Please write clearly in block capitals.

H

Centre number ☐☐☐☐☐ Candidate number ☐☐☐☐

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE

PHYSICS

Higher Tier Paper 2

Practice Paper Series – Set 2

Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:

- a ruler
- a scientific calculator
- the Physics Equations Sheet (printed at the back of this booklet).

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.
- Do not write outside the box around each page or on blank pages.
- 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 work out your answer.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions 08.1 and 09.1 you need to make sure that your answer:
  - is clear, logical, sensibly structured
  - fully developed
  - shows how the points that you make are related or follow on from each other where appropriate.

For Examiner's Use

Question	Mark
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10	
11	
TOTAL	

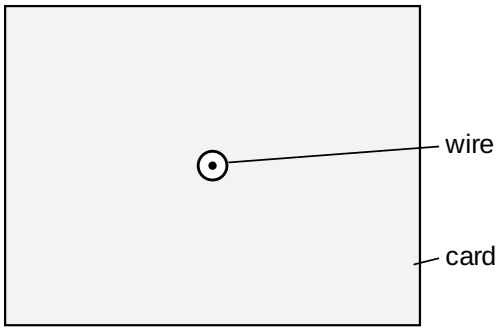
This is an original practice paper written for sciencegcse.co.uk to match the style and demand of AQA GCSE Physics (8463) Paper 2 (Higher Tier). It is not an AQA examination paper and has not been produced or endorsed by AQA. It is not a prediction of a future examination.

0 1 A current in a wire produces a magnetic field around the wire.

Figure 1 shows a vertical wire passing through a horizontal piece of card. The view is from above.

The current in the wire is upwards, out of the page.

Figure 1

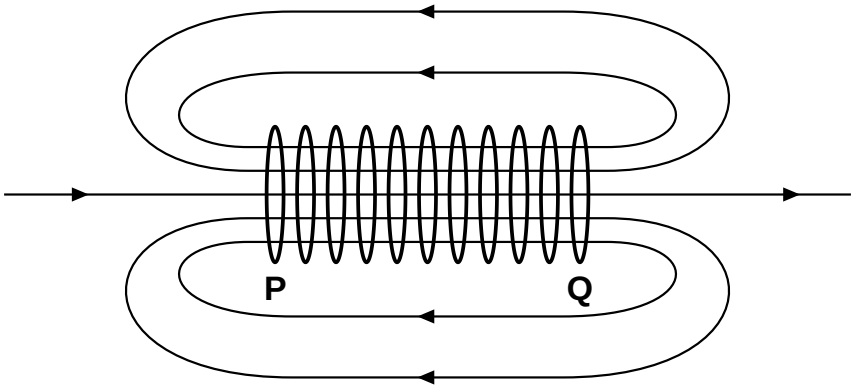


0 1 . 1 Draw the magnetic field pattern around the wire on **Figure 1**. [2 marks]

Show the direction of the magnetic field.

Figure 2 shows the magnetic field of a solenoid. **P** and **Q** are the two ends of the solenoid.

Figure 2



0 1 . 2 Which end of the solenoid, **P** or **Q**, is the north pole? [2 marks]

Give a reason for your answer.

End .....

Reason

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0 1 . 3 The magnetic field inside the solenoid is uniform. [2 marks]

How do the field lines in **Figure 2** show that the field inside the solenoid is uniform?

0 1 . 4 State the effect on the magnetic field of the solenoid of: [2 marks]

- putting an iron core inside the solenoid
- reversing the direction of the current.

Iron core

Reversing the current

0 2 The Earth absorbs radiation from the Sun and emits radiation into space.

0 2 . 1 What is meant by a perfect black body? [1 mark]

0 2 . 2 For many years the mean temperature of the Earth stayed almost constant. [1 mark]

What does this show about the radiation absorbed and the radiation emitted by the Earth?

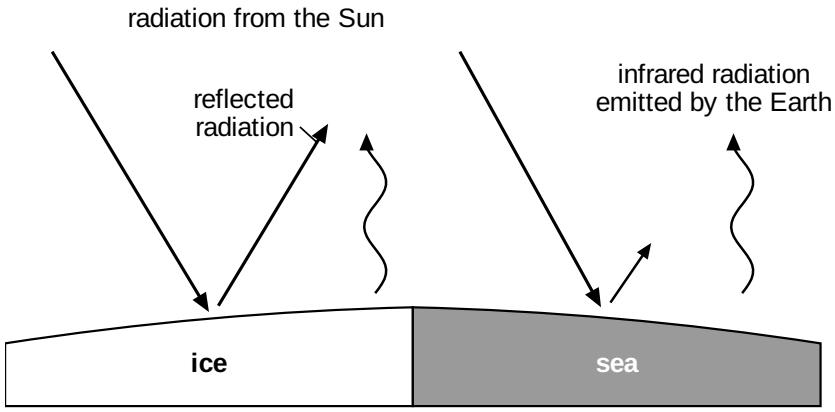
Question 2 continues on the next page

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Figure 3 shows what happens to some of the radiation from the Sun that reaches the Earth's surface. It also shows infrared radiation emitted by the Earth's surface.

Ice reflects more of the radiation from the Sun than sea water does.

Figure 3



0 2 . 3 The area of ice in the Arctic is decreasing. [4 marks]

Explain how this could affect the temperature of the Earth.

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Turn over for the next question

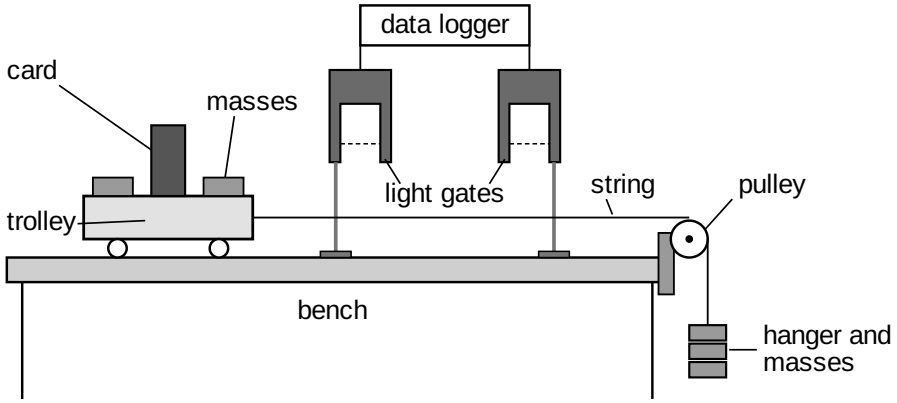
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0 3 A student investigated how the acceleration of a trolley depends on the force pulling it.

Figure 4 shows the equipment.

The pulling force is the weight of the hanger and the masses on it.

Figure 4



0 3 . 1 To increase the pulling force, the student moved masses from the trolley to the hanger. [2 marks]

Explain why the student did not add extra masses to the hanger instead.

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0 3 . 2 In one test, the speed of the card was 0.40 m/s at the first light gate and 0.70 m/s at the second light gate. [2 marks]

The card took 0.60 s to travel from the first light gate to the second light gate.

Calculate the acceleration of the trolley.

Acceleration = ... m/s^2

Question 3 continues on the next page

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Table 1 shows the student's results.

Table 1

Pulling force in N	0.10	0.20	0.30	0.40	0.50
Acceleration in m/s^2	0.10	0.30	0.50	0.70	0.90

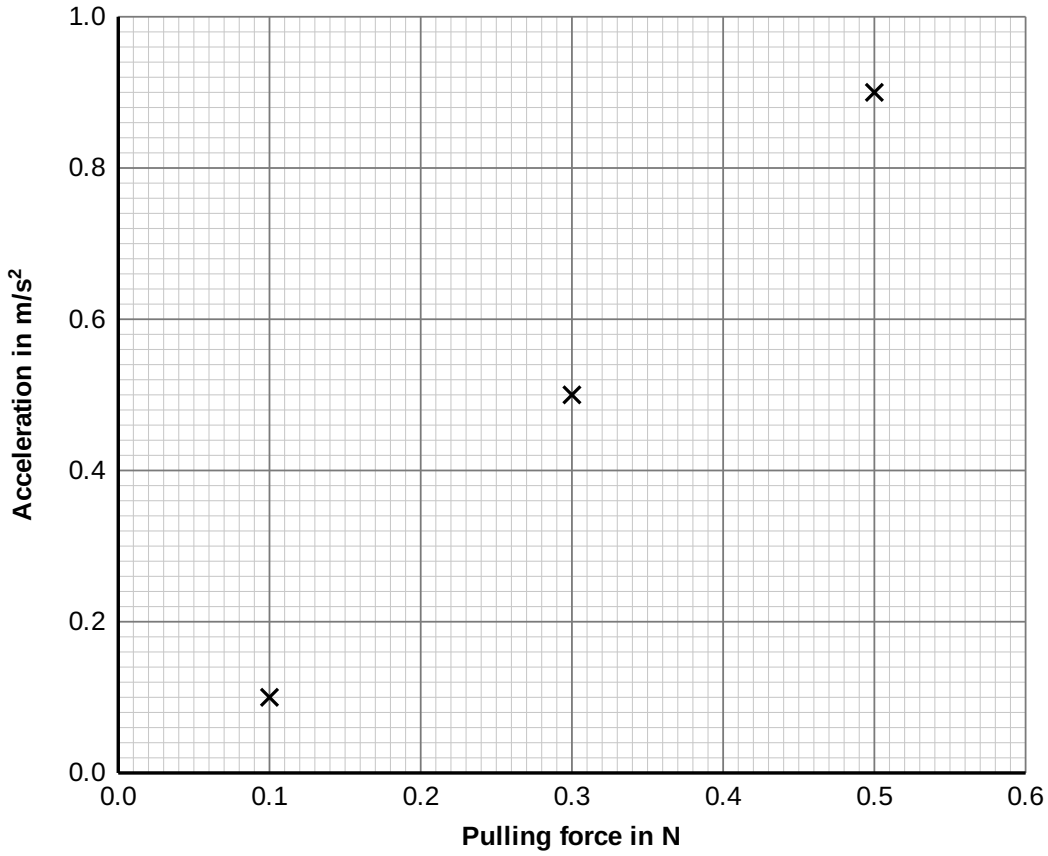
0 3 . 3 **Figure 5** shows some of the results. [2 marks]

Complete **Figure 5**.

You should:

- plot the results for 0.20 N and 0.40 N
- draw a line of best fit.

Figure 5



Do not write outside the box

Question 3 continues on the next page

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0 3 . 4 Determine the gradient of the line. [3 marks]

Use the gradient to determine the total mass of the trolley, the hanger and the masses.

Gradient = ...

Total mass = ... kg

0 3 . 5 The line of best fit does not pass through the origin. [1 mark]

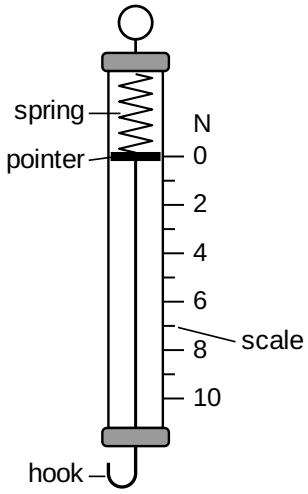
Suggest why.

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0 4 **Figure 6** shows a newtonmeter. The newtonmeter contains a spring.

Figure 6



0 4 . 1 The divisions on the scale of the newtonmeter are equally spaced. [2 marks]

Explain why.

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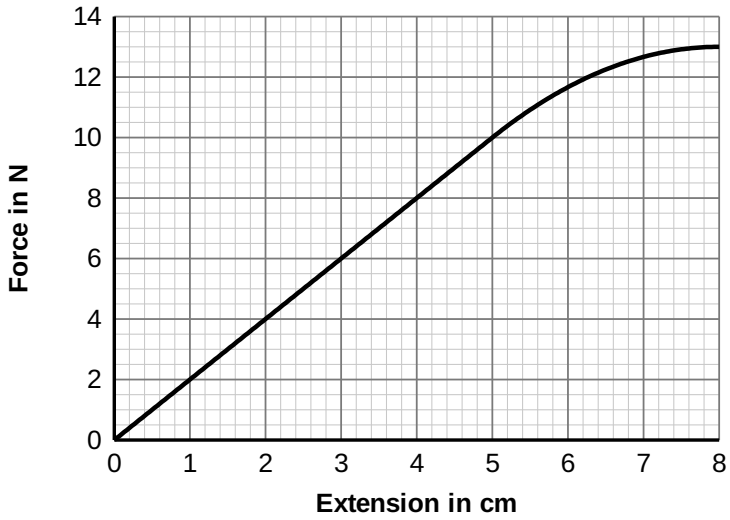
Question 4 continues on the next page

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Figure 7 shows the force–extension graph for the spring.

Figure 7



0 4 . 2 Determine the spring constant of the spring. [2 marks]

Give your answer in N/m

Spring constant = ... N/m

0 4 . 3 Calculate the elastic potential energy stored in the spring when the extension is 4.0 cm [2 marks]

Use the Physics Equations Sheet.

Elastic potential energy = ... J

Question 4 continues on the next page

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0 4 . 4 The newtonmeter should not be used to measure forces greater than 10 N [2 marks]

Suggest why.

Use **Figure 7**.

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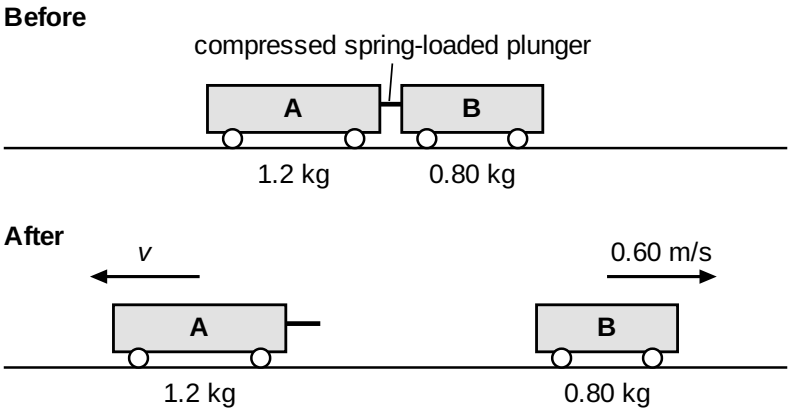
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0 5 **Figure 8** shows two trolleys, **A** and **B**, on a horizontal track.

A spring-loaded plunger on trolley **A** is pushed in against trolley **B**. Both trolleys are stationary.

When the plunger is released, the trolleys move apart.

Figure 8



0 5 . 1 What is the total momentum of the two trolleys before the plunger is released? [1 mark]

Total momentum = ... kg m/s

0 5 . 2 After the plunger is released, trolley **B** moves to the right at 0.60 m/s [3 marks]

Calculate the speed *v* of trolley **A**.

Speed = ... m/s

Question 5 continues on the next page

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0 5 . 3 Explain why the trolleys move in opposite directions. [2 marks]

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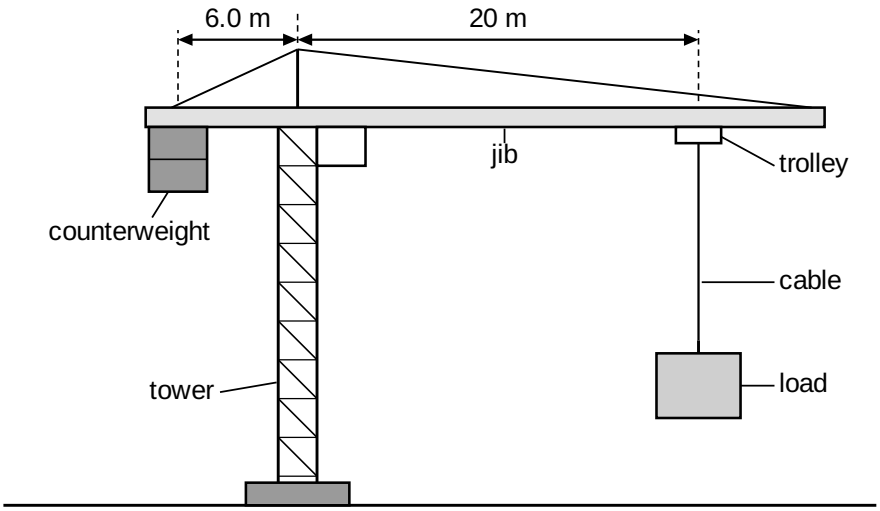
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0 6 **Figure 9** shows a tower crane lifting a load.

Figure 9



0 6 . 1 What is meant by the moment of a force? [1 mark]

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0 6 . 2 The weight of the load is 15 000 N [2 marks]

Calculate the moment of the load about the tower.

Moment = ... N m

Question 6 continues on the next page

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0 6 . 3 The crane is balanced. [3 marks]

Calculate the weight of the counterweight.

Ignore the weight of the jib.

Weight of the counterweight = ... N

0 6 . 4 The trolley then moves the load further away from the tower. [2 marks]

Explain why the crane could topple over.

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0 6 . 5 Suggest **one** way the crane could safely lift a heavier load. [1 mark]

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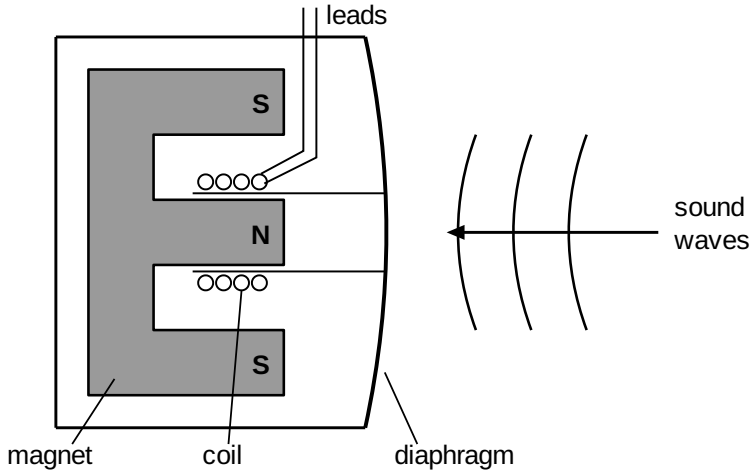
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Turn over for the next question

0 7 **Figure 10** shows a cross-section through a moving-coil microphone. The coil is attached to the diaphragm.

Figure 10



0 7 . 1 Explain how the microphone produces an alternating potential difference when a sound wave reaches it. [4 marks]

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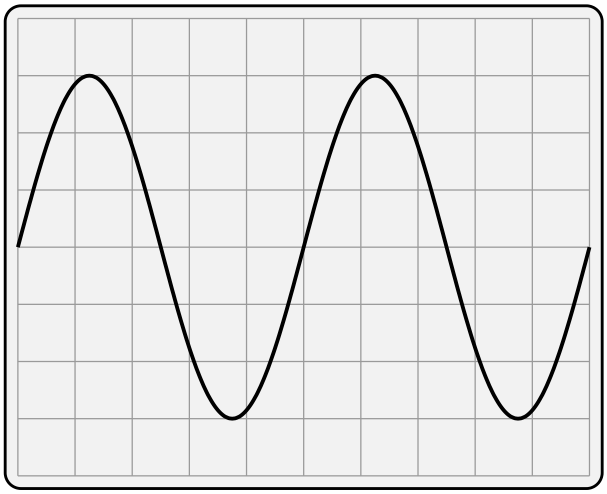
Question 7 continues on the next page

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The microphone is connected to an oscilloscope.

Figure 11 shows the trace on the oscilloscope when a student whistles a note.

Figure 11



0 7 . 2 The student then whistles a quieter note that has a higher frequency. The settings of the oscilloscope are not changed. [2 marks]

Draw the new trace on **Figure 11**.

0 7 . 3 A loudspeaker has a similar structure to the microphone. [3 marks]

Explain how a loudspeaker produces a sound wave when there is an alternating current in its coil.

Do not write outside the box

Question 7 continues on the next page

An alternator generates an alternating potential difference.

Table 2 shows how the peak potential difference produced by an alternator depends on the number of rotations of its coil each second.

Table 2

Number of rotations each second	5	10	15	20	25
Peak potential difference in V	1.6	3.2	4.8	6.4	8.0

0 7 . 4 Describe the relationship between the peak potential difference and the number of rotations each second. [2 marks]

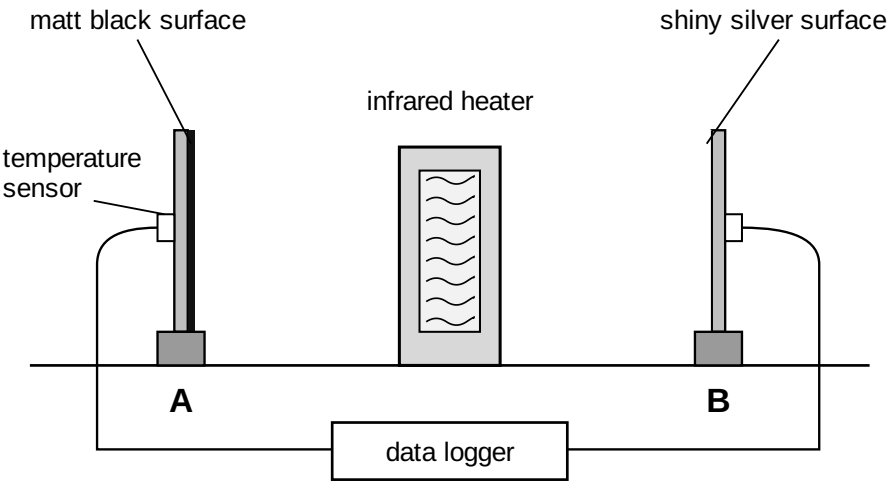
Use data from **Table 2**.

0 8 A student investigated how the type of surface affects how much infrared radiation the surface absorbs.

Figure 12 shows the equipment.

Plates **A** and **B** are identical metal plates. The surface of plate **A** facing the heater is matt black. The surface of plate **B** facing the heater is shiny silver.

Figure 12



Question 8 continues on the next page

Do not write outside the box

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0 8 . 1 Describe a method the student could use to compare how well the two surfaces absorb infrared radiation. [6 marks]

Do not write outside the box

Table 3 shows the student's results.

Table 3

Time in minutes	0	1	2	3	4	5
Temperature of plate A in °C	20.0	23.4	26.5	29.2	31.8	34.0
Temperature of plate B in °C	20.0	21.0	21.9	22.8	23.6	24.4

0 8 . 2 Which surface is the better absorber of infrared radiation? [2 marks]

Give a reason for your answer.

Use data from **Table 3**.

Surface .....

Reason

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0 8 . 3 The mass of plate **A** is 0.080 kg [3 marks]

The specific heat capacity of the metal is 900 J/kg °C

Calculate the mean rate at which energy was transferred to the thermal energy store of plate **A** during the 5 minutes

Use the Physics Equations Sheet.

Mean rate = ... W

0 8 . 4 The rate of temperature increase of plate **A** decreased during the investigation. [1 mark]

Suggest why.

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Turn over for the next question

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0 9 The Sun is a star.

0 9 . 1 Describe the life cycle of a star with the same mass as the Sun. [6 marks]

Your answer should include how the star forms and why it is stable for billions of years.

Do not write outside the box

0 9 . 2 Elements heavier than iron are found on the Earth. [1 mark]

Where were these elements produced?

Tick (✓) **one** box.

- In the core of the Sun ☐
- In a comet ☐
- In a supernova ☐
- During the Big Bang ☐

Table 4 gives information about the Moon and three artificial satellites that orbit the Earth.

Table 4

Object	Radius of orbit in km	Orbital speed in km/s
Weather satellite	7 000	7.5
Navigation satellite	28 000	3.8
Communications satellite	42 000	3.1
The Moon	384 000	1.0

0 9 . 3 A student suggests that the orbital speed is inversely proportional to the radius of the orbit. [2 marks]

Use data from **Table 4** to show that the student is **not** correct.

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0 9 . 4 A satellite moves in a circular orbit at a constant speed. [2 marks]

Explain why its velocity is continually changing.

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Turn over for the next question

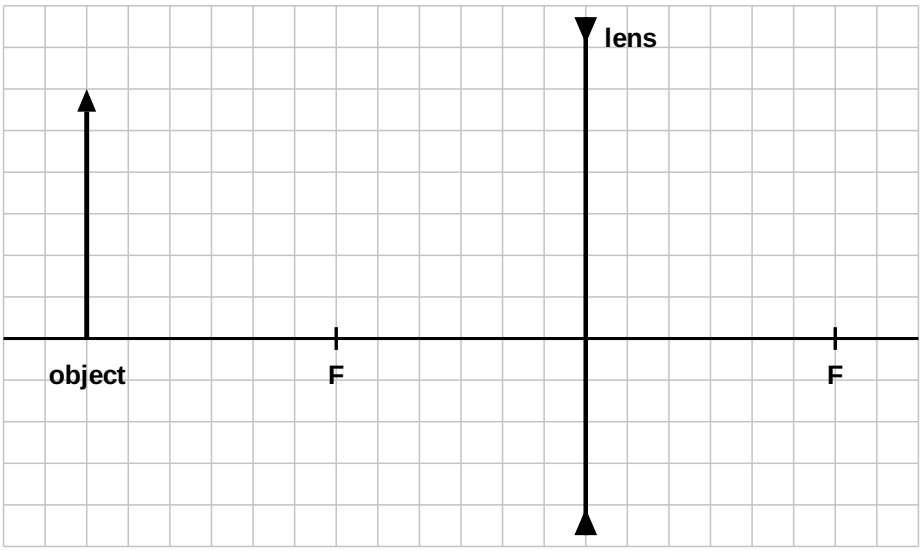
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1 0 **Figure 13** shows an object and a concave lens.

Each point marked F is a principal focus of the lens.

Figure 13



1 0 . 1 Complete the ray diagram to show how the lens forms an image of the object. [3 marks]

Draw an arrow to show the image.

1 0 . 2 Describe **two** properties of the image. [2 marks]

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1 0 . 3 Determine the magnification produced by the lens. [2 marks]

Use **Figure 13**.

Use the Physics Equations Sheet.

Magnification = ...

Question 10 continues on the next page

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A student looks at a green leaf through a red filter. The leaf is in white light.

1 0 . 4 The leaf looks black. [3 marks]

Explain why.

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1 0 . 5 The wavelength of the red light is 7.0×10^{-7} m [2 marks]

The speed of light in air is 3.0×10^{8} m/s

Calculate the frequency of the red light.

Frequency = ... Hz

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Turn over for the next question

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1 1 The mass of a car is 1200 kg

The driver brakes and the car stops.

Table 5 shows the braking distance of the car at different speeds.

Table 5

Speed in m/s	10	20	30
Braking distance in m	7.5	30.0	67.5

1 1 . 1 Calculate the mean braking force on the car when it stops from a speed of 20 m/s [4 marks]

Use data from **Table 5**.

Mean braking force = ... N

1 1 . 2 A student said: [3 marks]

'The braking distance of the car is directly proportional to its speed.'

Evaluate the student's statement.

Use data from **Table 5**.

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END OF QUESTIONS

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There are no more questions in this paper. Original practice paper © sciencegcse.co.uk – free to use for non-commercial education. Not an AQA paper.

Physics Equations Sheet

GCSE Physics – Practice Paper Series, Set 2

You may use these equations in your answers. HT = Higher Tier only equations. The equations are those listed in the AQA specification; this sheet is provided by sciencegcse.co.uk and is not an AQA document.

		Word equation	Symbol equation
1		kinetic energy = 0.5 × mass × (speed)^2	$E_k = \frac{1}{2} m v^2$
2		elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2} k e^2$
3		gravitational potential energy = mass × gravitational field strength × height	$E_p = m g h$
4		change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta\theta$
5		power = energy transferred ÷ time	$P = E / t$
6		power = work done ÷ time	$P = W / t$
7		efficiency = useful output energy transfer ÷ total input energy transfer	
		efficiency = useful power output ÷ total power input	
8		charge flow = current × time	$Q = I t$
9		potential difference = current × resistance	$V = I R$
10		power = potential difference × current	$P = V I$
11		power = (current)^2 × resistance	$P = I^2 R$
12		energy transferred = power × time	$E = P t$
13		energy transferred = charge flow × potential difference	$E = Q V$
14		density = mass ÷ volume	$\rho = m / V$
15		thermal energy for a change of state = mass × specific latent heat	$E = m L$
16		pressure × volume = constant (for gases)	$p V$ = constant
17		weight = mass × gravitational field strength	$W = m g$
18		work done = force × distance (along the line of action of the force)	$W = F s$
19		force = spring constant × extension	$F = k e$
20		moment of a force = force × distance (normal to direction of force)	$M = F d$
21		pressure = force normal to a surface ÷ area of that surface	$p = F / A$
22	**HT**	pressure due to a column of liquid = height of column × density of liquid × gravitational field strength	$p = h \rho g$
23		distance travelled = speed × time	$s = v t$
24		acceleration = change in velocity ÷ time taken	$a = \Delta v / t$
25		(final velocity)^2 − (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2 a s$
26		resultant force = mass × acceleration	$F = m a$
27	**HT**	momentum = mass × velocity	$p = m v$
28	**HT**	force = change in momentum ÷ time taken	$F = m \Delta v / \Delta t$
29		period = 1 ÷ frequency	$T = 1 / f$
30		wave speed = frequency × wavelength	$v = f \lambda$
31		magnification = image height ÷ object height	
32	**HT**	force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length	$F = B I l$
33	**HT**	potential difference across primary coil ÷ potential difference across secondary coil = number of turns in primary coil ÷ number of turns in secondary coil	$V_p / V_s = n_p / n_s$
34	**HT**	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_p I_p = V_s I_s$