OXFORD
INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

INTERNATIONAL GCSE

PHYSICS

Paper 2

Monday 16 November 2020 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a pencil and a ruler
- a scientific calculator
- a protractor
- the Physics Equations Sheet (enclosed).

Instructions
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you worked out your answer.

Information
- The maximum mark for this paper is 90.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

Answer **all** questions in the spaces provided.

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0 1 The Sun is a main sequence star.

0 1 . 1 Which gas is the most common gas found in the Sun?

[1 mark]

Tick (✓) **one** box.

- Carbon dioxide ☐
- Hydrogen ☐
- Nitrogen ☐
- Oxygen ☐

0 1 . 2 Which part of the Sun has the greatest temperature?

[1 mark]

Tick (✓) **one** box.

- The core ☐
- The outer layers ☐
- The surface ☐

Do not write outside the box

0 1 . 3 Energy is released in the Sun when small nuclei join together.

What is the name of this process?

[1 mark]

Tick (✓) **one** box.

Nuclear decay ☐

Nuclear fission ☐

Nuclear fusion ☐

0 1 . 4 Some of the energy released in the Sun when small nuclei join together is transferred to the surface of the Earth.

Give **one** way in which the energy is transferred from the Sun to the Earth.

[1 mark]

_____

Question 1 continues on the next page

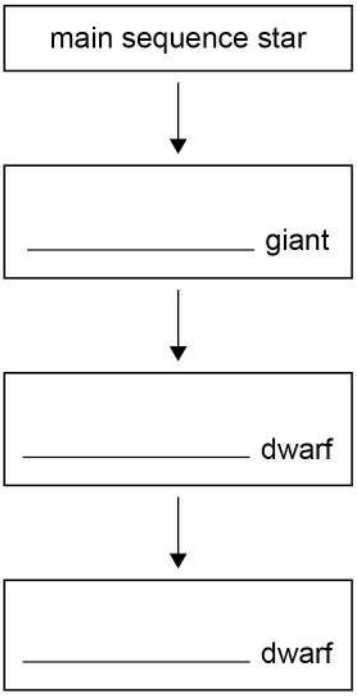
Do not write outside the box

0 1 . 5 Complete the diagram to show how the Sun will change after it leaves the main sequence.

Choose answers from the box.

[2 marks]

black	**blue**	**orange**	**red**	**white**	**yellow**



0 1 . 6 Stars much more massive than the Sun end their cycle with a large explosion.

What is the name of this explosion?

[1 mark]

Tick (✓) **one** box.

Black hole ☐

Nebula ☐

Neutron star ☐

Supernova ☐

7

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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0 2 Cobalt-60 is a radioactive isotope.

An atom of cobalt-60 can be represented by the symbol $^{60}_{28}Co$.

0 2 . 1 How many protons does a nucleus of cobalt-60 have?

[1 mark]

Number of protons _____

0 2 . 2 Give the relative charge of a proton.

[1 mark]

Charge _____

0 2 . 3 How many neutrons does a nucleus of cobalt-60 have?

[1 mark]

Number of neutrons _____

0 2 . 4 Give the relative charge of a neutron.

[1 mark]

Charge _____

Do not write outside the box

Cobalt-60 emits beta radiation.

0 2 . 5 What is beta radiation?

[1 mark]

Tick (✓) **one** box.

A fast moving particle consisting of two protons and two neutrons. ☐

A high energy electron ejected from the nucleus. ☐

A high frequency electromagnetic wave. ☐

0 2 . 6 When an atom emits beta radiation a new element is formed.

Why is a new element formed?

[1 mark]

Tick (✓) **one** box.

The number of electrons in the atom changes. ☐

The number of neutrons in the atom changes. ☐

The number of protons in the atom changes. ☐

0 2 . 7 Which row gives the ionising power and range in air of beta radiation?

[1 mark]

Tick (✓) **one** box.

Ionising power	**Range in air**	
Low	~ 1.0 cm	☐
Medium	~ 1.0 m	☐
High	Infinite	☐

7

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0 3 **Figure 1** shows a stationary basketball.

Figure 1

0 3 . 1 The ball has a mass of 0.60 kg.

gravitational field strength = 9.8 N/kg

Calculate the weight of the ball.

Use the Physics Equations Sheet.

[2 marks]

Weight = _____ N

Do not write outside the box

0 3 . 2 The ball exerts a normal contact force on the ground. This force is equal to the weight of the ball.

What is the size of the force that the ground exerts on the ball?

[1 mark]

Tick (✓) **one** box.

- Less than the weight of the ball ☐
- The same as the weight of the ball ☐
- Greater than the weight of the ball ☐
- The size of the force is zero ☐

Question 3 continues on the next page

Do not write outside the box

Figure 2 shows some students playing a game of basketball.

During the game, players bounce the ball off the ground.

Figure 2

One of the students in **Figure 2** is exerting a downward force on the ball.

0 3 . 3 The resultant force on the ball is 18 N downwards.

mass of ball = 0.60 kg

Calculate the acceleration of the ball.

Use the Physics Equations Sheet.

[3 marks]

Acceleration = _____ m/s^2

Do not write outside the box

0 3 . 4 The ball is moving downwards.

What is the effect of increasing the downward resultant force on the ball?

[1 mark]

Tick (✓) **one** box.

Decreases the height the ball bounces to. ☐

Decreases the time it takes for the ball to bounce back to the student's hand. ☐

Decreases the velocity the ball has when it hits the floor. ☐

0 3 . 5 Describe the energy changes that occur when the ball hits the ground.

[3 marks]

Turn over for the next question

10

Do not write outside the box

0 4 **Figure 3** shows a drink made from crushed ice.

The drink is at a temperature of 0 °C.

A student investigated how the temperature of the drink changed with time.

Figure 3

0 4 . 1 The drink had a starting temperature of 0 °C.

The crushed ice has a melting point of 0 °C.

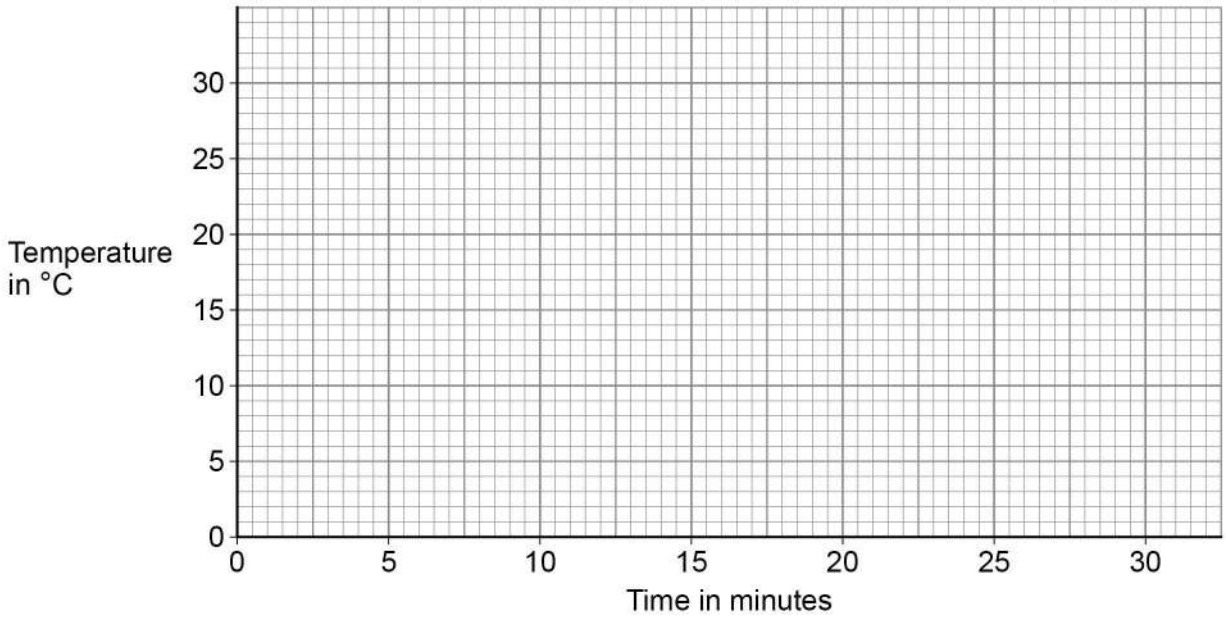
All of the ice had melted after 10 minutes.

The drink reached the room temperature of 25 °C after a further 10 minutes.

Complete **Figure 4** to show how the temperature of the drink changed in 25 minutes.

[3 marks]

Figure 4



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0 4 . 2 Describe how the student could have taken accurate measurements of temperature and time for this investigation.

[4 marks]

Temperature _____

_____

_____

_____

Time _____

_____

_____

_____

0 4 . 3 It took 132 000 J of energy to melt all of the ice.

The mass of ice melted was 0.40 kg.

Calculate the specific latent heat of fusion of ice.

Use the Physics Equations Sheet.

[3 marks]

_____

_____

_____

_____

_____

Specific latent heat of fusion = _____ J/kg

Question 4 continues on the next page

Turn over ►

Do not write outside the box

0 4 . 4 Describe the changes in arrangement and movement of the particles as the ice melts and turns to water.

[4 marks]

Arrangement _____

_____

_____

_____

_____

_____

Movement _____

_____

_____

_____

_____

_____

14

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0 5 **Figure 5** shows a lightning strike. Lightning is caused by a discharge of static electricity from a cloud to the ground.

Figure 5

0 5 . 1 During the lightning strike there is an average current of 6.0×10^5 A.

The lightning strike lasts for 4.0×10^{-6} s.

Calculate the charge transferred during the lightning strike.

Use the Physics Equations Sheet.

Give the unit.

[4 marks]

Charge transferred = _____ Unit _____

Do not write outside the box

0 5 . 2 The potential difference between the cloud and the ground during the lightning strike is 5.0×10^6 V.

Determine the energy transferred by the lightning strike.

Use the Physics Equations Sheet.

Give your answer in standard form.

[4 marks]

Energy transferred (standard form) = _____ J

0 5 . 3 Scientists use detectors to monitor lightning strikes.

The distance to a lightning strike can be calculated using the following measurements.

- The time between the flash of light and the noise caused by the strike.
- The speed of light.
- The speed of sound.

Explain how these measurements can be used to determine the distance to the lightning strike.

[3 marks]

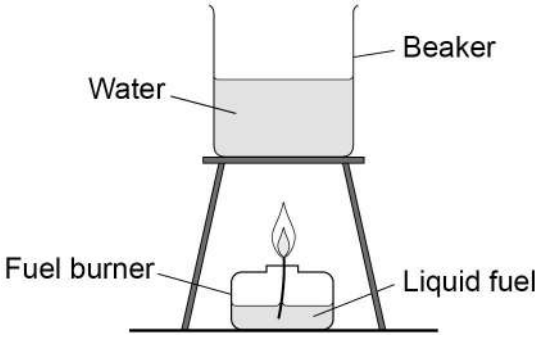
11

Turn over ►

0 6 A student investigated the energy released when different liquid fuels are burned.

Figure 6 shows some of the equipment used.

Figure 6



This is the method used.

1 Pour different liquid fuels into identical fuel burners.
2 Pour water into a beaker.
3 Measure the starting temperature of the water.
4 Light the fuel burner.
5 Measure the final temperature of the water.
6 Repeat steps **2** to **5** for different liquid fuels.

0 6 . 1 The starting temperature of the water was the same for each fuel.

Explain how **two** other variables should be controlled.

[4 marks]

1 _____

_____

_____

_____

2 _____

_____

_____

_____

Do not write outside the box

0 6 . 2 When the fuel is burned, **not** all of the energy released is transferred to the water.

What happens to the energy that is not transferred to the water?

[1 mark]

0 6 . 3 Different renewable fuels can be used in motor vehicles.

The amount of energy released per kg of fuel can be measured.

The amount of CO_2 released per kg of fuel can be measured.

Table 1 gives the results for two different fuels.

Table 1

Fuel	Energy released in kW h	CO_2 released in kg
Methanol	8.3	1.91
Ethanol	5.5	1.37

The amount of CO_2 per kW h is used to compare how polluting the fuels are.

Determine which fuel would be the **least** polluting.

[3 marks]

Question 6 continues on the next page

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0 6 . 4 Public transport systems are being developed to reduce pollution.

Figure 7 shows a tram.

Figure 7

Trams can be powered by an electric motor or by an engine that burns hydrogen.

Hydrogen produces only water when it is burned.

Explain why the hydrogen tram is less polluting to use than the electric tram.

[2 marks]

10

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ANSWER IN THE SPACES PROVIDED

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0 7 **Figure 8** shows a cannon.

An explosion inside the cannon causes a heavy ball called a cannonball to be fired forwards. The cannon moves backwards.

Figure 8

The cannonball and the cannon are initially stationary.

An average force of 4.0 kN acts on the cannonball for 0.50 s.

The cannonball leaves the cannon with a velocity of 80 m/s.

0 7 . 1 Calculate the mass of the cannonball.

Use the Physics Equations Sheet.

[4 marks]

Mass = _____ kg

Do not write outside the box

0 7 . 2 A larger cannon fires a cannonball with a mass of 40 kg at a speed of 90 m/s.

mass of cannon = 1600 kg

Determine the initial velocity of the cannon as the cannonball leaves the cannon.

Use the Physics Equations Sheet.

[4 marks]

Initial velocity of cannon = _____ m/s

0 7 . 3 The larger cannon moves a short distance before it stops moving.

Explain why the cannon stops moving.

[3 marks]

11

Turn over ►

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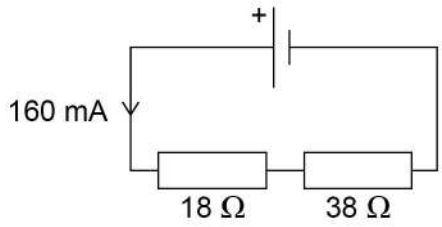
0 8 **Figure 9** shows a circuit diagram with two resistors and a cell in series.

Figure 9



0 8 . 1 Explain which resistor in **Figure 9** has the greater potential difference across it.

[3 marks]

0 8 . 2 Determine the potential difference across the cell in **Figure 9**.

Give your answer to 2 significant figures.

Use the Physics Equations Sheet.

[4 marks]

Potential difference (2 significant figures) = _____ V

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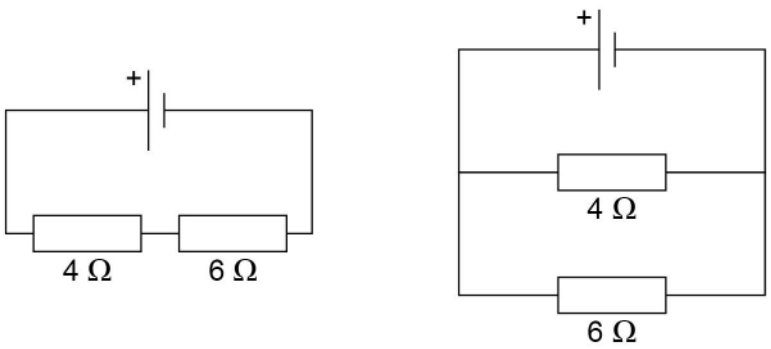
0 8 . 3 **Figure 10** shows two resistors and identical cells connected as a series circuit and connected as a parallel circuit.

Figure 10



Compare the potential differences and currents in the series circuit with the potential differences and currents in the parallel circuit.

[4 marks]

11

Turn over for the next question

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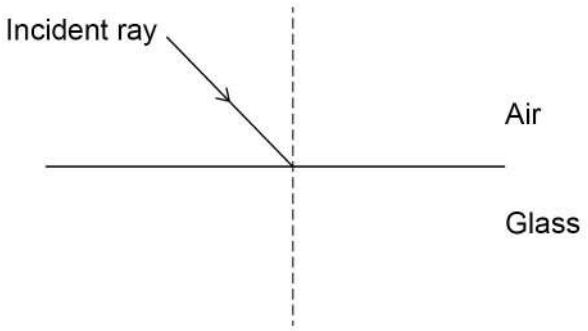
0 9 **Figure 11** shows part of a ray diagram for light travelling from air into glass.

Figure 11



0 9 . 1 Complete **Figure 11** to show the path of the ray as it enters the glass.

Label the appropriate angles and the ray you draw.

[3 marks]

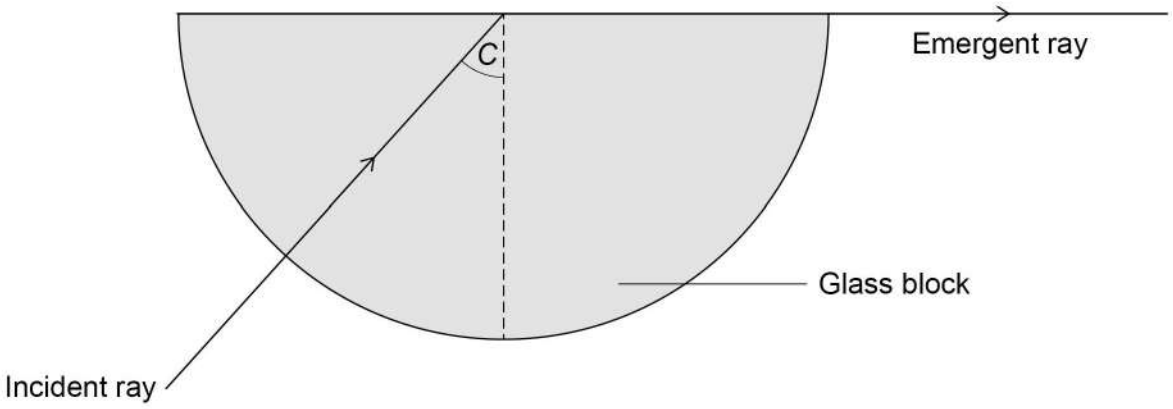
Do not write outside the box

0 9 . 2 The refractive index n of glass is given by

$$n = \frac{\text{speed of light in air}}{\text{speed of light in glass}}$$

Figure 12 shows a ray of light entering and leaving a glass block. The diagram is actual size.

Figure 12



speed of light in air = 3.0×10^8 m/s

Determine the speed of light in glass.

Take a measurement from the diagram.

Use the Physics Equations Sheet.

[6 marks]

Speed of light in glass = _____ m/s

END OF QUESTIONS

9

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