



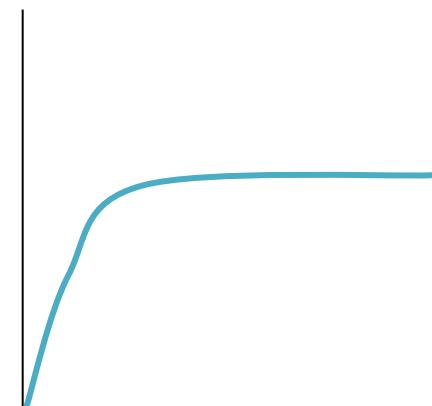
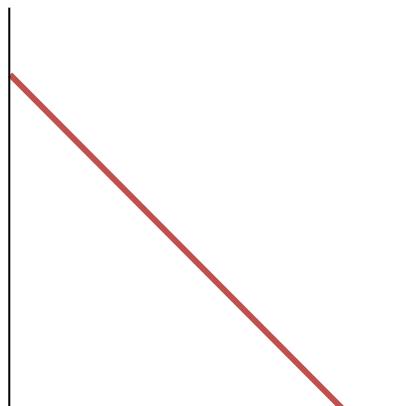
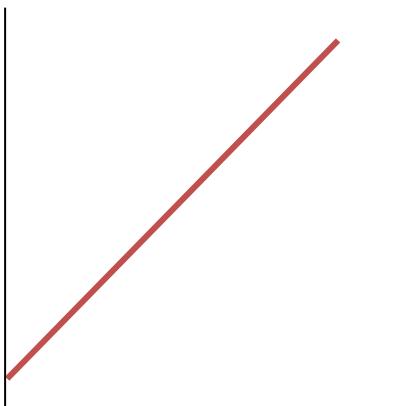
Gradients

Lesson 10 – How Science Works

Scatter Graphs

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

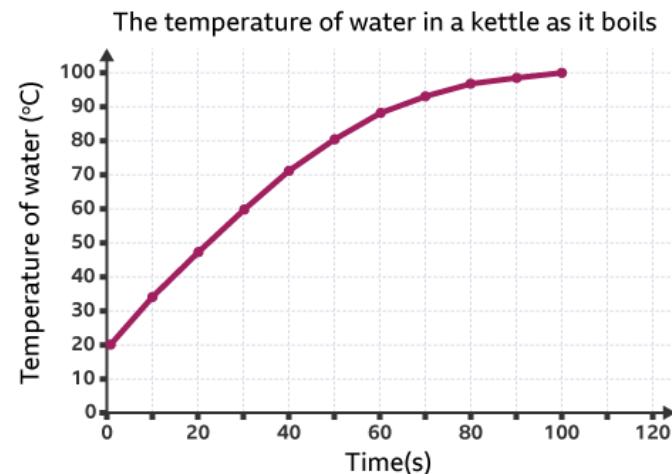
The relationship between the data can be described as either **linear** or **non-linear**



Scatter Graphs

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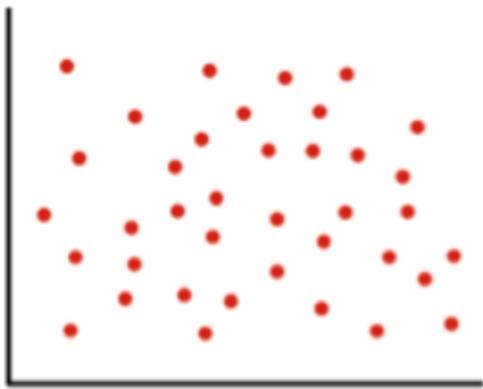
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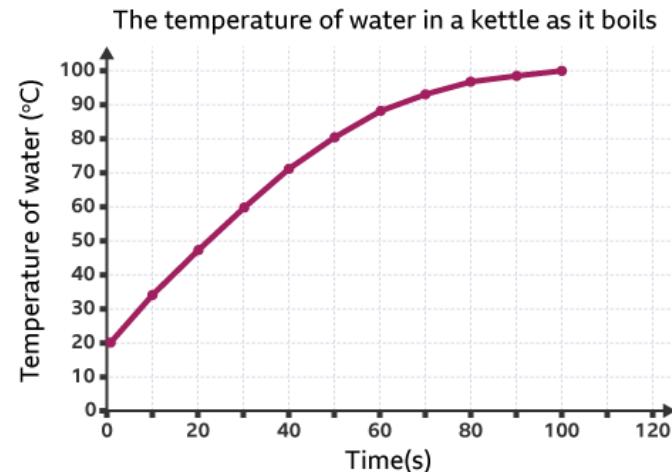
Scatter Graphs

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**



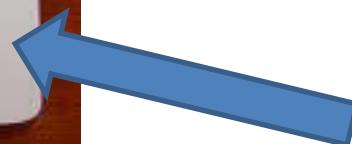
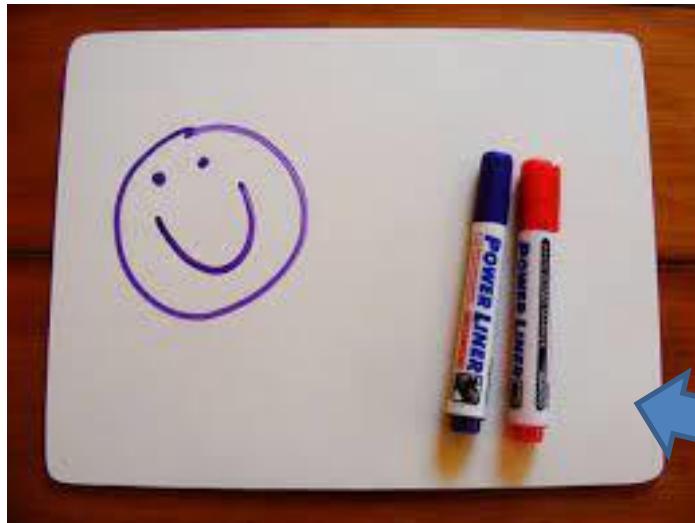
No correlation



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!**
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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.
- B. is plotted on the y-axis.
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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



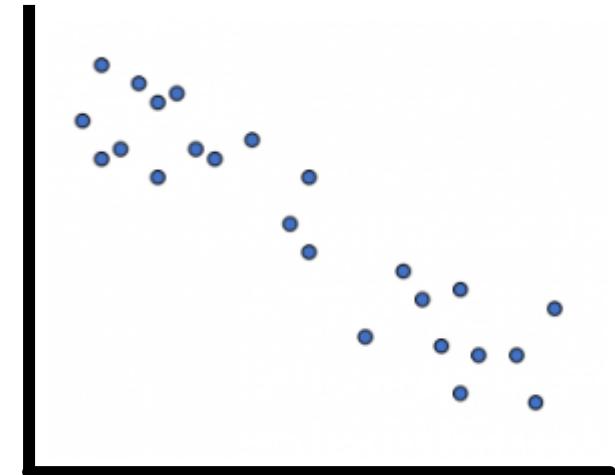
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Testing Your Knowledge

Q. What type of relationship does the graph show?

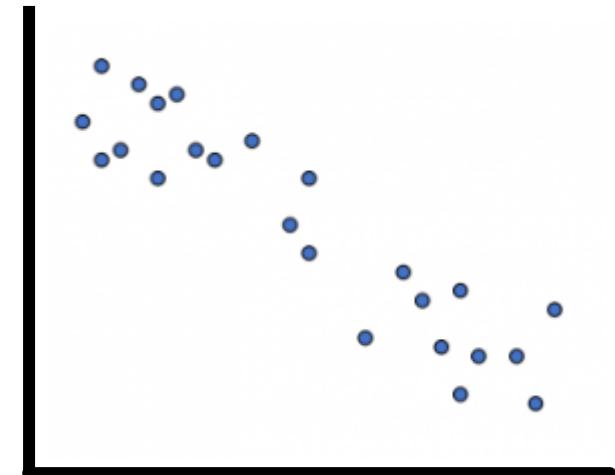
- A. Positive, linear relationship.
- B. Positive, non-linear relationship.
- C. Negative, non-linear relationship.
- D. Negative, linear relationship.



Testing Your Knowledge

Q. What type of relationship does the graph show?

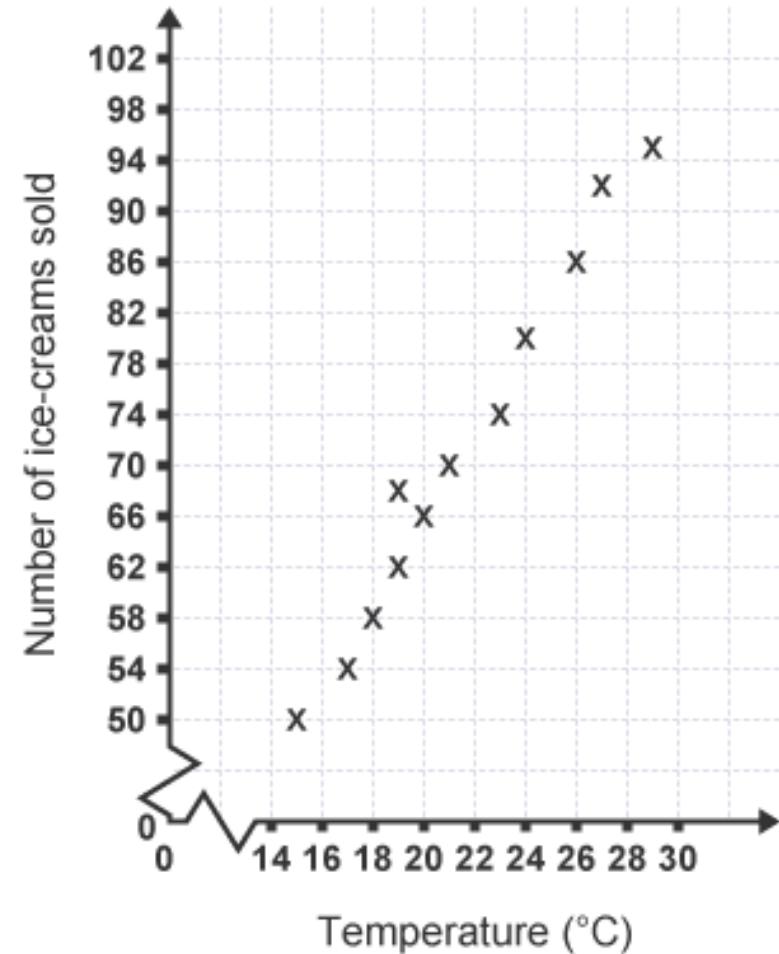
- A. Positive, linear relationship.
- B. Positive, non-linear relationship.
- C. Negative, non-linear relationship.
- D. Negative, linear relationship.**



Testing Your Knowledge

Q. What does the graph show?

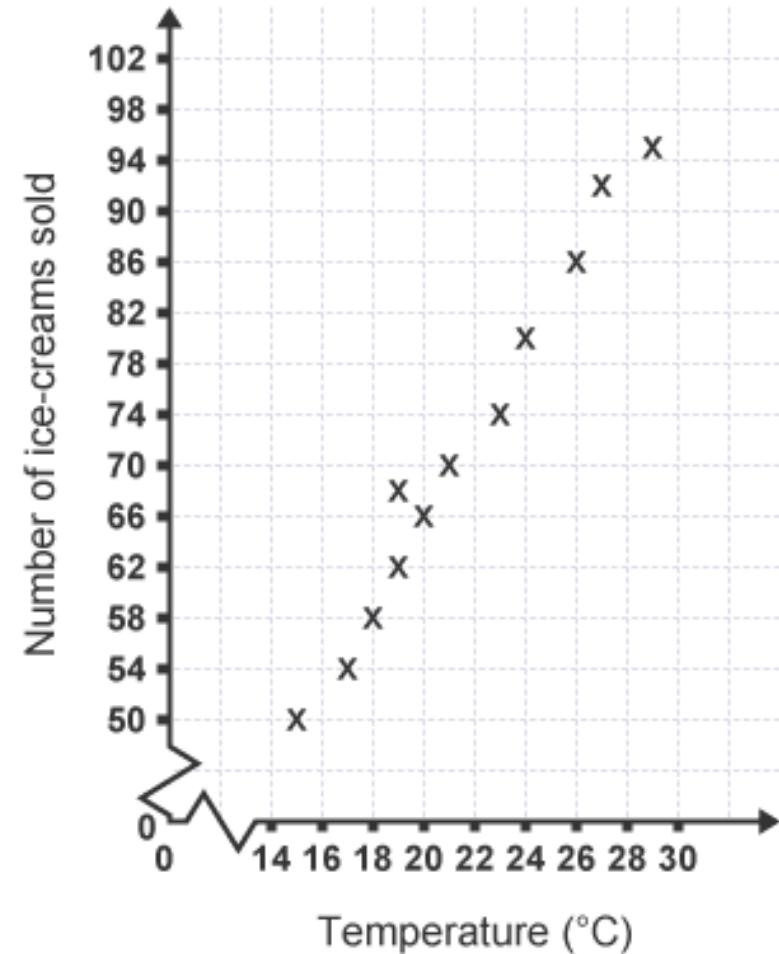
- A. No ice creams were sold at 0°C .
- B. The correlation is negative.
- C. The relationship is non-linear.
- D. More ice creams were sold in hot weather.



Testing Your Knowledge

Q. What does the graph show?

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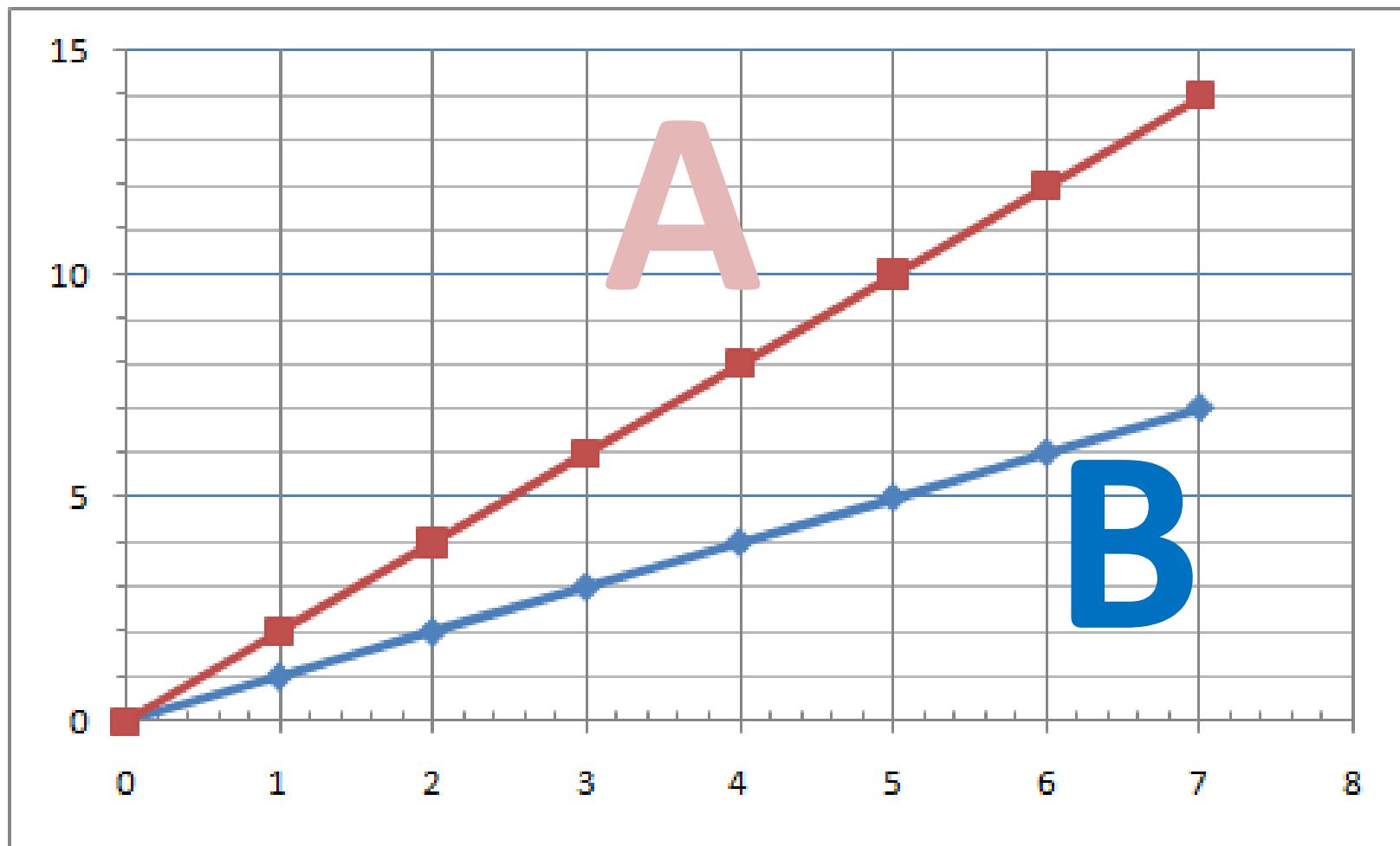
Which is the steepest hill? A or B



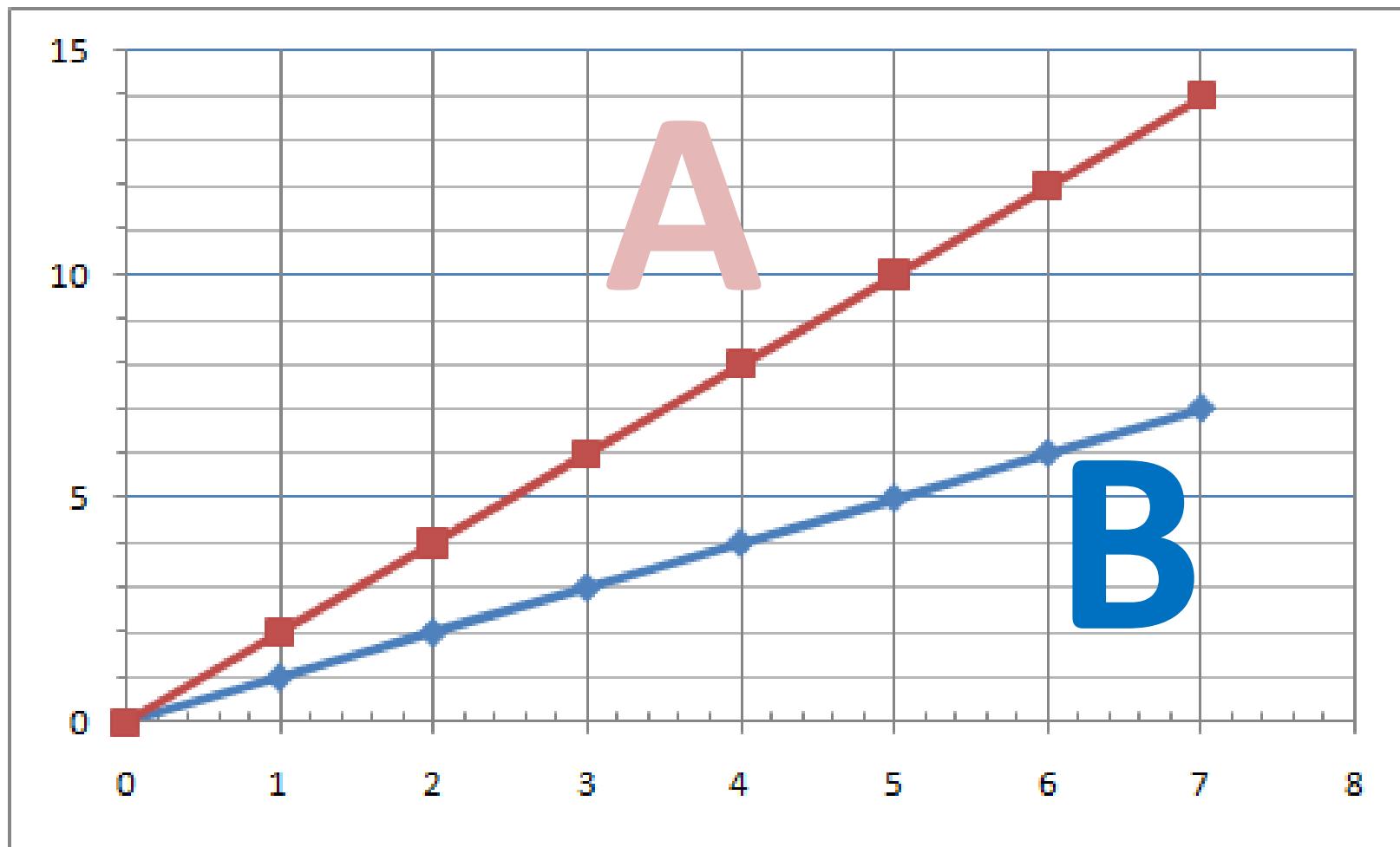
Which has the largest gradient? A or B



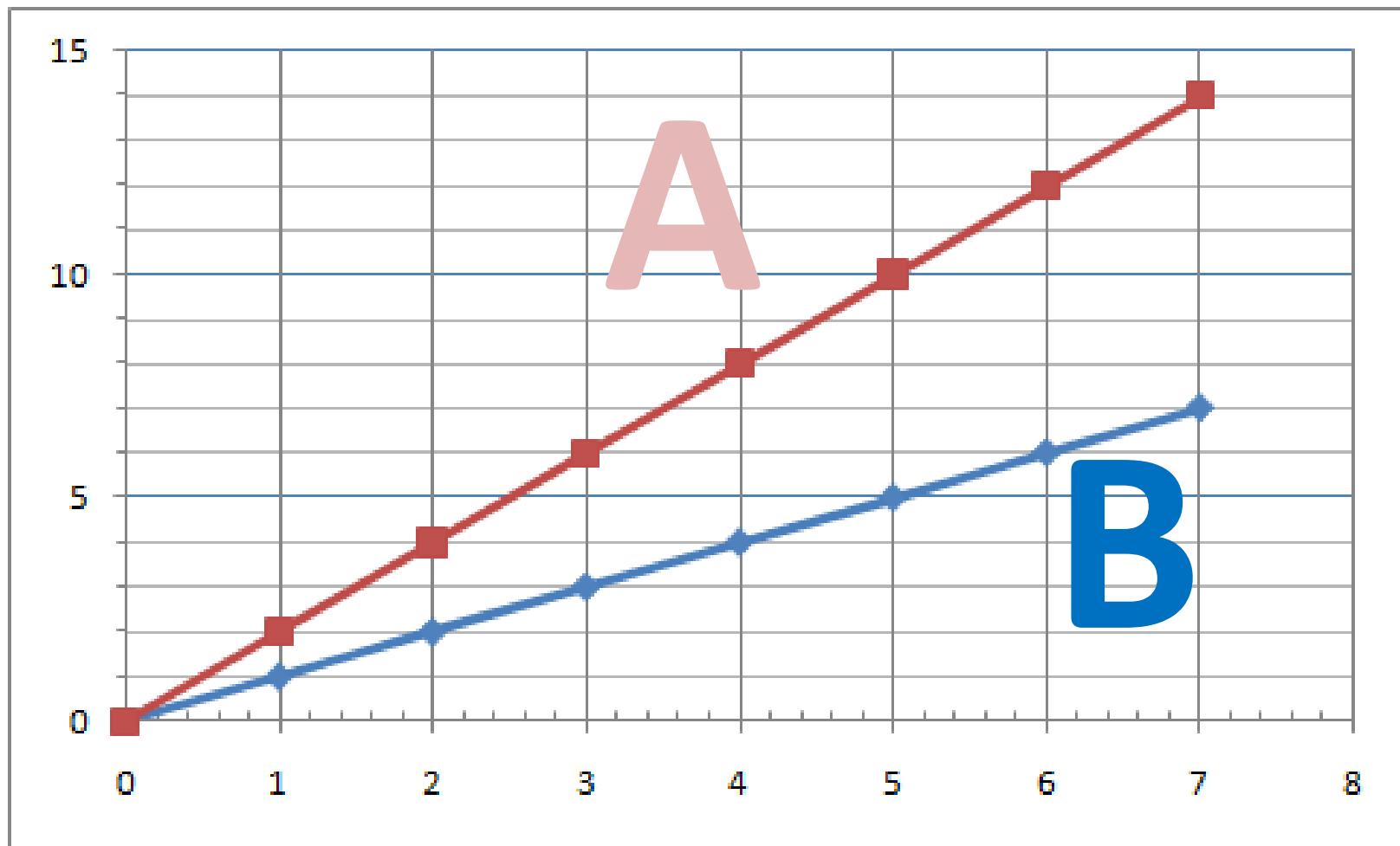
Which is the steepest line, A or B?



Which of A or B has the largest gradient?



Which is the lowest gradient, A or B?



Which slide has the steepest gradient?



A



B

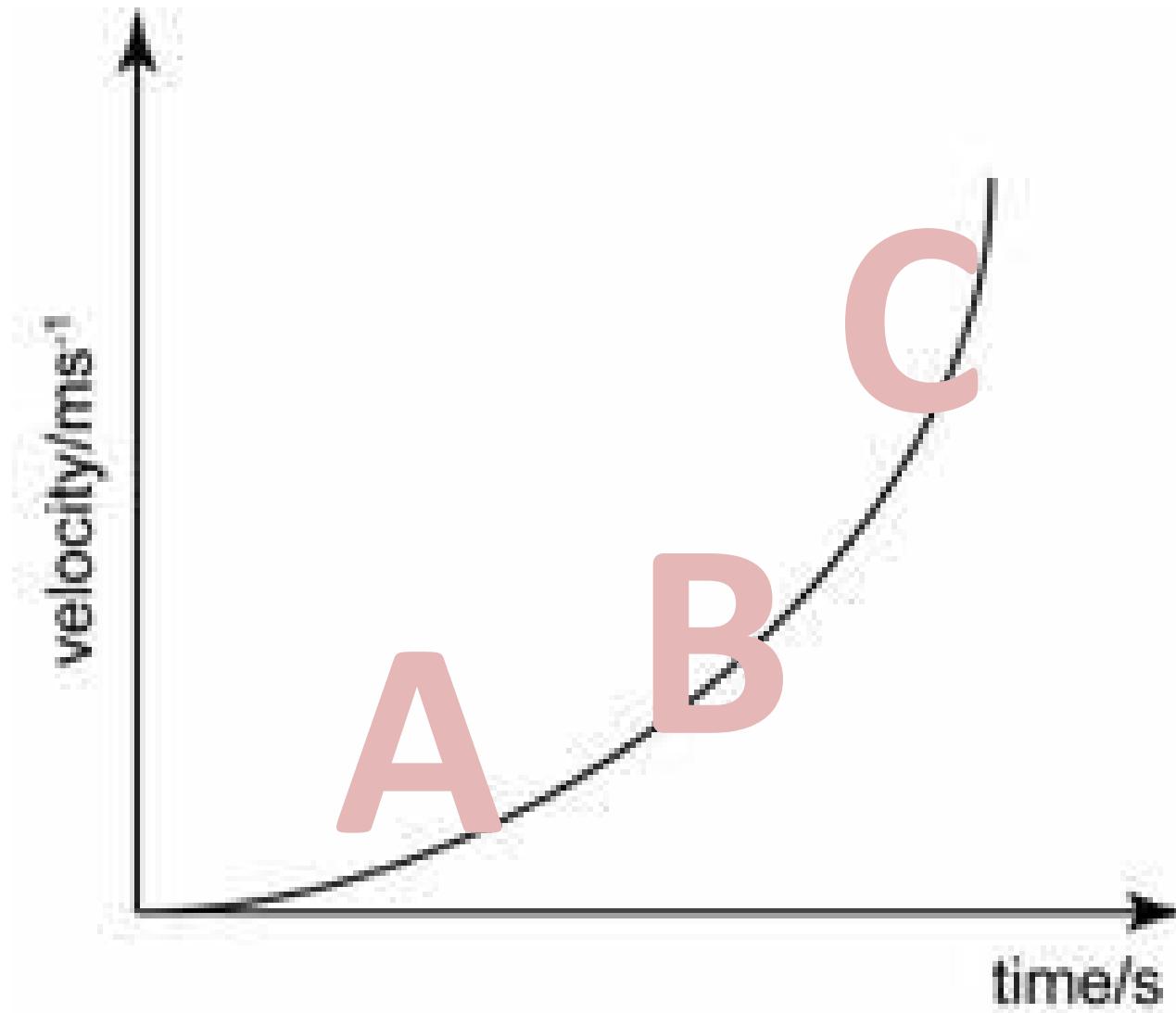


C

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



6. Toxic

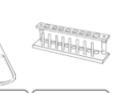


7. Flammable



8. 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

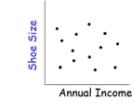
10.4 s, 10.3 s, 10.1 s,

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



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.

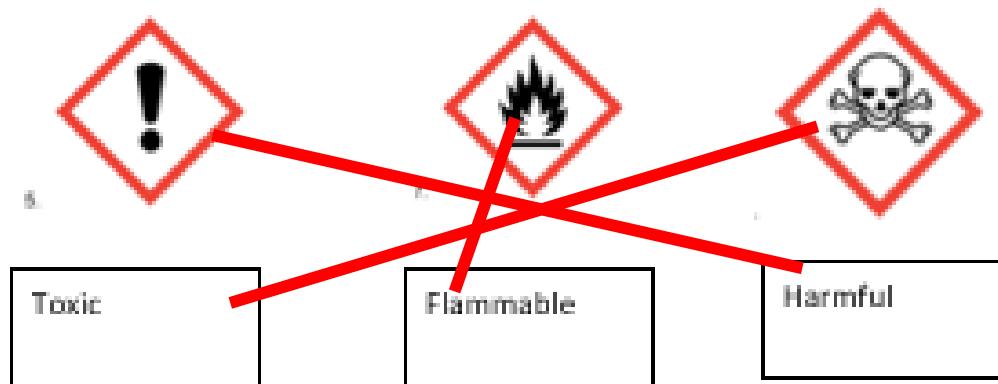
Describe and explain the control measures that should be used to carry out this experiment. (2 marks)

1) _____ 2) _____

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



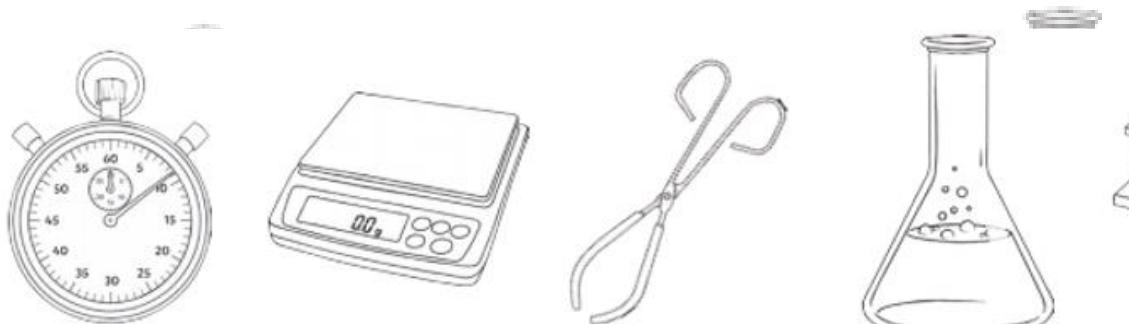
1) Match the hazard symbol to the meaning by drawing a line from each



Marking

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

2) Name the scientific equipment below



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

stopwatch top-pan balance tongs conical flask test tube rack

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 = _____

Uncertainty = _____

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

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

Only change the independent variable (1)

Repeat and find the mean (1)

Measure the dependent variable (1)

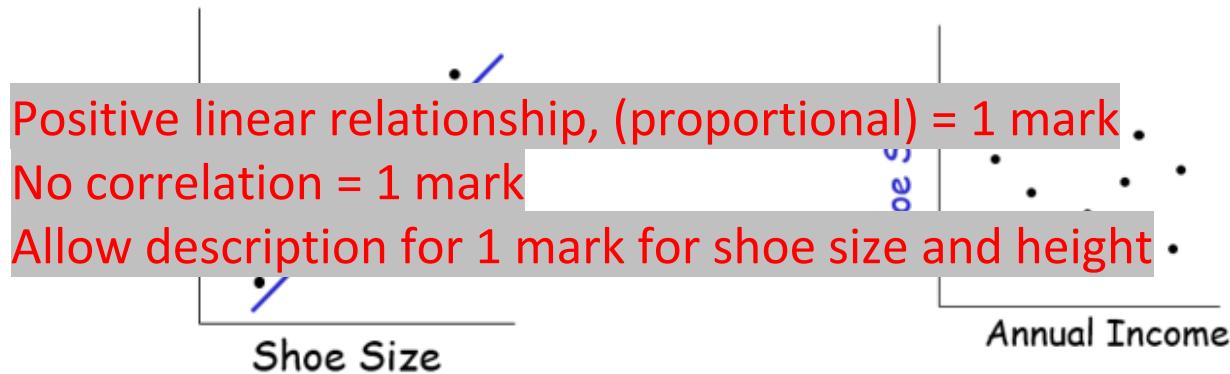
Control all variables you are not investigating (1)

7) Name the relevant variables (1) MAX 2 MARKS

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

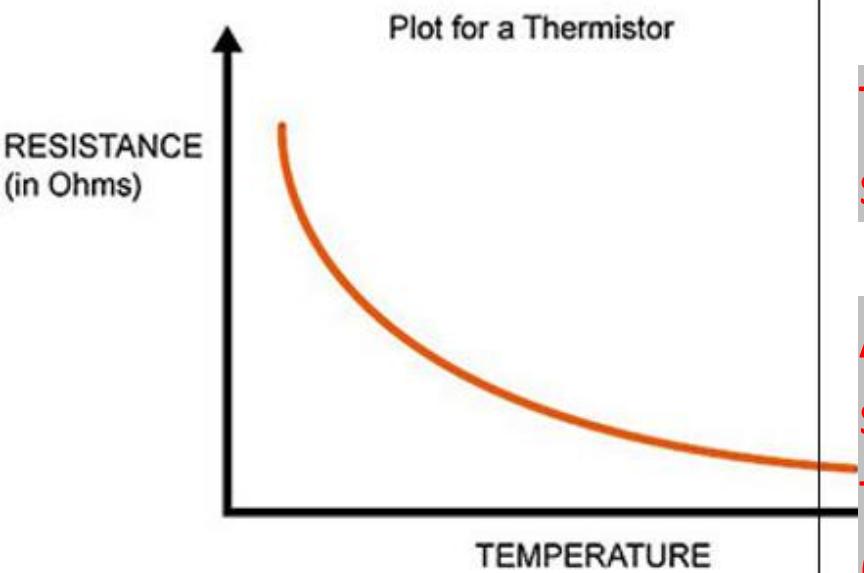
4 Paul is carrying out an experiment involving concentrated sulfuric acid. The acid is produced by mixing concentrated sulfuric acid with concentrated chlorine gas. Describe the control measures that would be used to carry out this experiment. (2 marks)

Googles/Apron/Tongs = 1 mark together and chlorine

Fume cupboard = 1 mark used to carry out this experiment.

(2 marks)

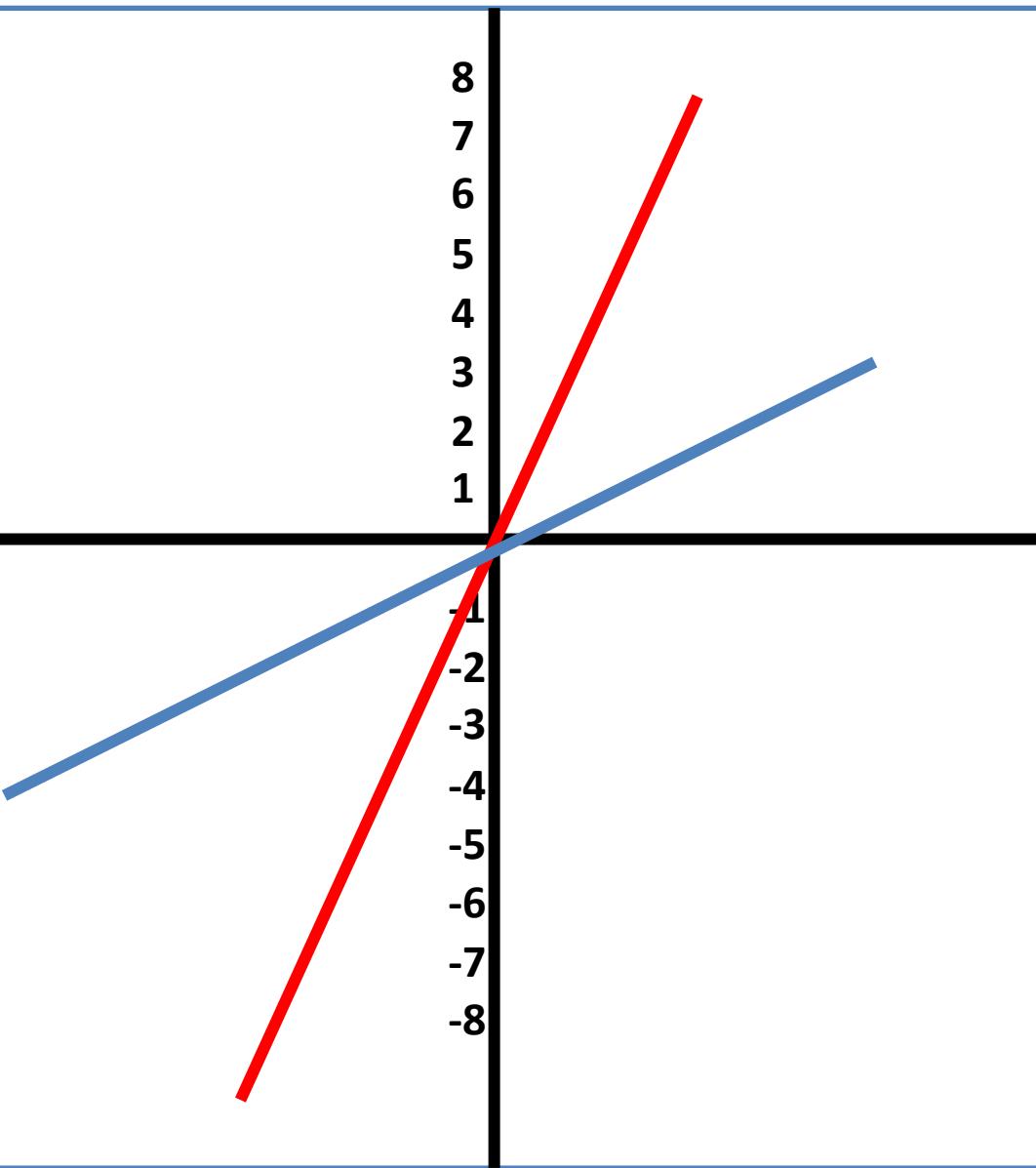
9) Describe how the gradient changes in the graph below.



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)

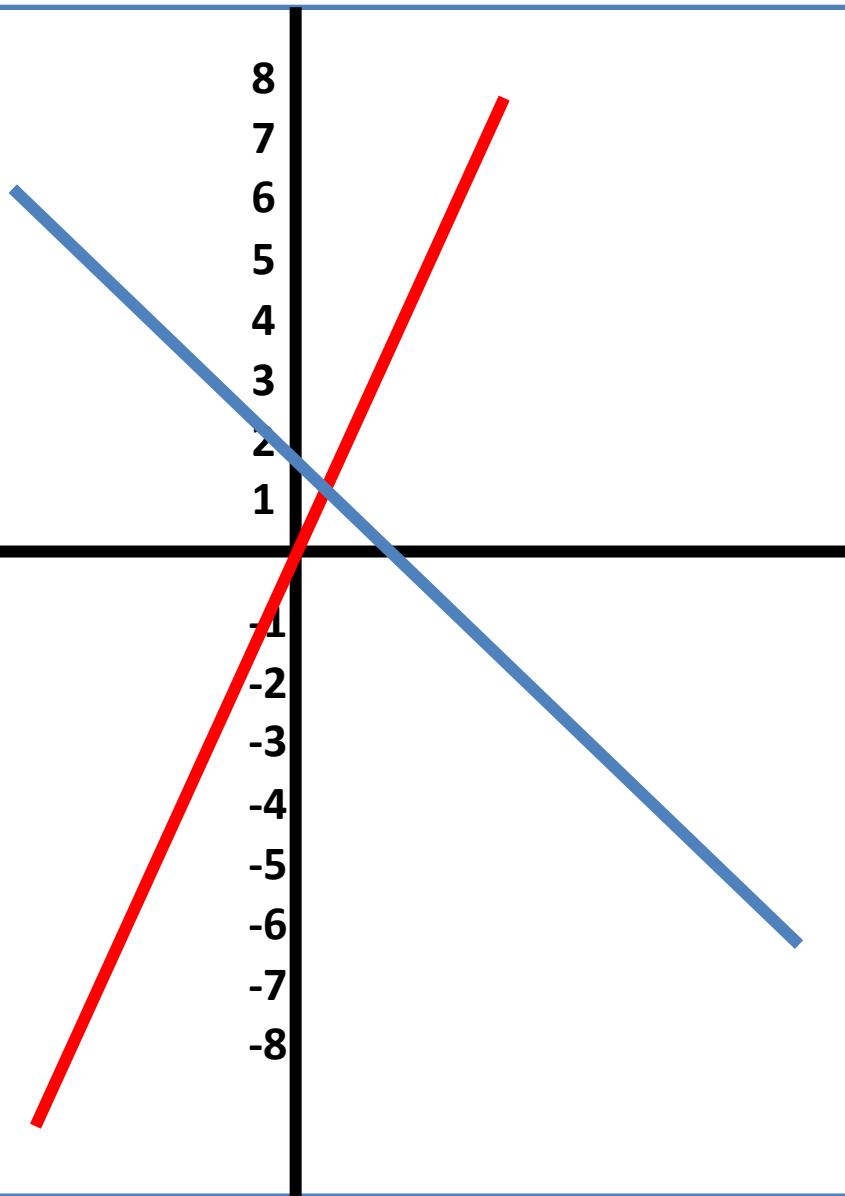
The rate of change decreases with temperature (2), Inverse proportion (2)



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

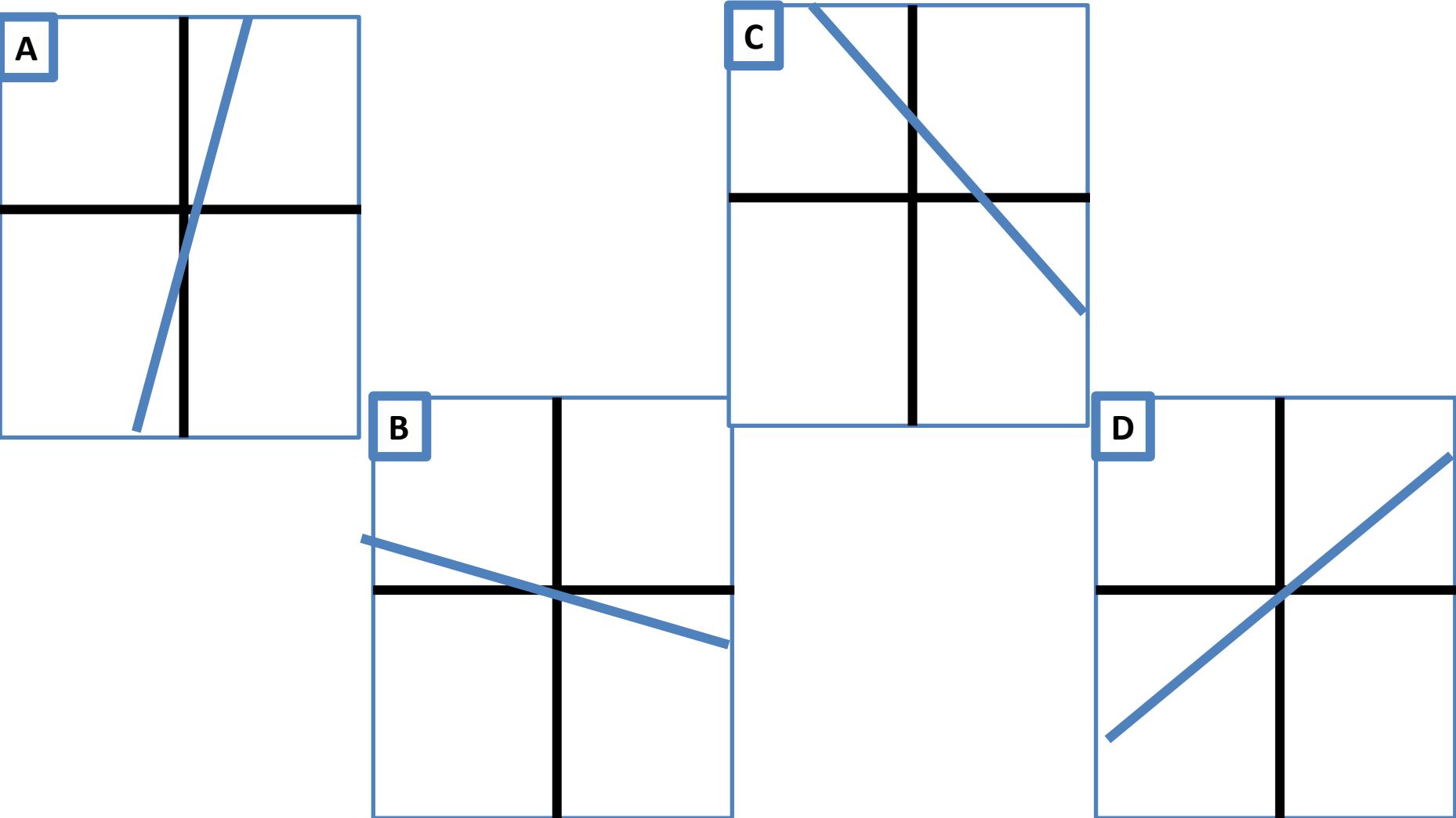
A big gradient gives a **STEEP** line

A small gradient gives a **SHALLOW** line



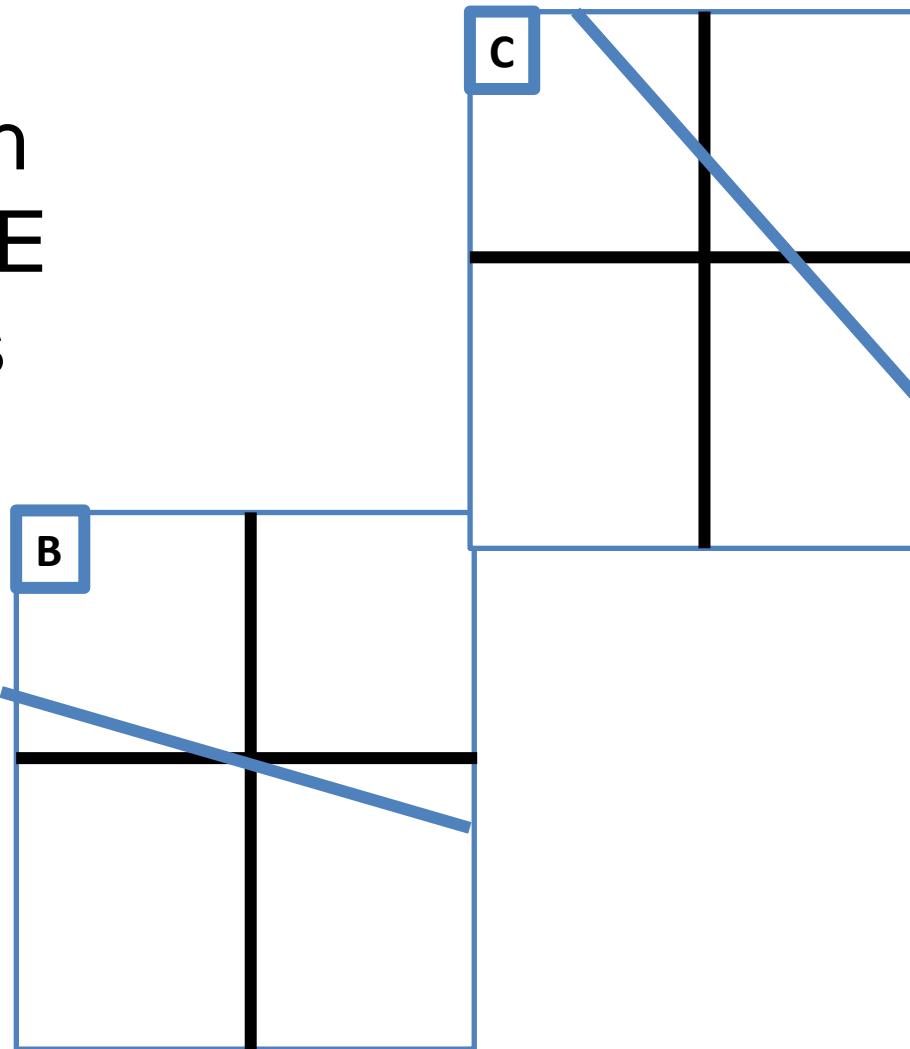
The **RED** line has a positive gradient, the **BLUE** line has a negative gradient

Which of these lines has the smallest negative gradient?



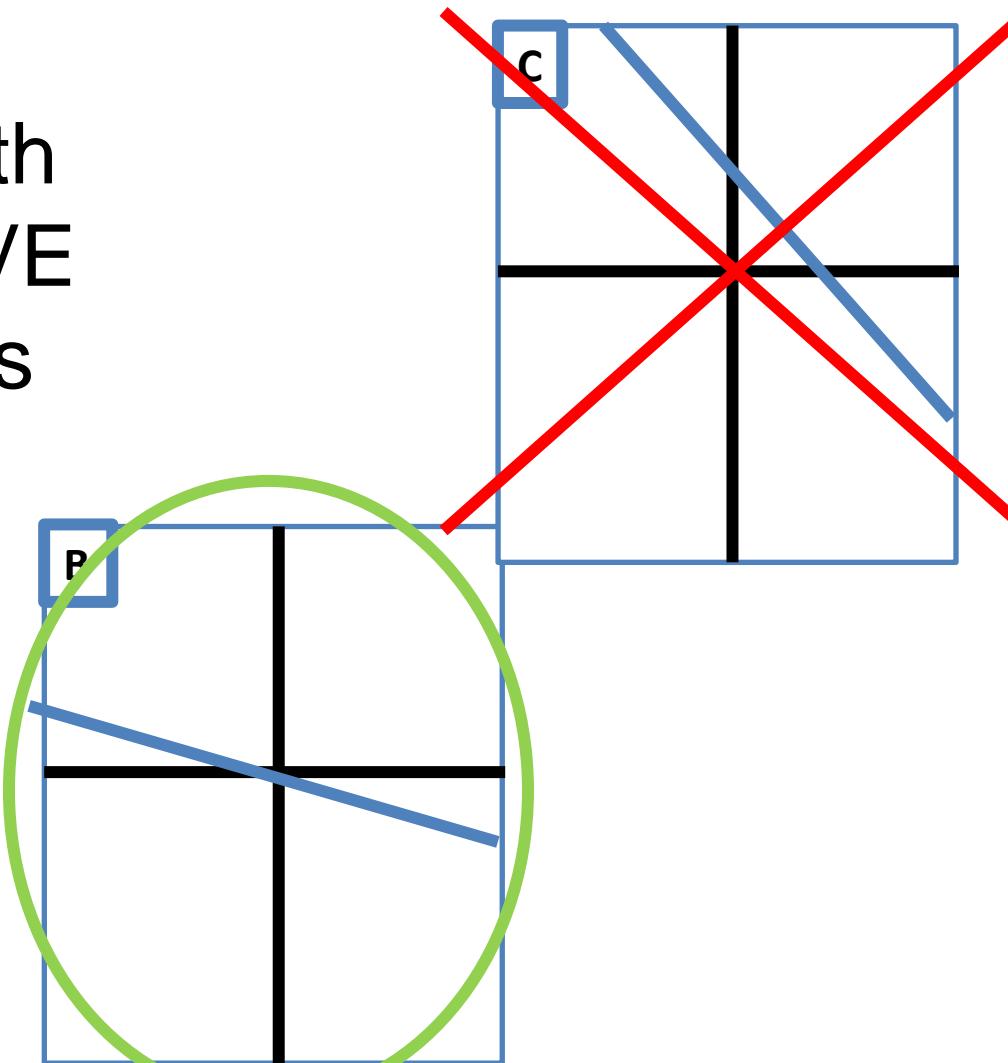
Which of these lines has the smallest negative gradient?

A and D
were both
POSITIVE
gradients



Which of these lines has the smallest negative gradient?

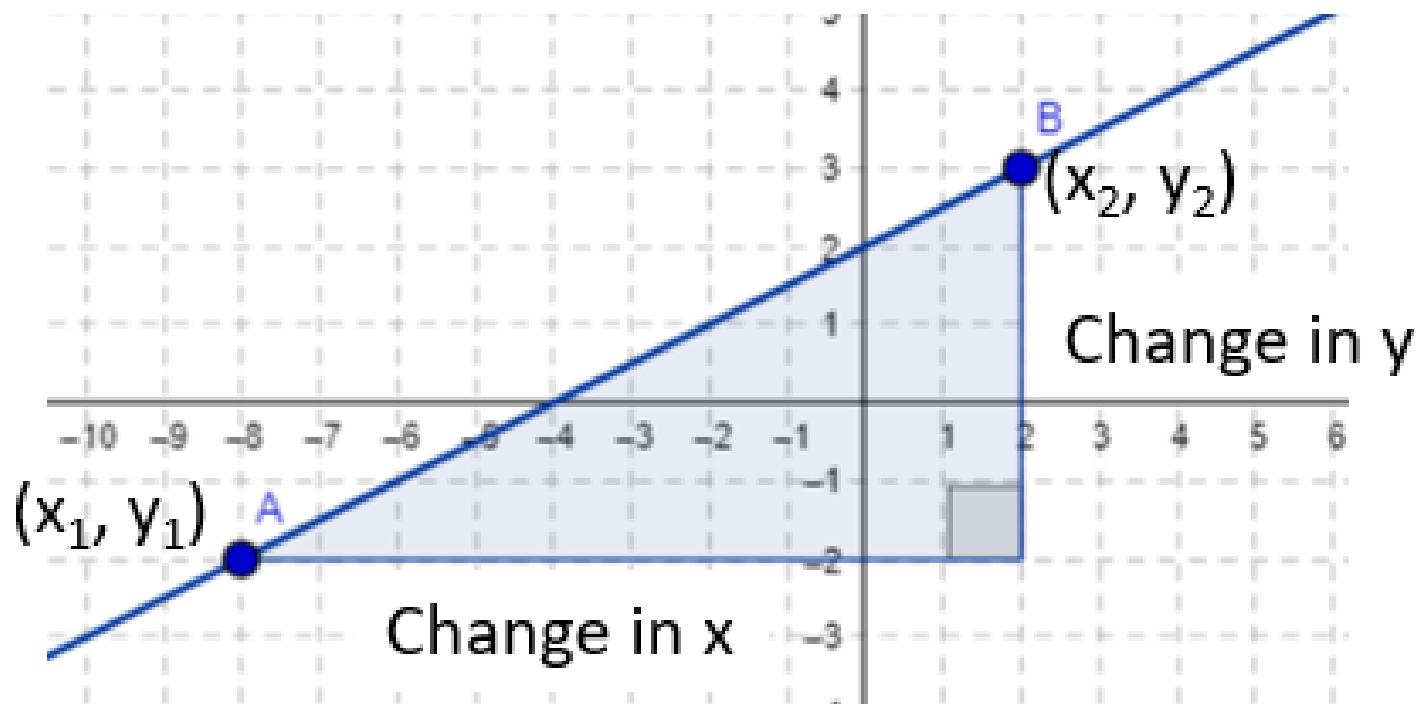
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How to find the Gradient

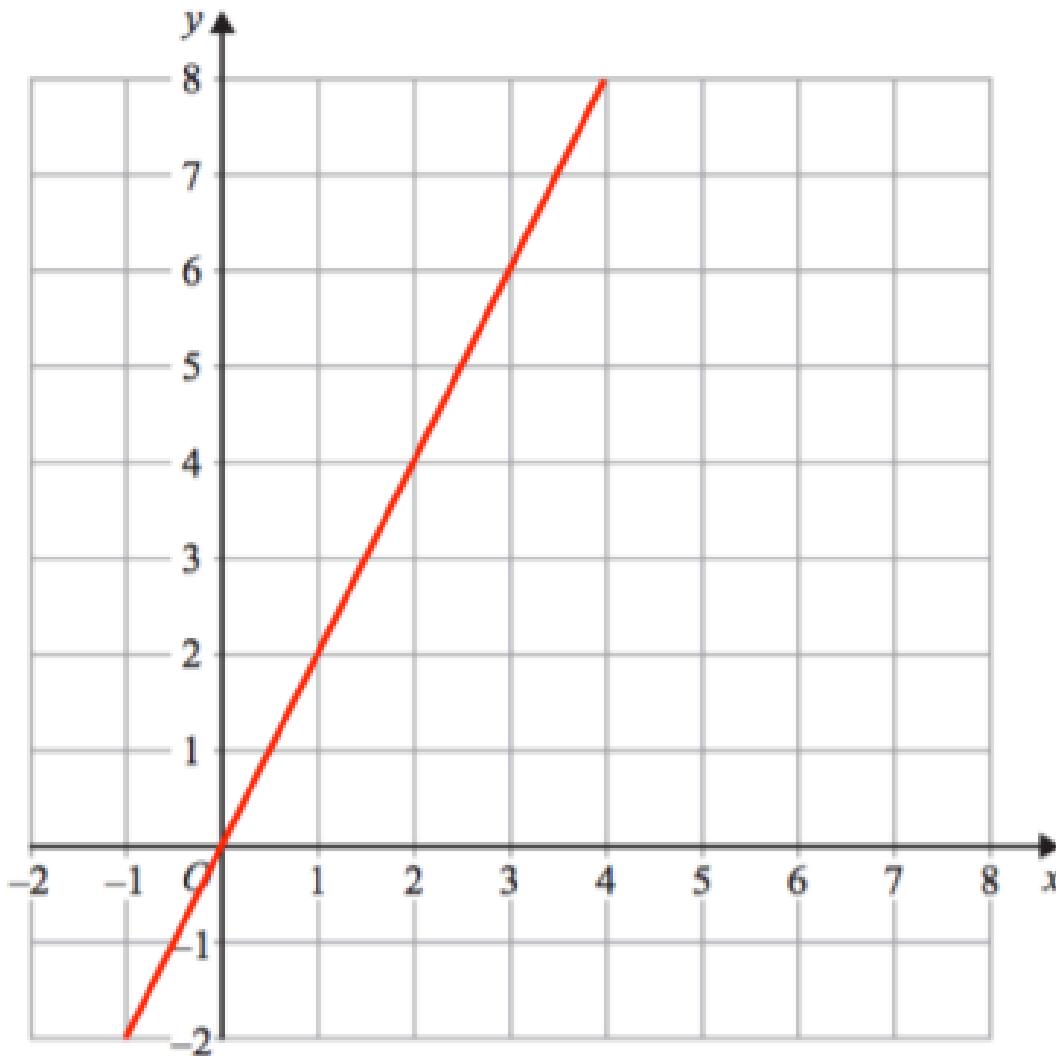
- We are going to find the gradient of a line between two points.
- We need to divide the DIFFERENCE IN Y by the DIFFERENCE IN X
- $(\text{Difference in } y) \div (\text{Difference in } x) = \text{Gradient}$
- $\Delta y / \Delta x = \text{gradient}$

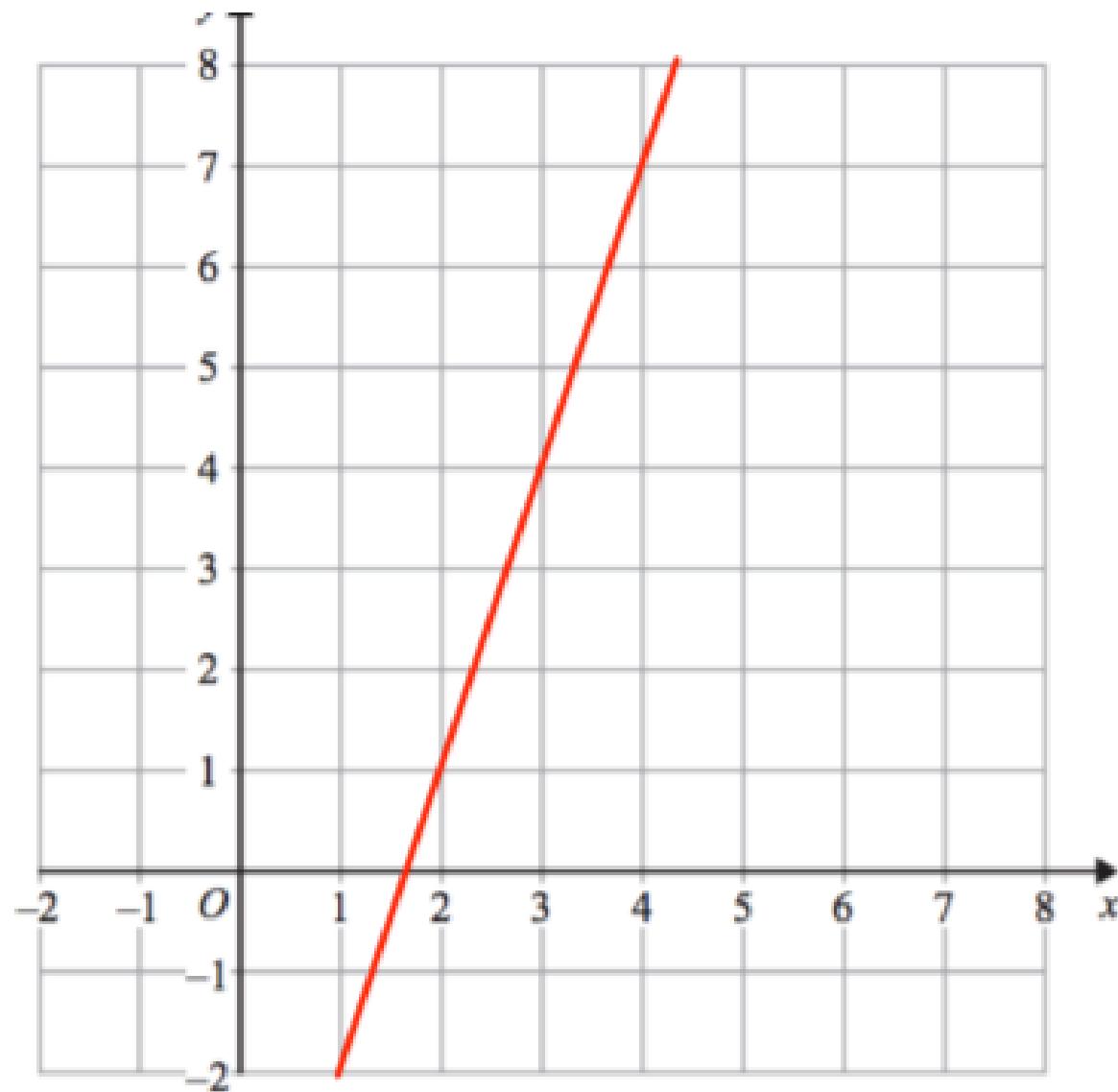
Gradient of a Straight Line

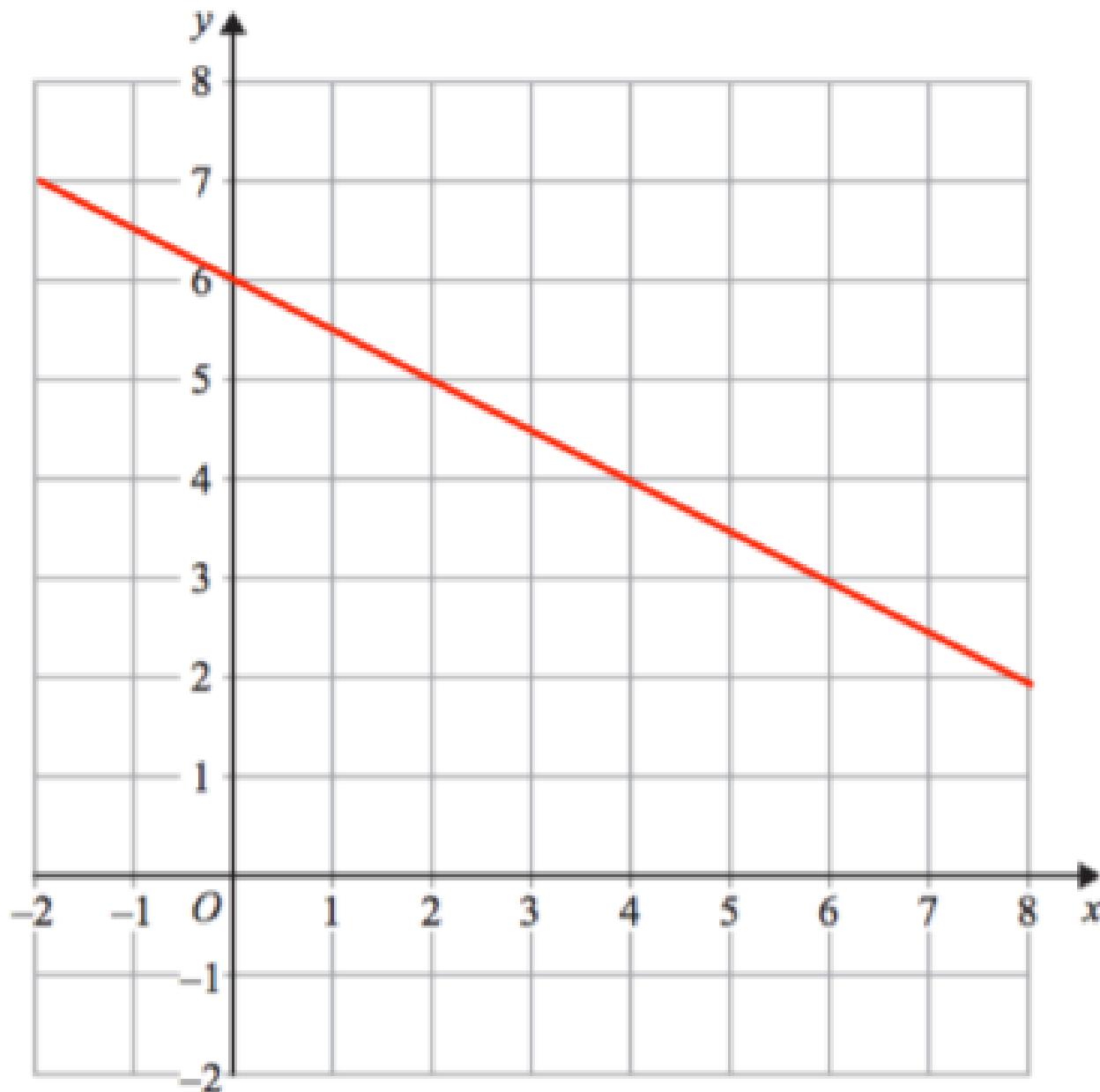


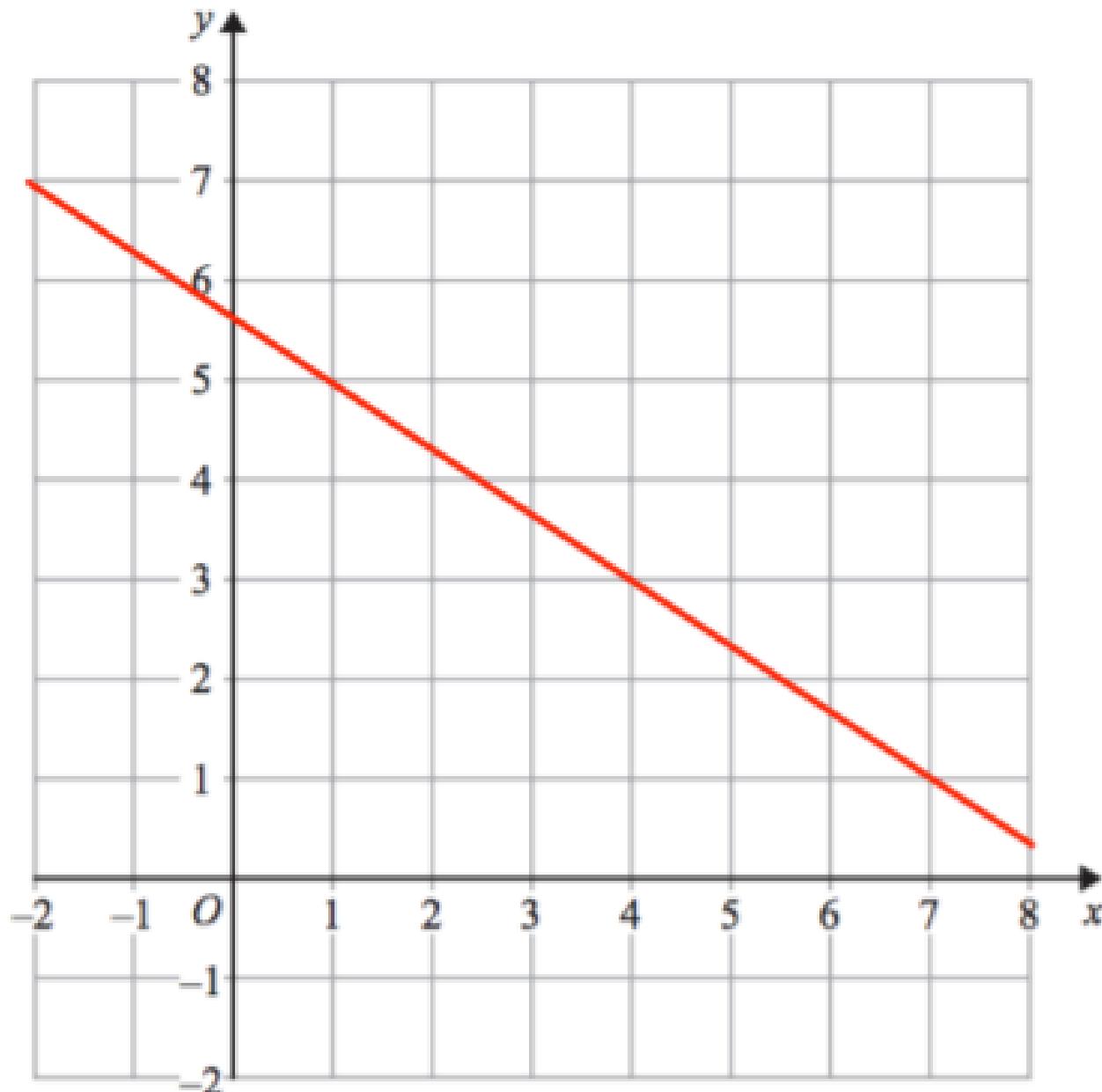
$$\text{Gradient} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Change in } y}{\text{Change in } x}$$

$y = x$



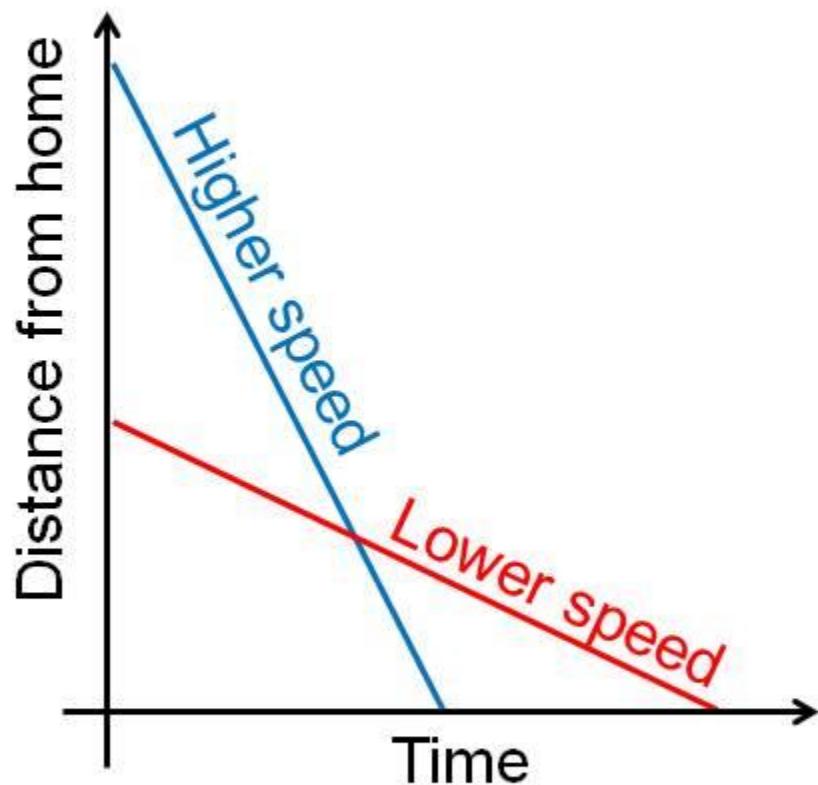
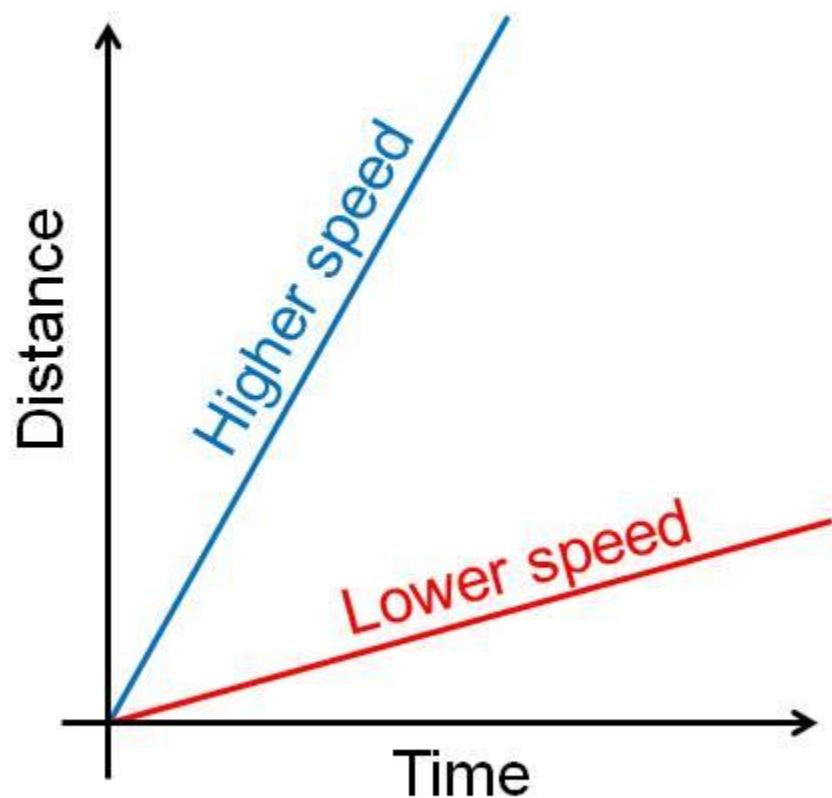






(f)

For a distance-time graph, speed = gradient



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

