

Physics Paper 2 for All Boards

- ① Complete the table below to show if the forces are contact or non-contact forces. The first one has been done for you. (4 marks)

Force Type	Contact Force	Non-contact Force
Upthrust	✓	
Friction		
Gravity		
Air resistance		
Electrostatic		

- ② a Choose the correct unit for gravitational field strength. (1 mark)

N
kg/m ³
N/kg
kgm/s

- b Choose the correct unit for acceleration. (1 mark)

m/s
m/s ²
/m ²
kgm/s

- c Choose the vector example from the following. (1 mark)

Force
Energy
Speed
Distance

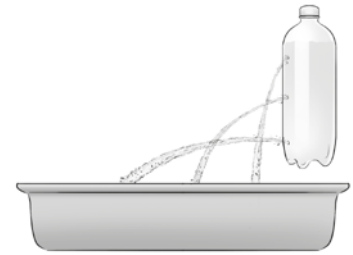
- d Choose a unit that can be used for work done. (1 mark)

Nm
N/m
N/m ²
kgm/s

- 3 a State the formula that describes how pressure difference in a liquid can be calculated when there is a change in depth. (1 mark)

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- b Explain why the water spurts out further at the bottom of the container shown in the image to the right. (3 marks)



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- c A scuba diver is diving in open water.



The density of the water is 1027 kg/m^3 .

The gravitational field strength is 10 N/kg .

- i The diver descends from the surface to a depth of 25 m.

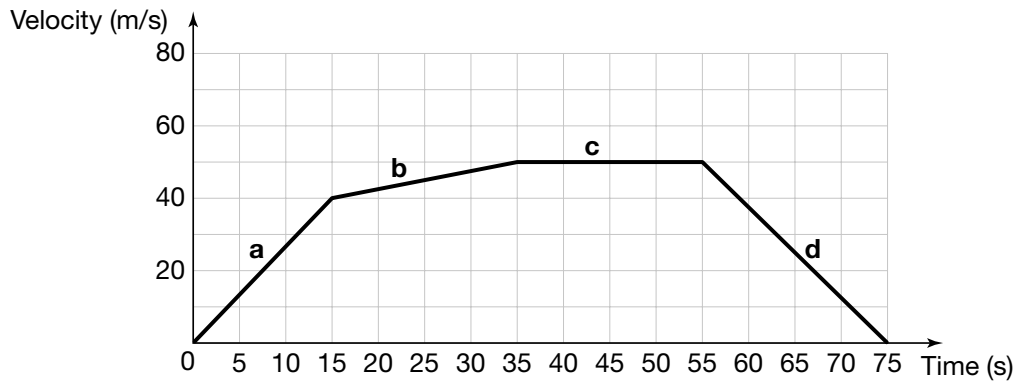
Calculate the increase in pressure on her body at the depth of 25 m. (3 marks)

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- ii How deep would the diver have to descend for the pressure to increase to 22 kPa? (4 marks)

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- 4 A car goes on a journey. The following velocity–time graph is made of a short part of the journey.



Use the graph to:

- a Calculate the total distance travelled in parts a and b of the journey. (4 marks)

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- b Calculate the acceleration during part b. (3 marks)

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- c Describe the car's motion in part c. (1 mark)

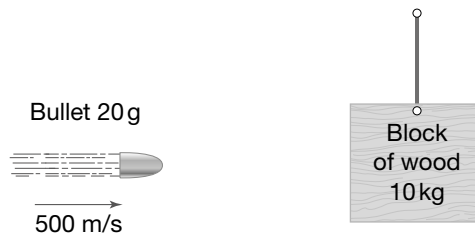
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- d Without calculation describe the car's motion in part d. (1 mark)

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- 5 A bullet of mass 20 g is fired into a block of wood of mass 10 kg. The block is suspended from a piece of string.



- a Calculate the momentum of the bullet before it hits the block. (2 marks)

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- b When the bullet hits the block it becomes embedded in it.

Use the principle of conservation of momentum and assume the bullet and block form part of a closed system to calculate the velocity of the block of wood and bullet just after the impact. (3 marks)

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- c Calculate the kinetic energy of the block of wood with the bullet in it just after impact. (3 marks)

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- d Assume energy is conserved in the collision. Shifts in energy take place only from kinetic to gravitational stores. Calculate how high up the block will swing. (3 marks)

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- ⑥ A car of mass 1000 kg is travelling at 20 m/s.
 The car crashes into a tree, and comes to a complete halt in 0.05 s.
 Calculate the force acting on the car during the collision. (5 marks)



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- ⑦ Ultrasound waves can be used for medical imaging.
 A transducer is a device that can be used in this application.



- a Explain how ultrasound and a transducer can be used in pre-natal scanning. (6 marks)

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b Explain why ultrasound is more suitable than X-ray for pre-natal scanning. (4 marks)

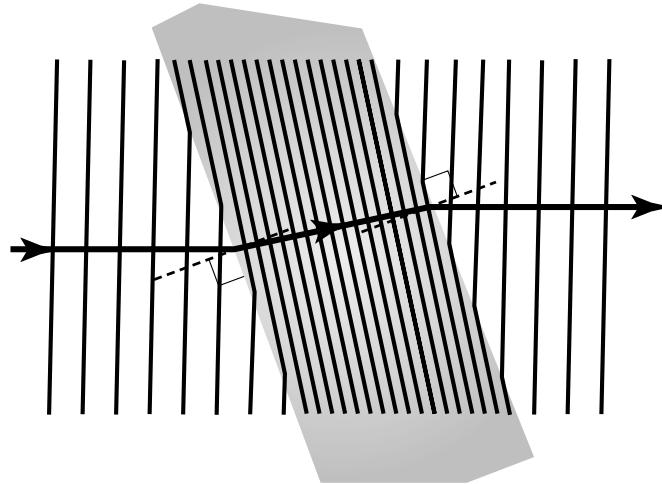
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8 The following diagram shows a light ray entering a glass block. The wave fronts of light have also been shown.



Explain what changes take place for the light wave when it enters the block. (4 marks)

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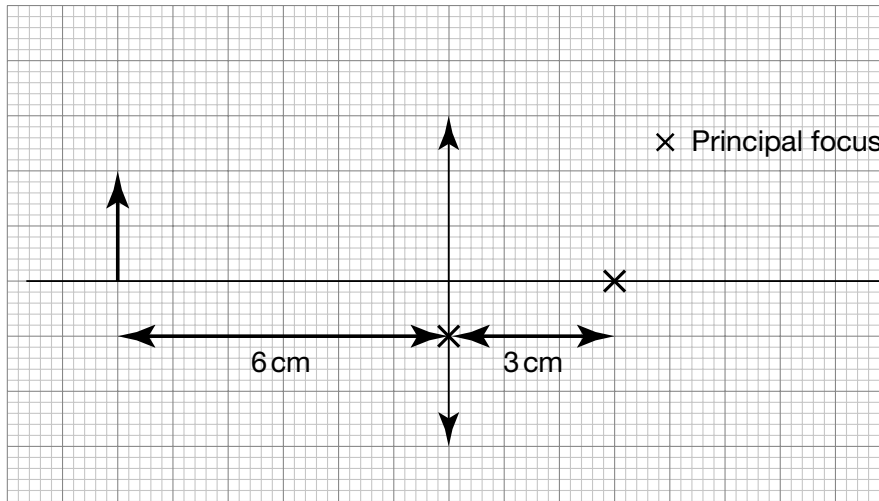
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9 An object is placed 8 cm from a lens. The lens has a focal length of 8 cm.

a Complete the ray diagram to show the image formation. (5 marks)



b State the type of lens used. (1 mark)

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c State the type of image that is formed. (1 mark)

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d Determine the magnification of the image. (1 mark)

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10 A student wishes to observe the magnetic field of a magnet using a plotting compass, a piece of paper and a pencil. Write a short method they can use to carry out this task. (6 marks)

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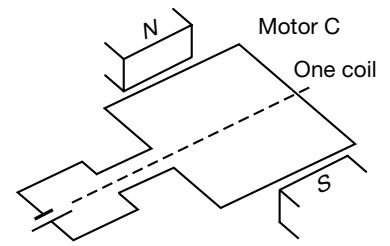
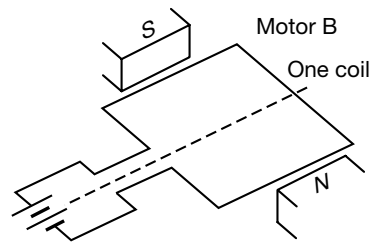
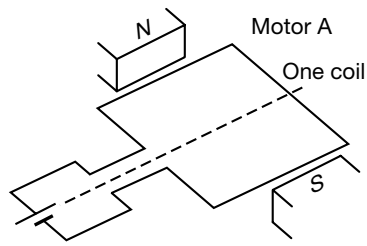
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11 The following diagrams show simple dc motors.



Motor A rotates anticlockwise.

a Which way will motor B rotate? (1 mark)

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b Which way will motor C rotate? (1 mark)

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c Will all the motors rotate at the same speed? Explain your answer. (3 marks)

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d What other modifications could be made to the motors to change the speed of the motors' rotation? (2 marks)

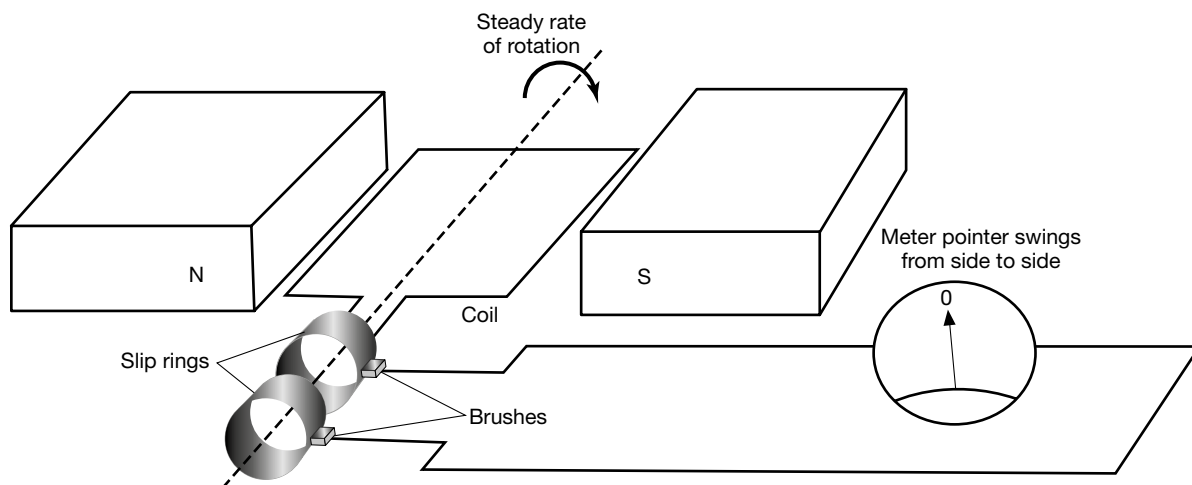
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- 12 The diagram below shows an alternating current (ac) generator. The coil is made to rotate by an external force at a steady speed. In the diagram the coil is parallel to the magnetic field lines of the magnet.

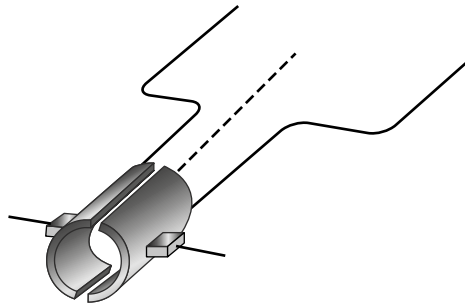


- a Using the axes below, sketch a trace to show how potential difference varies with time for at least one cycle of the ac generator. Label this potential difference 1. (2 marks)



- b Mark on your graph with an x the points where the coil is at right angles to the magnetic field lines. (2 marks)
- c The steady speed is increased to twice the original speed. Sketch a trace of how potential difference varies with time on the same graph above. Label this trace potential difference 2. (2 marks)

- d The two slip rings are now replaced with a split-ring commutator as seen in the diagram below.



The coil rotates at a steady speed.

Use the axes below to sketch the voltage waveform that is produced. (2 marks)



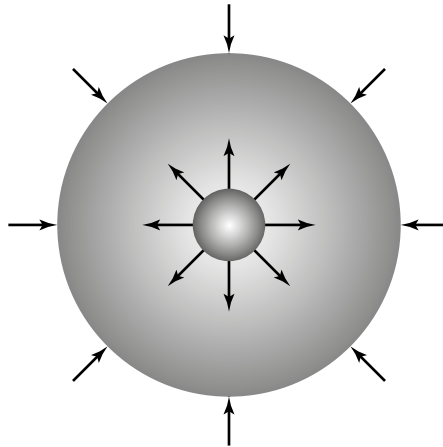
- e Explain the main difference between the output with slip rings and a split-ring commutator. (2 marks)

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13 Below is a diagram of the forces acting on the Sun.



The Sun is currently in a stable state where two forces are balanced.

At this stage it is called a main-sequence star and this will last for several billion years.

a State the two forces that are balanced in our Sun. (2 marks)

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b State the next stage in our Sun's life cycle after being a main-sequence star.

Explain why this next stage will happen. (3 marks)

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c Explain how the life cycle is different for a star much bigger than our Sun. (6 marks)

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