

Wednesday 30 May 2012 – Afternoon

**GCSE GATEWAY SCIENCE
PHYSICS B**

B651/01 Unit 1 Modules P1 P2 P3 (Foundation Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

Duration: 1 hour

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)



| | | | |
|--------------------|--|-------------------|--|
| Candidate forename | | Candidate surname | |
|--------------------|--|-------------------|--|

| | | | | | | | | | | |
|---------------|--|--|--|--|--|------------------|--|--|--|--|
| Centre number | | | | | | Candidate number | | | | |
|---------------|--|--|--|--|--|------------------|--|--|--|--|

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- A list of physics equations is printed on page two.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

EQUATIONS

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy (kilowatt hours)} = \text{power (kW)} \times \text{time (h)}$$

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

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{work done} = \text{force} \times \text{distance}$$

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

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Question 1 starts on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

Answer **all** the questions.

Section A – Module P1

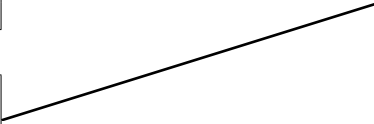
1 Alfie has high fuel bills for his house in winter.

He uses energy saving methods to reduce his fuel bills.

(a) (i) Draw a line from each **method of insulation** to **where** it is used.

One has been done for you.

| method of insulation | where |
|------------------------|--------|
| double glazing | wall |
| loft insulation | roof |
| carpet | window |
| cavity foam insulation | door |
| draught proofing | floor |



[2]

(ii) Reflective foil can be used for insulating houses.

Suggest how it could be used to insulate Alfie's house.

.....
..... [1]

(b) Alfie has cavity foam insulation added to his house.

(i) It costs **£900**.

It saves him **£200** each year in fuel bills.

Calculate the **payback time** for cavity foam insulation.

.....
.....

answer years [1]

(ii) Cavity foam insulation contains trapped air.

Why is this trapped **air** important?

.....
..... [1]

[Total: 5]

2 This question is about waves.

(a) Look at the diagram of radiations in the electromagnetic spectrum.

| | | | | | | |
|-------|-----------|----------|---------|-------------|-------|-------|
| radio | microwave | infrared | visible | ultraviolet | X-ray | gamma |
|-------|-----------|----------|---------|-------------|-------|-------|

(i) Which type of radiation is used for changing a TV channel from a remote control?

..... [1]

(ii) Which type of radiation is used for sending a text message from a mobile phone?

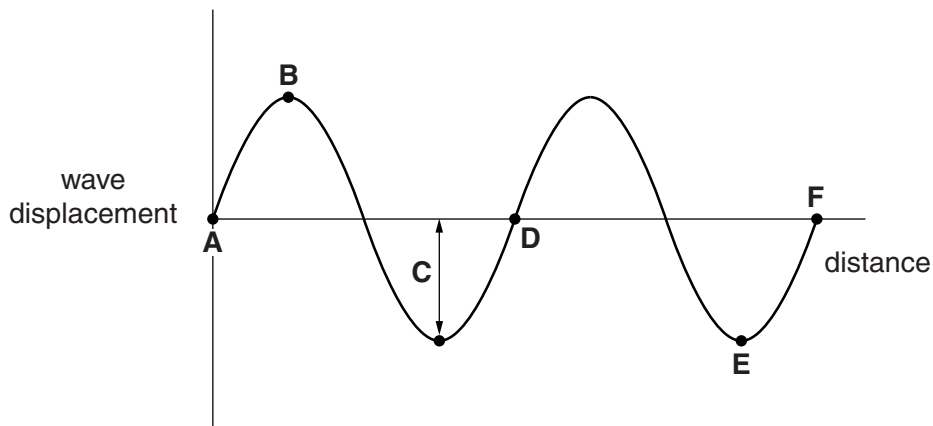
..... [1]

(iii) **Ultraviolet** radiation can harm humans.

What **damage** can ultraviolet radiation do to humans?

..... [1]

(b) Look at the diagram of a wave.



(i) Complete the sentences. The first one has been done for you.

Letter **E** shows a trough.

Letter **C** shows the

Letter **B** shows a

The distance between letters **A** and **D** is called the [3]

7

(ii) The distance between **A** and **F** is 8 cm.

The frequency of the wave is 0.6 Hz.

What is the **speed** of the wave?

The equations on page 2 may help you.

Choose from

0.15

2.4

4.8

7.4

8.6

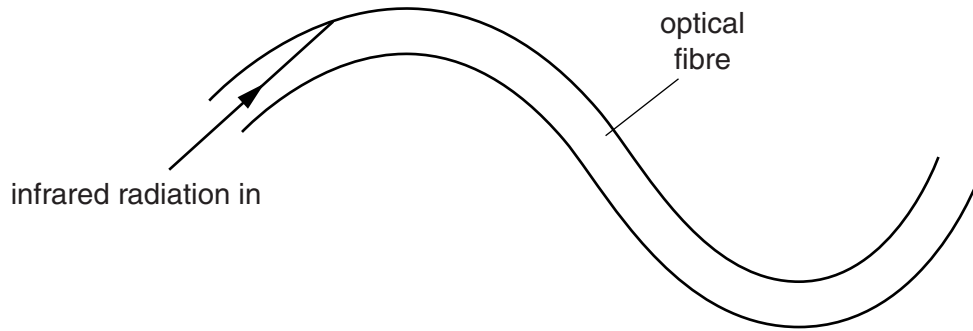
answer..... cm/s

[1]

[Total: 7]

3 This question is about communicating using waves.

(a) (i) Look at the diagram of an optical fibre.



Infrared radiation travels along the fibre from one end to the other.

Describe **how** the infrared radiation travels along the fibre.

.....
.....
..... [2]

(ii) Optical fibres are used to transmit information.

Information can be carried by **analogue** or **digital** signals.

Describe analogue **and** digital signals to show how they are **different**.

.....
.....
.....
..... [2]

(b) Look at the two types of phone.



Gloria's mobile phone



Gloria's office phone

Gloria's mobile phone uses wireless technology. It does **not** need a wire.

Write about other **advantages** for Gloria of communicating using her mobile phone instead of her office phone.

.....

.....

..... [2]

(c) Complete the sentence about **lasers**.

A DVD player uses a blue laser.

A blue laser produces a narrow beam of [2]

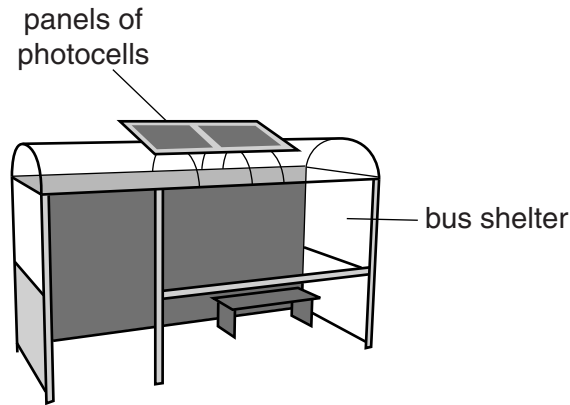
[Total: 8]

Section B – Module P2

4 Energy from the Sun can be harnessed in different ways.

(a) Bus shelters in some parts of China have panels of photocells on the top.

The panels provide energy to light the shelter at night.



The photocells take in energy from the Sun.

(i) Complete the sentences.

The photocells light energy into energy.

Some electrical generators produce alternating current (AC).

Photocells produce [2]

(ii) The photocells charge a battery during the day.

At night the battery delivers a current of 2.5 A at a voltage of 12 V for 8 hours.

Calculate the **power** output from the battery.

The equations on page 2 may help you.

.....
.....
.....

answer W [2]

(b) Winds blowing on Earth are caused by energy from the Sun.

The energy of the wind can be harnessed using the machines shown in the photograph below.



Complete the sentence.

The Sun's energy produces wind on the Earth.

Wind is caused by currents and is used to turn the blades
of wind

[2]

[Total: 6]

5 There are three types of nuclear radiation.

Two types are **alpha (α)** and **beta (β)**.

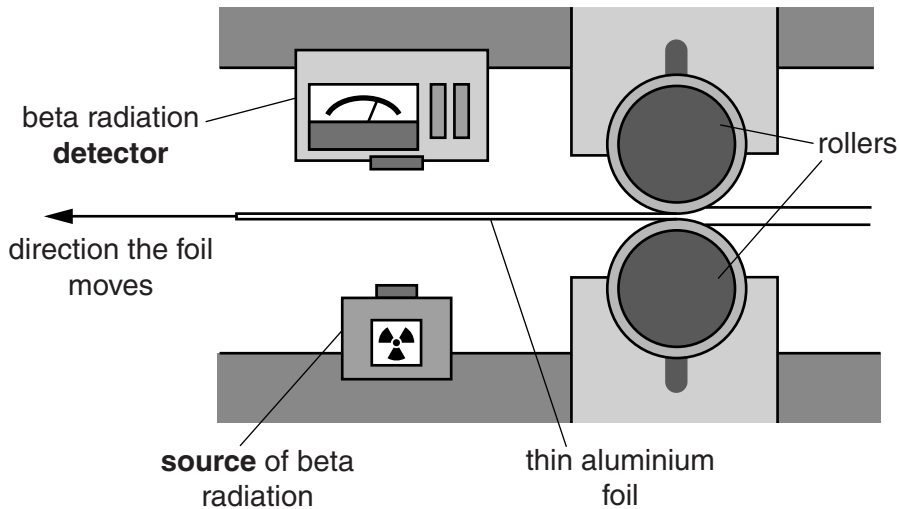
(a) Write down the name of the **third** type of radiation.

answer radiation.

[1]

(b) Beta radiation is used in a factory to monitor the thickness of aluminium cooking foil.

The diagram shows the system being used.



(i) The source of radiation and the radiation detector are fixed in place.

As the foil passes between the source and the detector, the amount of beta radiation detected suddenly drops.

Suggest why this happens.

.....
..... [1]

(ii) Why is alpha radiation **not** used for monitoring the thickness of the foil?

.....
..... [1]

(iii) Radioactive materials, like the beta source, must be handled safely.

Workers at the factory wear protective clothing.

Describe one **other** precaution they take when handling radioactive materials.

.....
..... [1]

[Total: 4]

6 Solar flares are given out by the Sun.

Solar flares and the Sun are both examples of objects in the Solar System.



(a) Look at the objects in the Solar System and the statements which describe them.

Draw **one** line from each **object** to the correct **1st statement**.

Draw **one** line from each **1st statement** to the correct **2nd statement**.

| object | 1 st statement | 2 nd statement |
|----------------|------------------------------|--------------------------------|
| Earth and Moon | centre of Solar System | ejected at very high speed |
| solar flare | formed when planets collided | planets orbit it |
| Sun | clouds of charged particles | iron cores merged when created |

[2]

(b) Complete the sentences about asteroids and comets.

Asteroids are made of and have made on the Moon's surface.

The of a comet is a trail of debris.

[2]

[Total: 4]

7 There is increasing demand for electricity from consumers.

Large scale production of electricity uses non-renewable energy sources.



Describe the production and distribution of electricity from a **non-renewable** source.

In your answer write about

- **where** the energy is produced
- the energy source at the **start** of the production process
- who the **consumers** are
- how the electricity **reaches** the consumers.

.....

.....

.....

.....

..... [3]

[Total: 3]

8 Sanjay is learning about stars in a science lesson.

Sanjay's teacher gives him three questions to answer.

Sanjay has started his three answers.

Complete his three answers.

Question 1

Why can we see stars even though they are a huge distance away?

Answer We can see stars because they

.....
.....
.....

Question 2

**Stars have a finite life.
What do stars start their life as?**

Answer Stars start their life as a

.....
.....
.....

Question 3

What is the name for a large group of stars?

Answer A large group of stars is called a

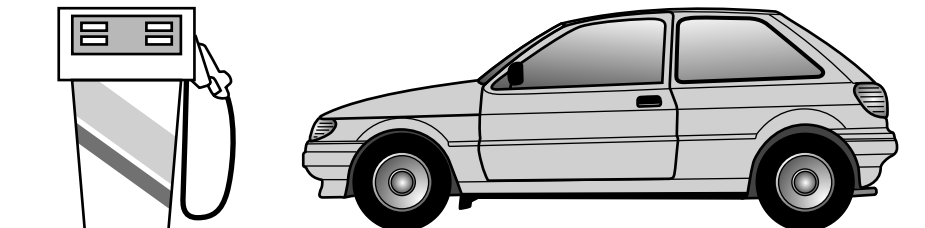
.....
.....

[3]

[Total: 3]

Section C – Module P3

9 **Fossil fuels** are the main fuels for cars.



(a) Write down two **fossil fuels** used to power cars.

..... and [1]

(b) Look at the information on fuel consumption.

| vehicle | fuel consumption in kilometres per litre |
|---------|---|
| A | 10 |
| B | 9 |
| C | 7 |
| D | 6 |

(i) Which vehicle has the best fuel consumption?

Choose from **A B C D**

answer [1]

(ii) **Car C** has a fuel consumption of 7 kilometres per litre.

It travels 280 km. Calculate how many **litres** of fuel it uses.

.....

answer litres [1]

(iii) Cars that use fossil fuels have a fuel tank.

Electric cars do not have a fuel tank to store energy.

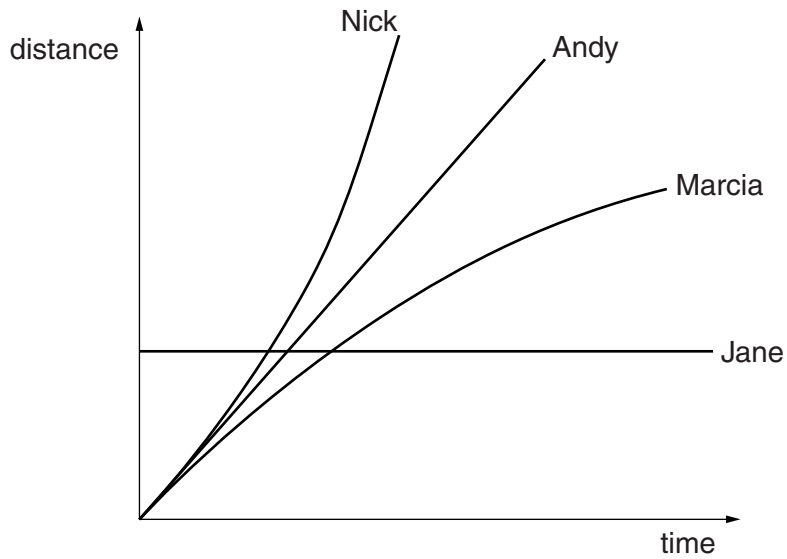
Where do electric cars **store** energy?

.....

..... [1]

[Total: 4]

10 Look at the distance-time graphs for four runners.



(a) Which runner is **stationary**?

Choose your answer from

- Andy Jane Marcia Nick**

answer [1]

(b) Which runner moves at a **steady** speed?

Choose your answer from

- Andy Jane Marcia Nick**

answer [1]

(c) Which runner has the **highest** average speed?

Choose your answer from

- Andy Jane Marcia Nick**

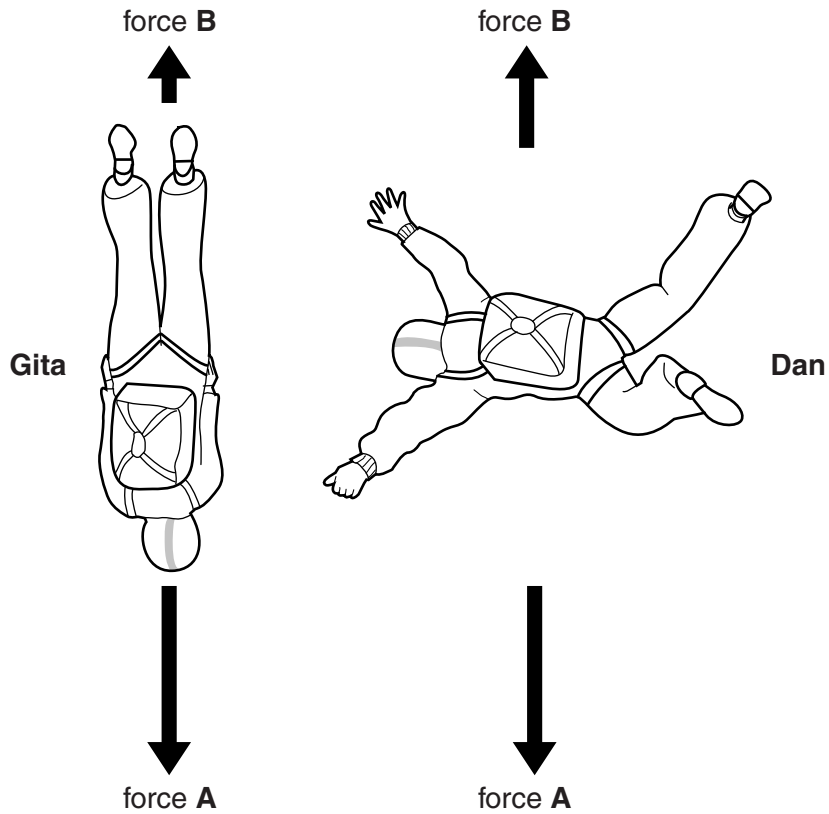
answer [1]

[Total: 3]

11 Gita and Dan have unopened parachutes.

They jump from an aeroplane.

Their speeds increase.



(a) Force **A** pulls Gita and Dan towards the Earth.

Write down the name of force **A**.

..... [1]

(b) The **upward** force on Dan is **greater** than the upward force on Gita.

Explain why.

In your answer, name the upward force and explain **why** the upward force on Dan is greater.

.....

 [2]

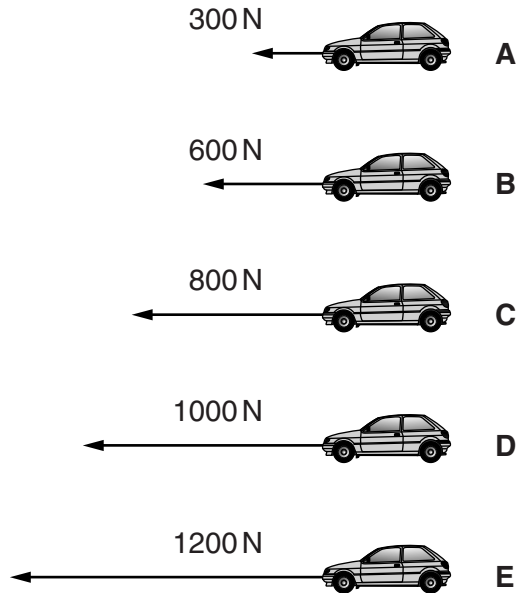
[Total: 3]

12 This question is about force and motion.

(a) Look at the information in the diagrams.

The cars have the **same** mass.

They have **different** driving forces.



Which car has the **highest** acceleration?

Choose from **A** **B** **C** **D** **E**

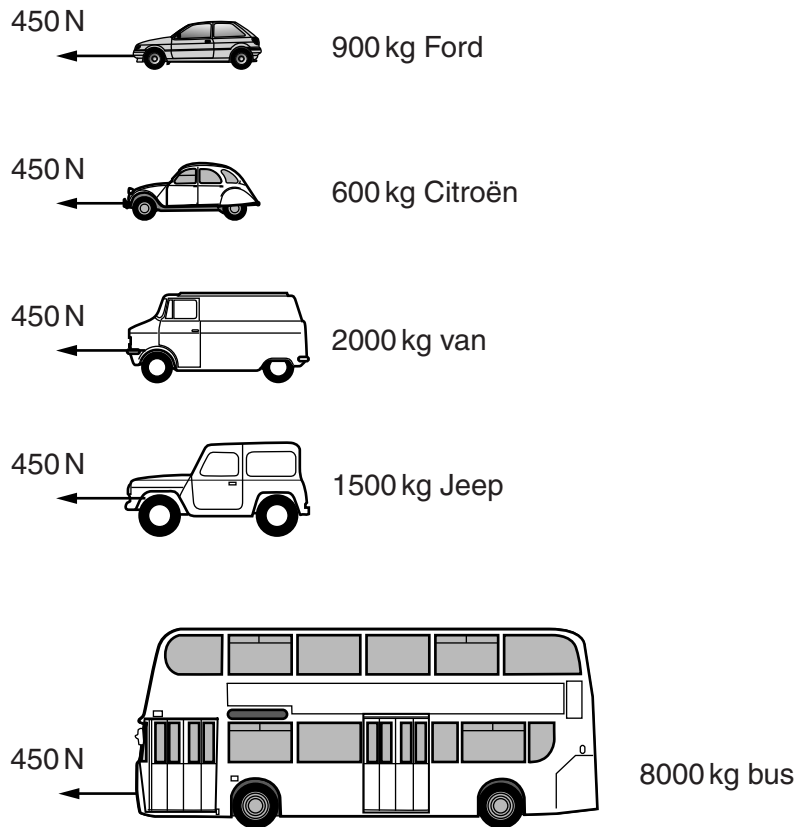
answer

[1]

(b) Look at the information in the diagrams.

The vehicles have the **same** driving force.

They have **different** masses.



Which vehicle has the **highest** acceleration?

Put a **ring** around the correct answer.

900 kg Ford

600 kg Citroën

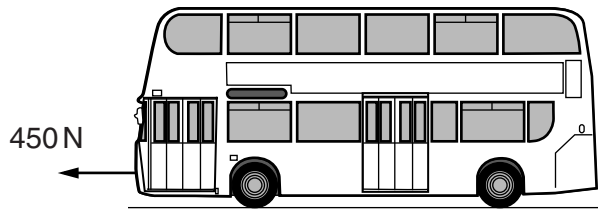
2000 kg van

1500 kg Jeep

8000 kg bus

[1]

(c) Look at the information in the diagram.



(i) The bus moves a distance of 120m in 8 s.

The driving force of the bus is 450 N.

Calculate the **work done** by the bus.

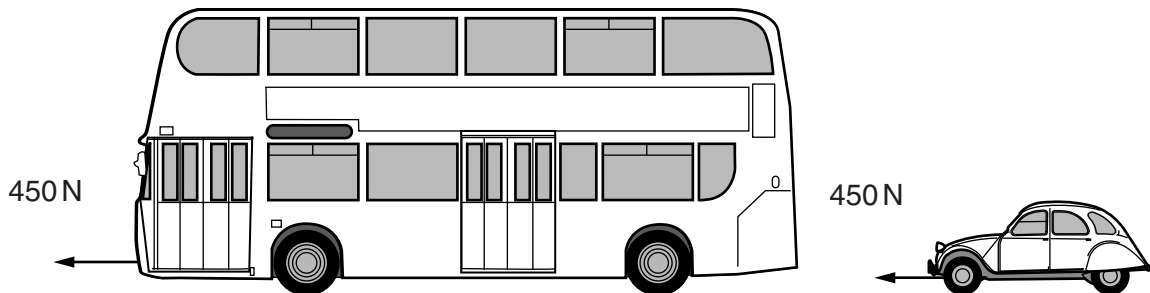
The equations on page 2 may help you.

.....

answer J

[2]

(ii) Look at the information in the diagram.



The bus and car both move 120m.

The **work done** by the bus and the work done by the car are the **same**.

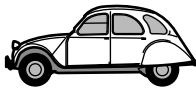
Explain why.

.....

[1]

(d) Look at the diagrams of the five different vehicles.

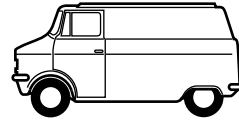
They show the speed and mass of each vehicle.



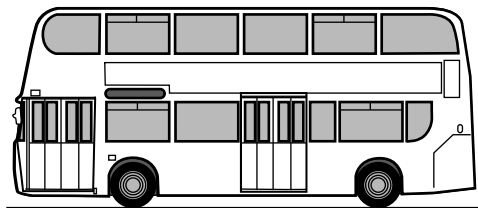
← 20 m/s
600 kg



← 12 m/s
900 kg



← 9 m/s
2000 kg



← 22 m/s
8000 kg



← 12 m/s
1500 kg

All these vehicles have **kinetic energy**.

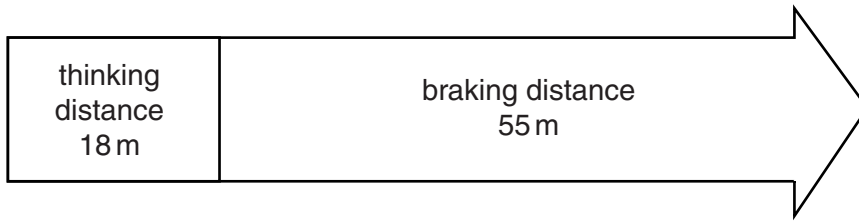
The bus has the **most** kinetic energy.

Explain why.

.....
..... [1]

[Total: 6]

13 Look at the information about the stopping distance for a car travelling at 30 m/s.



(a) Calculate the **stopping** distance for this car.

.....
answer m [1]

(b) The **thinking distance** at this speed is 18 m.

(i) What does thinking distance mean?

Complete the sentence.

The thinking distance is the travelled before the driver

..... [1]

(ii) Write down two things that **increase** thinking distance at this speed.

1

2 [1]

(c) Poor brakes increase **braking distance**.

Write down two other things that **increase** braking distance at this speed.

1

2 [1]

[Total: 4]

END OF QUESTION PAPER

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