Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

7220313829

PHYSICS **0625/31**

Paper 3 Theory (Core) **October/November 2018**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m/s^2).

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **14** printed pages and **2** blank pages.

DC (NH/CGW) 151472/4

CAMBRIDGE International Examinations

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1 Fig. 1.1 shows a speed-time graph for a student who is running.

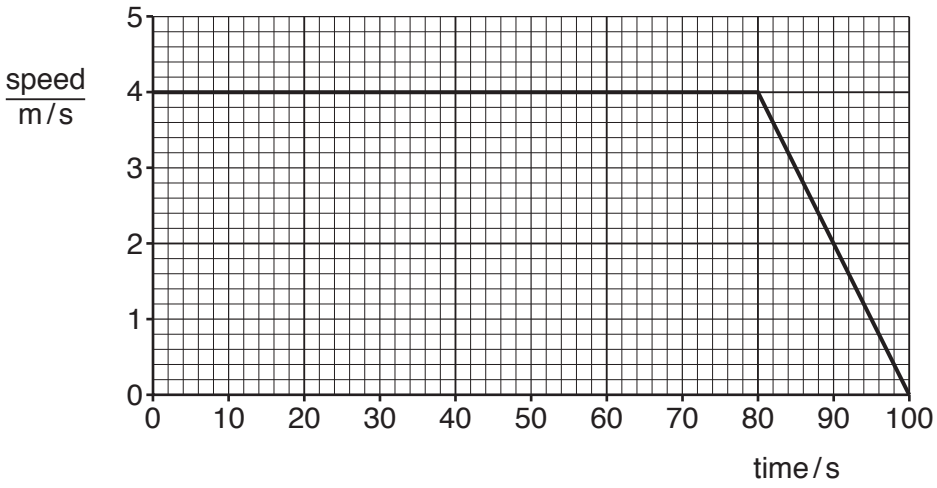

Fig. 1.1

(a) **(i)** Describe the movement of the student, as shown in Fig. 1.1.

.....

.....

.....[2]

(ii) Calculate the distance travelled by the student between 80 s and 100 s.

distance travelled = ...m [3]

(b) An athlete runs 630 m in 130 s on a flat section of a road and then 254 m in 40 s on a downhill slope.

Calculate the average speed for the total distance run by the athlete.

average speed = ... m / s [3]

[Total: 8]

2 Fig. 2.1 shows a raft floating on water.

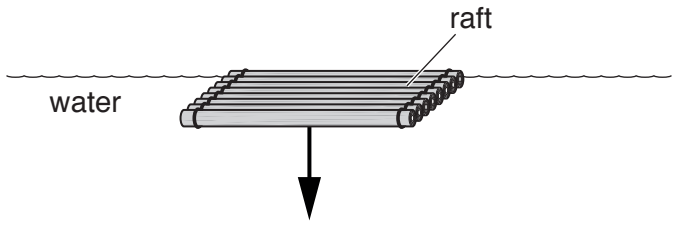

Fig. 2.1

(a) A force of 20 000 N acts on the raft in the direction of the arrow shown in Fig. 2.1.

(i) State the name given to the force shown in Fig. 2.1.

.....[1]

(ii) Calculate the mass of the raft.

mass = ... kg [3]

(b) A sail is added to the raft, as shown in Fig. 2.2.

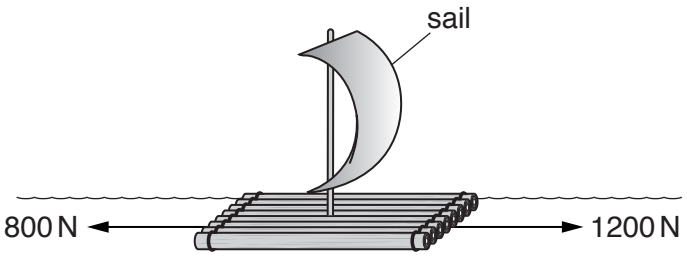

Fig. 2.2

Fig. 2.2 shows the horizontal forces acting on the raft at one moment.

Calculate the resultant horizontal force acting on the raft and state the direction of this force.

force = ... N

direction = ...[2]

[Total: 6]

3 A tower crane has a load W, as shown in Fig. 3.1.

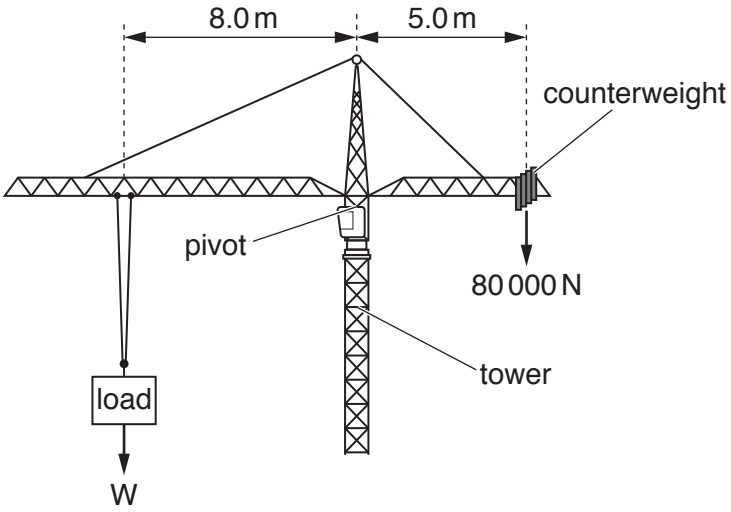

Fig. 3.1

(a) The counterweight has a weight of 80 000 N. This acts at a distance of 5.0 m from the pivot, as shown in Fig. 3.1.

Calculate the moment of the counterweight about the pivot. Give the unit.

moment = ...[3]

(b) The tower crane in Fig. 3.1 balances horizontally when holding the load W.

Calculate the weight of load W.

weight = ... N [3]

[Total: 6]

4 A student draws diagrams that represent three states of matter, as shown in Fig. 4.1.
Box B shows the arrangement of particles in a liquid.

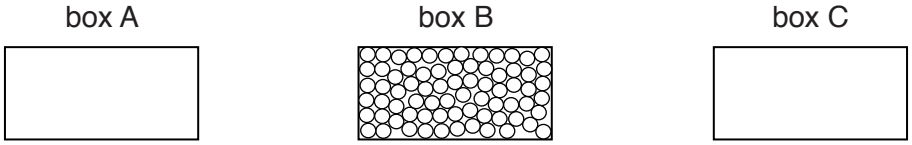

Fig. 4.1

(a) **(i)** In box A, draw the arrangement of particles in a solid. [1]

(ii) In box C, draw the arrangement of particles in a gas. [1]

(b) Write the correct term for each change of state below each arrow in Fig. 4.2.

solid ⟹ liquid gas ⟹ liquid

....

[2]

Fig. 4.2

(c) A wet beaker is in a warm room. After several hours the beaker is dry.

State and explain what happens to the water.

Use your ideas about molecules in your answer.

.....

.....

.....

.....

.....

.....[3]

[Total: 7]

5 A tidal barrage (dam) produces electricity using tides. Fig. 5.1 shows a diagram of a tidal barrage (simplified).

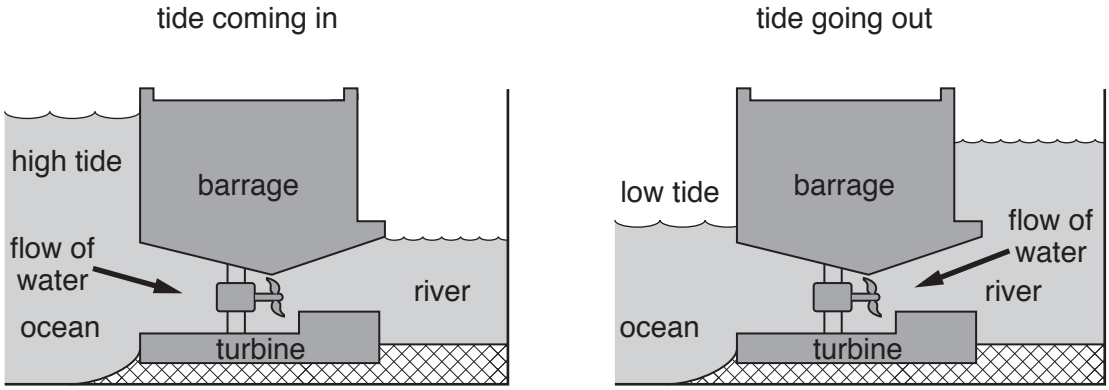

Fig. 5.1

(a) The water behind the barrage (dam) is a store of energy. State the name of this stored energy.

.....[1]

(b) Explain how the tidal barrage (dam) produces electricity.

.....

.....

.....

.....[3]

[Total: 4]

6 **(a)** Some materials are poor conductors of thermal energy (heat energy).

State the term that describes materials that are poor conductors of thermal energy.

.....[1]

(b) Some materials are good conductors of thermal energy.

Draw a ring around each material that is a good conductor of thermal energy.

air aluminium copper glass plastic water [1]

(c) A student has two rods made of different materials. The rods are the same size.

Describe an experiment to identify which material is the better conductor of thermal energy.

You may draw a diagram in the space below.

.....

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.....

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.....[3]

[Total: 5]

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7 Fig. 7.1 shows the electromagnetic spectrum. One type of radiation is not labelled.

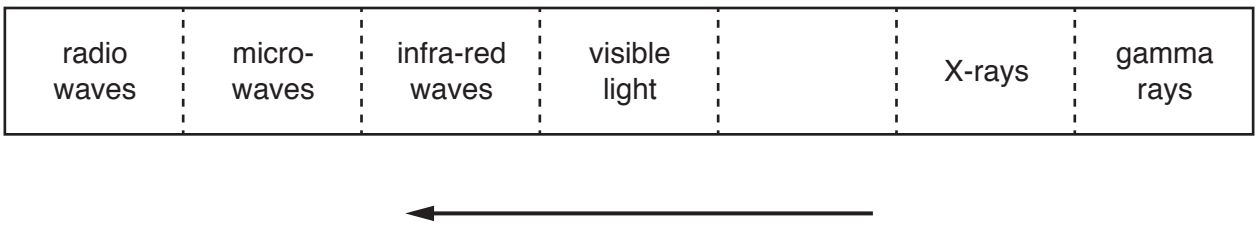

Fig. 7.1

(a) (i) On Fig. 7.1, add the label for the missing type of radiation. [1]

(ii) The arrow in Fig. 7.1 indicates a property that is increasing.

State the name of the property that is increasing in the direction of the arrow.

.....[1]

(iii) Compare the speeds of radio waves and visible light in a vacuum.

.....[1]

(b) (i) Describe how X-rays are used for security in airports.

.....

.....

.....[2]

(ii) Explain the properties of X-rays that make them useful in airport security.

.....

.....

.....[2]

[Total: 7]

8 **(a)** Fig. 8.1 shows a tuning fork and a wooden block.

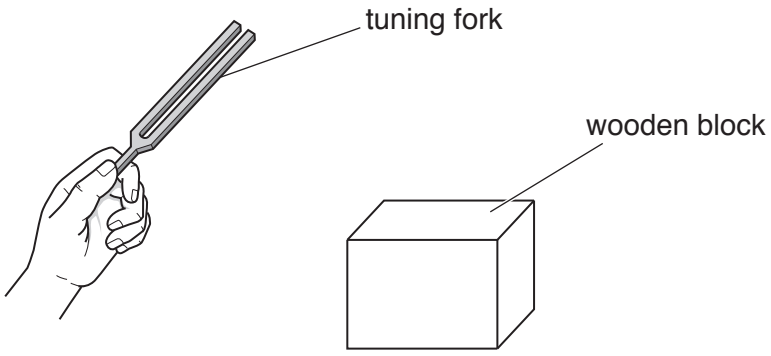

Fig. 8.1

(i) The tuning fork is hit against the wooden block and then makes a sound.

Describe how the tuning fork produces the sound.

.....

.....[1]

(ii) The tuning fork produces a sound with a frequency of 659 Hz.

State whether a healthy human ear can hear this frequency of sound. Explain your answer.

.....

.....[2]

(b) Fig. 8.2 represents the sound wave produced by a tuning fork.

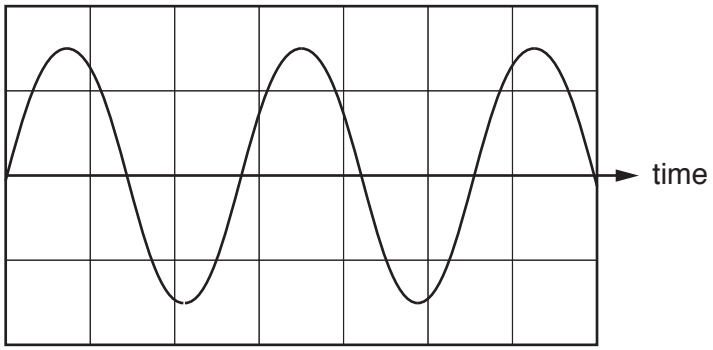

Fig. 8.2

A second tuning fork produces a different sound.

Compared with the sound represented in Fig. 8.2, this sound is quieter and has half the frequency.

On Fig. 8.2, draw the wave to show the sound produced by the second tuning fork. [2]

[Total: 5]

9 A student experiments with electric charge.

(a) The student uses a dry cloth to rub a plastic rod. The rod becomes positively charged.

Explain how the friction between the rod and the cloth causes the rod to become positively charged.
Use your ideas about the movement of charge.

.....

.....

.....[2]

(b) The student suspends a balloon from an insulating thread, as shown in Fig. 9.1.

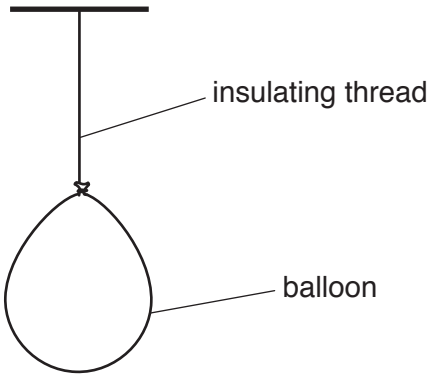

Fig. 9.1

The balloon has an electric charge.

Explain how the student can use a positively charged rod to determine the charge on the balloon.

.....

.....

.....[3]

[Total: 5]

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10 (a) A student does an experiment to determine the resistance of a fixed resistor, R.

The student draws an incomplete diagram of the circuit, as shown in Fig. 10.1.

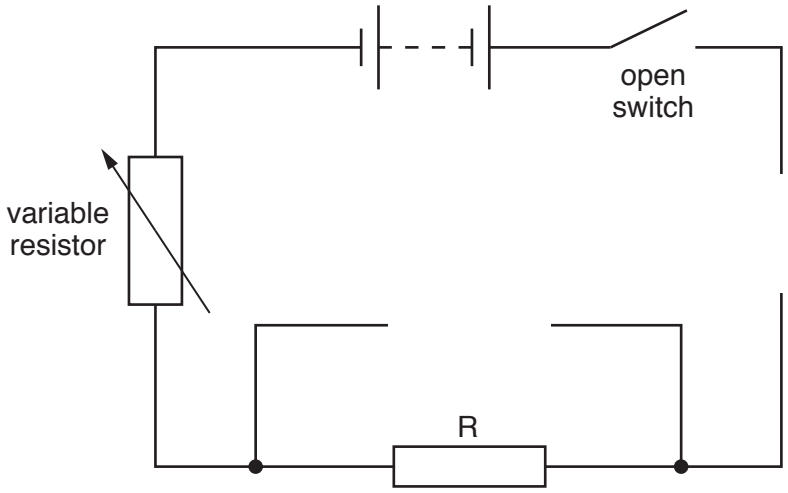

Fig. 10.1

(i) On Fig. 10.1, draw the missing circuit symbols. [3]

(ii) Describe how the student could use the circuit to determine a reliable value for the resistance of R.

.....

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.....[4]

(b) Fig. 10.2 shows a 20 Ω resistor connected to a power supply.

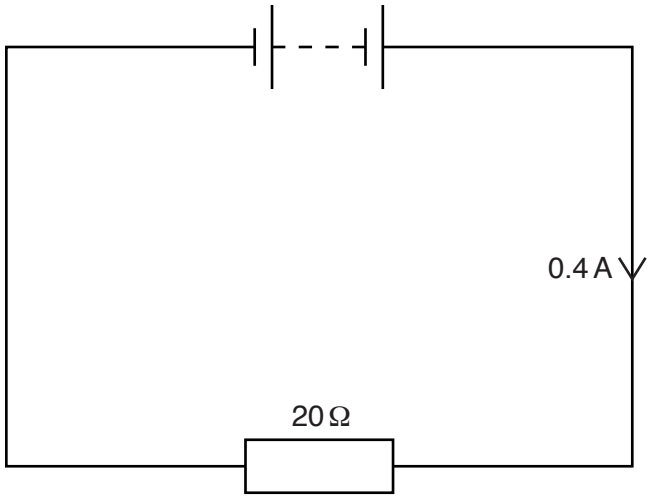

Fig. 10.2

A second 20 Ω resistor is connected in series with the first. State and explain how this affects the current in the circuit.

.....

.....

.....

.....[4]

[Total: 11]

11 **(a)** A student has a model electric railway. The model railway uses a step-down transformer.

The input voltage is 230 V. The transformer has 1710 turns on the input coil and 90 turns on the output coil.

Calculate the output voltage of the transformer.

output voltage = ... V [3]

(b) A step-up transformer is used to increase voltage.

Step-up transformers and step-down transformers have different coil arrangements.

Describe the differences in the coil arrangement for the two types of transformer.

.....

.....

.....

.....

.....[2]

(c) Explain the advantage of transmitting electricity at high voltages, rather than at low voltages.

.....

.....

.....

.....[2]

[Total: 7]

12 This notation represents the nucleus of a neutral atom of carbon-14.

$$^{14}_{6}C$$

(a) State the number of:

1. protons in the nucleus of an atom of carbon-14

.....[1]

2. electrons orbiting the nucleus of an atom of carbon-14

.....[1]

3. neutrons in the nucleus of an atom of carbon-14.

.....[1]

(b) Carbon-14 is an isotope of carbon. Carbon-12 is another isotope of carbon.
Compare the nucleus of carbon-14 with the nucleus of carbon-12.

State the similarities and differences.

.....

.....

.....

.....

.....[3]

(c) Scientists use carbon-14 to estimate the age of wood that is very old.

A very old sample of wood contains 1.0×10^8 carbon-14 atoms.
When the sample was new, it contained 8.0×10^8 carbon-14 atoms.

The half-life of carbon-14 is 5700 years.

Estimate the age of the sample of wood.

age of wood = ... years [3]

[Total: 9]

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