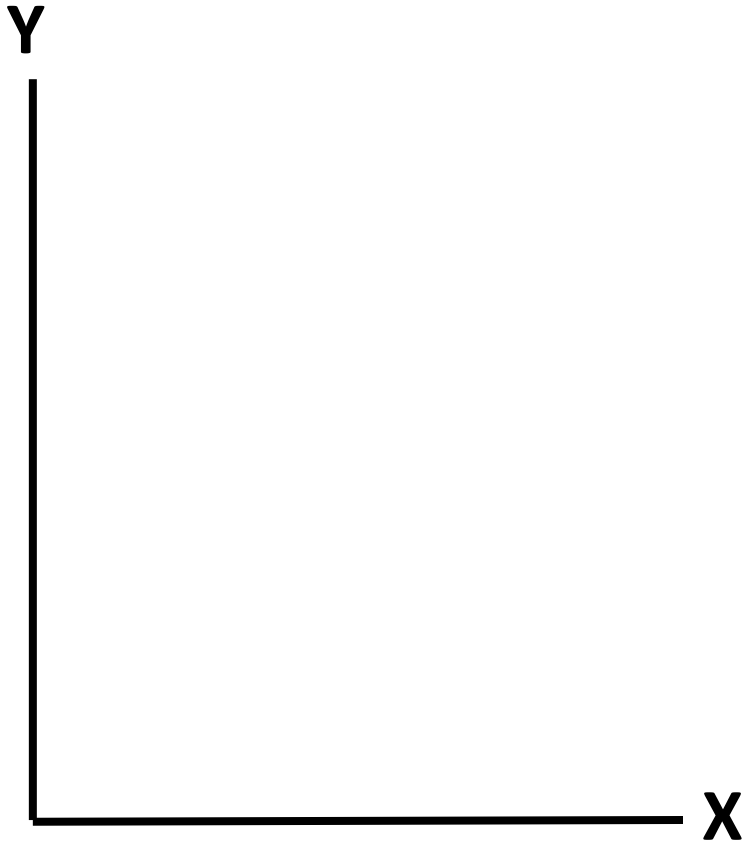


# Recap - Understanding & Drawing Graphs



- Graphs are useful, they help to clearly show patterns in data collected.
- They can help us make further predictions based on patterns shown.
- X axis (horizontal) – independent variable.
- Y axis (vertical) – dependent variable.

# Task 1 - Graph Work – Tell the Story



- look at the six different Simpsons graphs.
- Discuss with your partner what the graphs show.
- Explain the pattern by writing on you page

# Recap - Understanding & Drawing Graphs



Types of graphs:

**Bar graphs visualise  
categoric/ simple data**

**Line graphs show  
connections and  
continuous data**

**Pie charts are  
less common in  
science**

# Recap – Variables

- A variable is any factor that can be controlled, measured or changed in a science investigation.
- 1. Independent variable** – *This is what you are changing in your investigation.*
  - 2. Dependent variable** – *This is what you are measuring in your investigation.*
  - 3. Control variable** – *This is what you are keeping the same in your investigation.*



## Task 2 - Scenarios

- There are 4 scenarios on the next 3 pages in your workbook.
- You need to decide what the different variables would be, AND what headings to use in your results table.
- You DO NOT need to draw a full results table!



## Task 2 - Scenarios

- FOR EXAMPLE:

Independent variables go in the first column


Dependent variables go in the next columns...

What are the units?

Do we need a mean?



# Task 2 - Scenarios

- Class discussion! Correct your answers using green pen if needed!

## Task 2 – Scenarios

### Investigation 1 – Homer at the bowling alley

- Homer has just been selected for Mo's Bar bowling team.
- He is undecided which of his three pairs of bowling shoes he should wear for the inter-bar bowling championship.
- Should he wear the rubber soled shoes, the leather soled shoes or the plastic soled shoes?
- He tests them out at the bowling alley by running a fixed distance of 2.5 metres and ranks the shoes to which will give him the largest amount of slip.

#### Investigation 1

Independent Variable \_\_\_\_\_

Dependent Variable \_\_\_\_\_

Control Variables \_\_\_\_\_

Write in the headings for the results table. Include the units.



### Investigation 2 – Marge in the kitchen

- Marge is making waffles with maple syrup for the family's breakfast but has forgotten how many eggs she normally adds to make 10 waffles for the whole family.
- The night before, she makes some trial batches testing with 2 eggs, 4 eggs and 6 eggs. Then gets Homer to rate them according to taste before he says which is the best, second best and which is the worst.

#### Investigation 2

Independent Variable \_\_\_\_\_

Dependent Variable \_\_\_\_\_

Control Variables \_\_\_\_\_

Write in the headings for the results table. Include the units.



### Investigation 3 – Bart at the skateboard park

On the way home from school Bart and Lisa stop off at the skate park. The two of them decide to have a ~~speed~~ race on their ~~skateboards~~ over a distance of 10 metres. For an additional challenge, Bart thinks it would be a good idea for both of them to put different numbers of ~~school-books~~ on their heads. They get Lisa to time them and calculate their speed.

#### Investigation 3

Independent Variable \_\_\_\_\_

Dependent Variable \_\_\_\_\_

Control Variables \_\_\_\_\_

Write in the headings for the results table. Include the units.



### Investigation 4 – Lisa skipping science project

For her science project, Lisa decides to test how length of rope will affect the number of skips in 10 minutes. However, she only has ropes with different thicknesses.

She asks Marge to time her using a ~~stopwatch~~ with minutes, ~~seconds~~ and milliseconds on it for additional accuracy. She skips on a pressure mat which detects and counts every skip that she does. And to improve reliability of the investigation she asks Bart to also count the number of skips.

#### Investigation 4

Independent Variable \_\_\_\_\_

Dependent Variable \_\_\_\_\_

Control Variables \_\_\_\_\_

Write in the headings for the results table. Include the units.





## Task 2 - Scenarios

### Scenario 1:

- Homer has just been selected for Mo's Bar bowling team.
- He is undecided which of his three pairs of bowling shoes he should wear for the inter-bar bowling championship.
- Should he wear the **rubber soled shoes, the leather soled shoes or the plastic soled shoes?**
- He tests them out at the bowling alley by running a **fixed distance of 2.5 metres** and **ranks the shoes to which will give him the largest amount of slip.**

**Independent**

**Dependent**

**Control**





## Task 2 - Scenarios

### Scenario 1:

#### Investigation 1

Independent Variable Type of shoe sole

Dependent Variable Distance of slip (meters)

Control Variables Distance run, speed of run

Write in the headings for the results table. Include the units.

Type of shoe sole	Distance of slip / meters (m)



## Task 2 - Scenarios

### Scenario 2:

- Marge is making waffles with maple syrup for the family's breakfast but has forgotten how many eggs she normally adds to make 10 waffles for the whole family.
- The night before, she makes some trial batches testing with **2 eggs, 4 eggs and 6 eggs**. Then gets Homer to **rate them according to taste** before he says which is the best, second best and which is the worst.

**Independent**

**Dependent**

**Control**



# Task 2 - Scenarios

## Scenario 2:

Independent Variable Number of eggs

Dependent Variable Ranking of the taste of waffles

Control Variables Recipe, cooking time...

Write in the headings for the results table. Include the units.

Number of eggs	Taste of waffles / 1 = best



## Task 2 - Scenarios

### Scenario 3:

- On the way home from school Bart and Millhouse stop off at the skate park.
- The two of them decide to have a downhill race on their skateboards over a **distance of 10 metres**.
- For an additional challenge, Bart thinks it would be a good idea for both of them to put **different numbers of school books on their heads**. They get Lisa to **time** them and calculate their speed.

**Independent**

**Dependent**

**Control**



# Task 2 - Scenarios

## Scenario 3:

Independent Variable Number of books on head

Dependent Variable Time (seconds)

Control Variables Distance

Write in the headings for the results table. Include the units.

Number of books on head	Time / seconds (s)



## Task 2 - Scenarios

### Scenario 4:

- For her science project, Lisa decides to test how **length of rope** will affect the number of skips in **10 minutes**.
- She asks Marge to time her using a stopclock with minutes, seconds and milliseconds on it for additional accuracy.
- She skips on a pressure mat which detects and counts every skip that she does. And to improve reliability of the investigation she asks Bart to also count the **number of skips**.

**Independent**

**Dependent**

**Control**



# Task 2 - Scenarios

## Scenario 4:

Independent Variable Length of rope (cm or m?)

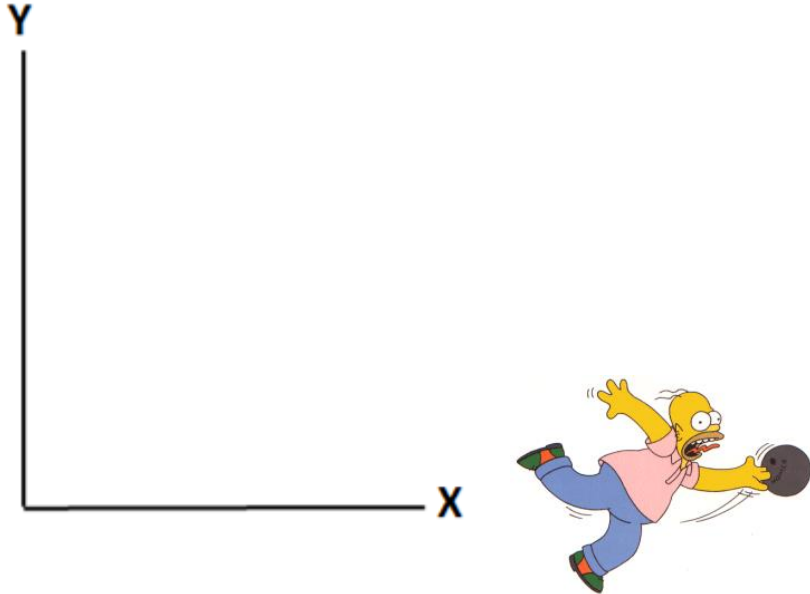
Dependent Variable Number of skips (in 60 seconds)

Control Variables Time to skip

Write in the headings for the results table. Include the units.

Length of rope / meters (m)	Number of skips in 60 seconds

# Task 3 Graph Work – Simpson's Results



Type of Sole	Distance of Slip / meters (m)
Rubber	1.2
Leather	0.4
Plastic	1.7

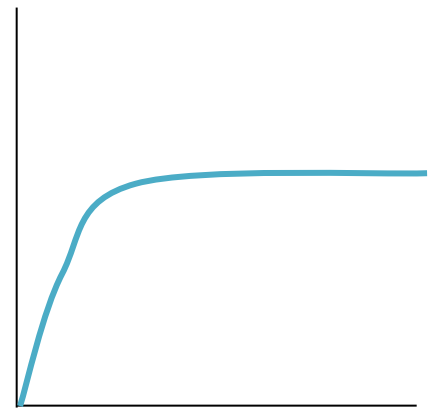
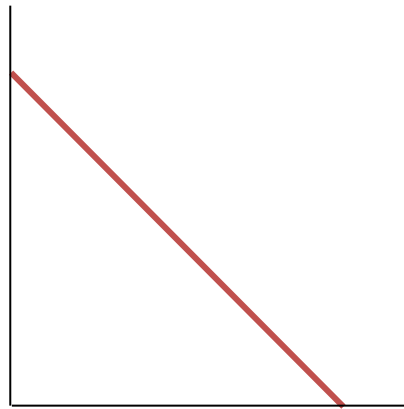
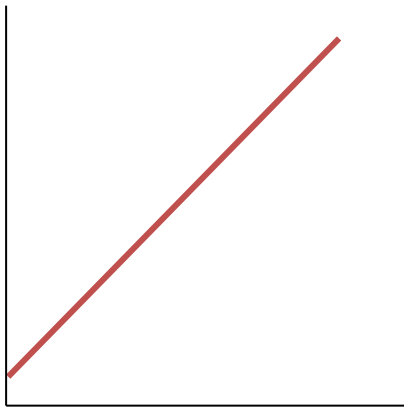
- You have been given results from 2 of the investigations.
- Discuss how the graph might look.
- **Sketch** these on your sheet, including correct labels for each axis.



# Scatter Graphs

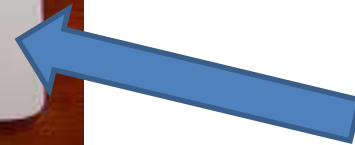
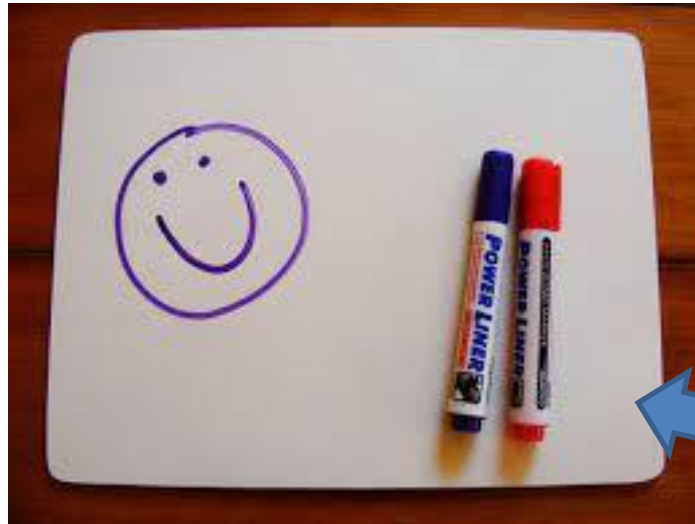
**Scatter graphs** are used to show whether there is a **relationship** between **two** sets of data.

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



# Mini Whiteboard Quiz

- Collect a mini whiteboard, pen and a paper towel



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

# Testing Your Knowledge



Q. The independent variable...

- A. is what you keep the same.
- B. is what you measure.
- C. is what you change.
- D. is how we keep it a fair test.

# Testing Your Knowledge



Q. The independent variable...

- A. is what you keep the same.
- B. is what you measure.
- C. is what you change.**
- D. is how we keep it a fair test.

# Testing Your Knowledge

Q. The dependent variable...



- A. is what you keep the same.
- B. is what you measure.
- C. is what you change.
- D. is how we keep it a fair test.

# Testing Your Knowledge

Q. The dependent variable...



A. is what you keep the same.

**B. is what you measure.**

C. is what you change.

D. is how we keep it a fair test.

# Testing Your Knowledge



Q. On which axis do you put the independent variable?

- A. Y
- B. It doesn't matter.
- C. X
- D. It changes each depending on the practical.

# Testing Your Knowledge



Q. On which axis do you put the independent variable?

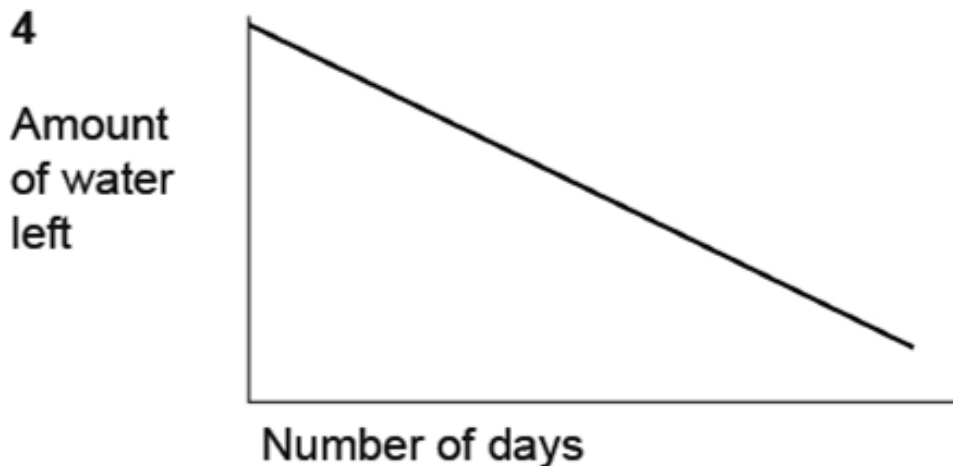
- A. Y
- B. It doesn't matter.
- C. X**
- D. It changes each depending on the practical.



# Testing Your Knowledge

Q. What does the graph show?

- A. As the days increase, the amount of water increases.
- B. The amount of water does not change over the days.
- C. As the days increase, the water level goes up and down.
- D. As the days increase, the amount of water decreases.



# Testing Your Knowledge

Q. What does the graph show?

- A. As the days increase, the amount of water increases.
- B. The amount of water does not change over the days.
- C. As the days increase, the water level goes up and down.
- D. As the days increase, the amount of water decreases.**



# Testing Your Knowledge

Q. Control variables...



- A. make it fair
- B. are what you measure.
- C. are what you change.
- D. are what you keep the same.

# Testing Your Knowledge

Q. Control variables...



A. make it fair

B. are what you measure.

C. are what you change.

**D. are what you keep the same.**

# NEW KNOWLEDGE

A **gradient** is a way of measuring how steep a slope is using maths.

The bigger the gradient, the steeper the slope!



# Which is the steepest hill? A or B

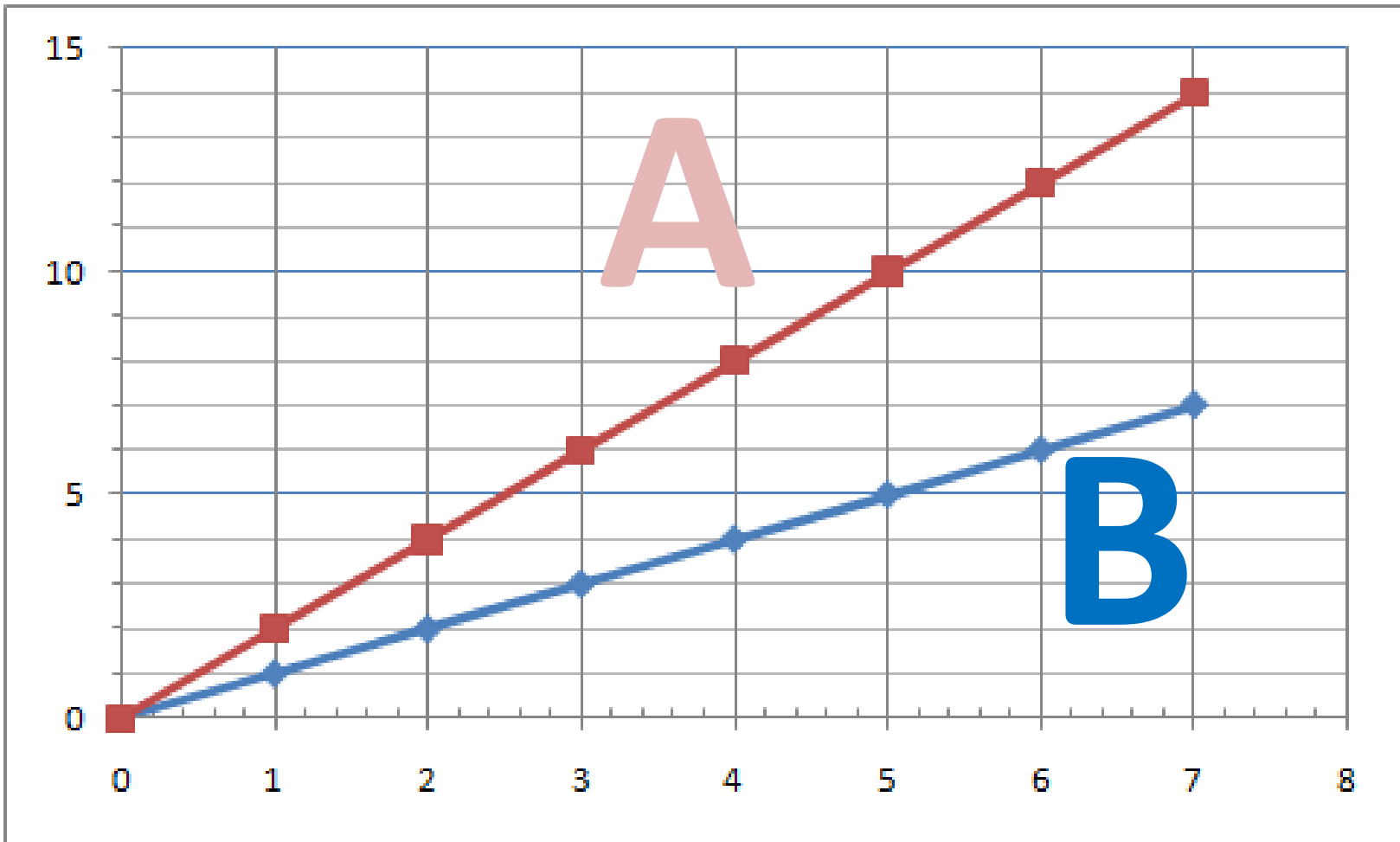




Which has the largest gradient? A or B

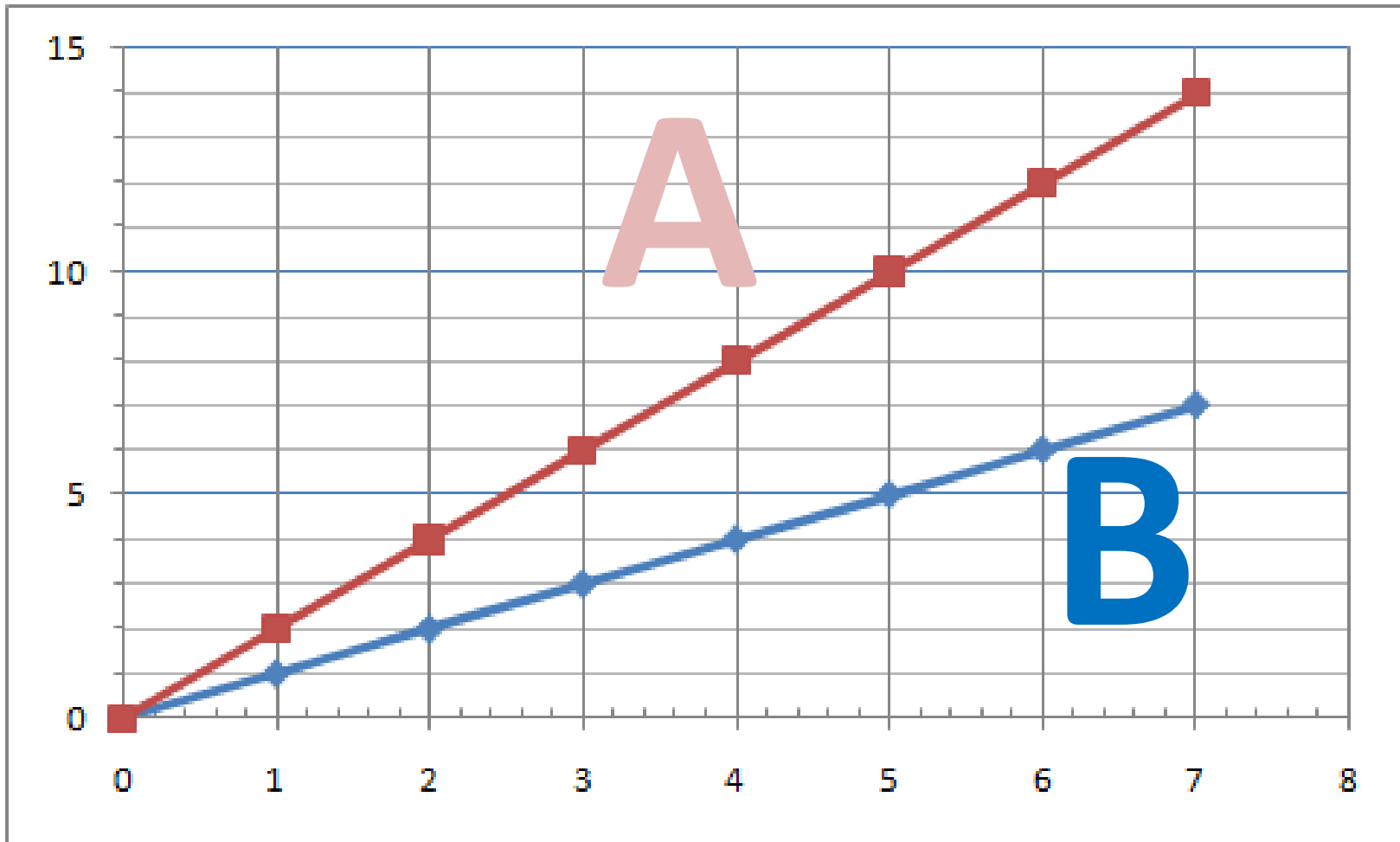


# Which is the steepest line, A or B?

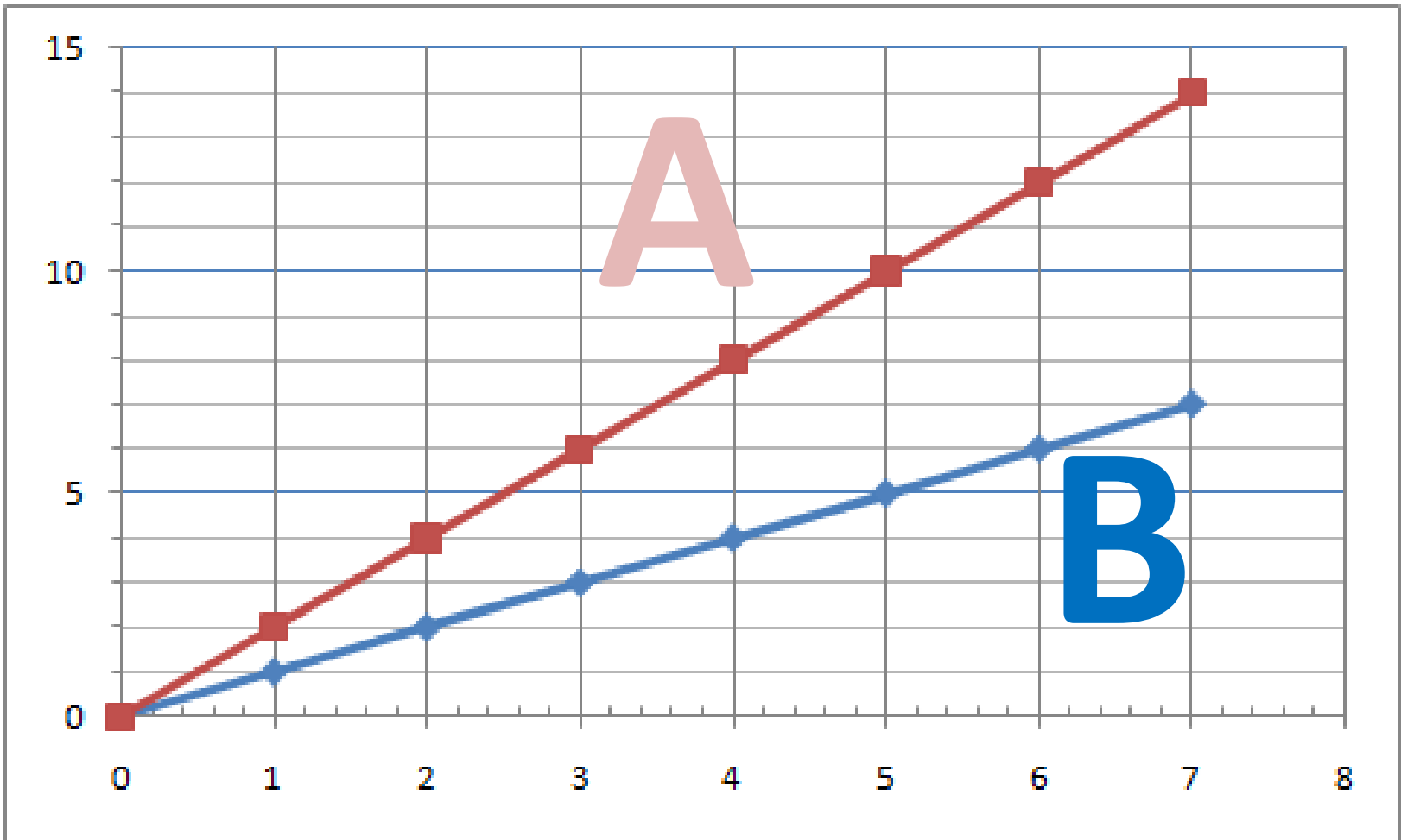




Which of A or B has the largest gradient?



Which is the lowest gradient, A or B?



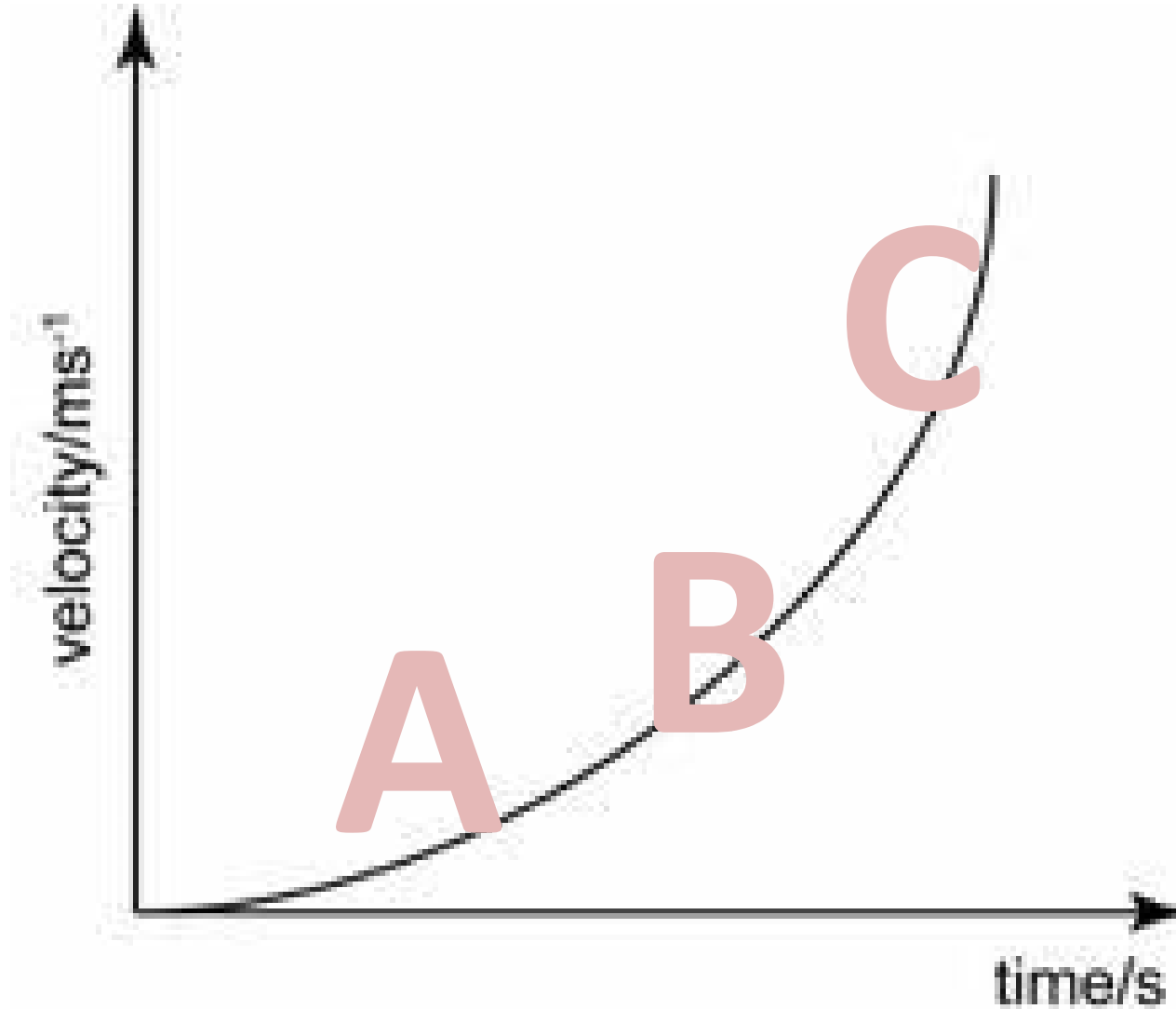
Which slide has the steepest gradient?



Where is the gradient largest?



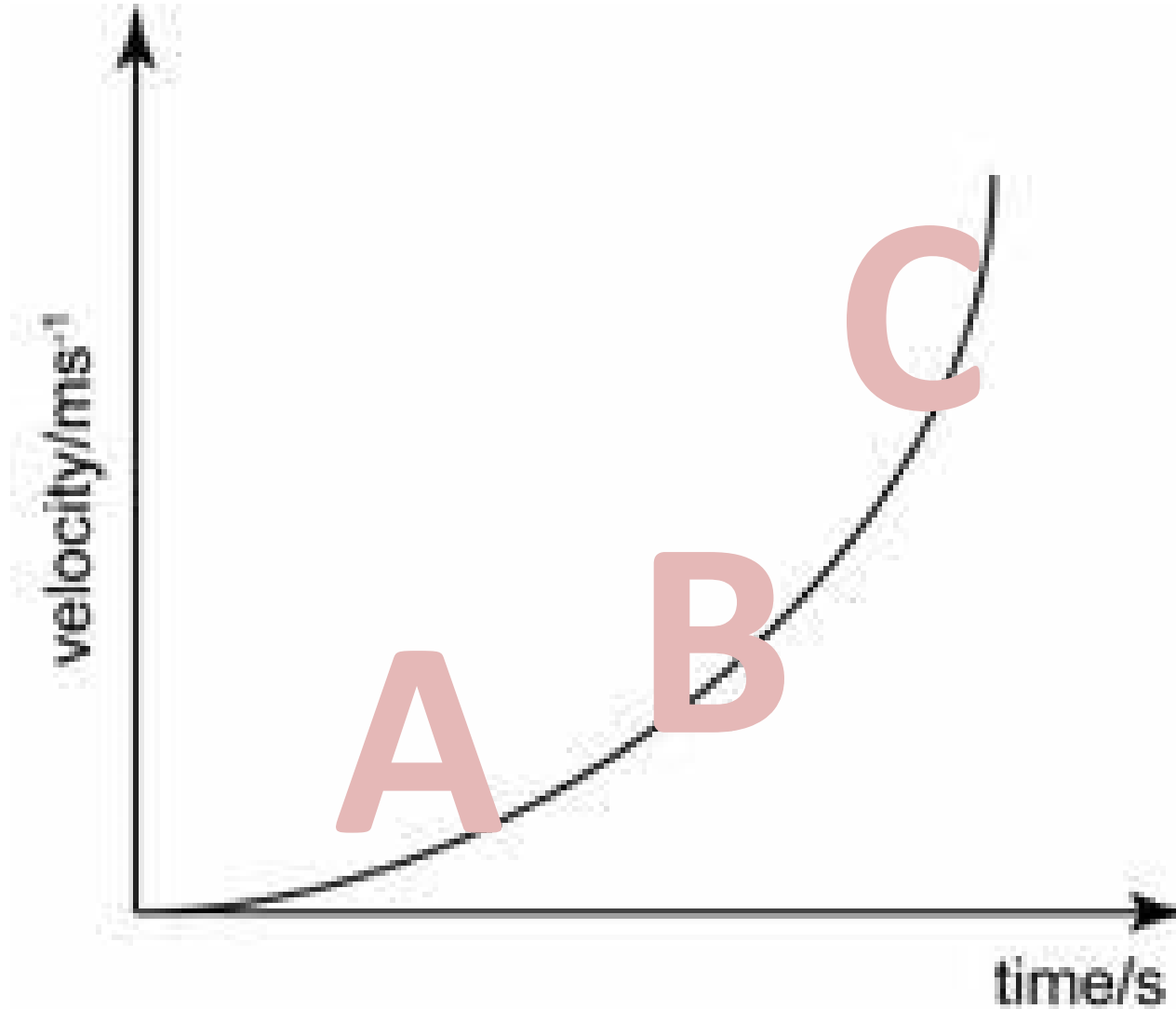
Where is the gradient largest



# New Information

- 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 the **rate** at which the variable on the y-axis changes with a change on the x-axis.

Where is the gradient largest






# 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.

Harmful to the Environment   
  Corrosive   
  Oxidising

2) Name the scientific equipment below.

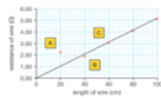
3) Describe the difference between the keywords ACCURACY and PRECISION.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4) Circle the anomalous result in both sets of data below.



Thickness of lead (cm)	Count on ratemeter (counts per minute)
0	450
1	232
2	112
3	61
4	31

5) Find the mean of the results below to show the average time taken for a car to stop at 70mph.

10.1 s, 10.2 s, 9.9 s, 10.0 s, 10.3 s

6) Parallax error is a human error caused by the position of the scientist, compared to the instrument they are using to take measurements. Explain **weather parallax error is a random or systematic error and why.**

\_\_\_\_\_

\_\_\_\_\_

7) Fill in the gaps to describe the type of graph that would be used with the data collected.

Bar Chart    Range    Data    Continuous    Groups

When \_\_\_\_\_ recorded in set categories or \_\_\_\_\_ this is called **categoric data** and scientist present this using a \_\_\_\_\_. When scientists collect data that covers a \_\_\_\_\_ of different values this is called \_\_\_\_\_ data and it is presented on a line graph.

8) Name 2 control variable in the experiment described below.

2. A plant geneticist is trying to breed a tomato plant whose tomatoes remain firm when they are ripe. He grows two groups of 10 tomato plants; group A are genetically engineered to keep the tomatoes firm when ripe and group B is an ordinary strain of tomato plants. Both groups are grown in the same greenhouse with the same quantities of compost and water.

One control variable is \_\_\_\_\_

Another control variable is \_\_\_\_\_

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

↑ Plot for a Thermistor


\_\_\_\_\_



# Marking

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


1.



Harmful to the Environment      Corrosive      Oxidising

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

2) Name the scientific equipment below



Bunsen Burner, Beaker, Measuring cylinder, Test tube, Boiling tube

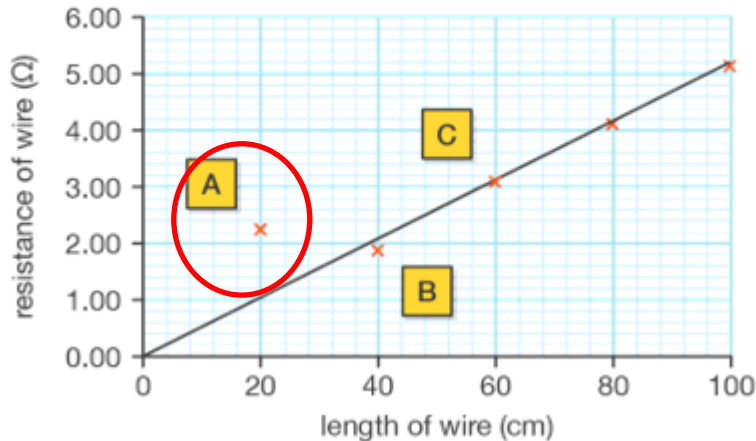
5/5 = 2 marks, 2-4 = 1 mark

\_\_\_\_\_

3) Describe the difference between the keywords ACCURACY and PRECISION

Precision is how close together repeat readings are (1)   
Accuracy is how close to the TRUE VALUE a measurement is (1)

4) Circle the anomalous result in both sets of data below



Thickness of lead (cm)	Count on ratemeter (counts per minute)		
	1	2	3
0	450	445	451
1	232	234	241
2	112	40	111
3	61	60	58
4	31	32	35

5) Find the mean of the results below to show the average time taken for a car to stop at 70mph:

10.1 s, 10.2 s, 9.9 s, 10.0 s, 10.3 s

$$10.1 + 10.2 + 9.9 + 10.0 + 10.3 = 50.5 \text{ (1)}$$

$$50.5 / 5 = 10.1 \text{ seconds (1)}$$

- 6) Parallax error is a human error caused by the position of the scientist compared to the instrument they are using to take measurements. **Explain weather parallax error is a random or systematic error and why.**

Random error(1)

The position of the scientist can change every time/readings  
Can be bigger or smaller(1)

- 7) Fill in the gaps to describe the type of graph that would be used with the data collected.

Bar Chart

Range

Data

Continuous

Groups

When **Data** is recorded in set categories or **Groups** this is called categoric data and scientist present this using a **Bar Chart**. When scientists collect data that covers a **Range** of different values this is called **Continuous** data and it is presented on a line graph.

- 8) Name 2 control variable in the experiment described below

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

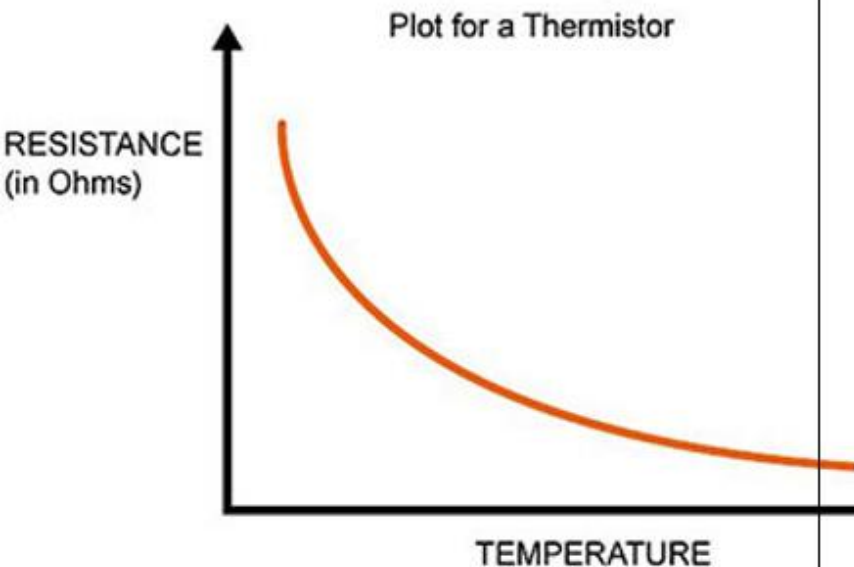
- 2 A plant geneticist is trying to breed a tomato plant whose tomatoes remain firm when they are ripe. He grows two groups of 10 tomato plants: group A are genetically engineered to keep the tomatoes firm when ripe and group B is an ordinary strain of tomato plant. Both groups are grown in the same greenhouse with the same quantities of compost and water.

One control variable is \_\_\_\_\_

Another control variable is \_\_\_\_\_

Same greenhouse / quantity of compost / quantity of water any 2 = 2makrs

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)