Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number | | | | | |

Candidate Number | | | | |

Mock Set 2 – Autumn 2018

(Time: 1 hour 45 minutes) | Paper Reference **1PH0/2H**

Physics

Paper 2

Higher Tier

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an **asterisk (*)**, marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.
- A list of equations is included at the end of this exam paper.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 (a) Figure 1 shows three gears.

Gear R is rotating clockwise.

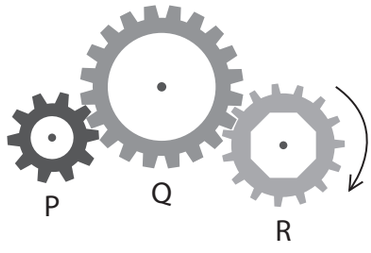


Figure 1

Gear P will rotate

(1)

☒ **A** clockwise and faster than gear R

☒ **B** clockwise and slower than gear R

☒ **C** anticlockwise and faster than gear R

☒ **D** anticlockwise and slower than gear R

(b) (i) State the equation that can be used to calculate the moment of a force.

(1)

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Figure 2 shows a spanner turning a nut.

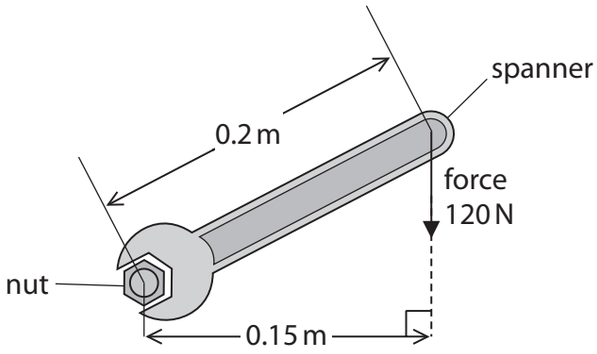


Figure 2

(ii) Calculate the moment of the 120 N force applied to the nut in Figure 2.

(2)

moment of force = ... Nm

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(c) Figure 3 shows one type of weighing machine.

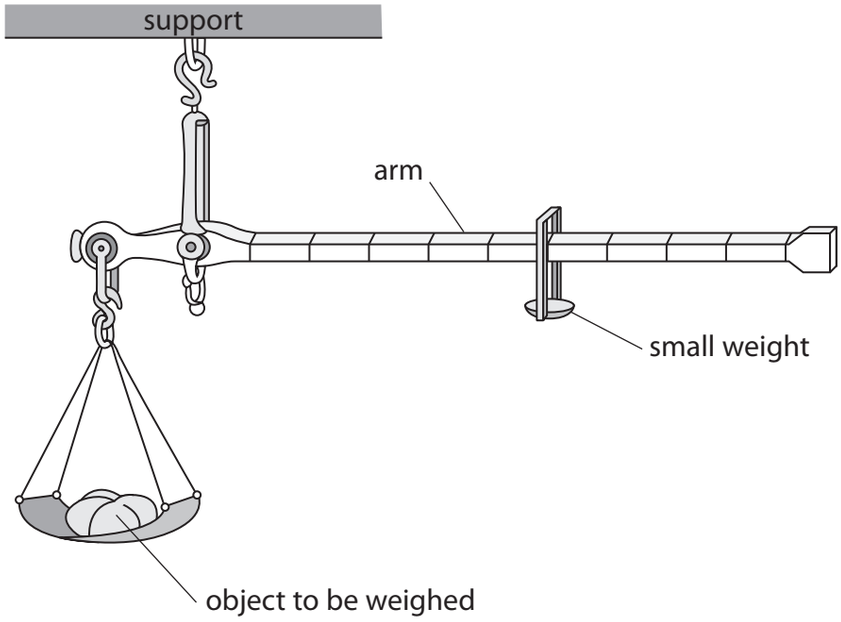


Figure 3

The small weight is moved along the arm until the arm is perfectly horizontal.

Explain how this illustrates the principle of moments.

(2)

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2 (a) Figure 4 shows three resistors R_1, R_2 and R_3 connected to a power supply.

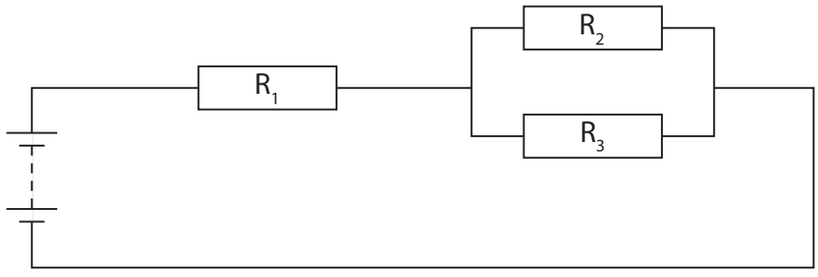


Figure 4

The current in R_2 will **always** be

(1)

☒ **A** less than the current in R_1

☒ **B** less than the current in R_3

☒ **C** the same as the current in R_3

☒ **D** the same as the current in R_1

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(b) Figure 5 shows a power supply connected to an 82 Ω resistor and a variable resistor.

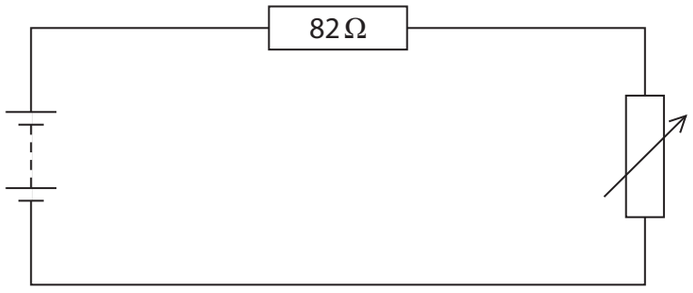


Figure 5

(i) The potential difference across the 82 Ω resistor is 6.0 V.

Calculate the current in the circuit.

(3)

current = ... A

(ii) Describe how a student could add meters to the circuit so that the current in the 82 Ω resistor and the potential difference across the 82 Ω resistor can be measured.

You may like to draw a new circuit diagram to help with your answer.

(2)

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(c) The student replaces the 82 Ω resistor in the circuit with two different resistors as shown in Figure 6.

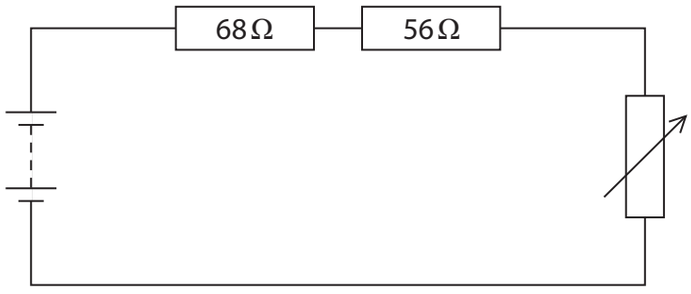


Figure 6

The student adjusts the current to be 0.030 amps.

Calculate the **total** potential difference across the 68 Ω and 56 Ω resistors combined.

(3)

potential difference = ... V

(Total for Question 2 = 9 marks)

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3 (a) (i) Thermal energy is needed to change the state of a substance from solid to liquid.

Calculate the thermal energy needed to change the state of 3.5 kg of a substance with a specific latent heat 336 000 J/kg.

Use an equation selected from the list of equations at the end of this paper.

(2)

energy = ... J

(ii) Give **one** reason why the change of state from solid to liquid is described as a physical change.

(1)

.....

.....

(b) The kinetic theory describes solids, liquids and gases in terms of particles.

The table in Figure 7 gives the density of various substances at room temperature.

substance	density in kg/m³
water	1000
lead	11 300
air	1.2

Figure 7

Use the kinetic theory to explain, in terms of particles, the difference in the densities of lead and air.

(2)

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(c) One of the steel nails shown in Figure 8 has a mass of 2.7 g and a volume of 0.31 cm^3.



Figure 8

Calculate the density of the steel.

(2)

density of steel = ... g/cm^3

(d) Describe how the movement of particles in a substance changes as the substance is cooled down towards −273 °C.

(2)

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(Total for Question 3 = 9 marks)

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4 Figure 9 shows a type of printer.

The printer generates a jet of ink-drops.

After the ink-drops leave the generator, they pass through a charging tube.

The charging tube gives each ink-drop an electric charge.

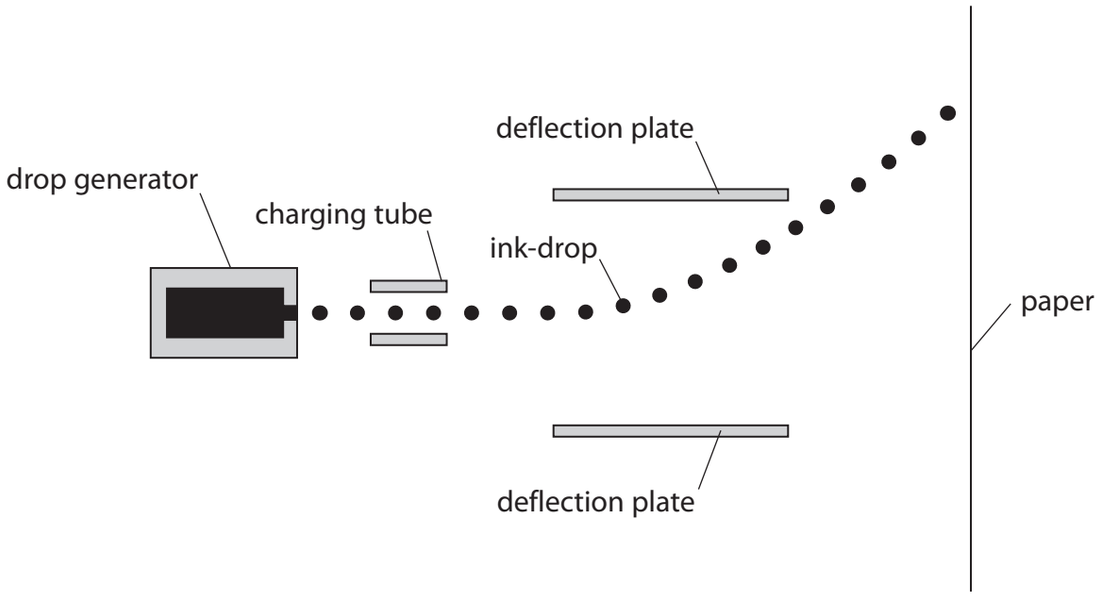


Figure 9

(a) (i) The charging tube gives the drops a positive charge by ionisation.

The charging tube

- ☒ **A** removes protons from each ink-drop
- ☒ **B** adds protons to each ink-drop
- ☒ **C** removes electrons from each ink-drop
- ☒ **D** adds electrons to each ink-drop

(1)

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Figure 10 shows how the deflection plates are connected to a potential difference of 400 V.

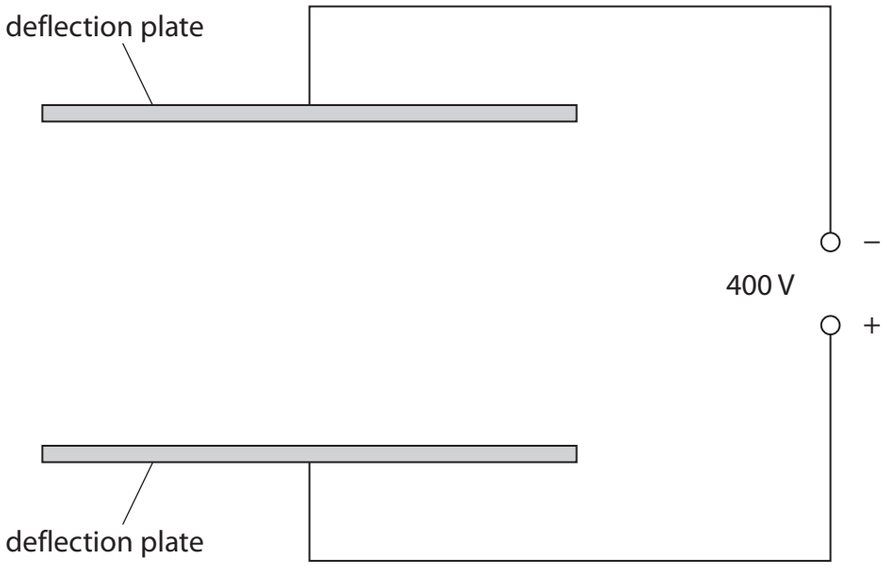


Figure 10

(ii) Draw lines on the diagram in Figure 10 to show the shape and direction of the electric field between the plates.

(2)

(iii) Figure 9 shows that the drops change direction as they travel between the plates.

Explain why the drops follow a curved path as they travel between the plates.

(2)

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(iv) The time taken to charge one ink-drop is 2.0×10^{-6} s.

The current that charges the ink-drop is 9×10^{-5} A.

Calculate the charge given to the ink-drop.

(2)

charge = ... C

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(b) A student rubs a balloon with a cloth.

This gives the balloon a positive charge.

The balloon is then placed against a wall.

The balloon sticks to the wall as shown in Figure 11.

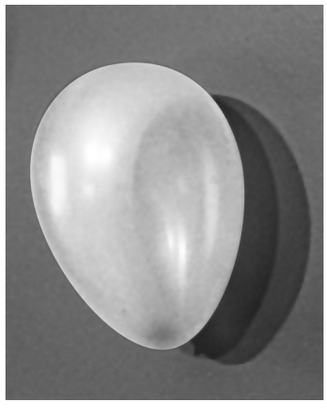


Figure 11

Explain, in terms of the movement of electrons, why the balloon sticks to the wall.

(4)

(Total for Question 4 = 11 marks)

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5 (a) A student investigates how the extension of a spring changes when different weights are hung from one end.

Figure 12 shows the student's apparatus.

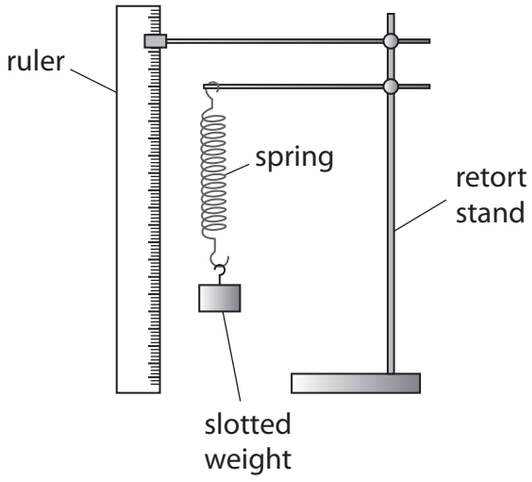
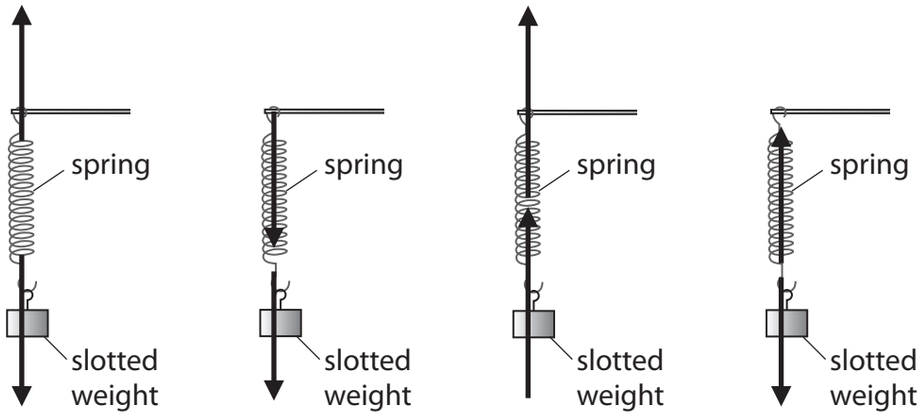


Figure 12

Which diagram correctly shows the forces acting on the spring?

(1)



☒ **A** ☒ **B** ☒ **C** ☒ **D**

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(b) Figure 13 is a graph showing the extension of the spring for weights between 0 N and 4 N.

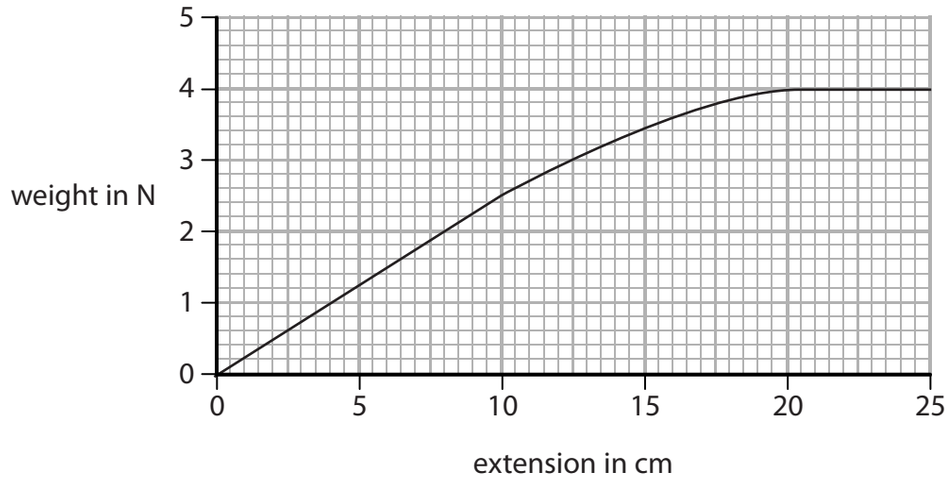


Figure 13

(i) Calculate the spring constant, using information from the graph, in the weight range 0 N and 2.5 N.

(3)

spring constant = ... N/m

(ii) Describe how the extension of the spring changes as the weight increases from 0 N to 4 N.

(2)

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(c) A different spring is stretched.

The work done to stretch this spring is 4.2 J.

This spring has a spring constant of 23 N/m.

Calculate the extension of this spring.

Use an equation selected from the list of equations at the end of this paper.

(3)

extension = ... m

(Total for Question 5 = 9 marks)

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6 (a) A student is given a coil of wire, a permanent magnet and a sensitive ammeter.

Describe how the student could use this apparatus to show that a current can be induced in the coil of wire.

(2)

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(b) Figure 14 shows a moving coil microphone producing an electrical signal from a sound.



Figure 14

(i) Explain how the microphone produces this electrical signal.

(3)

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(ii) The average electrical power output from the microphone is measured.

The amplitude of the sound is increased but the frequency of the sound stays the same.

Explain why the electrical power output from the microphone increases.

(3)

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(c) The primary coil of a transformer has 500 turns.

The secondary coil of the transformer has 43 turns.

The primary coil of the transformer is connected to the 230 V a.c. mains supply.

Calculate the voltage across the secondary coil of the transformer.

Use an equation selected from the list of equations at the end of this paper.

(3)

voltage = ... V

(Total for Question 6 = 11 marks)

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7 (a) A student investigates how the current in and brightness of a filament lamp change when different numbers of batteries are connected to the lamp.

The student's results are shown in Figure 15.

number of batteries	current in mA
1	60
2	83
3	91

Figure 15

Explain what these results show about the changes in the filament as the current increases.

(3)

(b) The student decides to use a light dependent resistor (LDR) to get a measure of the change in the brightness of the lamp as the number of batteries is varied.

The student uses an arrangement shown in Figure 16.

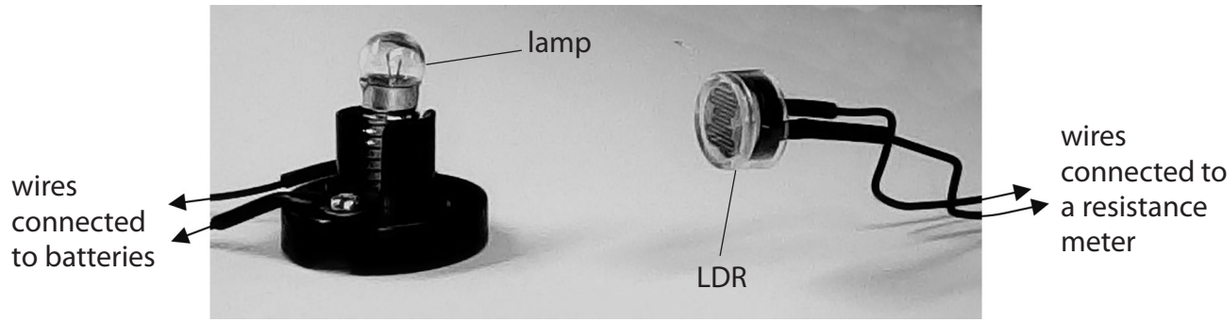


Figure 16

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Figure 17 shows some of the results.

number of batteries connected to the lamp	resistance of LDR in Ω
1	600
2	580
3	520

Figure 17

(i) State what the resistance readings show about the properties of an LDR.

(1)

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.....

(ii) The student thinks that these results do not give a good indication of the change in brightness of the lamp.

Explain **one** way that the student could improve the experiment with the LDR to give a better indication of the change in brightness of the lamp.

(3)

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(c) Describe how the student could develop the investigation by using an electrical circuit to get a measure of the temperature just above the surface of the lamp.

(3)

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(Total for Question 7 = 10 marks)

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8 (a) Figure 18 shows four plotting compasses on a piece of cardboard.

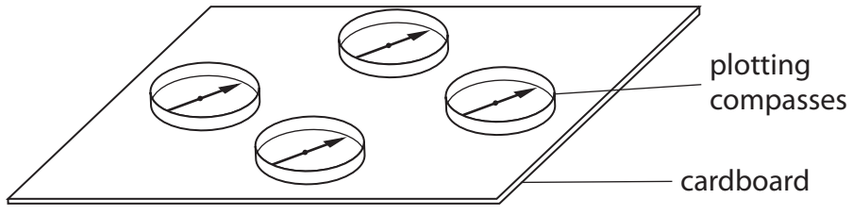


Figure 18

(i) State the reason why the four compass needles all point in the same direction.

(1)

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(ii) In Figure 19 a long wire goes through the centre of the piece of cardboard.

The wire is carrying a large electric current downwards.

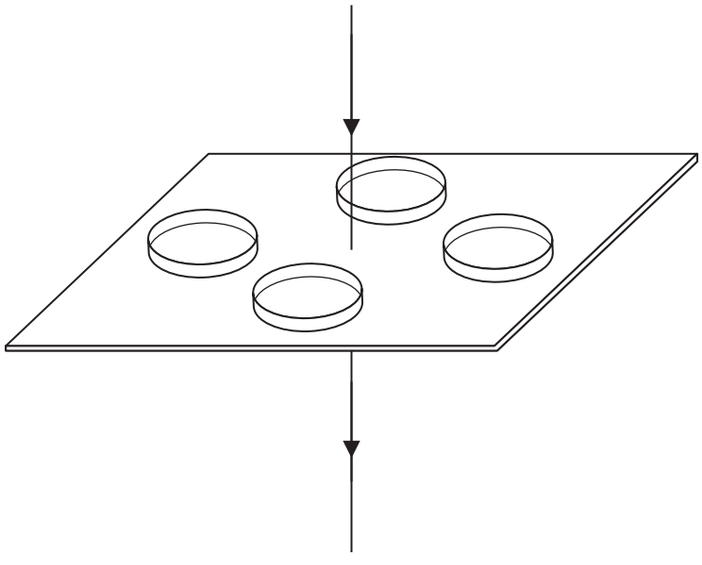


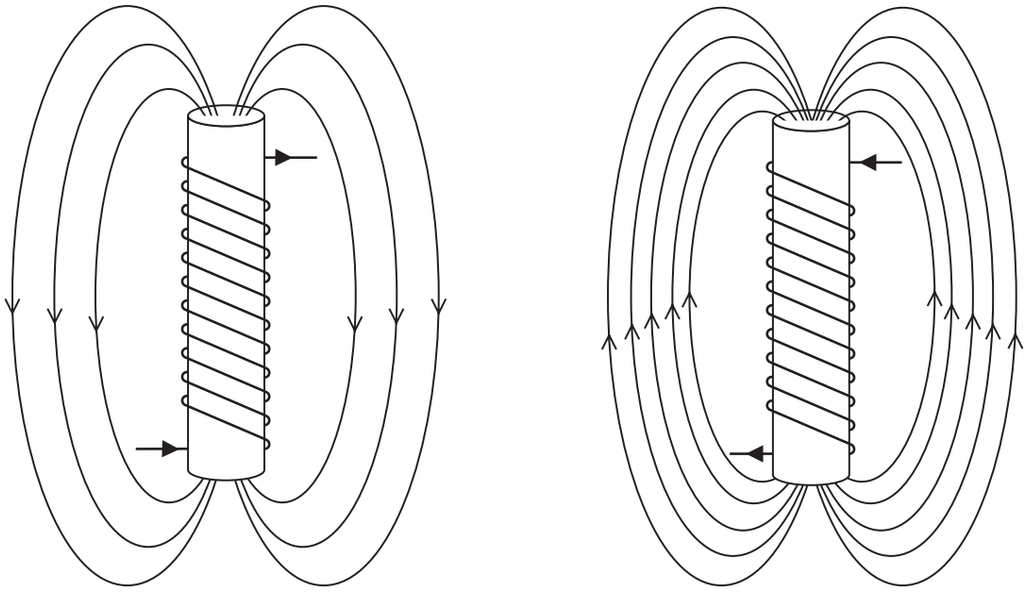
Figure 19

Draw arrows on Figure 19 to show the new directions of the four compass needles.

(2)

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(b) Figure 20 shows the magnetic field around solenoid P and the magnetic field around solenoid Q.



P Q

Figure 20

Explain the difference between the two magnetic fields.

(3)

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(c) Figure 21 shows a wire between the poles of a magnet.

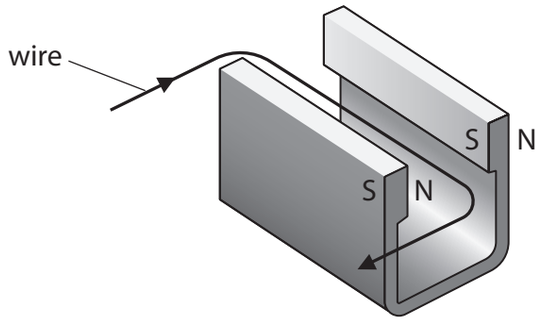


Figure 21

The wire is carrying a current of 0.30 A.

The strength of the magnetic field between the poles is 0.65 N/A m.

The length of the wire inside the magnetic field is 0.20 m.

(i) Calculate the size of the force acting on the wire.

Use an equation selected from the list of equations at the end of this paper.

(2)

force = ... N

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(ii) Describe the magnitude and direction of the forces between the wire and the magnet.

(3)

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(Total for Question 8 = 11 marks)

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9 (a) A block of wood floats in a liquid because of the upthrust acting on the block.

(1)

The magnitude of the upthrust is equal to the

☒ **A** density of the liquid

☒ **B** pressure of the liquid

☒ **C** volume of the block of wood

☒ **D** weight of the block of wood

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(b) Figure 22 shows a ship that carries containers around the world.



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Figure 22

Figure 23 shows a simple cross-section through the ship floating on the sea before it is loaded with containers.

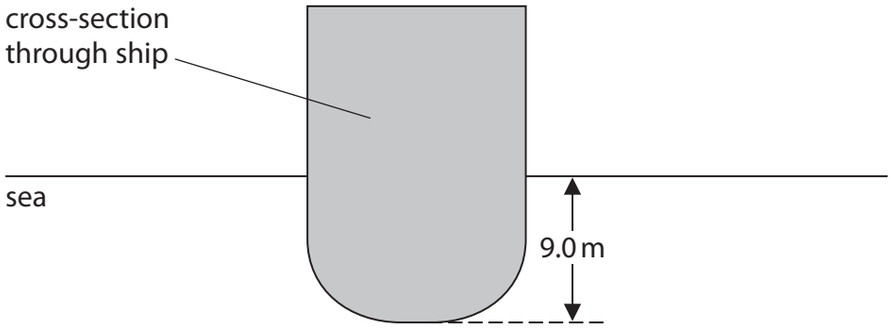


Figure 23

The bottom of the ship is 9 m below the surface of the sea.

(i) Calculate the pressure on the bottom of the ship due to the seawater.

The density of the seawater is 1025 kg / m^3.

Use an equation selected from the list of equations at the end of this paper.

(2)

pressure = ... Pa

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(ii) Figure 24 shows an enlarged view of the bottom of the ship.

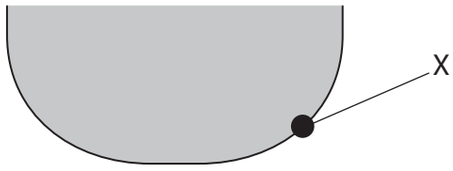


Figure 24

Add an arrow to Figure 24 to show the direction of the force at X resulting from the pressure of the seawater on the ship.

(1)

(iii) The ship is loaded by adding containers to the ship.

Explain how the change in how much of the ship is below the waterline is related to the weight of the containers added.

(2)

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*(c) The graph in Figure 25 shows how the density of seawater changes with the temperature of the water.

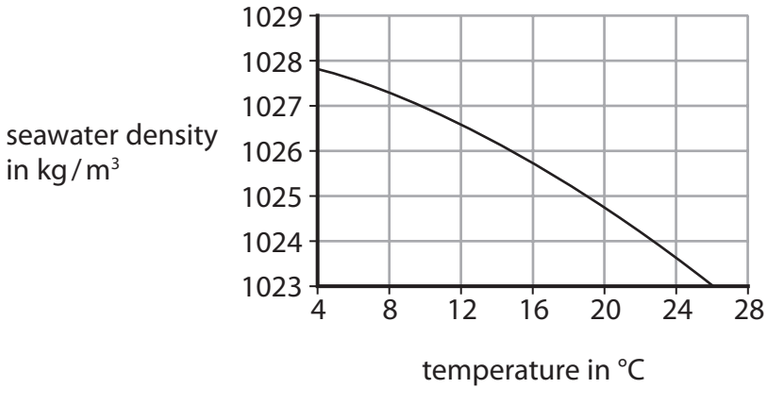


Figure 25

Explain why the maximum load the ship can carry in **cold** seawater is different from the maximum load which the same ship can safely carry in **warm** seawater.

(6)

(Total for Question 9 = 12 marks)

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10 (a) A wooden block of weight 5 N is pulled along a horizontal table for a distance of 50 cm by a force of 3 N.

(1)

How much work is done?

☒ **A** 250 J

☒ **B** 150 J

☒ **C** 2.5 J

☒ **D** 1.5 J

(b) An electric motor is used to lift a weight of 26 N.
The gravitational potential energy of the weight changes by 180 J.

(i) Calculate the distance by which the weight rises.

(2)

distance = ... m

(ii) The input power of the electric motor is 60 W.
The system is 50% efficient when lifting the weight.
Calculate the time it takes for the motor to lift the weight.

(3)

time = ... s

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*(c) A student wants to determine the useful power developed when a person does a physical activity.

Explain the measurements that should be taken during a suitable physical activity and how the measurements should be used to determine the useful power developed by the person doing the physical activity.

(6)

(Total for Question 10 = 12 marks)

TOTAL FOR PAPER = 100 MARKS

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Equations

(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance $v^2 - u^2 = 2 \times a \times x$
force = change in momentum ÷ time $F = \frac{(mv - mu)}{t}$
energy transferred = current × potential difference × time $E = I \times V \times t$
force on a conductor at right angles to a magnetic field carrying a current = magnetic flux density × current × length $F = B \times I \times l$
$\frac{\textit{voltage across primary coil}}{\textit{voltage across secondary coil}} = \frac{\textit{number of turns in primary coil}}{\textit{number of turns in secondary coil}}$ $\frac{V_p}{V_s} = \frac{N_p}{N_s}$
potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil $V_p \times I_p = V_s \times I_s$
change in thermal energy = mass × specific heat capacity × change in temperature $\Delta Q = m \times c \times \Delta\theta$
thermal energy for a change of state = mass × specific latent heat $Q = m \times L$
to calculate pressure or volume for gases of fixed mass at constant temperature $P_1 V_1 = P_2 V_2$
energy transferred in stretching = 0.5 × spring constant × (extension)^2 $E = ½ \times k \times x^2$
pressure due to a column of liquid = height of column × density of liquid × gravitational field strength $P = h \times \rho \times g$

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