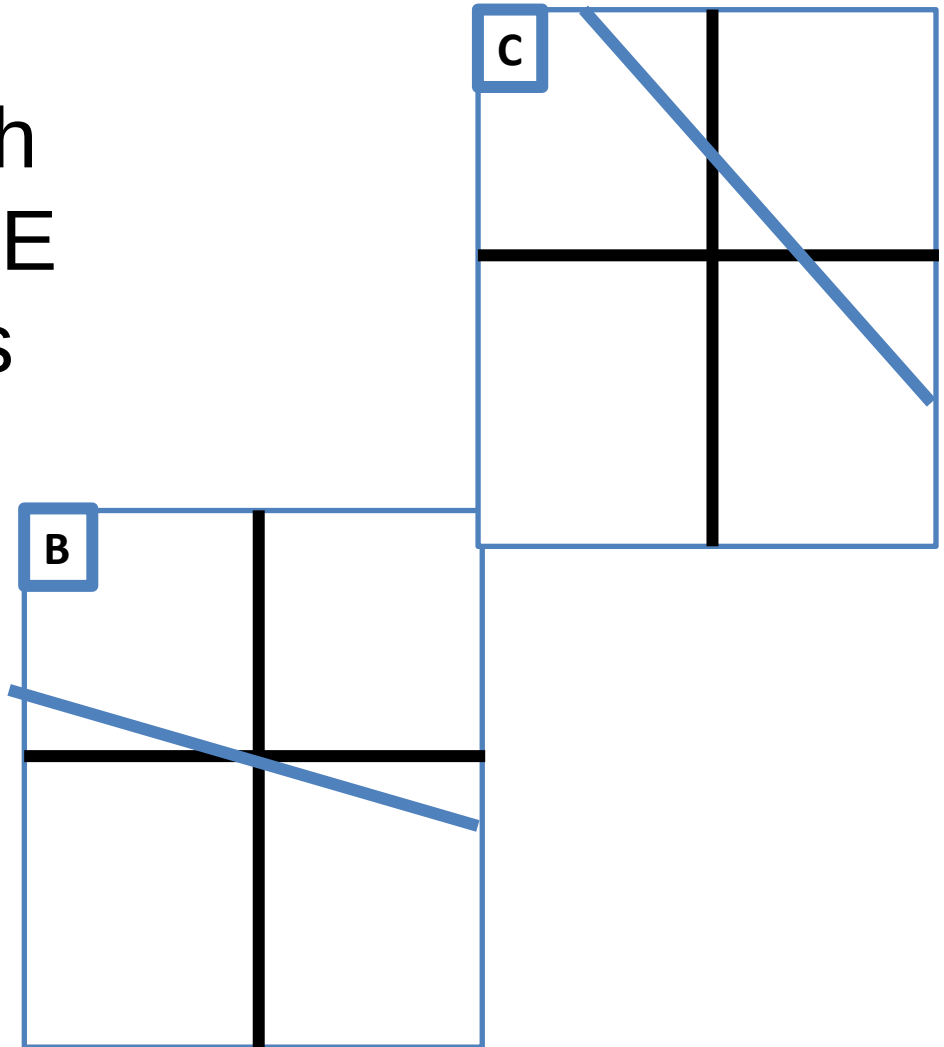


D



Which of these lines has the smallest negative gradient?

A and D were both POSITIVE gradients



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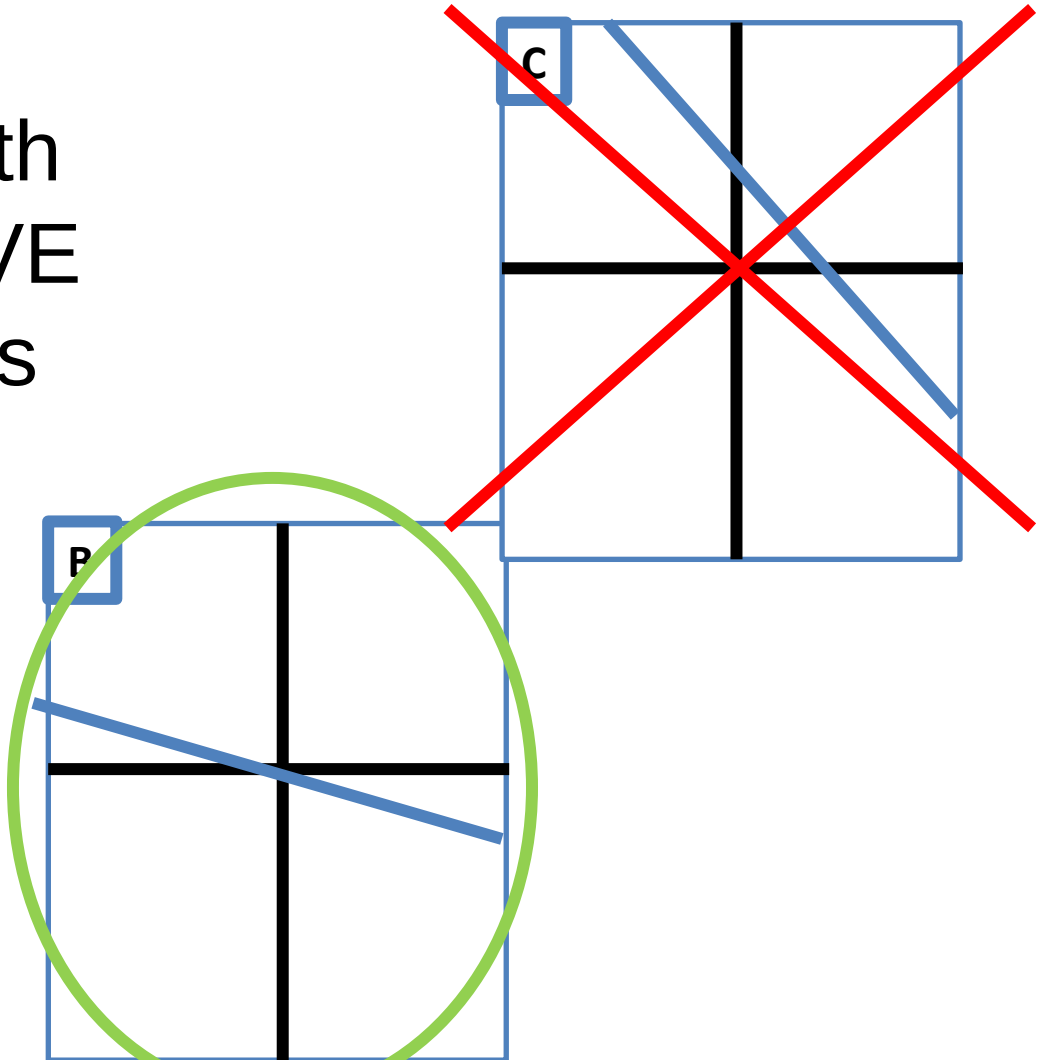


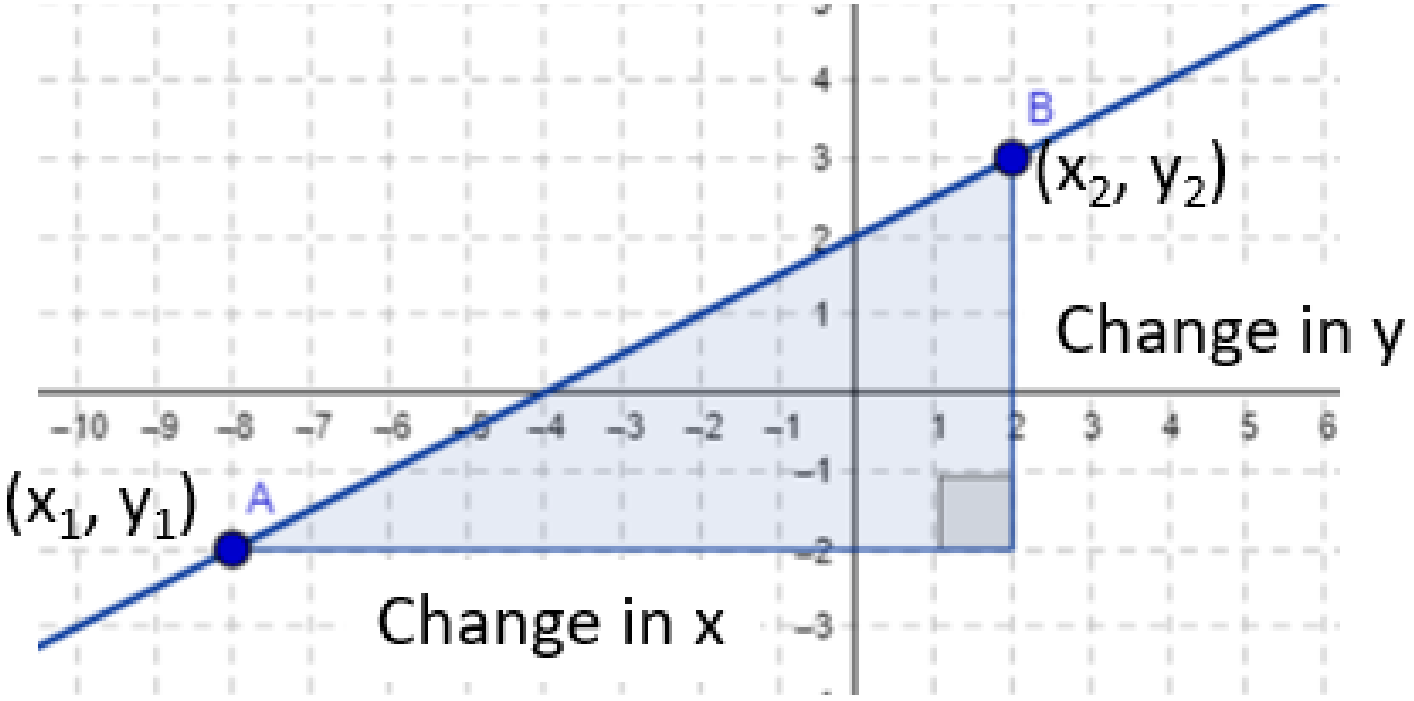
How to find the Gradient

- We are going to find the gradient of a line between two points.

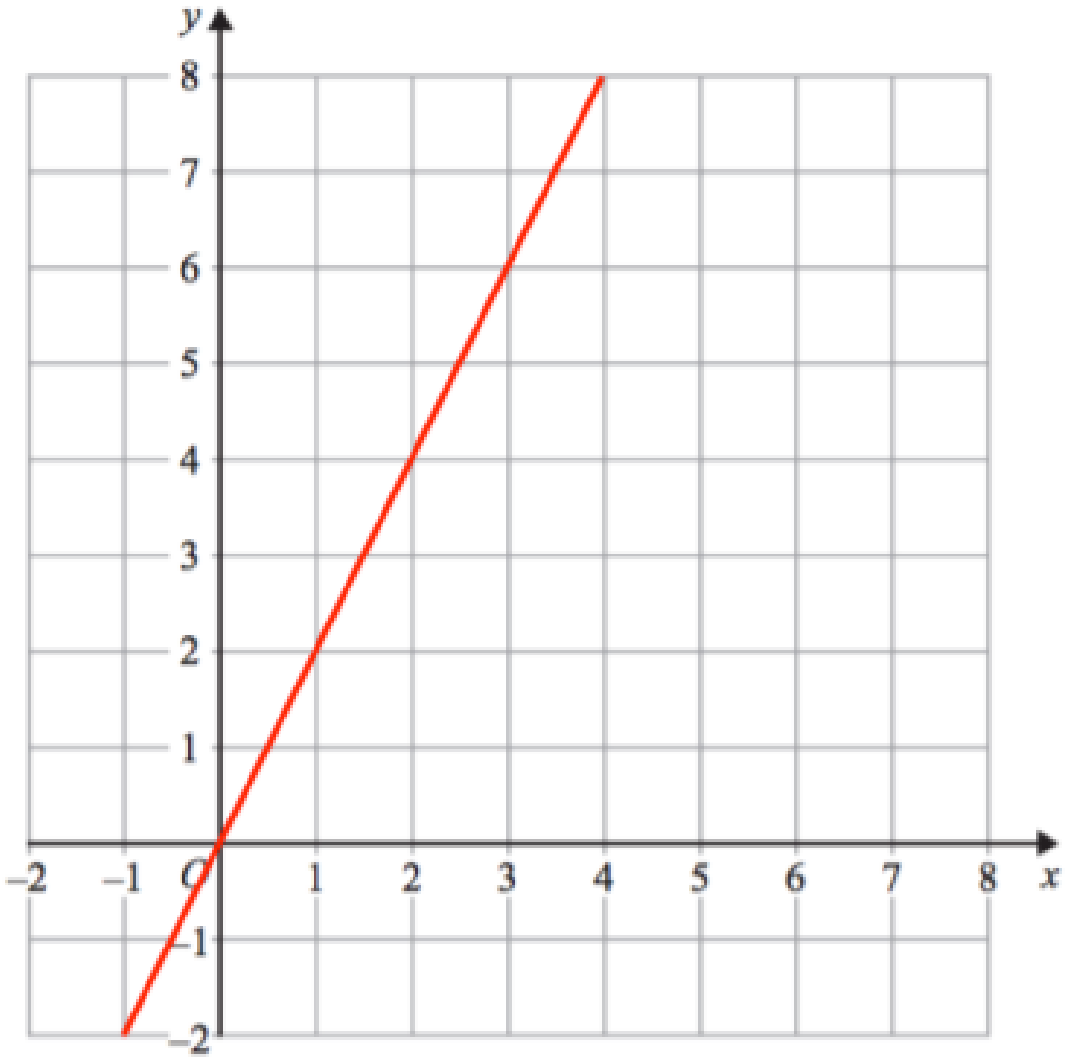
- We need to divide the DIFFERENCE IN Y by the DIFFERENCE IN X

- (Difference in y) ÷ (Difference in x)= Gradient
- $\Delta y/\Delta x$ = gradient

Gradient of a Straight Line



$$\text{Gradient} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Change in y}}{\text{Change in x}}$$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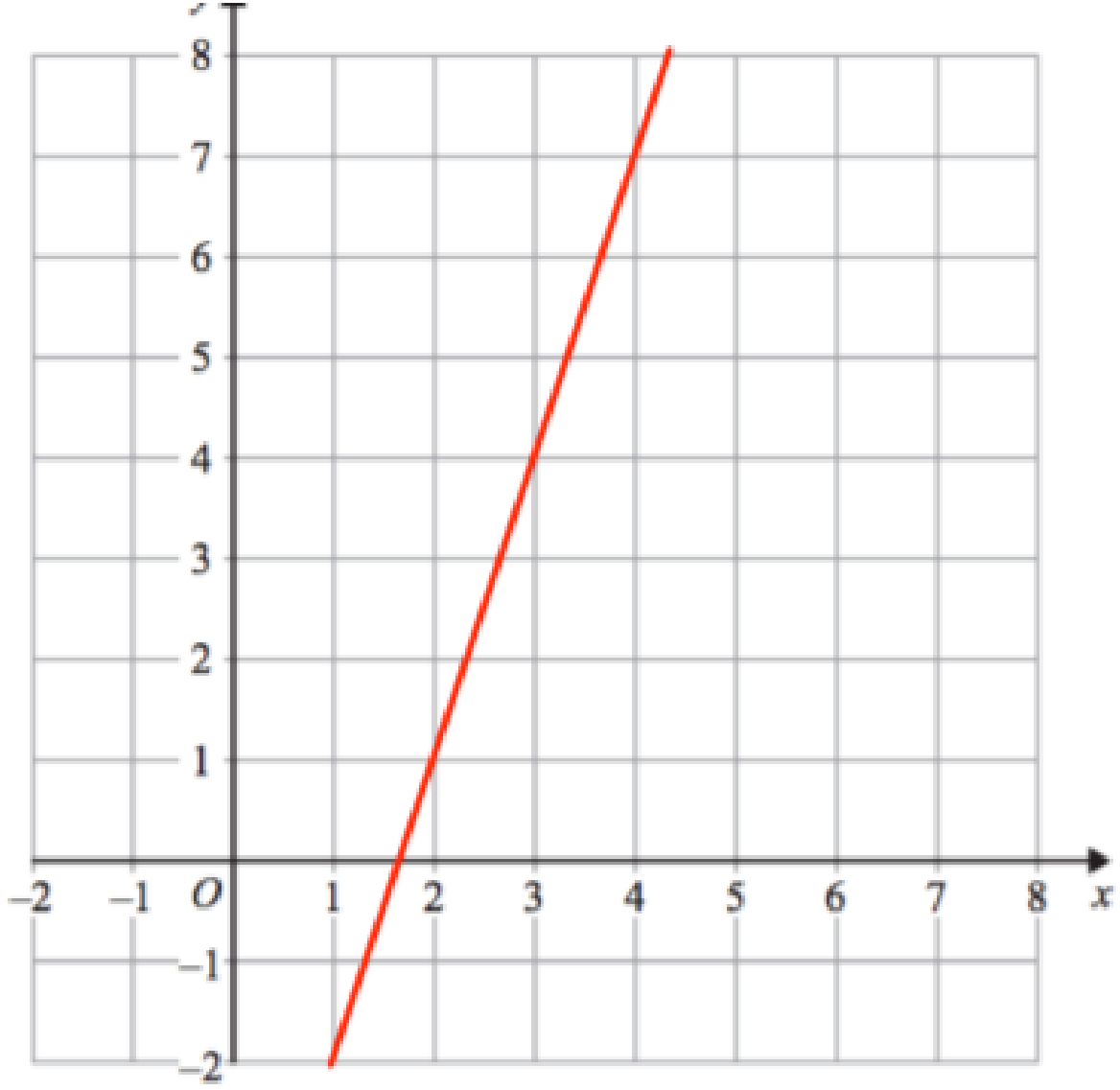
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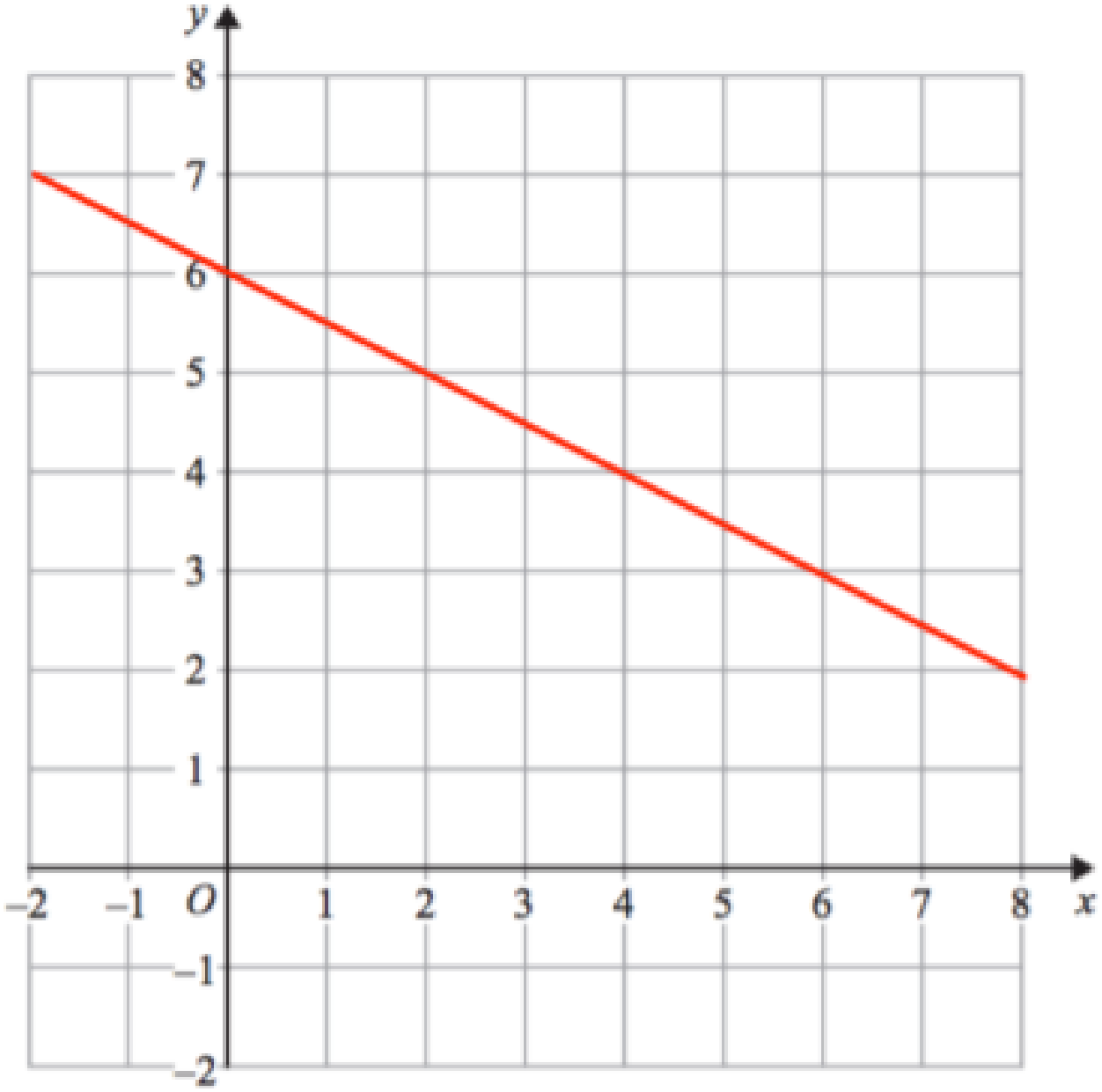
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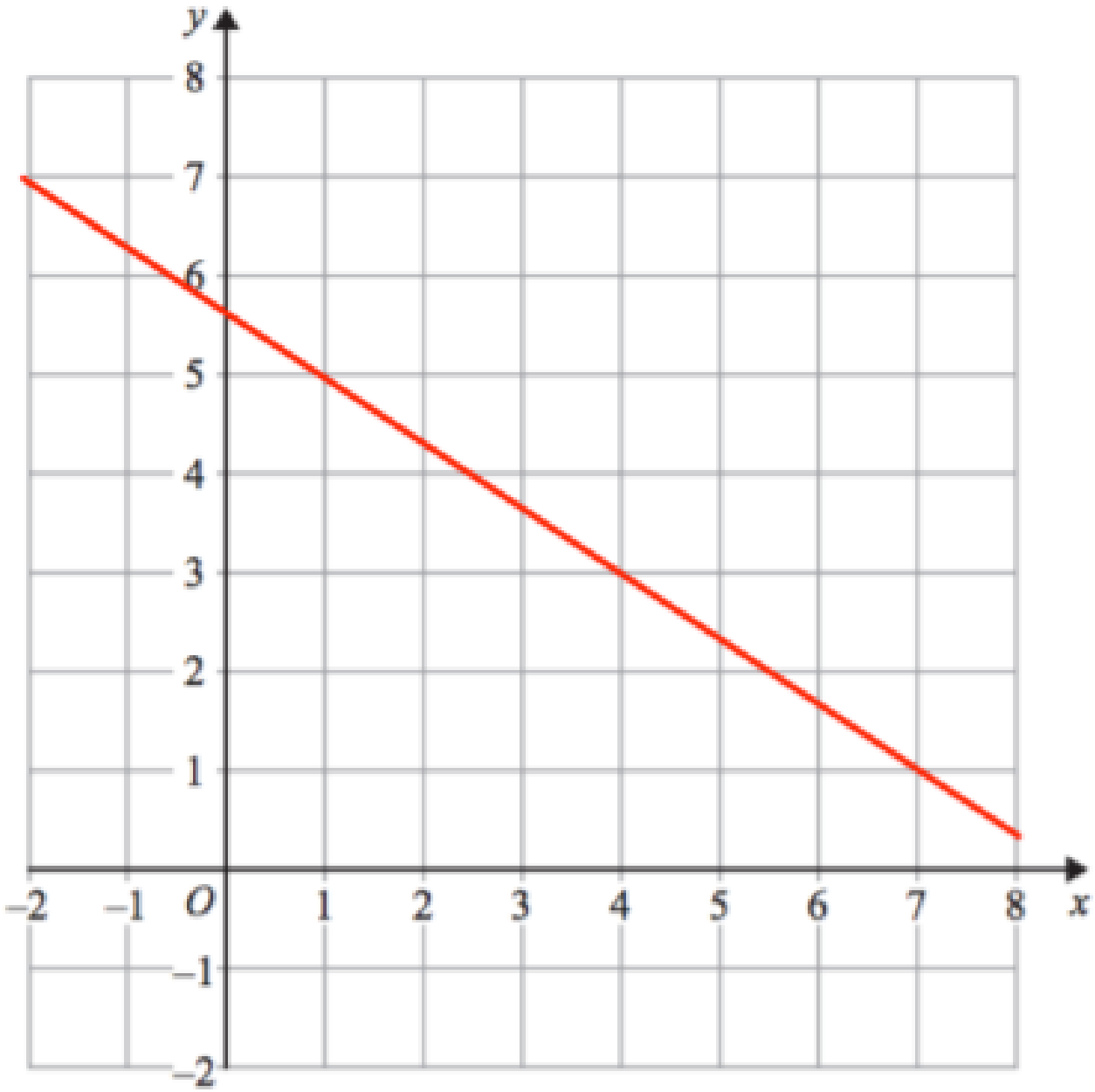
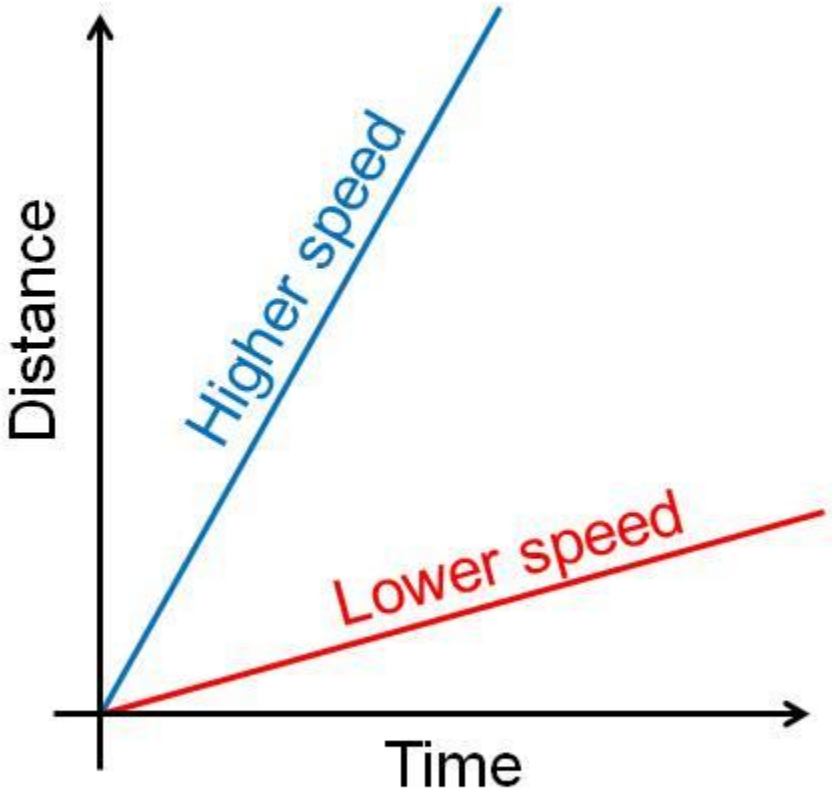
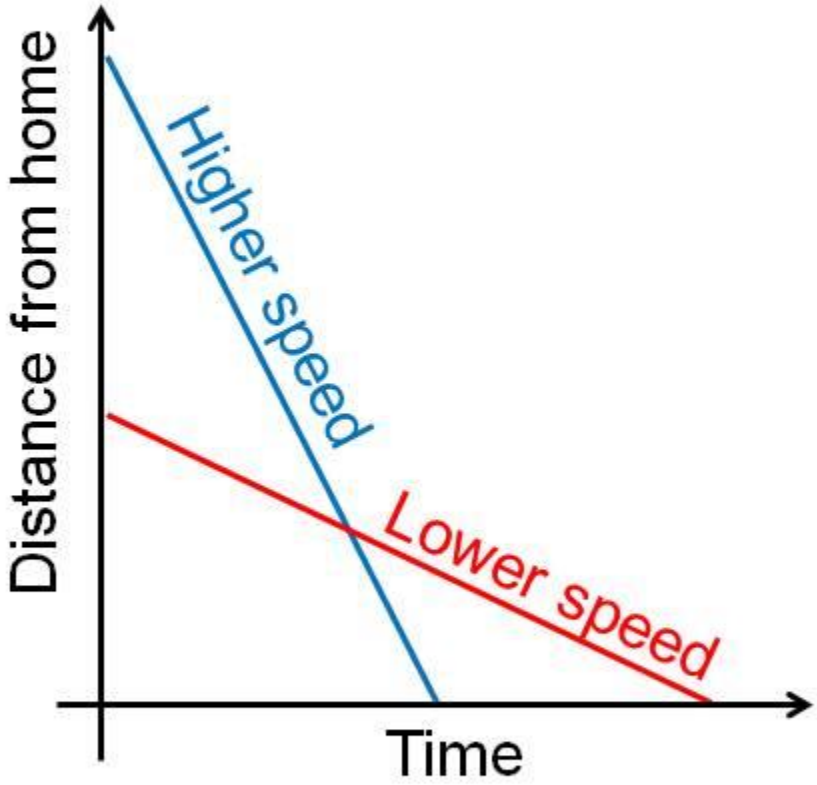
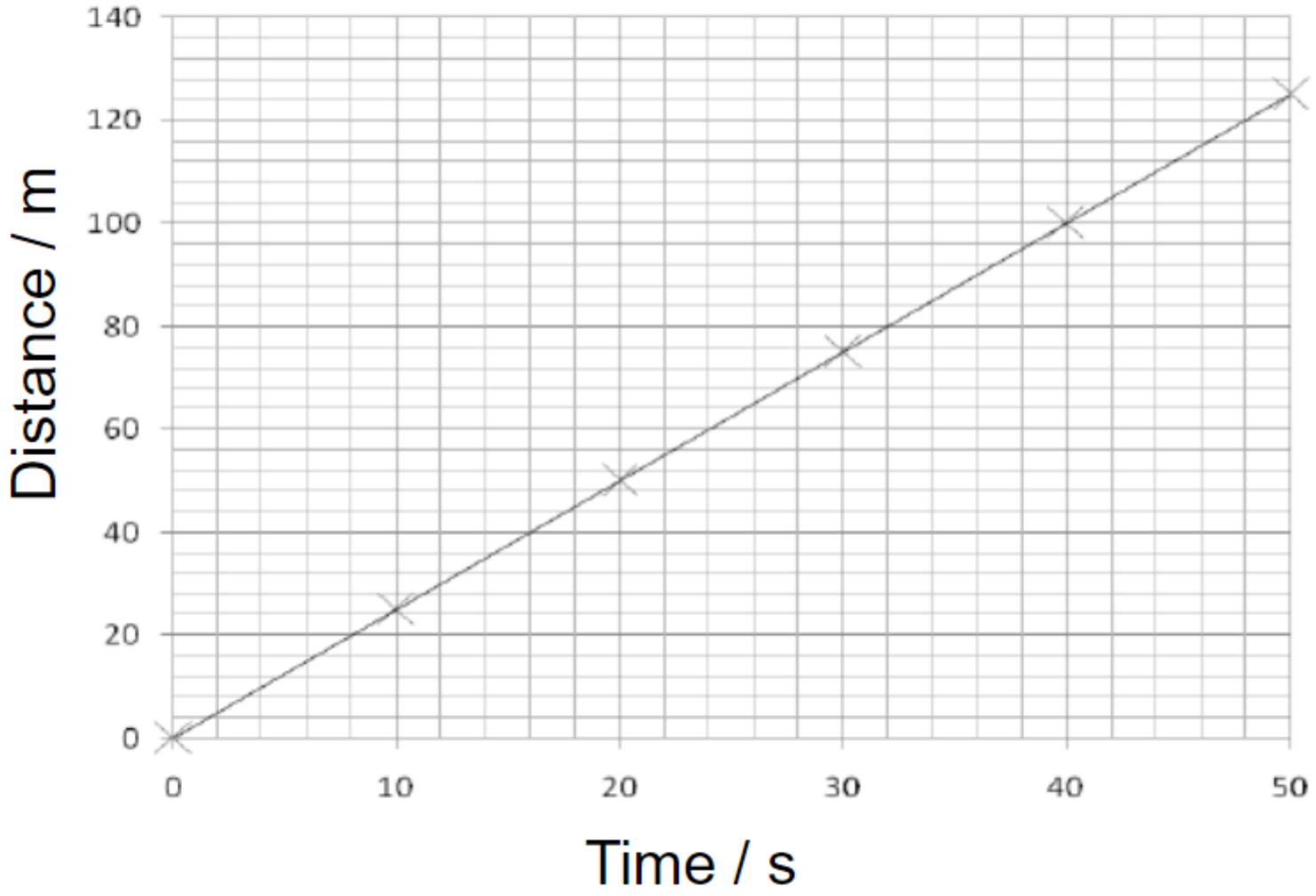


(f)

For a distance-time graph, speed = gradient





The gradient of a distance-time graph is equal to the (instantaneous) speed.