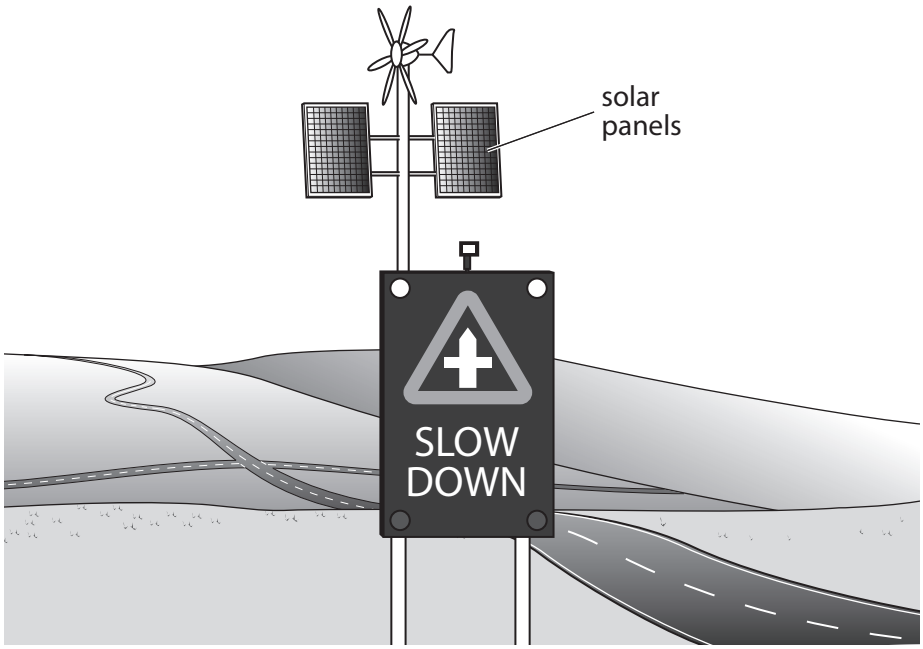
1 The figure shows a sign used to warn drivers of a road hazard.



The sign lights up as cars approach.

The sign makes use of two sources of renewable energy, one of which is solar energy.

Identify the other source of renewable energy used by the sign. Tick the correct box.

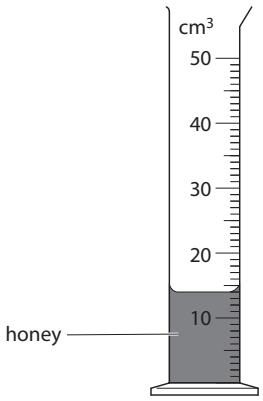
- ☐ chemical
- ☐ geothermal
- ☐ light
- ☐ wind

[1]

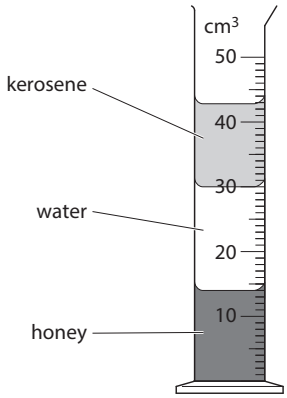
[Total: 1]

2 A student investigates the density of three different liquids.

The student pours liquid honey into a container, as shown in the figure.



The student then carefully adds some water and then some kerosene. The liquids do not mix but form three separate layers as shown in the figure below.



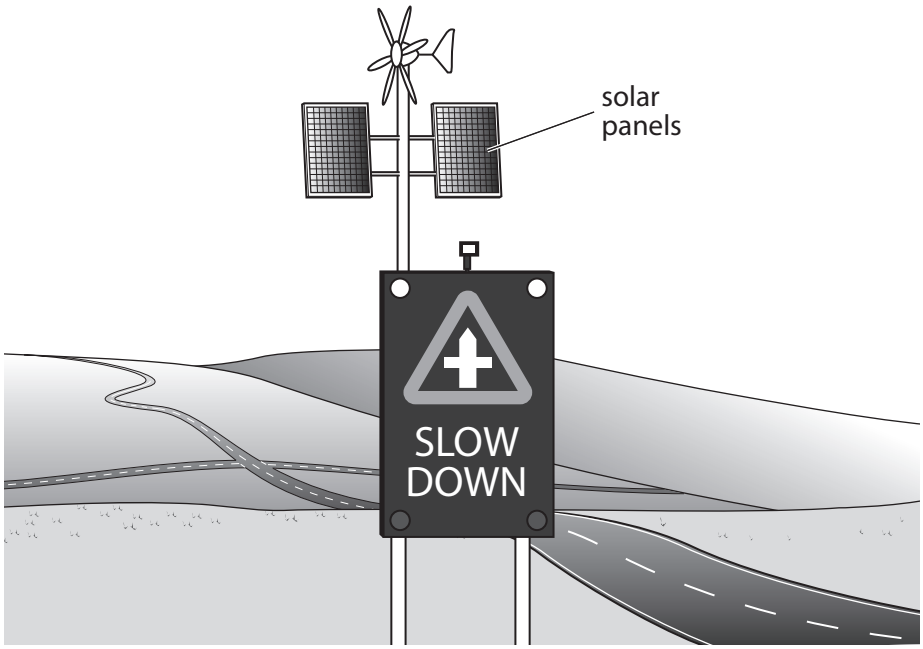
Identify the correct statements about the densities of the liquids. Tick only **two** boxes.

- ☐ Honey has the smallest density.
- ☐ Honey has a larger density than water.
- ☐ Kerosene has the largest density.
- ☐ Kerosene has a smaller density than water.
- ☐ Water has a larger density than honey.
- ☐ Water has a smaller density than kerosene.

[2]

[Total: 2]

3 The figure shows a sign used to warn drivers of a road hazard.



The sign lights up as cars approach.

After passing the sign, the cars climb a steep hill.

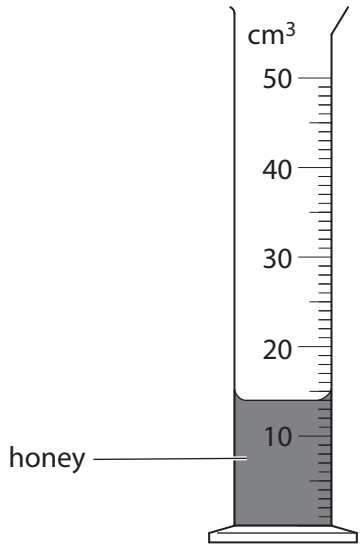
State the type of energy gained by cars as they climb the hill.

..... [1]

[Total: 1]

4 A student investigates the density of three different liquids.

The student pours liquid honey into a container, as shown in the figure.



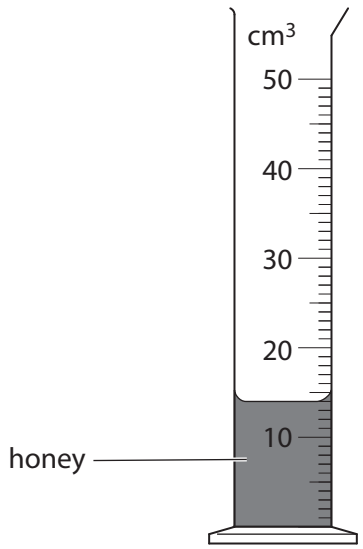
Name the container shown in the figure.

..... [1]

[Total: 1]

5 A student investigates the density of three different liquids.

The student pours liquid honey into a container, as shown in the figure.

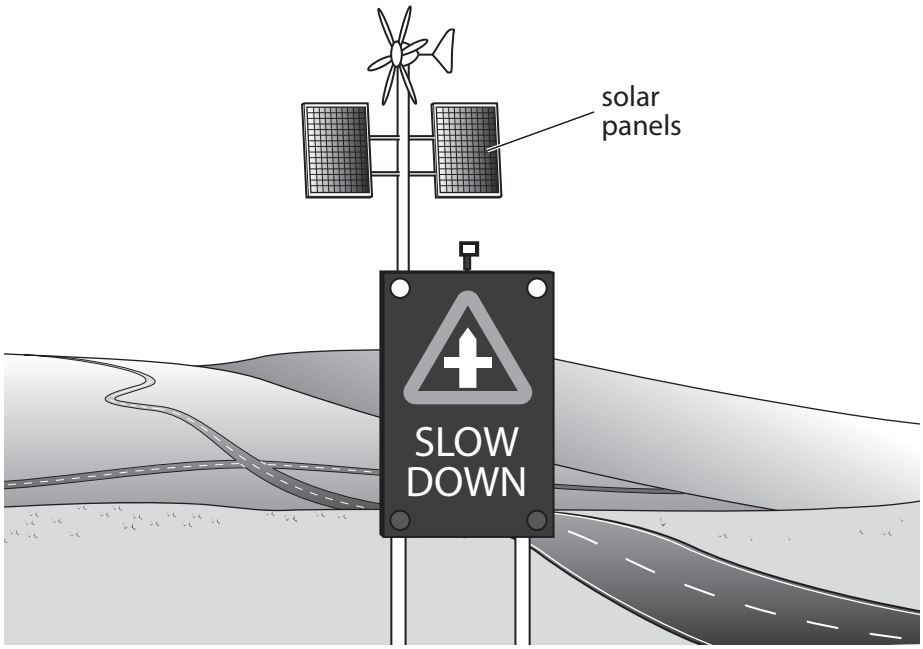


Name the other piece of apparatus necessary when determining the density of the honey.

..... [1]

[Total: 1]

6 The figure shows a sign used to warn drivers of a road hazard.



The sign lights up as cars approach.

The sign makes use of two sources of renewable energy, which are solar energy and wind.

(a) In certain conditions, the sign cannot use its sources of renewable energy.

State these conditions.

..... [2]

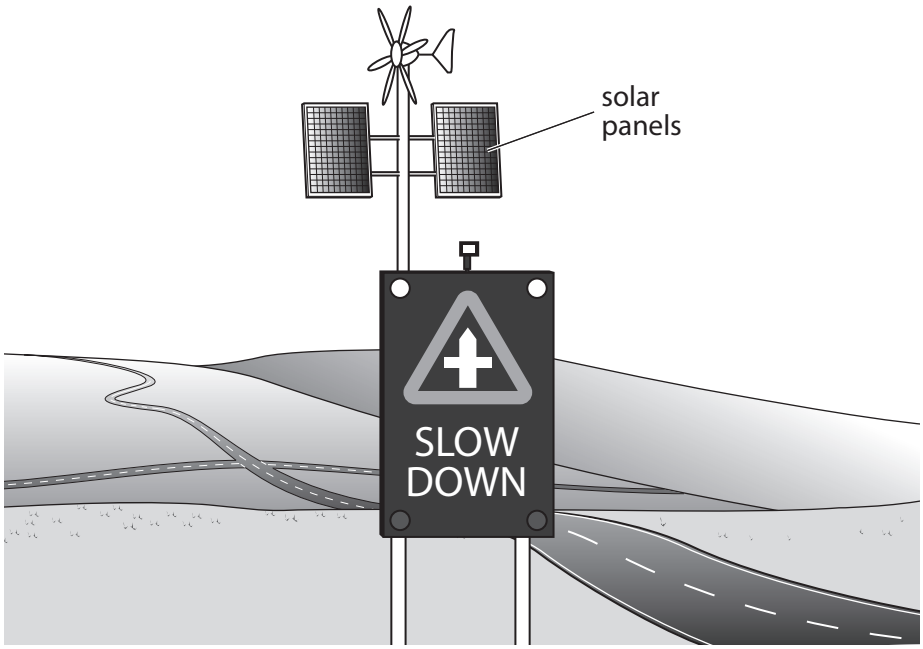
(b) The sign needs to be able to operate at all times.

Suggest a way of overcoming the problem identified in **(a)**.

..... [1]

[Total: 3]

7 The figure shows a sign used to warn drivers of a road hazard.



The sign lights up as cars approach.

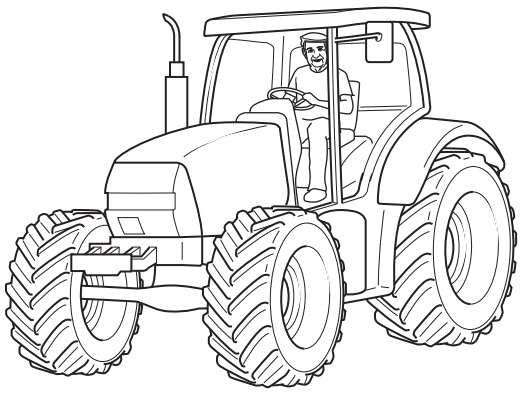
The sign makes use of two sources of renewable energy, one of which is solar energy.

Fill in the blank spaces to complete one of the useful energy conversions taking place when the sign is operating using solar energy.

solar energy → ..... → ..... [2]

[Total: 2]

8 The figure shows a farmer driving a tractor that has a diesel engine.

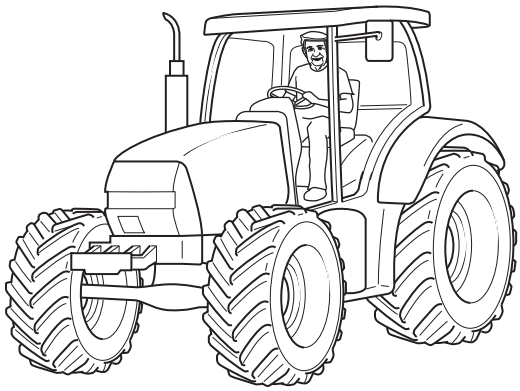


State the unit of energy.

..... [1]

[Total: 1]

9 The figure shows a farmer driving a tractor that has a diesel engine.



The tractor in the figure is a lot heavier than a car. A car sinks into soft ground. The tractor does not sink.

Explain why this is.

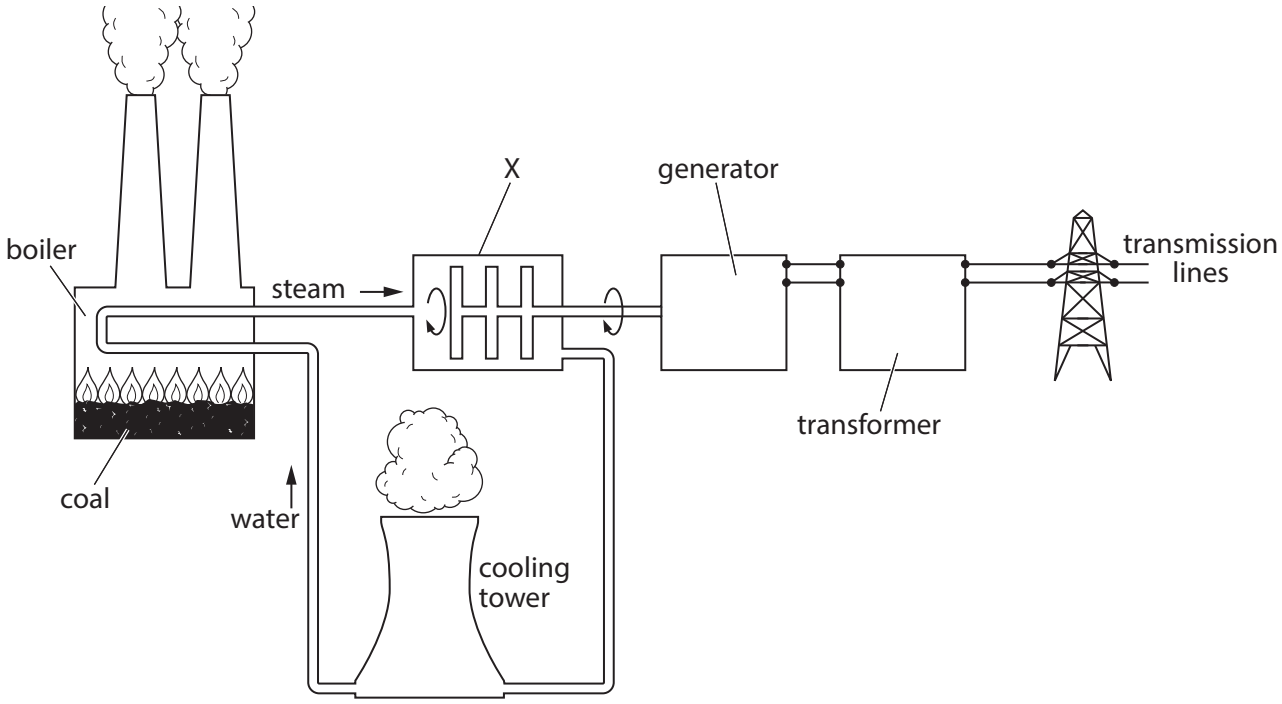
.....

.....

..... [3]

[Total: 3]

10 The figure below is a diagram of a power station that uses coal.

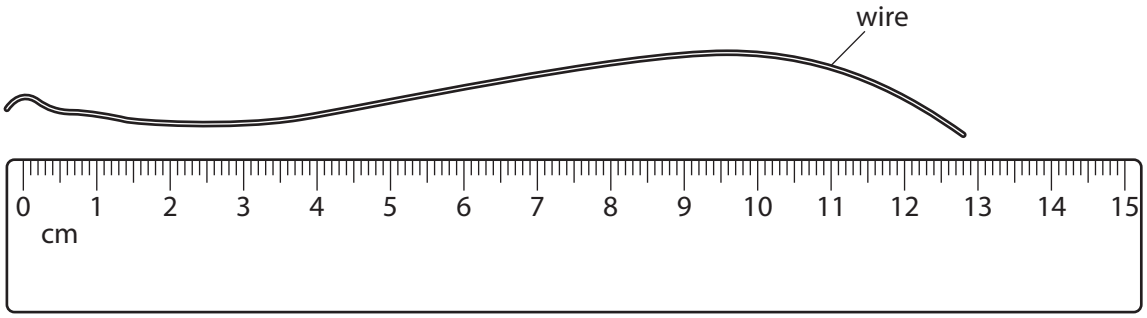


State the name of the part of the power station labelled X.

..... [1]

[Total: 1]

11 A student uses a rule to measure a thin piece of wire as shown in the figure.



The student records the length of the wire as 12.8 cm.

State two errors in the student's measurement of the length of wire.

1. .....

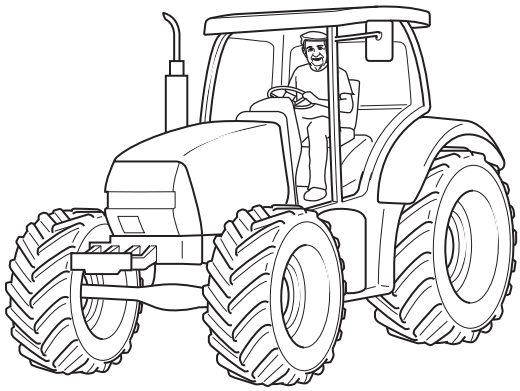
.....

2. .....

..... [2]

[Total: 2]

12 The figure shows a farmer driving a tractor that has a diesel engine.



Complete the following sentence by ticking **one** box.

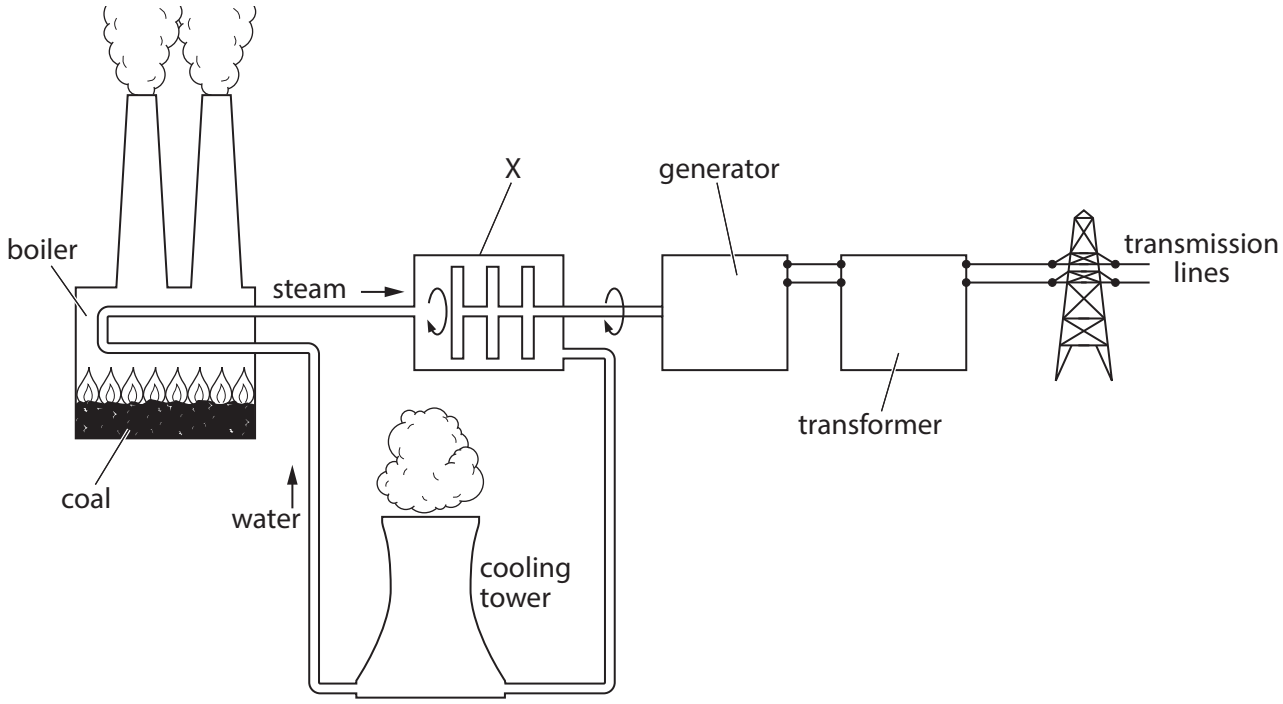
Modern diesel engines waste less energy than older diesel engines. This means modern diesel engines are

- ☐ faster.
- ☐ more efficient.
- ☐ more reliable.

[1]

[Total: 1]

13 The figure is a diagram of a power station that uses coal.



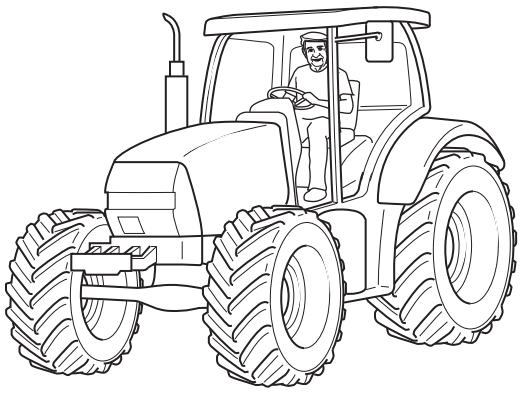
State two disadvantages of generating electricity using fossil fuels.

1. .....

2. ..... [2]

[Total: 2]

14 The figure shows a farmer driving a tractor that has a diesel engine.



State the useful energy obtained from the diesel engine as the tractor starts to move.

..... [1]

[Total: 1]

15 Hydroelectric power is described as a renewable source of energy.

Using a renewable source of energy is one advantage of hydroelectric power compared with other energy sources.

(a) State **two** other advantages of hydroelectric power.

1. .....

2. ..... [2]

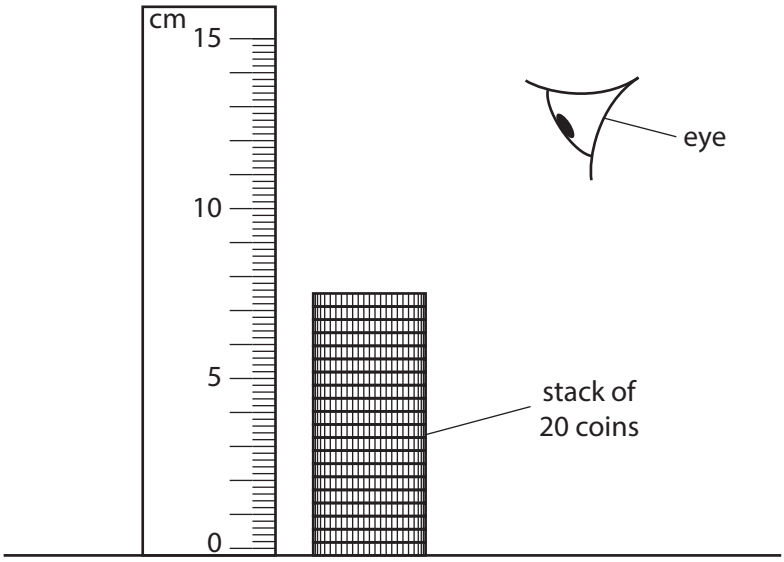
(b) State **one** disadvantage of hydroelectric power.

..... [1]

[Total: 3]

16 A student has a stack of 20 identical coins.

The figure shows the student measuring the height of the stack using a ruler.



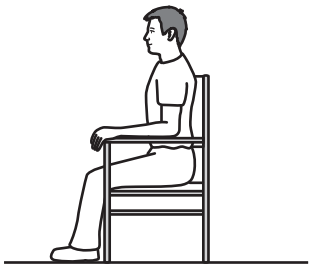
The student correctly determines the height of the stack as 7.7 cm.

Calculate the average thickness of one coin.

thickness = ... cm [2]

[Total: 2]

17 A student is sitting on a chair as shown in the figure.

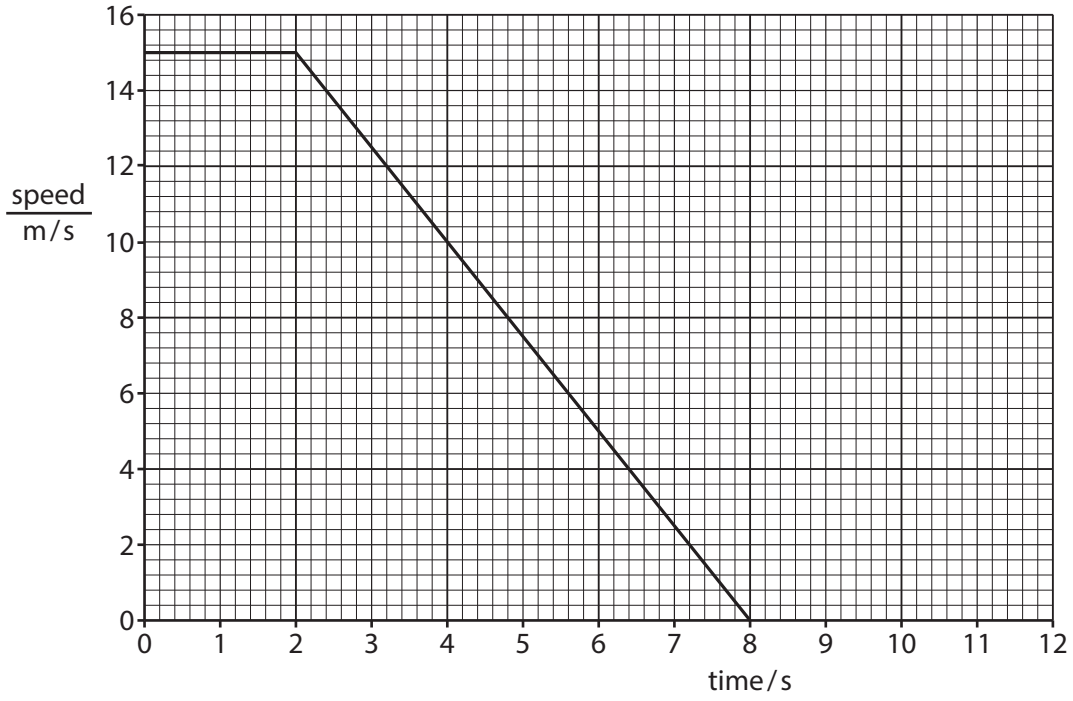


Estimate the mass of the student. ..... [1]

[Total: 1]

18 A car is travelling at a speed of 15 m / s. The driver applies the brakes and brings the car to a stop.

The figure represents the last part of the journey.



Calculate the distance travelled by the car as it slows down.

distance = ... m [2]

[Total: 2]

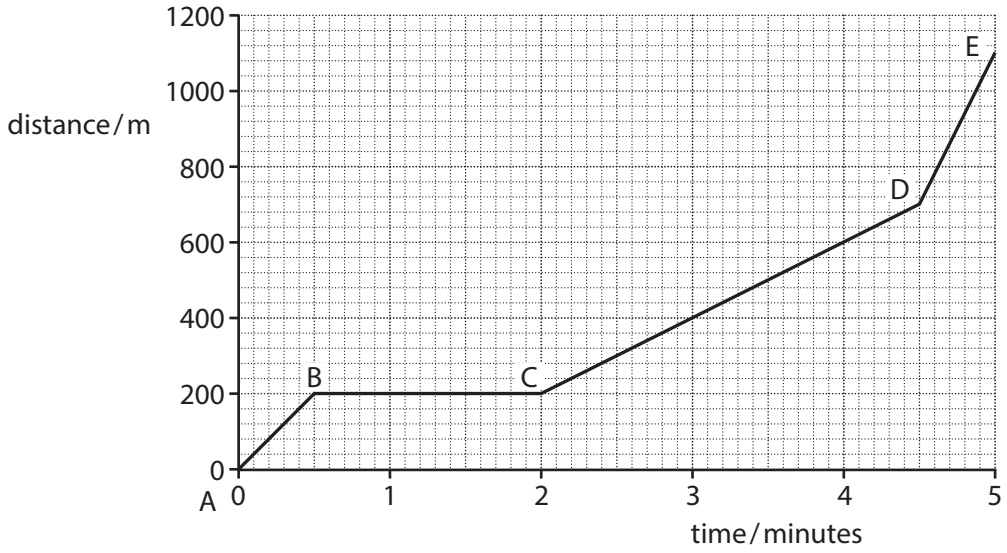
19 A car is travelling at a constant speed of 80 km / h.

Calculate the distance travelled by the car in half an hour.

distance = ... km [1]

[Total: 1]

20 A girl cycles to meet a friend. The distance-time graph for her journey from start to finish is shown in the figure.

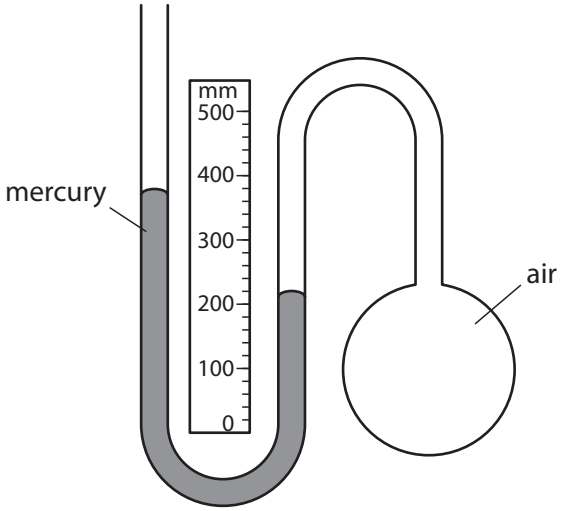


Describe the motion of the girl between points B and C.

..... [1]

[Total: 1]

21 A round-bottomed flask is connected to a mercury manometer. The air inside the flask is warm. The arrangement is shown in the figure.



(a) State the scale reading for the left-hand column.

left-hand column = ... mm

State the scale reading for the right-hand column.

right-hand column = ... mm [1]

(b) Atmospheric pressure is equal to 760 mm of mercury.

Calculate the pressure of the air inside the flask.

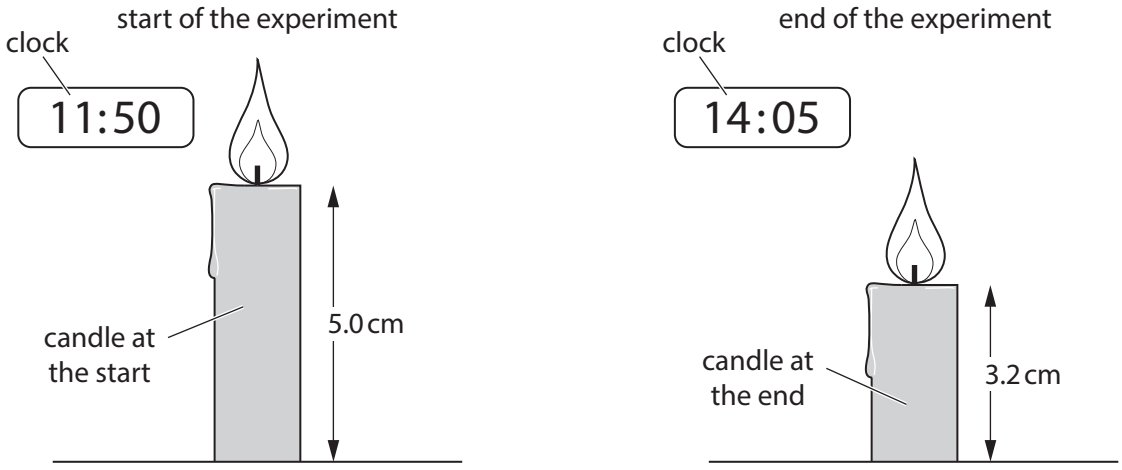
pressure = ... mm of mercury [3]

[Total: 4]

22 In the past, burning candles were used as timers.

A boy carries out an experiment to make his own timer using a burning candle.

The figure (not to scale) shows the length of the candle, and the clock he used, at the start of the experiment and at the end of the experiment.



(a) Use the figure to complete the table.

time at start of the experiment	
time at end of the experiment	
time for which the candle was burning	..... hours .....minutes = ... hours

[2]

(b) The difference in the length of the candle from the start to the end of the experiment was 1.8 cm.

Calculate the rate, in cm / hour, at which the candle burns.

rate = ... cm / hour [2]

(c) The boy estimates that he would need a candle about 24 cm long, of the same material and diameter, to make a candle timer that would last at least one day.

State whether the boy's estimate is correct. Give a reason for your answer.

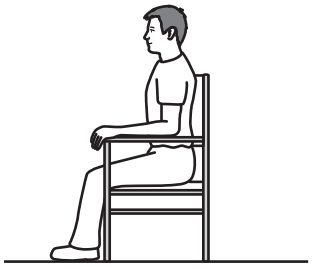
.....

.....

..... [2]

[Total: 6]

23 A student is sitting on a chair as shown in the figure.



Which statement is correct for the mass of the chair on the Moon and the mass of the chair on the Earth?

Tick the box next to the correct statement.

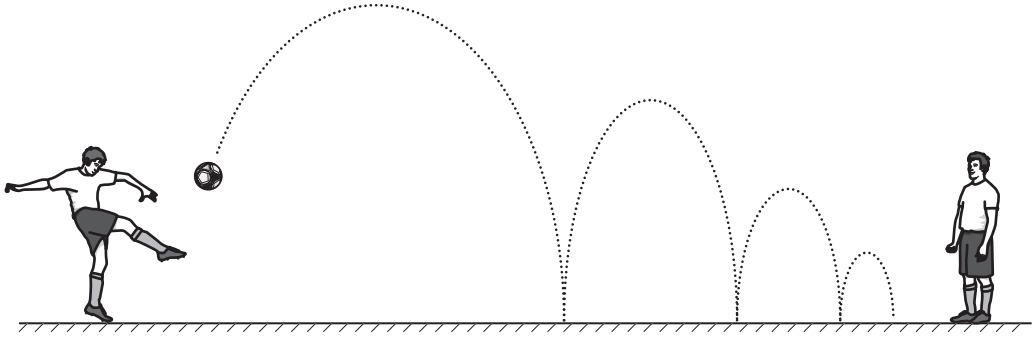
- ☐ The mass of the chair is greater on the Moon.
- ☐ The mass of the chair is less on the Moon but not zero.
- ☐ The mass of the chair is the same on the Moon.
- ☐ The mass of the chair is zero on the Moon.

[1]

[Total: 1]

24 A footballer kicks a football and it bounces to another player.

The figure shows part of the path taken by the ball.



Use words from the table to complete the sentences below. Each word may be used once, more than once, or not at all.

direction	downwards	forwards	mass	shape	slower	upwards

(a) Each time the football moves ....., it gains gravitational potential energy.

[1]

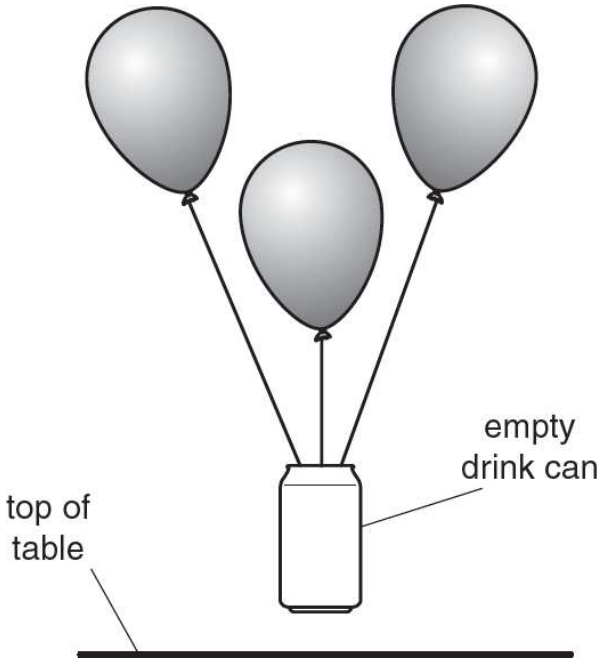
(b) Each time the football hits the ground, it changes ....., and this results in energy stored as strain energy (elastic potential energy).

[1]

[Total: 2]

25 At a party, three balloons are filled with a gas less dense than air. The balloons are tied to an empty drink can. The can floats, without moving, in the air above a table, as shown in the figure on the left.

The figure on the right represents the vertical forces acting on the can as it floats in the air.



One of the balloons suddenly bursts.

State and explain what happens to the can.

.....

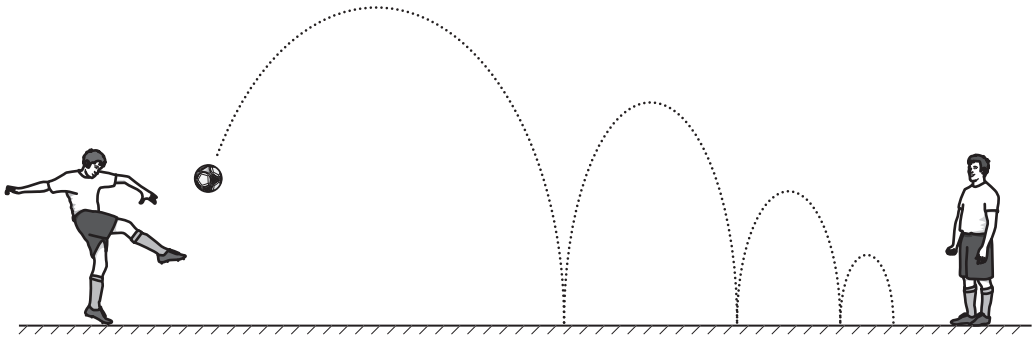
.....

..... [1]

[Total: 1]

26 A footballer kicks a football and it bounces to another player.

The figure shows part of the path taken by the ball.



Each time the football hits the ground, energy is transferred away from the ball.

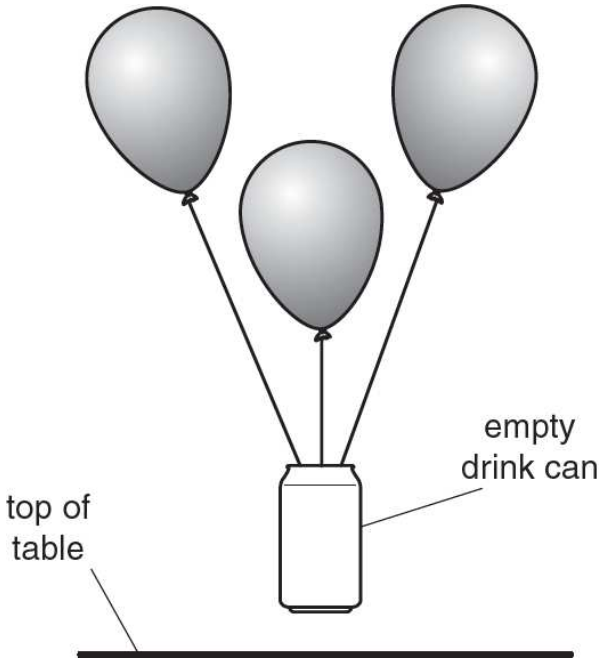
State how you can tell this from the diagram.

.....

..... [1]

[Total: 1]

27 At a party, three balloons are filled with a gas less dense than air. The balloons are tied to an empty drink can. The can floats, without moving, in the air above a table, as shown in the figure on the left.



The figure on the right represents the vertical forces acting on the can as it floats in the air.

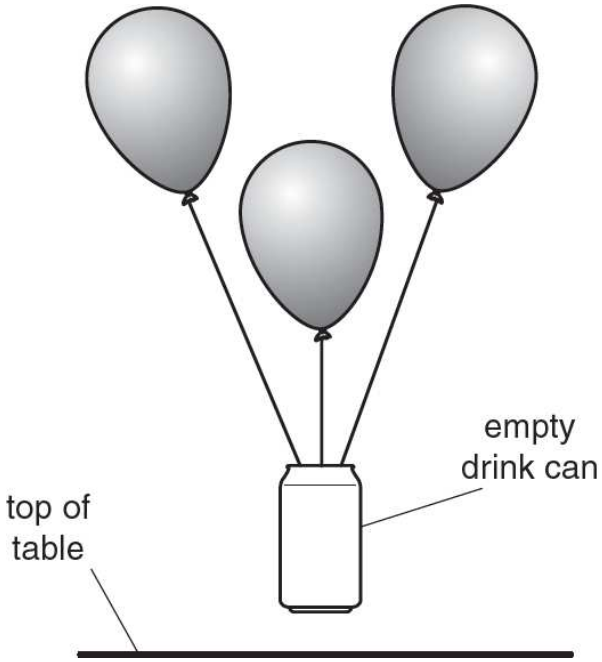
In terms of the vertical forces acting on the can, explain why the can does not rise or fall.

.....

..... [2]

[Total: 2]

28 At a party, three balloons are filled with a gas less dense than air. The balloons are tied to an empty drink can. The can floats, without moving, in the air above a table, as shown in the figure on the left.



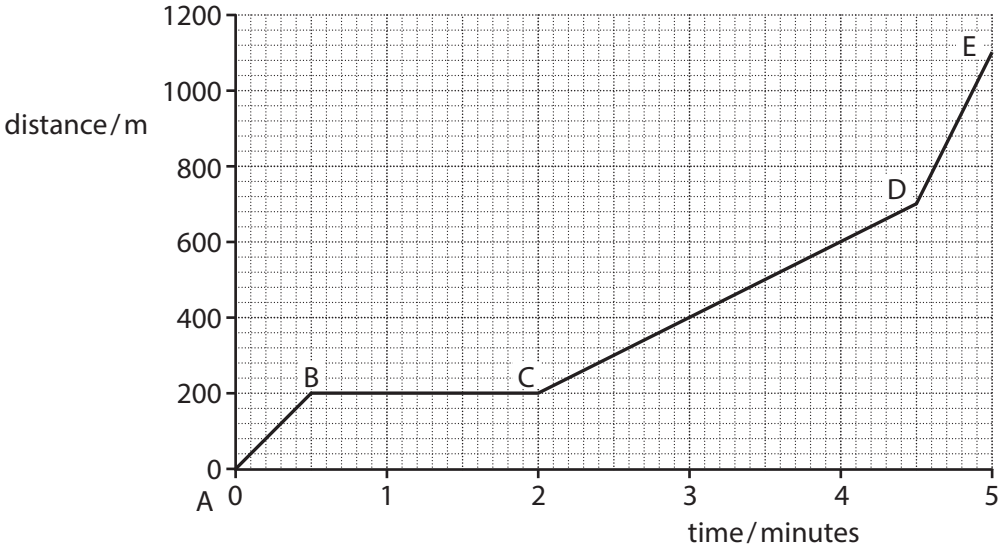
The figure on the right represents the vertical forces acting on the can as it floats in the air.

State the name given to the downward force labelled Y.

..... [1]

[Total: 1]

29 A girl cycles to meet a friend. The distance-time graph for her journey from start to finish is shown in the figure.



Which section of the graph shows the part of the girl's journey that involves cycling up a hill 500 m long?

between ..... and .....
[1]

[Total: 1]

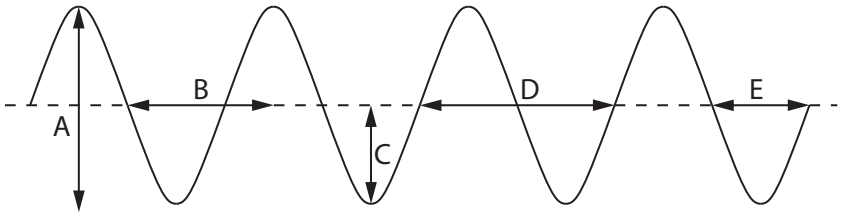
30 The mass of an object is 12 g.

State this mass in kg.

mass = ... kg [1]

[Total: 1]

31 The figure represents a wave in a water tank. Five distances are shown, labelled A, B, C, D and E.



The speed of the wavefronts is 7.5 cm / s.

Calculate the distance moved by a wavefront in 4.0 s.

distance = ... cm [2]

[Total: 2]