A-level physics baseline assessment

Name: ……
Previous school: ……

GCSE grades	Paper 1	Paper 2	Paper 3	Practical/ coursework
AQA				
Edexcel				
OCR				
Did you receive extra time in your GCSE exams?			No / Yes: ……..%	

A-level options chosen				
Any plans after A-level?				

Section A of this assessment contains GCSE level questions covering only GCSE content. This content is common to all exam boards so no-one should be at an advantage.

Section B consists of questions based on the summer project you were asked to complete. Solutions were provided.

Once this assessment is marked, your score, GCSE grades and the quality of response you provide to these questions will **all** be used to inform our opinion of your suitability for the course and our recommendations (see below) as to how we proceed. This is done entirely in your best interest.

	Based on your score in this assessment and your previous grades, it looks like you are in a great position to study A-level Physics. This is not a guarantee of success but with hard work you should succeed. If you realise or are informed that your knowledge on a particular topic is weak, you must seek help from your teacher sooner rather than later.
	Based on your score in this assessment and your previous grades, it looks like you are in a great position to study A-level Physics. Our only concern at the moment is that your subject choices lack the support of a Maths A-level. For this reason, it is recommended that you attend our Maths for Physics booster sessions in the first half term to ensure you have the tools which are essential for success in Physics.
	Some of your responses to questions in this assessment indicate a lack of knowledge or skills in some key areas necessary for A-level physics. To give you the best chance of success, it is essential that you attend the Maths for Physics / Physics booster session at least once a week for the first half term when your progress can be reviewed.
	Based on your score on this test and/or your previous grades it is questionable whether A-level physics is the right choice for you. This is not a guarantee of failure but it will take a lot of hard work to ensure you achieve a grade which will be useful to you in the future. To succeed, it is vital that you attend the Maths for Physics booster sessions **and** Physics booster sessions at least once a week for the first half term at which point your progress will be reviewed.

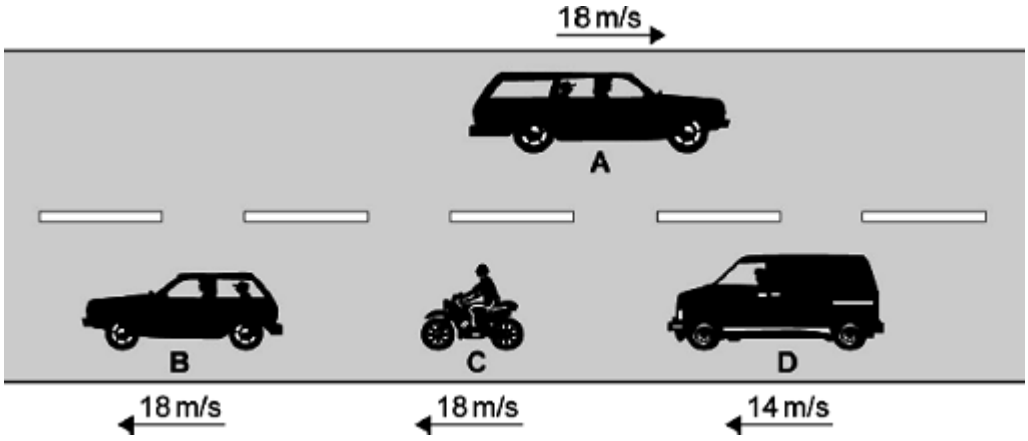
Please have your parent/carer sign below to confirm that they have received this information and that you agree to proceed in the manner suggested above.

Physics %	Maths for Physics %	Signed (student)	Signed (parent/carer)

Please direct questions or concerns to a.hudson@grange.outwood.com.

Section A

Q1.(a) The diagram shows four vehicles, **A**, **B**, **C** and **D**, travelling along a road.



(i) Which **two** of the vehicles, **A**, **B**, **C** or **D**, have the same velocity?
Write your answers in the boxes.

☐ and ☐

Give the reason for your answer.

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(2)

(ii) Each of the quantities in the box is either a scalar or a vector quantity.

acceleration	**distance**	**force**	**kinetic energy**
momentum	**time**	**weight**	

Complete the table by writing each of the quantities in the box in the correct column.

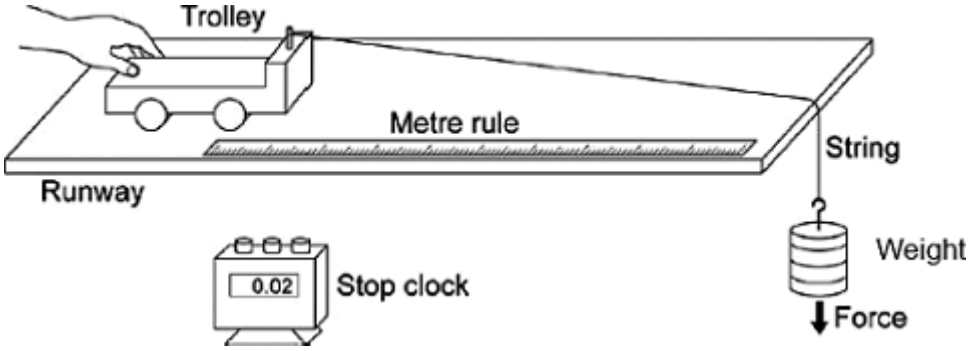
One has already been done for you.

Vector quantity	**Scalar quantity**
force	.....
.....	.....
.....	.....
.....	.....
.....	.....

(6)

(b) A student investigated how the average speed of a trolley depends on the force applied to it.

The diagram shows the trolley just before the student released it.



After releasing the trolley the student measured the time it took for the trolley to travel 1 metre.

The student repeated this with different weights attached to the string.

(i) The measurements taken by the student were not accurate.

Which **two** of the following would cause an error in the student's measurements?

Tick (✓) **two** boxes.

The front of the trolley is not level with the end of the metre rule. ☐

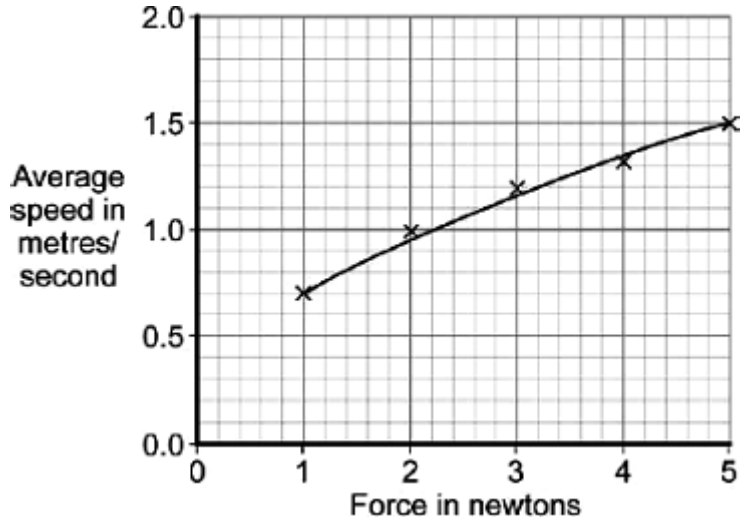
The string is rubbing against the front of the runway. ☐

The stop clock has not been reset to zero. ☐

The force is found by counting the weights tied to the string. ☐

(2)

(ii) Having calculated the average speed, the student plotted the graph shown below.



Describe the pattern that links the average speed of the trolley and the force applied to the trolley.

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(2)

(c) The diagram shows the horizontal forces acting on a car as it moves along a straight road.

The *resultant force* on the car is zero.

(i) What is meant by the term *resultant force*?

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(1)

(ii) Describe the movement of the car when the resultant force is zero.

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(1)

(d) A resultant force of 3600 N, acting on a car and its driver, causes the car to accelerate at 3 m/s^2.

Calculate the mass, in kilograms, of the car and the driver.

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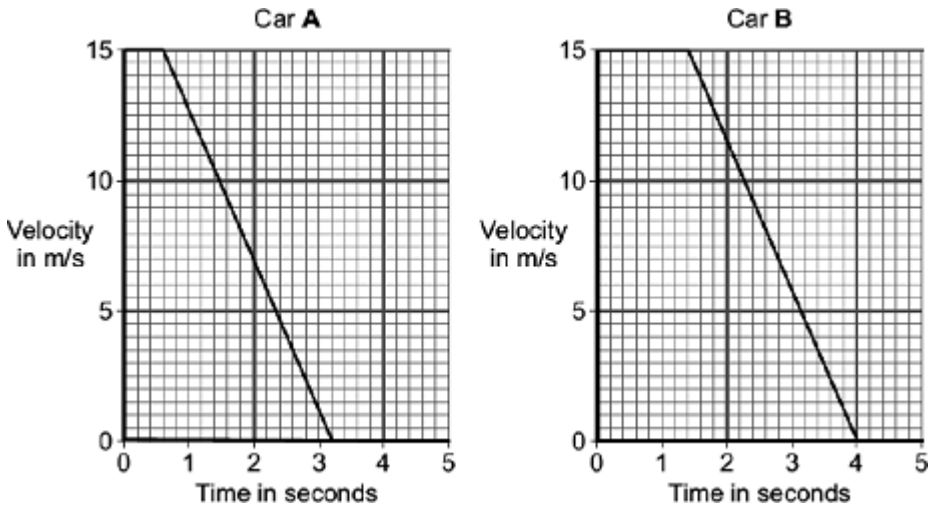
Mass = ... kg

(2)

(e) The graphs show how the velocities of two cars, **A** and **B**, change from the moment the car drivers see an obstacle blocking the road.



Compare and evaluate the information shown in the two graphs.

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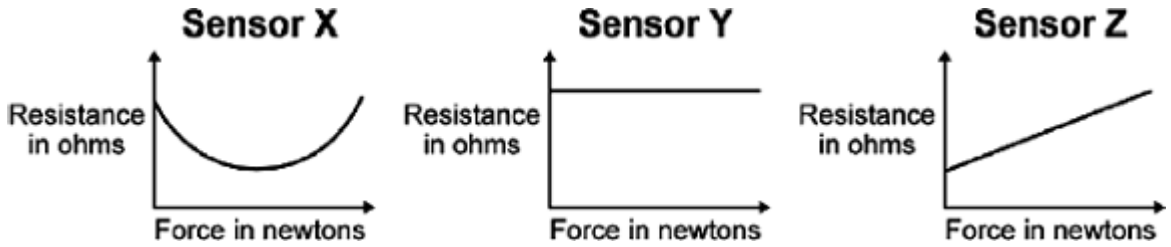
(6)

(f) In a road accident test laboratory, scientists use sensors to measure the forces exerted during collisions.

The graphs show how the electrical resistance of 3 experimental types of sensor, **X**, **Y** and **Z**, change with the force applied to the sensor.



Which of the sensors, **X**, **Y** or **Z**, would be the best one to use as a force sensor?

Write your answer in the box.

Give reasons for your answer.

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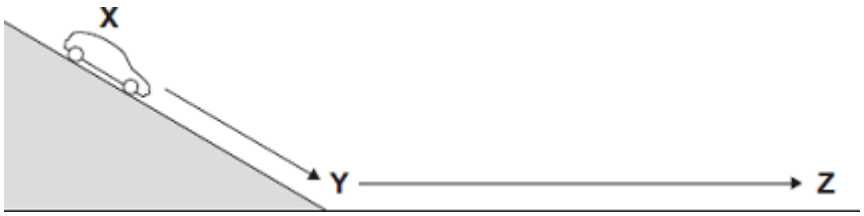
(3)
(Total 25 marks)

Q2.(a) The diagram shows a car at position **X**.



The handbrake is released and the car rolls down the slope to **Y**.
The car continues to roll along a horizontal surface before stopping at **Z**.
The brakes have **not** been used during this time.

(i) What type of energy does the car have at **X**?

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(1)

(ii) What type of energy does the car have at **Y**?

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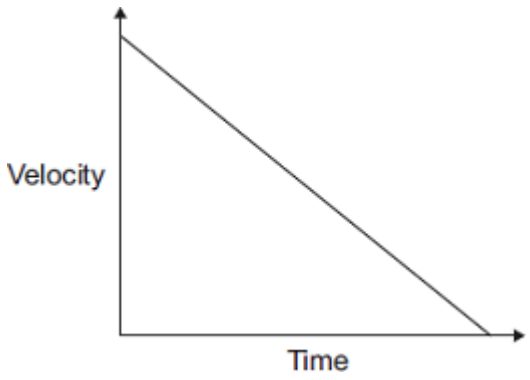
(1)

(b) The graph shows how the velocity of the car changes with time between **Y** and **Z**.



(i) Which feature of the graph represents the negative acceleration between **Y** and **Z**?

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(1)

(ii) Which feature of the graph represents the distance travelled between **Y** and **Z**?

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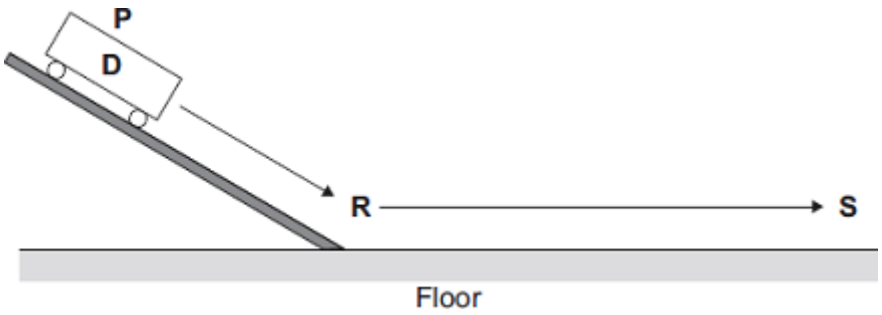
(1)

(iii) The car starts again at position **X** and rolls down the slope as before. This time the brakes are applied lightly at **Y** until the car stops.

Draw on the graph another straight line to show the motion of the car between **Y** and**Z**.

(2)

(c) Three students carry out an investigation. The students put trolley **D** at position **P** on a slope. They release the trolley. The trolley rolls down the slope and along the floor as shown in the diagram.



The students measure the distance from **R** at the bottom of the slope to **S** where the trolley stops. They also measure the time taken for the trolley to travel the distance **RS**.
They repeat the investigation with another trolley, **E**.

Their results are shown in the table.

Trolley	Distance RS in centimetres	Time taken in seconds	Average velocity in centimetres per second
D	65	2.1	
E	80	2.6	

(i) Calculate the average velocity, in centimetres per second, between **R** and **S** for trolleys **D** and **E**. Write your answers in the table.

Use the correct equation from **Section A** of the Physics Equations Sheet.

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(3)

(ii) Before the investigation, each student made a prediction.

- Student **1** predicted that the two trolleys would travel the same distance.
- Student **2** predicted that the average velocity of the two trolleys would be the same.

- Student **3** predicted that the negative acceleration of the two trolleys would be the same.

Is each prediction correct?

Justify your answers.

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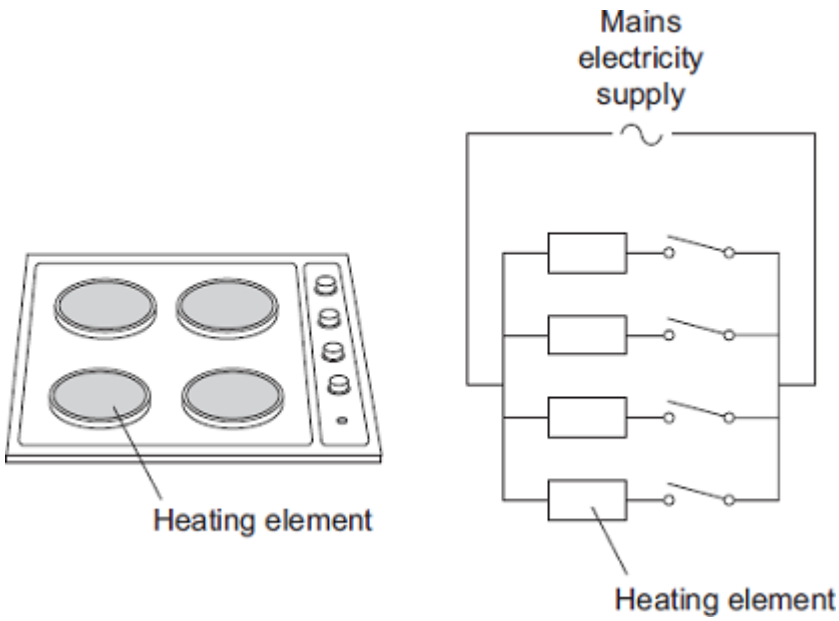
(3)
(Total 12 marks)

Q3. The picture shows an electric cooker hob. The simplified circuit diagram shows how the four heating elements connect to the mains electricity supply. The heating elements are identical.



When all four heating elements are switched on at full power the hob draws a current of 26 A from the 230 V mains electricity supply.

(a) Calculate the resistance of one heating element when the hob is switched on at full power.

Use the correct equation from the Physics Equations Sheet.

Give your answer to 2 significant figures.

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Resistance = ... Ω

(3)

(b) The table gives the maximum current that can safely pass through copper wires of different cross-sectional area.

Cross-sectional area in mm^2	Maximum safe current in amps
1.0	**11.5**
2.5	**20.0**
4.0	**27.0**
6.0	**34.0**

(i) The power sockets in a home are wired to the mains electricity supply using cables containing 2.5 mm^2 copper wires. Most electrical appliances are connected to the mains electricity supply by plugging them into a standard power socket.

It would **not** be safe to connect the electric cooker hob to the mains electricity supply by plugging it into a standard power socket.

Why?

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(2)

(ii) Describe the structure of the cable that should be used to connect the electric cooker hob to the mains electricity supply.

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(3)

(c) Mains electricity is an alternating current supply. Batteries supply a direct current.

What is the difference between an alternating current and a direct current?

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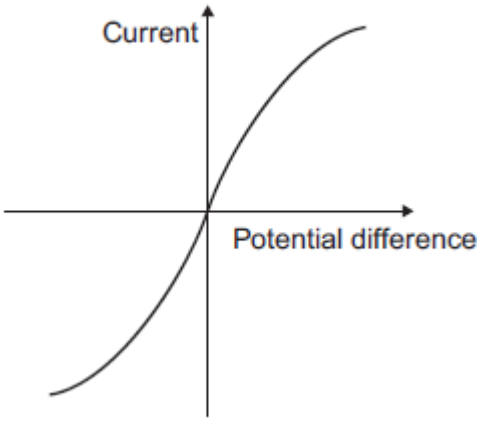
(2)
(Total 10 marks)

Q4. The current in a circuit depends on the potential difference provided by the cells and the total resistance of the circuit.

(a) **Figure 1** shows the graph of current against potential difference for a component.

Figure 1



What is the name of the component?

Draw a ring around the correct answer.

diode	**filament bulb**	**thermistor**

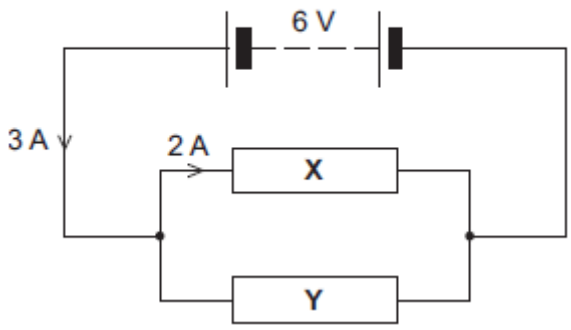
(1)

(b) **Figure 2** shows a circuit containing a 6 V battery.

Two resistors, **X** and **Y**, are connected in parallel.

The current in some parts of the circuit is shown.

Figure 2



(i) What is the potential difference across **X**?

Potential difference across **X** = ... V

(1)

(ii) Calculate the resistance of **X**.

Use the correct equation from **Section C** of the Physics Equations Sheet.

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Resistance of **X** = ... Ω

(2)

(iii) What is the current in **Y**?

Current in **Y** = ... A

(1)

(iv) Calculate the resistance of **Y**.

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Resistance of **Y** = ... Ω

(1)

(v) When the temperature of resistor **X** increases, its resistance increases.

What would happen to the:

- potential difference across **X**
- current in **X**
- total current in the circuit?

Tick (✓) **three** boxes.

	Decrease	**Stay the same**	**Increase**
Potential difference across **X**			
Current in **X**			
Total current in the circuit			

(3)

(Total 9 marks)

Section B