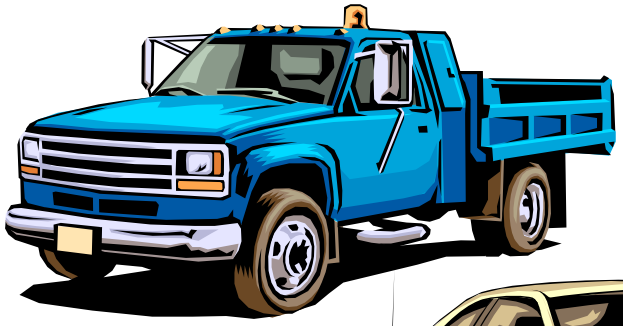
Standard Grade Physics

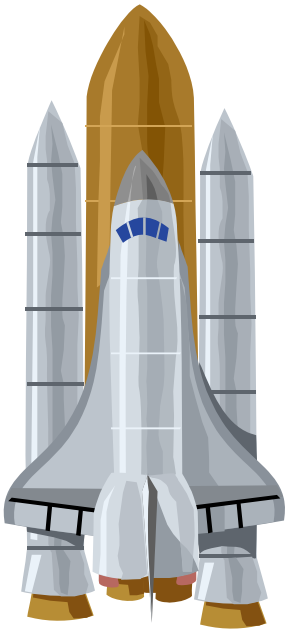
North Berwick High School

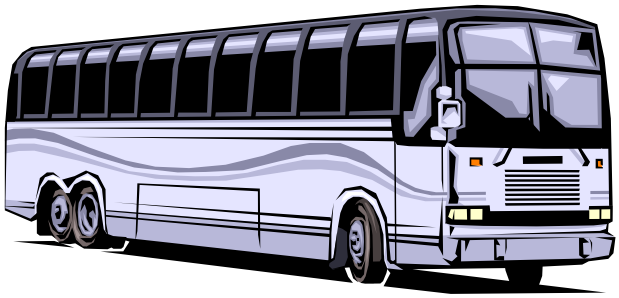
Physics Department

UNIT 1

Measuring Motion







Homework Sheets

Measuring Motion
Working at Home

TO THE PUPIL

Each day you have physics at school, you should set aside time for work at home. By this stage you should be accepting more responsibility for your own learning and should undertake the following tasks on a regular basis:

- Tackle the supplied homework sheets as each section of work is completed in class.
- Check your own progress in the homework sheets by referring to the homework answer files available in class. Discuss any difficulties that arise with your class teacher.
- Complete any formal homework tasks that your teacher may issue from time to time and hand them in on the due date for marking.
- Revise the work you have covered in class activities by referring to your classwork jotters.

TO THE PARENT

Your co-operation would be appreciated in ensuring that pupils are encouraged to complete homework. It would be helpful if you could talk over the work given for homework and sign the homework record sheet on this page after they have completed each exercise.

The Physics department hopes that this record of your child's achievement will be of interest to you, and we would welcome any comments on this or other areas related to the work of the department.

Please sign here to confirm that you have seen the homework record sheet: _____

HOMEWORK RECORD SHEET

HOMEWORK	SECTION OF WORK	MARK	CHECK	PARENTAL SIGNATURE
1.1	On the Move 1			
1.2	On the Move 2			
1.3	Forces at Work 1			
1.4	Forces at Work 2			

Some questions in the pack are marked with symbols to give you specific information. Here is the key:

CR Credit Level question. This relates directly to the Credit Level learning outcomes.

PS Problem Solving question. This puts the knowledge you have gained into new contexts.

Measuring Motion
Homework Exercises

Homework 1.1 – On the Move I

1. A top class sprinter covers the 100m in a time of 10 seconds. Calculate the sprinter's average speed. (1)

2. How long will it take a Formula 1 car to travel one lap around a 5 km long circuit if it is travelling at an average speed of 180 km/h? (1)

CR 3. A physics pupil tries to calculate his friend's instantaneous speed when running by timing how long it takes her to cross a line. He uses a stopclock to measure the time.

   (a) Explain why this method will give poor results for the instantaneous speed. (1)
   (b) Suggest the equipment needed to make the experiment more accurate. (1)

4. Calculate a car's acceleration if its speed increases by 12 m/s in a time of 3 s. (1)

CR 5. A physics pupil running away from a wasp accelerates from rest to 5 m/s in a time of 1.25 s. Calculate the pupil's acceleration. (2)

PS 6. Read this passage on *Thinking and Braking* and then answer the questions that follow it.

> You are travelling at 30 mph in a car in good road conditions when you suddenly see children crossing the road. By the time you react and apply the brakes, the car has travelled a total distance of 23 m. If the car had been travelling at 60 mph the stopping distance would have been 73 m.
>
> The stopping distance consists of two parts: the thinking distance and the braking distance. The thinking distance is the distance travelled in the time between seeing a hazard on the road and pressing the brake pedal. This time is called the reaction time.
>
> *thinking distance = speed x reaction time*
>
> Reaction times vary from person to person. An average driver has a reaction time of about 0.8 seconds. A professional racing driver has a reaction time of about 0.2 seconds. Your reaction time is likely to be much longer if you have taken drugs or alcohol. Even a small amount of alcohol can greatly increase your reaction time.

   (a) What is meant by the term ' thinking distance'? (1)
   (b) What will happen to the thinking distance if the car is going faster? (1)
   (c) If a car is going faster will the reaction time alter? Explain your answer. (1)

Total 10 marks

Measuring Motion
Homework Exercises

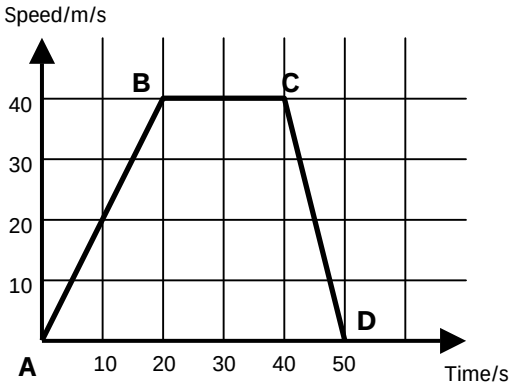
Homework 1.2 - On the Move II

1. A car's speed is recorded over a period and the results are show in the table below:

TIME (S)	SPEED (M/S)
0	0
2	6
4	12
6	18
8	24
10	30

(a) Plot a graph of the car's motion over this 10-second period. (2)
(b) From the graph, find the car's speed 5 seconds into its journey. (1)
(c) Describe the car's motion over the 10 seconds. (1)

2. Look at the graph. This shows the speed of a car over a short journey. Use the graph to answer these questions.

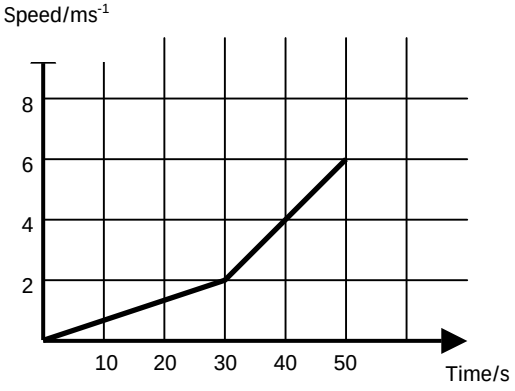


(a) Describe the car's motion between: (1½)

A and **B**;
B and **C**;
C and **D**.

(b) Estimate the car's speed after 10 seconds. (½)

CR 3. A hot air balloon is released and it accelerates upwards. During the ascent, some sandbags are released and the acceleration increases. The graph shows its vertical motion during the first 50 seconds of its flight.



(a) Calculate the acceleration **after** the sandbags are released. (2)
(b) How high had the balloon risen after the 50 seconds had passed? (2)

Total 10 marks

Measuring Motion
Homework Exercises

Homework 1.3 – Forces at Work I

PS

1. (a) A force is defined by the three main effects it may have on an object. Name any two of these. (1)
   (b) A tennis player applies a force on the ball with his racquet. Give one effect on the ball that proves a force has been applied. (1)

2. What value of gravitational field strength is used to calculate weight on Earth? Remember the unit! (1)

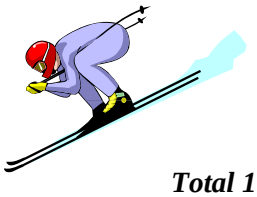
CR

3. The table below gives the gravitational field strength for the other planets in our solar system. Using information in this table, answer the questions.

PLANET	G (N/kg)
Mercury	3.7
Venus	8.8
Mars	3.8
Jupiter	26.4
Saturn	11.5
Uranus	11.7
Neptune	11.8
Pluto	4.2

   (a) Find the weight of a 60 kg man on Mercury. (1)
   (b) Find the weight of a 40 kg girl on Saturn. (1)
   (c) Find the mass of a woman who weighs 1188 N on Jupiter. (1)
   (d) Find the mass of a cat that weighs 6.3 N on Pluto. (1)

4. (a) How does the direction of the force of friction relate to the direction of a vehicle's motion? (½)
   (b) What type of energy is produced whenever a moving object meets friction? (½)
   (c) State an example of where friction is helpful and we try to increase it. (1)
   (d) Give an example where we try to reduce friction as much as possible. (1)



Total 10 marks

Measuring Motion
Homework Exercises

Homework 1.4 - Forces at Work II

1. (a) A boy of mass 45 kg slides down a chute at a leisure centre. His acceleration is initially 2 m/s^2. Find the force acting on him. (2)
   (b) A car's engine applies a force of 3000 N, and this accelerates it at 4 m/s^2. Calculate the mass of the car. (1)

2. Explain, using the theory of forces, how a seat belt can prevent injury in a car crash. (1)

3. (a) Explain the term *balanced forces*. (½)
   (b) What are balanced forces equivalent to? (½)

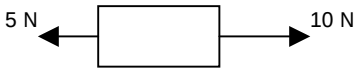
CR (c) State Newton's First Law. (1)

CR 4. The diagram below illustrates the forces acting on a motorbike. The combined mass of the bike and rider is 125 kg.

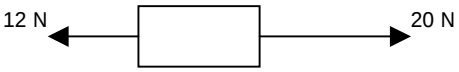
   (a) Calculate the resultant force acting on the bike. (1)
   (b) Calculate the acceleration of the bike. (2)

PS 5. Look at the pairs of forces acting on the objects below. In each case, state the resultant force and the direction in which it is acting. (1)

(a)



(b)



Total 10 marks