Name:
Science Class:
Teacher:
Hand in day:

Y9 Science
Term 1: Homework Booklet
Physics

	Hand in Date	Parents Signature
Forces		
Homework 1		
Homework 2		
Homework 3		
Homework 4		

Y9 Forces 2 Homework 1
Read the following information and answer the questions that follow.

In a race all the cars set off at the same time, and the one that gets t the finish line in the shortest time wins the race.
If you want to work out the speed of the winning car, you have to know the distance of the race and the time the winning car took to travel the distance.

You can calculate speed using the equation:

$$speed = \frac{distance}{time}$$

The units for speed depend on the measurements you make. For instance, if a car travels250miles in five hours, its speed would be measured in miles per hour (mph). Speed is also measured in metres per second (m/s) and kilometres per hour (km/h).

A racing car has to slow down to go around bends, and may have a pit stop to refuel. It travels the fastest on the straight sections of the track. The speed of the car worked out from the total distance an time taken is called the mean speed (or average speed) for the race.

For example, Usain Bolt ran 100m in 9.58 seconds so his mean speed would be 10.4m/s. However his top speed was actually 12.2m/s, but it took him a few seconds to reach this top speed.

Sometimes we know the speed that something is travelling at and want to know how far it will travel in a certain time, or how long it will take to travel a certain distance. We can rearrange the equation for speed to give these equations:

$$distance = speed \times time$$

$$time = \frac{distance}{speed}$$

Questions

1. **What two measurements do we need to work out the speed of an object?**

2. **What is the equation used to calculate speed?**

3. **State three units that we use for speed.**

4. **What is mean speed?**

5. **How long did it take Usain Bolt to run 100m?**

6. **What was Usain Bolt's mean speed during the race?**

7. **What was Usain Bolt's top speed during the race?**

8. **Write the equation we can use to determine the distance an object travels, using it speed and time.**

9. **Write the equation we can use to determine the time an object takes to travel a certain distance at a particular speed.**

10. **How far would a car travel if it drove at 10m/s for 50 seconds?**

Y9 Forces 2 Homework 2 – Speed and Acceleration

Task 1

Complete these sentences using the words in the box. You may need to use some words more than once.

distance	fast	metres	metres/second	speed	time

Speed is a way of saying how _____ something is moving. To work out a speed we need to measure a _____ and a _____.

The formula is:_____ = distance ÷ _____.

If the units for the distance are _____ and the units for the _____ are seconds, the units for speed will be _____.

The units for speed depend on the units for the distance and the time. Fill in the table.

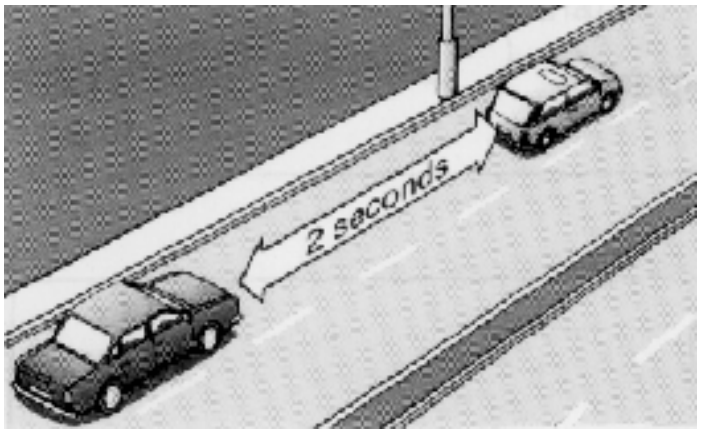
Units for distance	**Units for time**	**Units for speed**	
miles	hours		mph
kilometres		kilometres per hour	
	seconds		m/s

Task 2

(a) The 'two second rule' is a rule for car drivers. The rule is as follows:

'Leave enough space between you and the vehicle in front so that you can pull up safely if it suddenly slows down or stops. . . A two second time gap may be sufficient. . . Use stationary objects (eg lamp-posts) to help you keep a two second gap.'

(The Highway Code, 1993)



(i) The traffic is moving at 20 m/s, and a driver is keeping to the 'two second rule'.
What is the distance between the driver and the car in front?

.....

1 mark

(ii) The traffic increases its speed to 25 m/s, but the driver stays the same distance from the car in front.
She sees the car in front pass a lamp post.
How long will it take her to reach the same lamp post?

.....

.....s

1 mark

(b) The driver decides to check her speedometer while driving along a motorway.
She measures how long it takes her to travel 6 km. It takes her exactly 4 minutes.
What was her speed in **km/h**? Show your working.

.....

.....

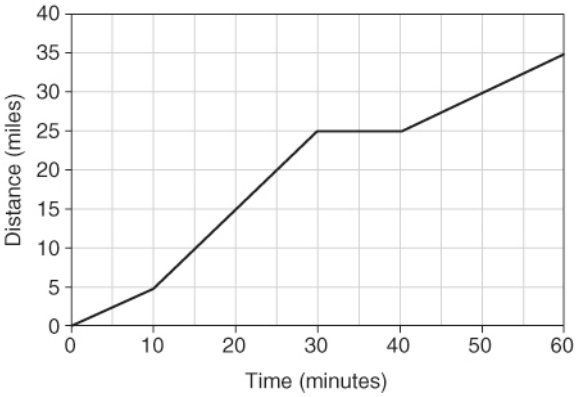
.....km/h

2 marks

Maximum 4 marks

Y9 Forces 2 Homework 2 – Distance-time graphs
Complete the questions below about distance-time graphs

1. The distance–time graph shows a journey by car.



a Write an F on the graph next to the part of the journey with the fastest speed.

b Write an S on the graph where the car stopped.

c How long did the car stop for?

_____

d What was the total distance travelled?

_____

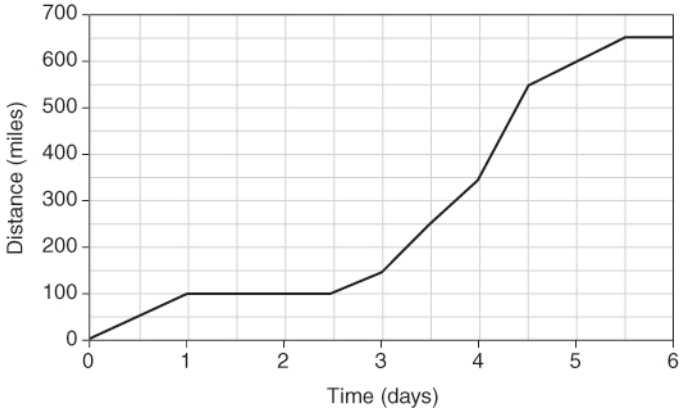
e The car travels 25 miles in the first 0.5 hours of the journey. Calculate its mean speed for this part of the journey.

speed =

2 Work out which letter describes part of the journey. Write the correct letter to the correct part of the graph.

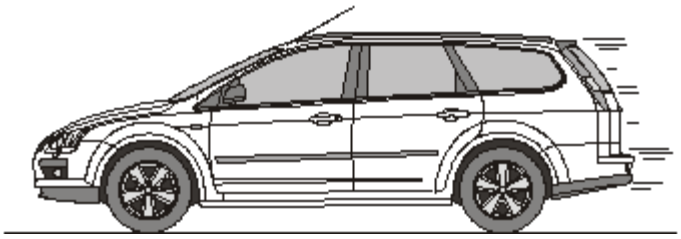
3 Calculate the speed for each different part of the line on the graph and write it next to each letter. You can use information from the descriptions or from the graph.

A Light breeze in the morning, dropped to calm at midday. Only 50 miles covered in total.	**B** Strong wind in the morning, covered 200 miles. Dropped to light breeze in afternoon – total distance 250 for the day.
C No wind until midday, then a light breeze all afternoon. 50 miles covered.	**D** Calm – no wind at all.
E Light breeze all day. 100 miles run.	**F** Fresh breeze all day. Speed about 8 mph all day.



Y9 Forces 2 Homework 3 – Momentum
Answer the questions below about momentum

a) The diagram shows a car travelling at a speed of 12 m/s along a straight road.



(i) Calculate the momentum of the car.

Mass of the car = 900 kg

Show clearly how you work out your answer.

_____

_____

_____

_____

Momentum = _____ kg m/s

(ii) Momentum has direction.

Draw an arrow on the diagram to show the direction of the car's momentum.

(b) The car stops at a set of traffic lights.

How much momentum does the car have when it is stopped at the traffic lights?

_____

Give a reason for your answer.

_____

_____

_____

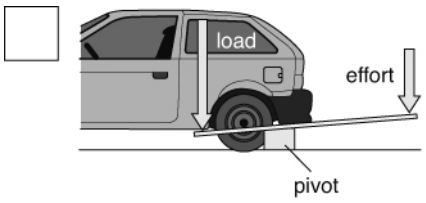
_____

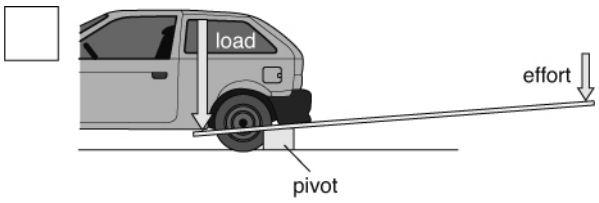
Y9 Forces 2 Homework 4 - Moments and levers.
Complete the tasks below about moments and levers
Task 1

1 Draw lines to match up the words and their meanings.

lever	a force put on a lever
pivot	a lever that can be used to take the tops from bottles
effort	a lever that makes a force bigger
load	a lever that makes something move further
force multiplier	the point that the lever turns around
distance multiplier	a long bar that can be used to increase the size of a force (or how far it moves)
bottle opener	the weight or force on something

2 **a** Which lever should Viv use to lift the car? Tick (✓) *one* box.





b Explain your answer to part **a**.

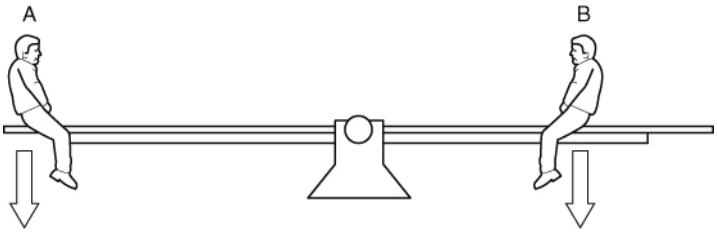
_____

_____

3 This seesaw will not balance.

a Draw an arrow to show which way it will move.

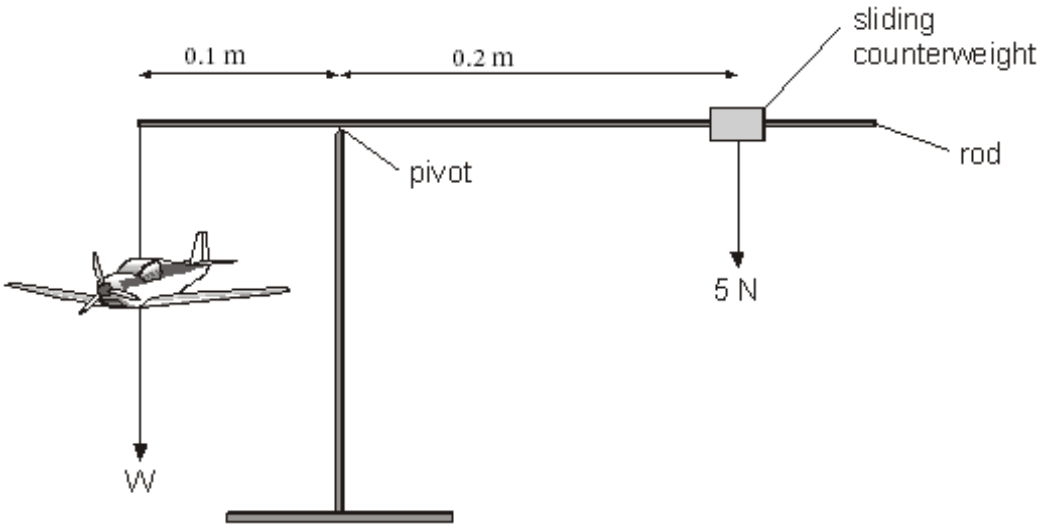
b Explain what the boys have to do to make the see-saw balance.



_____

Task 2

Zena has a model plane attached to a rod as shown below.
The plane is balanced by a sliding counterweight.



not to scale

(a) The rod is balanced horizontally.

(i) Calculate the moment produced by the counterweight.

Give the unit.

.....

.....

2 marks

(ii) What is the moment produced by the plane?

.....

1 mark

(iii) Calculate the weight, W, of the plane.

.....

.....N

1 mark