Speed and Motion Exam Style Questions 1

A group of pupils were racing their toy cars as shown below.

- What 2 measurements are required to calculate the speed of the cars?
- How would they use these measurements to calculate the speed?
- One of the pupils stated that the race was unfair because the cars were all of a different mass. The results for the cars are shown below.

Car	Mass of car (g)	Speed cm/s
A	10	20
B	15	15
C	20	10
D	25	5

- What effect did the mass of the car have on its speed?
- What is the independent variable?
- What was the dependent variable?

Speed and Motion Exam Style Questions 1 Answers

A group of pupils were racing their toy cars as shown below.

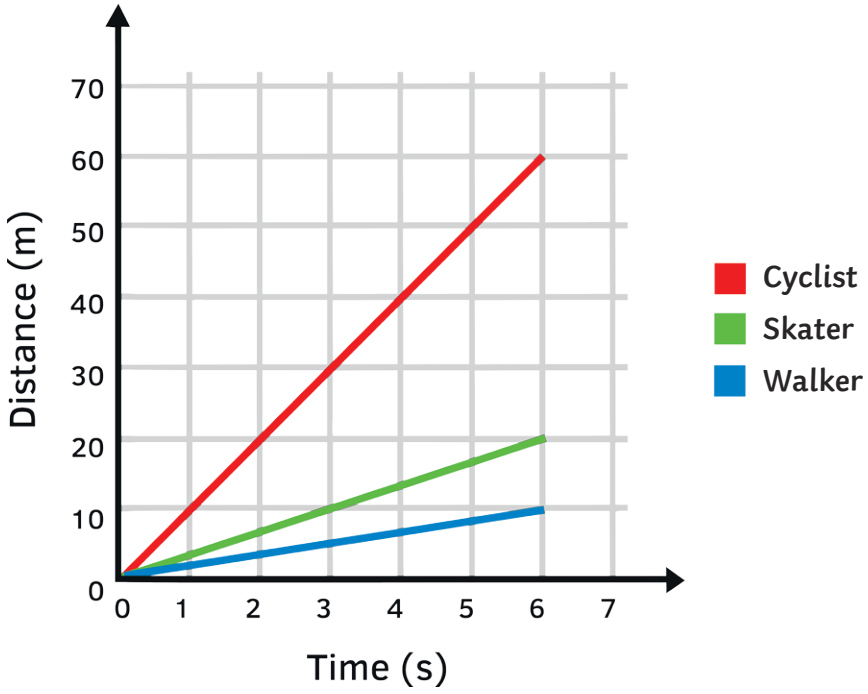
- What 2 measurements are required to calculate the speed of the cars? **Time and distance**
- How would they use these measurements to calculate the speed? **Speed =distance/time**
- One of the pupils stated that the race was unfair because the cars were all of a different mass. The results for the cars are shown below.

Car	Mass of car (g)	Speed cm/s
A	10	20
B	15	15
C	20	10
D	25	5

- What effect did the mass of the car have on its speed?
  The greater the mass the slower the speed of the car
- What is the independent variable?
  Mass of car
- What was the dependent variable?
  Distance travelled

Speed and Motion Exam Style Questions 2

1. The graph below shows a distance time graph for a walker, skater and cyclist.

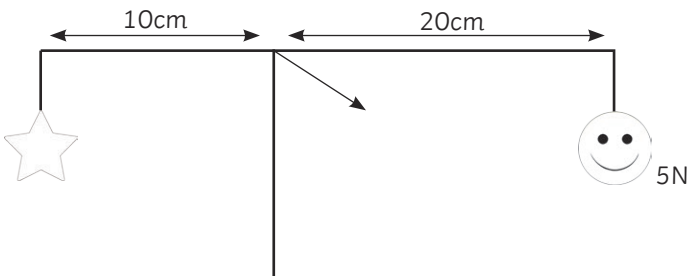


- Who travelled the furthest?
- How far did the cyclist travel between 4 seconds and 6 seconds?
- Speed = distance (m) / time (s)
- What was the speed of the

  Skater:

  Walker:

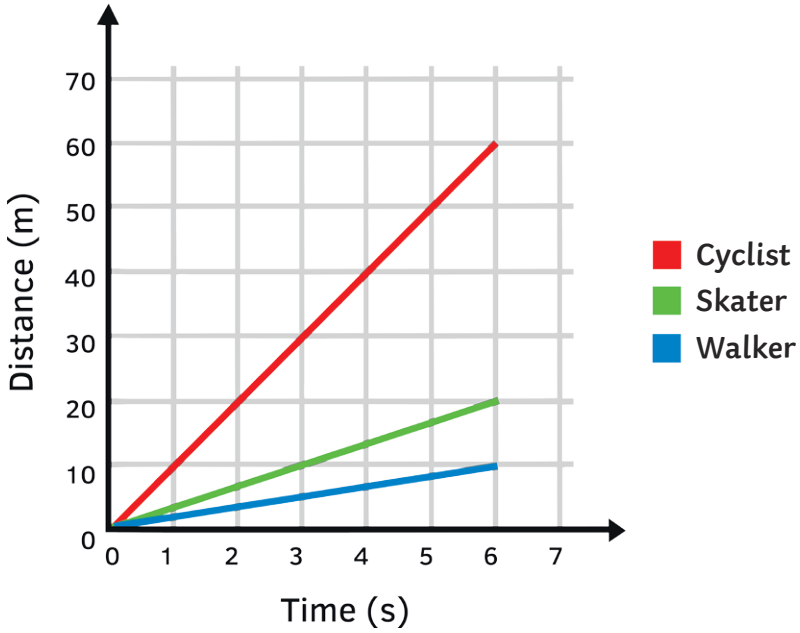
2. In order for a mobile (as shown below) to work, the turning moments need to be balanced.



- Calculate the turning moment produced by the smiley face. Remember to include units.
- What is the weight of the star?

Speed and Motion Exam Style Questions 2 Answers

1. The graph below shows a distance time graph for a walker, skater and cyclist.

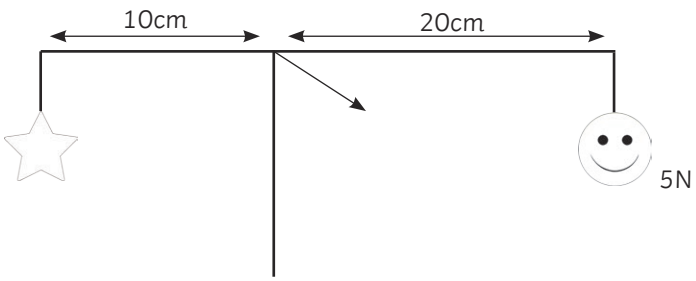


- Who travelled the furthest? **Cyclist**
- How far did the cyclist travel between 4 seconds and 6 seconds?
- Speed = distance m/time s
- What was the speed of the

  Skater: **20m/6s = 3.33m/s**

  Walker: **10m/6s = 1.6m/s**

2. In order for a mobile (as shown below) to work, the turning moments need to be balanced.



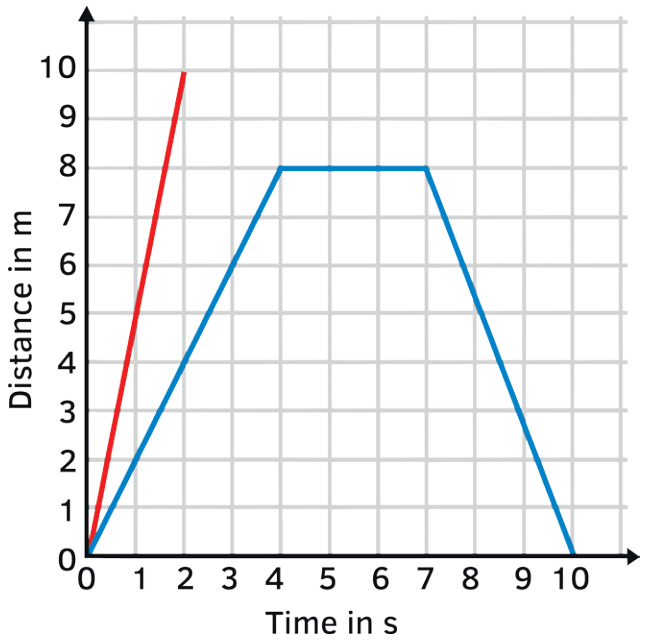
The mobile is balanced

- Calculate the turning moment produced by the smiley face. Remember to include units. **20 x 5 = 100 Nm**
- What is the weight of the star? **100/ 10 = 10N**

Speed and Motion

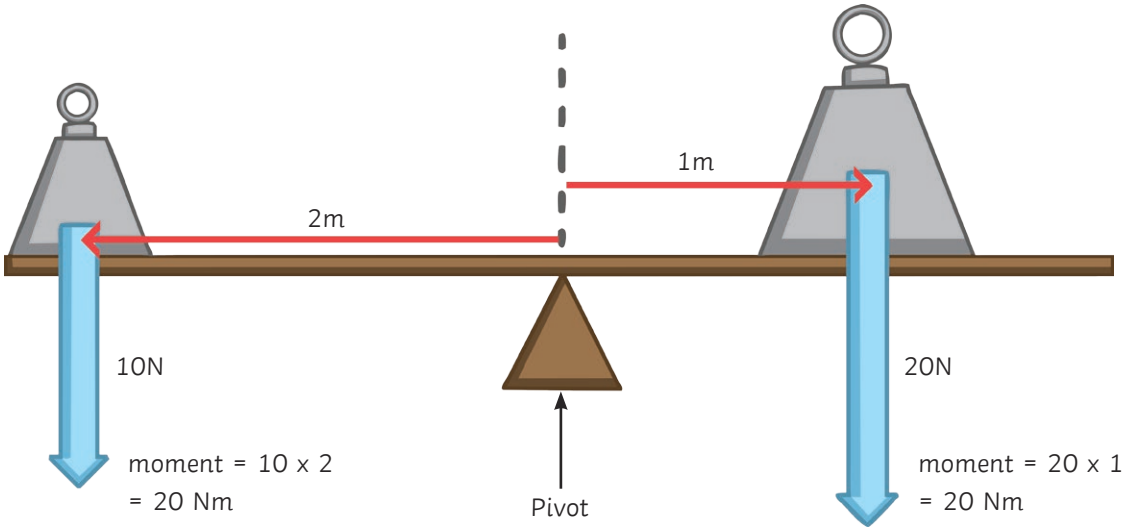
Key Revision Facts

- Speed is how fast something is travelling at a certain time.
- Speed equation: Speed (m/s) = $\frac{\text{distance (m)}}{\text{time (s)}}$
- Relative motion is how fast one object is travelling compared to another.
- Distance time graphs show the distance that something has travelled over a period of time. An example is shown below:



- On a distance time graph, the steeper the line, the faster the speed travelled at.
- Acceleration is an increase in speed.
- Gas pressure is caused by the force exerted by particles when they collide with a surface.
- Factors affecting gas pressure:
  - Volume – a smaller volume leads to greater pressure
  - Temperature – the higher the temperature, the more energy the particles have, leading to more collisions and greater pressure.
- Pressure can be calculated by the equation: Pressure (N/m^2) = force (N) / area (m^2)
- The pressure exerted on a drawing pin will be far greater than that of snow shoes because of the difference in their surface areas.
- The turning effect of a force is called a moment.
- Moment (Nm) = force (N) x perpendicular distance from pivot (m)

- Law of Moments:
- The sum of the clockwise moment = the sum of the anticlockwise moment
- Example:



- The see-saw is balanced because the moments are equal.
- Density equation: Density = mass (g)/ volume (cm^3).
- The density of water is $1g/cm^3$.

Speed and Motion **Progress Record**

Either colour each square Red, Amber or Green or put a tick in each row to indicate how confident you feel with each statement.

Topic - Speed and Motion			
Name			
I can	**R**	**A**	**G**
Calculate the speed of an object, using the correct formula and units.			
Explain the term relative motion and provide an example.			
Interpret distance time graphs.			
Calculate speed using a distance time graph.			
Define acceleration.			
Explain what causes gas pressure.			
List the factors that affect gas pressure.			
Explain, in terms of forces, why an object floats or sinks.			
Calculate pressure using the appropriate formula and units.			
Describe what is meant by a moment.			
Calculate the moment of a force.			

Topic - **Speed and Motion**

Place a tick to show you have completed the following:

Topic	I have studied	I have revised	I have attempted exam-style questions
How to calculate the speed of an object, using the correct formula and units.			
The term relative motion and provide an example.			
How to interpret distance time graphs.			
How to calculate speed using a distance time graph.			
Acceleration.			
The causes of gas pressure.			
The factors that affect gas pressure.			
How to explain in terms of forces, why an object floats or sinks.			
How to calculate pressure using the appropriate formula and units.			
What is meant by a 'moment'.			
How to calculate the moment of a force.			

Speed and Motion Assessment Package

Teacher's Notes

This assessment package has been designed to be used in a variety of ways and to be very flexible.

Progress Charts

The progress chart can be given out at the start of the topic and pupils complete it as each section has been covered

or

used towards the end of the topic so pupils can chart their understanding of the topic before a test.

There are a number of different progress charts available on the Twinkl website enabling the teacher to choose their preferred style.

Key Revision Facts

This information sheet ensures pupils have a copy of all the key facts and is particularly useful if pupils have been absent from lessons.

Test Yourself Sheets

These can be used either as home learning or in lesson just before a test to help pupil's asses their understanding of topics.

Exam-Style Questions

These are available to show pupils typical exam-style questions and can be used as a starter, plenary or home learning task.

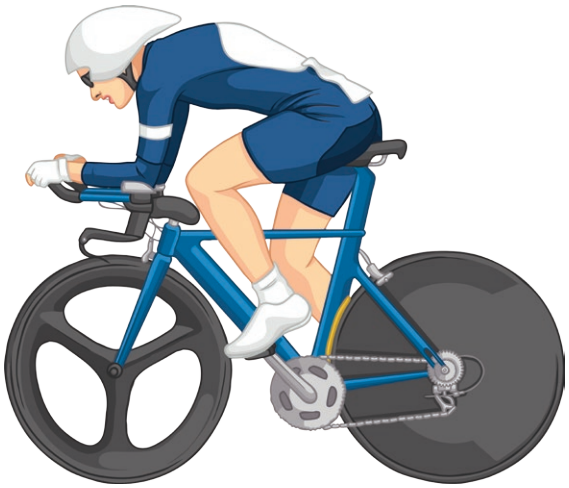
Speed and Motion **Test Yourself 1**

Match and Draw

Match the equation and units for the following:

speed	$\frac{\text{mass}}{\text{volume}}$	cm^3
density	force × perpendicular distance	Nm
volume	$\frac{\text{force}}{\text{area}}$	m/s
pressure	Length x width x height	N/m^2
moment	$\frac{\text{distance}}{\text{time}}$	g/m^3

Who is the Fastest?



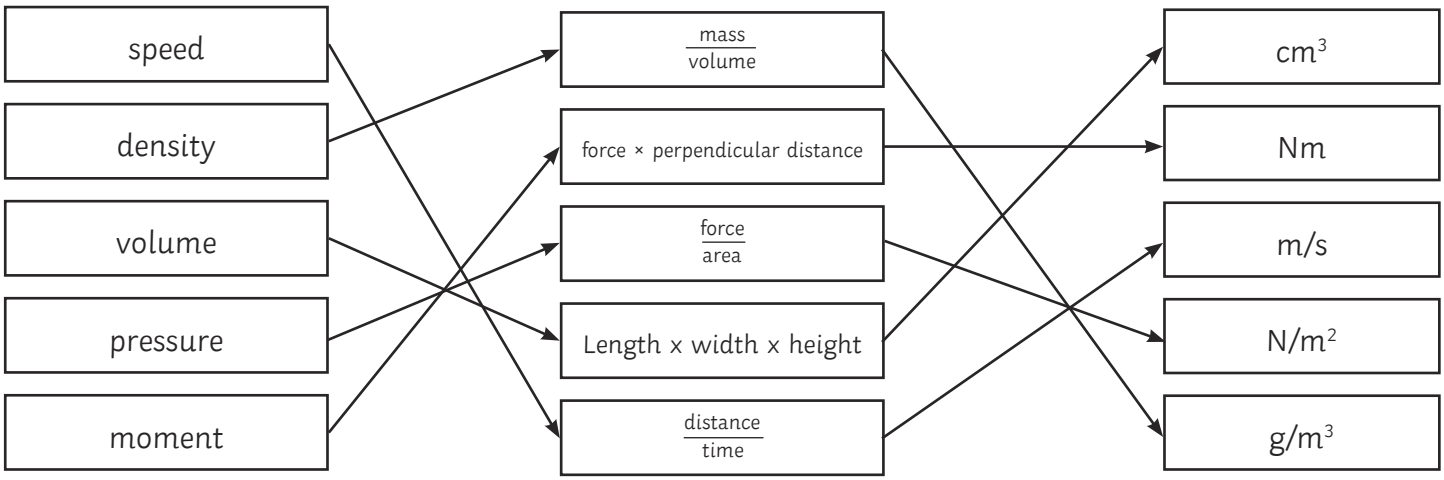
3 cyclists were discussing who was the fastest, but they were all travelling different distances. Use the information to find out who was correct. Remember to show your working out.

- Cyclist 1 covers a distance of 400m in 52 seconds
- Cyclist 2 covers a distance of 300m in 45 seconds
- Cyclist 3 covers a distance of 1.5km in 1 minute 20 seconds

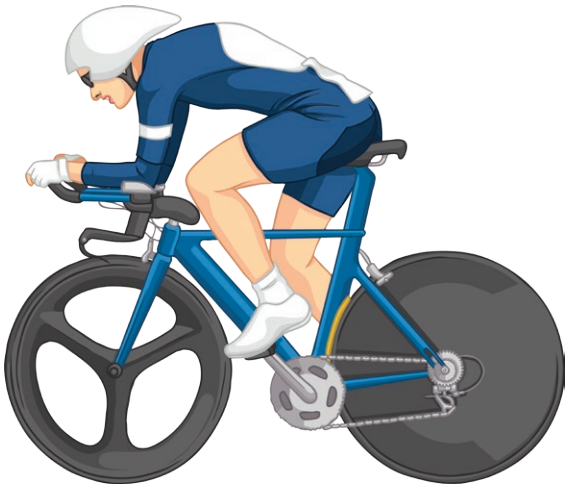
Speed and Motion **Test Yourself 1 Answers**

Match and Draw

Match the equation and units for the following:



Who is the Fastest?



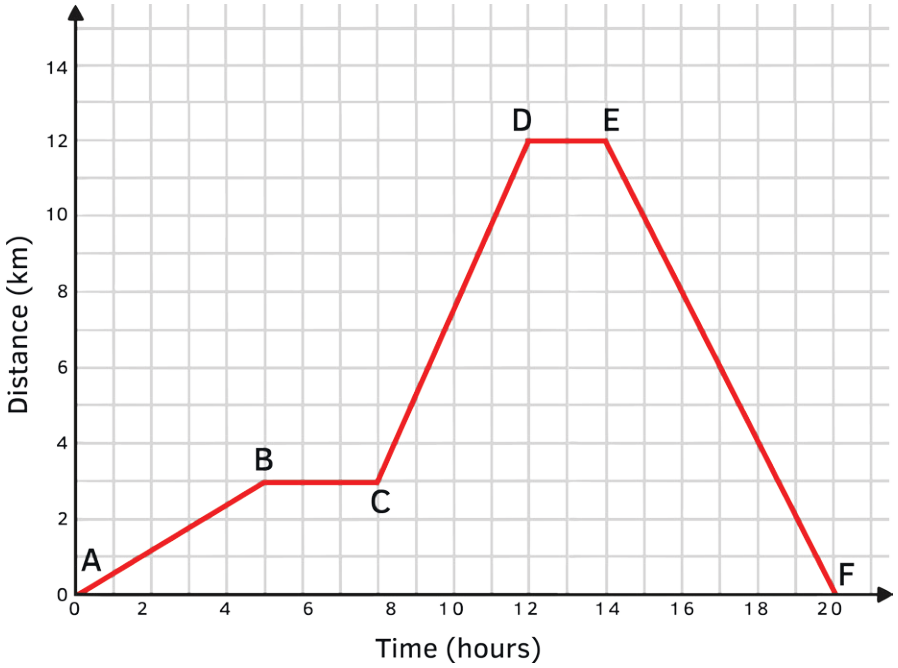
3 cyclists were discussing who was the fastest, but they were all travelling different distances. Use the information to find out who was correct. Remember to show your working out.

- Cyclist 1 covers a distance of 400m in 52 seconds **400/52 = 7.69 m/s**
- Cyclist 2 covers a distance of 300m in 45 seconds **300/45 = 6.66 m/s**
- Cyclist 3 covers a distance of 1.5km in 1 minute 20 seconds **1500/80 = 18.75m/s**

Speed and Motion **Test Yourself 2**

Distance- Time Graphs

Using the graph below, describe what is happening in terms of speed and distance between each of the points.



- A-B:
- B-C:
- C-D:
- D-E:
- E-F:

Between which two points is the speed the greatest? How do you know?

Float or Sink?

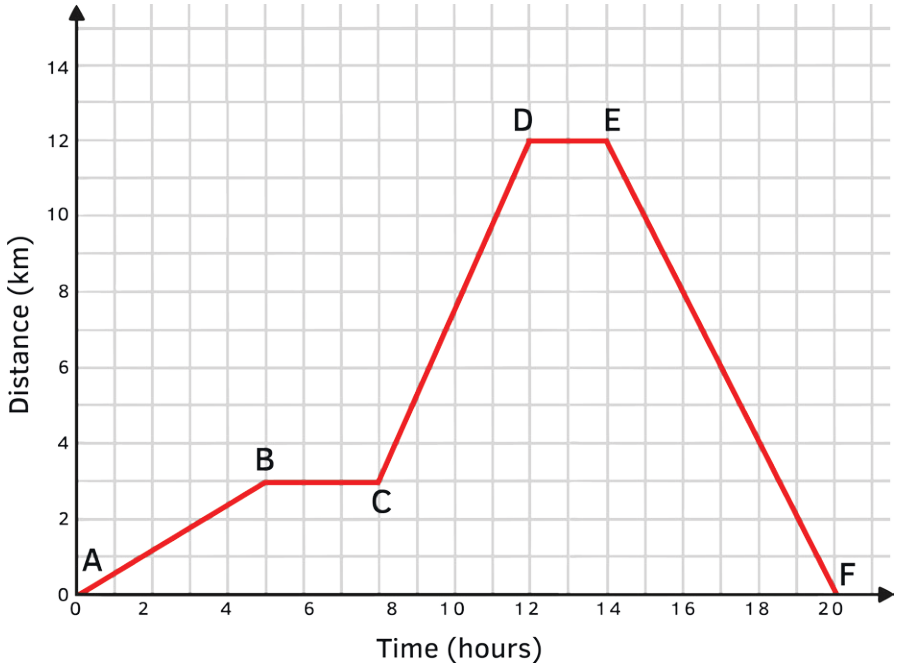
The density of water is 1g/cm^3. Work out whether the following would sink or float by completing the table below.

Object	Mass (g)	Volume (cm^3)	Density (g/cm^3)	Float or sink?
Cork	2.4	10		
Bone	18	10		
Ice	9	10		
Wood		10	0.77	
Diamond		10	3.01	

Speed and Motion **Test Yourself 2 Answers**

Distance- Time Graphs

Using the graph below, describe what is happening in terms of speed and distance between each of the points.



- A-B: **travels 3km in 5 hours at a steady speed.**
- B-C: **stationary.**
- C-D: **travels 9km in 4 hours.**
- D-E: **stationary.**
- E-F: **returns to starting position at a steady speed.**

Between which two points is the speed the greatest? How do you know?
C-D, as this shows the steepest gradient/line.

Float or Sink?

The density of water is 1g/cm^3. Work out whether the following would sink or float by completing the table below.

Object	Mass (g)	Volume (cm^3)	Density (g/cm^3)	Float or sink?
Cork	2.4	10	**0.24**	**float**
Bone	18	10	**1.8**	**sink**
Ice	9	10	**0.9**	**float**
Wood	**7.7**	10	0.77	**float**
Diamond	**30.1**	10	3.01	**sink**

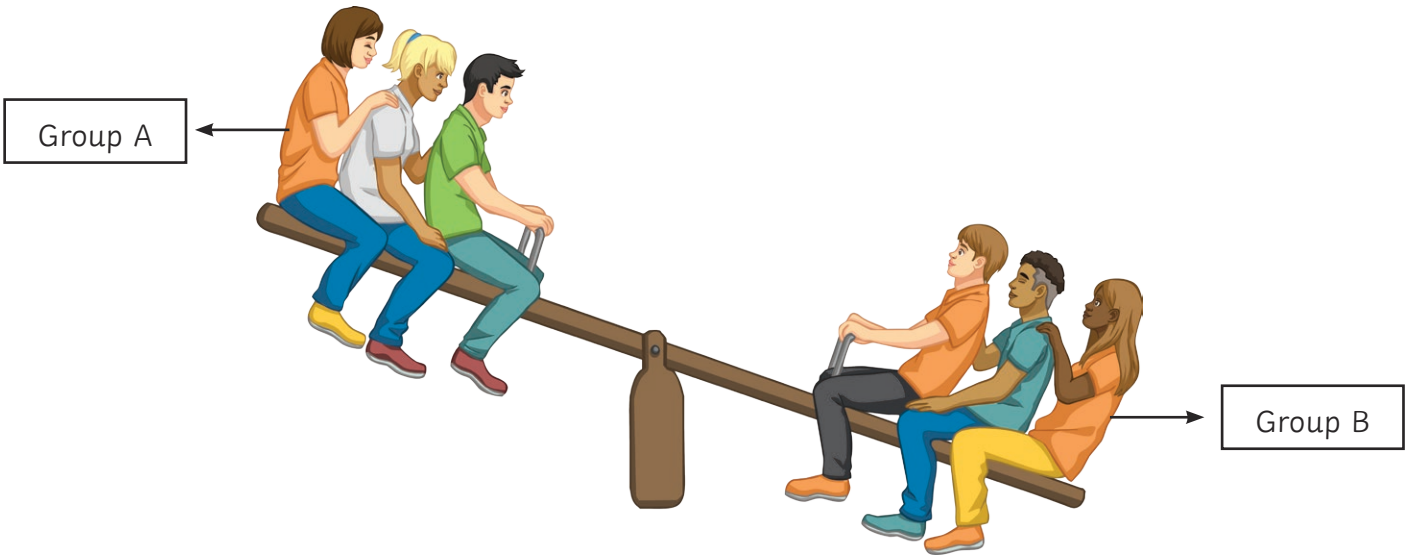
Speed and Motion **Test Yourself 3**

True or False?

- If I travel 30 miles in an hour, I am going at the same speed as someone who travels 60 miles in 2 hours.
- A runner who crosses the finish line after 40 seconds is going faster than the runner who crosses it after 30 seconds.
- The speed of a car is a measure of how far it is travelling.
- The pressure exerted by a drawing pin is greater than that exerted by a pair of snow shoes.

Moments

Several children play on a see-saw as shown below. In the examples below, work out whether the see-saw is balanced or unbalanced and show the direction of force.



- Group A weighs 1200N and sits 1m from the pivot and group B weigh 1000N and sit 1.2m from the pivot.
- Only some of group A get on the see-saw. They weigh 800N and sit a distance of 0.8m from the pivot. All of group B get on and sit 0.5m from the pivot.
- If all of group A sit a distance of 0.5m from the pivot, where will group B need to sit in order to balance the see-saw?

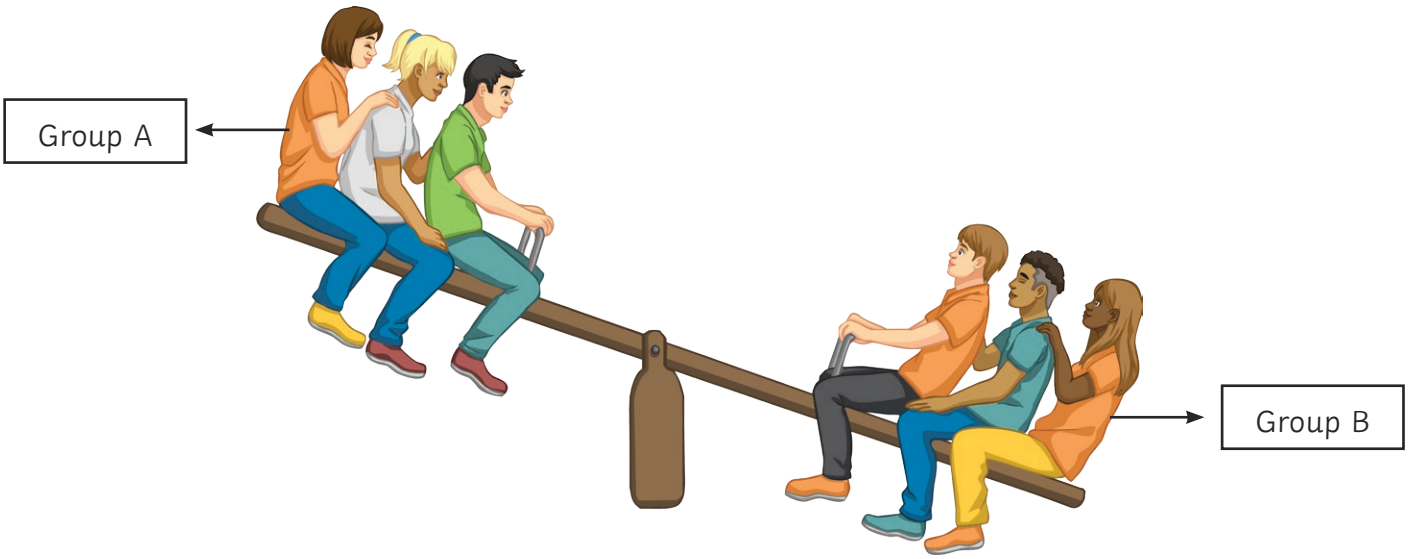
Speed and Motion **Test Yourself 3 Answers**

True or False?

- If I travel 30 miles in an hour, I am going at the same speed as someone who travels 60 miles in 2 hours. **True**
- A runner who crosses the finish line after 40 seconds is going faster than the runner who crosses it after 30 seconds. **False**
- The speed of a car is a measure of how far it is travelling. **False**
- The pressure exerted by a drawing pin is greater than that exerted by a pair of snow shoes. **True**

Moments

Several children play on a see-saw as shown below. In the examples below, work out whether the see-saw is balanced or unbalanced and show the direction of force.



- Group A weighs 1200N and sits 1m from the pivot and group B weigh 1000N and sit 1.2m from the pivot.
  1200 x 1 = 1200Nm 1000 x 1.2 =1200Nm. Balanced force
- Only some of group A get on the see-saw. They weigh 800N and sit a distance of 0.8m from the pivot. All of group B get on and sit 0.5m from the pivot.
  Group A 800 x 0.8 =640 Nm. Group B 1000 X 0.5 =500Nm. The see-saw is unbalanced, as group A will move downwards.
- If all of group A sit a distance of 0.5m from the pivot, where will group B need to sit in order to balance the see-saw?
  1200 x 0.5= 600 Nm 600/1000= 0.6m. Group B need to sit 0.6 m from the pivot.