ST EDWARD'S

OXFORD

16+ ENTRANCE EXAMINATION

For entry in September 2018

PHYSICS

(Use of a calculator is permitted)

Time: 1 hour

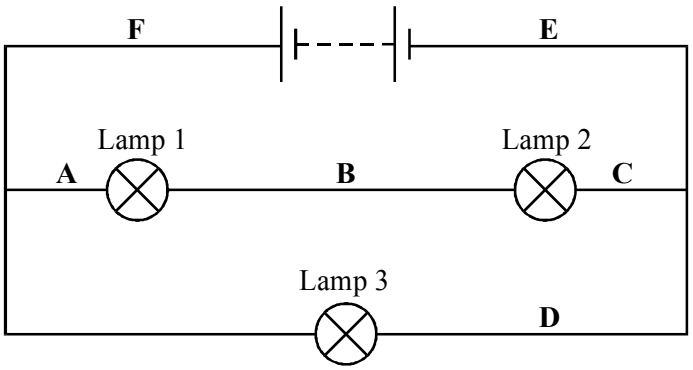
Candidate First Name: ……

Candidate Surname: ……

For Internal Use by St Edward's School:

Question Number:	Marks Allocated:
1	/10
2	/7
3	/14
4	/6
5	/4
6	/9
7	/4
8	/8
TOTAL:	/62
GRADE:	

1. The circuit contains three identical lamps.



(a) Complete each of the sentences about the circuit, using one of the phrases in the box.

more than	less than	the same as

(i) The current at **A** is ..... .the current at **B**.

(1)

(ii) The current at **A** is ..... .the current at **D**.

(1)

(iii) The current at **F** is ..... .the current at **E**.

(1)

(iv) The current at **F** is ..... .the current at **D**.

(1)

(b) In the circuit, which lamp is brightest?.....

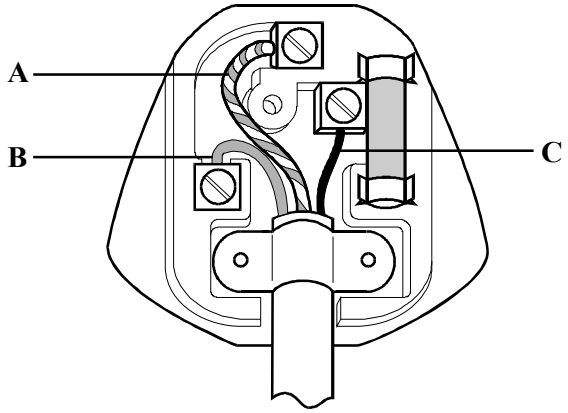
Give a reason for your answer.

.....

.....

(2)

(c) The diagram shows a 230 V mains plug, fitted with a fuse.



(i) Which of **A**, **B** or **C** shows the live wire? .....

(1)

(ii) What is the colouring of the insulation on the earth wire?

.....

(1)

(iii) The plug is attached to a table lamp.
Which fuse should be fitted into the plug?
Circle the correct answer.

3 A 5 A 13 A

(1)

(iv) Why should a metal table lamp always be earthed?

.....

.....

(1)

(Total 10 marks)

2. (a) Combing dry hair with a plastic comb makes the comb become positively charged.



Why does the comb become positively charged?

.....

.....

(1)

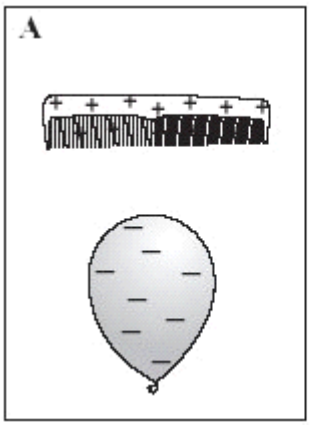
(b) Two objects are drawn in each of the boxes **A**, **B** and **C**. Each object is positively charged, negatively charged or uncharged.

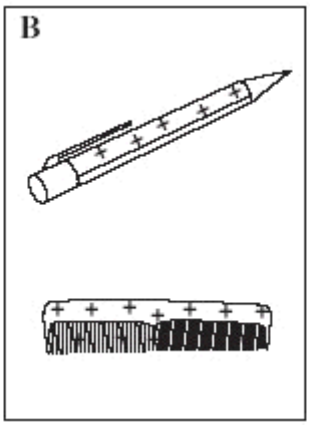
Write under each box whether the two objects will:

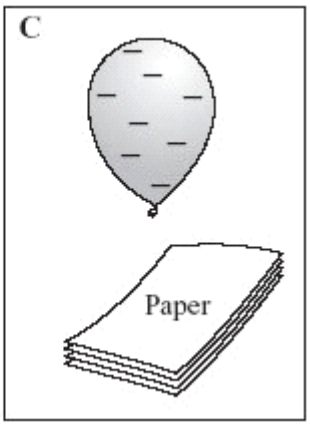
repel each other;

attract each other;

do nothing.







…….. …… ……

(3)

(c) The following sentences describe how a photocopier uses static electricity to make a photocopy. The sentences are in the wrong order.

A The charge left on the plate has the same pattern as the black parts of the original page.

B The paper is heated to make the powder stick; this is now a photocopy of the original page.

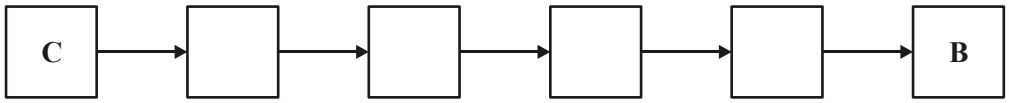
C The copying plate is given a charge. An image of the page to be copied is projected onto the plate.

D The charged parts of the plate attract particles of black powder.

E The black powder is transferred from the plate onto a piece of paper.

F Where light hits the plate, the charge leaks away.

Arrange the sentences in the right order. Start with sentence **C** and end with sentence **B**.

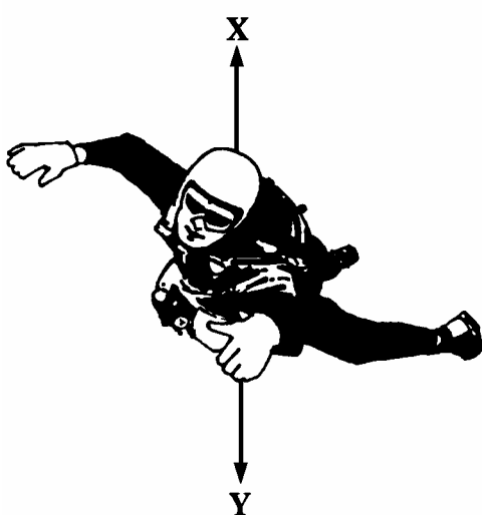


(3)

(Total 7 marks)

3. A sky-diver jumps from a plane.

The sky-diver is shown in the diagram below.



(a) Arrows **X** and **Y** show two forces acting on the sky-diver as he falls.

(i) Name the forces **X** and **Y**.

X .....

Y .....

(2)

(ii) Explain why force **X** acts in an upward direction.

.....

.....

(1)

(iii) At first forces **X** and **Y** are unbalanced.

Which of the forces will be bigger? .....

(1)

(iv) How does this unbalanced force affect the sky-diver?

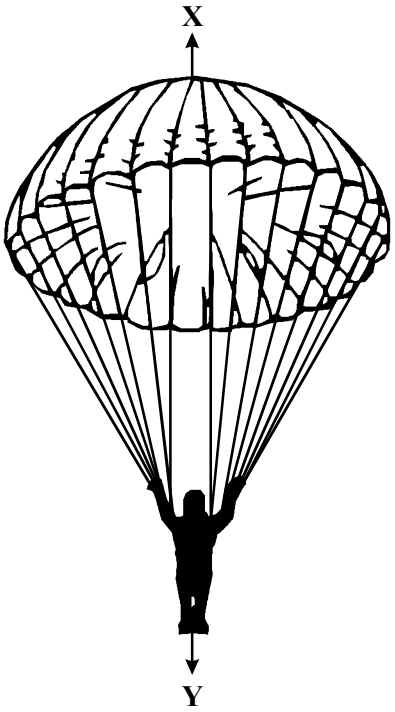
.....

.....

(2)

(b) After some time the sky-diver pulls the rip cord and the parachute opens.

The sky-diver and parachute are shown in the diagram below.



After a while forces **X** and **Y** are balanced.

Underline the correct answer in each line below.

Force **X** has

increased / stayed the same / decreased.

Force **Y** has

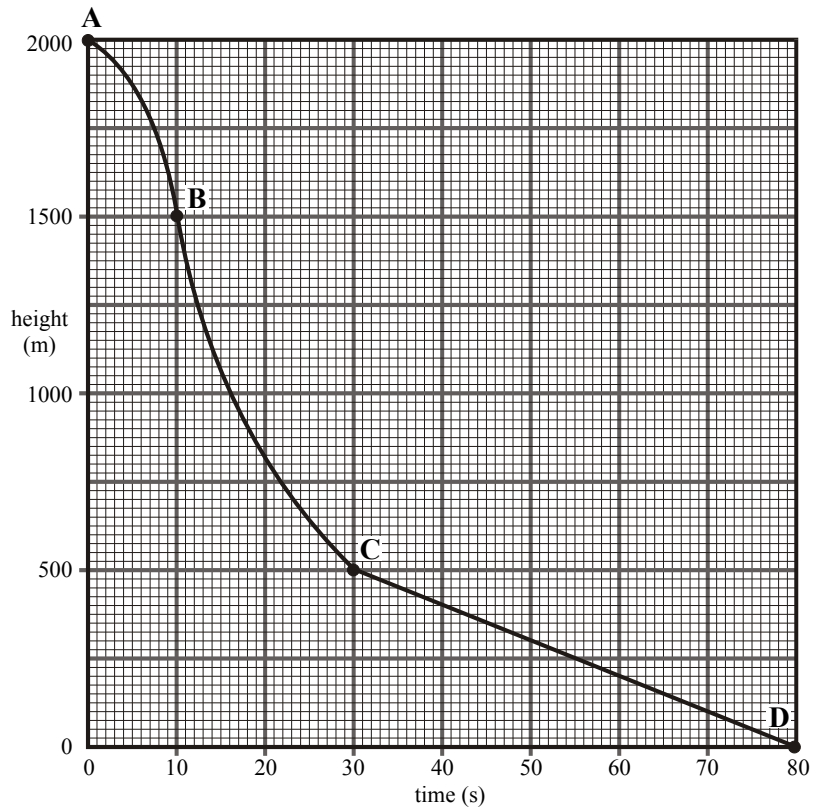
increased / stayed the same / decreased.

The speed of the sky-diver will

increase / stay the same / decrease.

(3)

(c) The graph below shows how the height of the sky-diver changes with time.



(i) Which part of the graph, **AB**, **BC** or **CD** shows the sky-diver falling at a constant speed?

.....

(1)

(ii) What distance does the sky-diver fall at a constant speed?

Distance ..... m

(1)

(iii) How long does he fall at this speed?

Time ..... s

(1)

(iv) Calculate this speed.

.....

.....

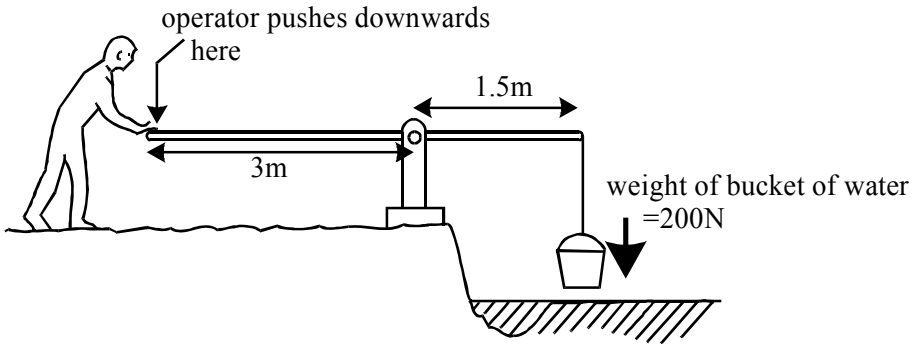
.....

Speed ..... m/s

(2)

(Total 14 marks)

4. The diagram shows a simple machine for lifting water from a river.



(a) Calculate the turning force (moment) of the bucket of water.

(Show your working.)

.....

.....

.....

Answer ..... Nm (newton metre)

(2)

(b) What can you say about the size of downwards force the operator must use to balance the moment of the bucket of water?

(Explain your answer, using numbers if you can.)

.....

.....

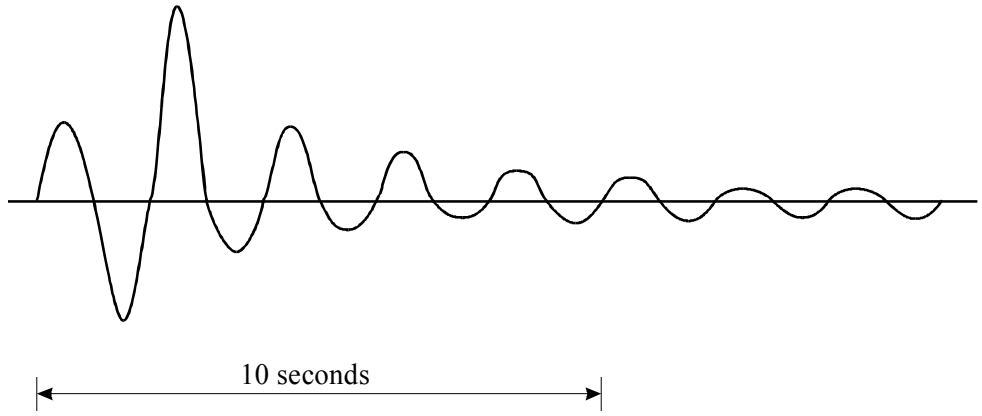
.....

.....

(4)

(Total 6 marks)

5. The vibration caused by a P wave travelling at 7.6 km/s has been recorded on a seismic chart.



(i) How many waves are produced in one second?

.....

(1)

(ii) Write down the equation which links frequency, wavelength and wave speed.

.....

(1)

(iii) Calculate the wavelength of the P wave. Show clearly how you work out your answer and give the unit.

.....

.....

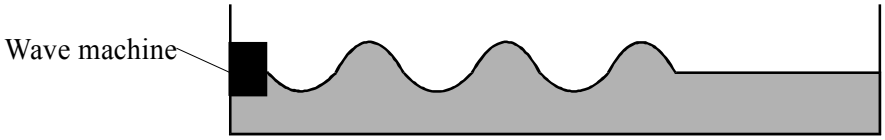
.....

Wavelength = ...

(2)

(Total 4 marks)

6. (a) A swimming pool has a wave making machine. The diagram shows the water wave pattern for 3 seconds.



(i) How many water waves are shown in the diagram?

.....

(1)

(ii) What is the frequency of the water waves?

.....

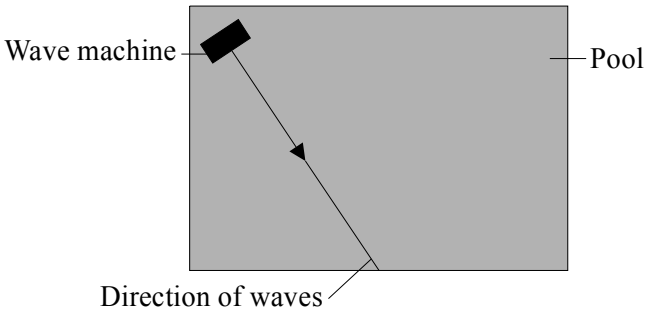
(1)

(iii) Which **one** of the units below is used to measure frequency? Underline your answer.

hertz joule watt

(1)

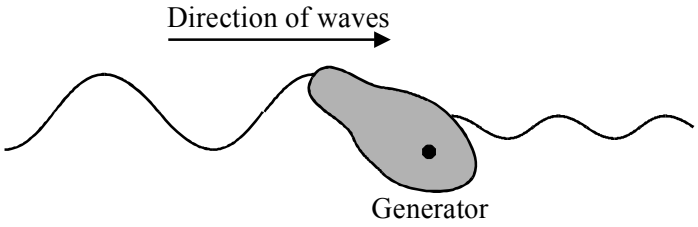
(b) The diagram shows the direction of the waves across the pool. The waves reflect off the side of the pool.



Draw a line on the diagram to show the direction of the waves after they hit the side of the pool.

(1)

(c) The swimming pool is used to test a model of an electricity generator. The waves make the floating generator move up and down. This energy is transferred to electricity.



(i) In the following sentence, cross out the **two** lines that are wrong in the box.

The diagram shoes that the amplitude of the waves

gets larger
stays the same
gets smaller

as the waves pass the generator.

(1)

(ii) What type of energy does the generator transfer to electricity?

.....

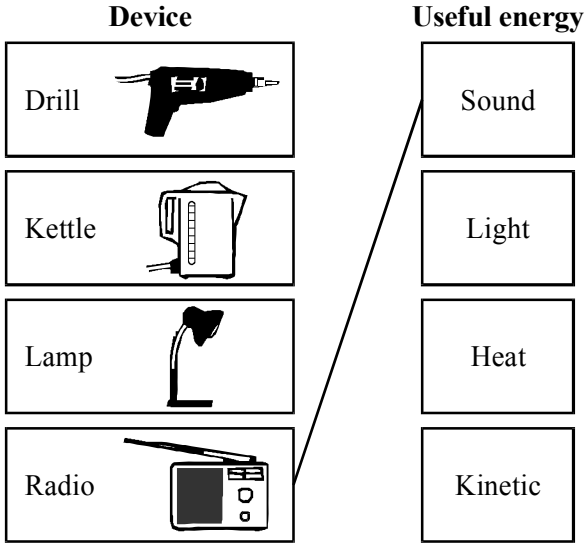
(1)

(iii) Energy from ocean waves could be used to generate electricity. Would this be a renewable or non-renewable energy resource?

.....

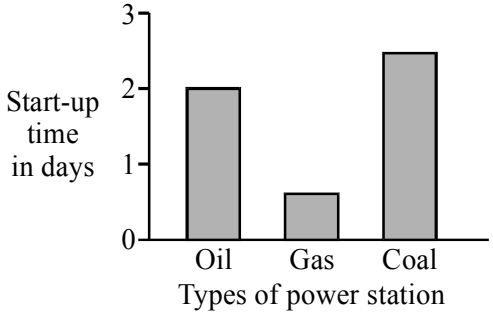
(1)

(d) Drawn in each box is a device designed to transfer electrical energy into another useful form. Draw lines to join each device to the useful energy form it produces. The radio has been done for you.



(2)
(Total 9 marks)

7. (a) The bar chart shows the start-up time for different types of fuel-burning power stations.



Which type of power station would be the quickest to start producing electricity?

.....

(1)

(b) A fuel-burning power station is more reliable than a wind generator at producing electricity. Explain why.

.....

.....

.....

.....

(2)

(c) Fuel-burning power stations may produce air pollution. Why does a wind generator not produce any air pollution?

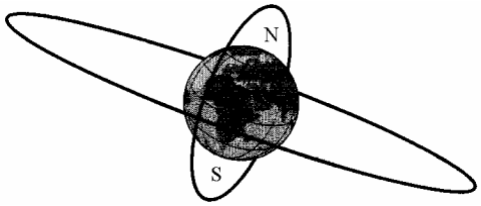
.....

.....

(1)

(Total 4 marks)

8. The diagram shows the orbits of two satellites around the Earth.



One of the satellites is used to photograph different parts of the Earth. The other is geosynchronous.

(a) (i) Give one use for geosynchronous satellites.

.....

(1)

(ii) Explain which satellite is geosynchronous.

.....

.....

(1)

(iii) Draw on the diagram the direction in which the geosynchronous satellite is moving.

(1)

(b) The diameter of the Earth is 12 000 km, and the height of a geosynchronous satellite is 35 000 km above the Earth's surface.

The circumference of an orbit = 3.14 × the diameter of the orbit.

What is the speed of the geosynchronous satellite through space?

.....

.....

Speed = ... km/hr

(3)

(c) The satellite which is **not** geosynchronous continually photographs a strip of Earth directly beneath it, about 200 km wide.

Explain why this satellite is able to photograph the whole Earth in a matter of days.

.....

.....

(2)

(Total 8 marks)