

Hydraulics

Question Paper

Level	GCSE
Subject	Physics
Exam Board	AQA
Unit	P3
Topic	Hydraulics
Difficulty Level	Gold Level
Booklet	Question Paper

Time Allowed: 21 minutes

Score: /21

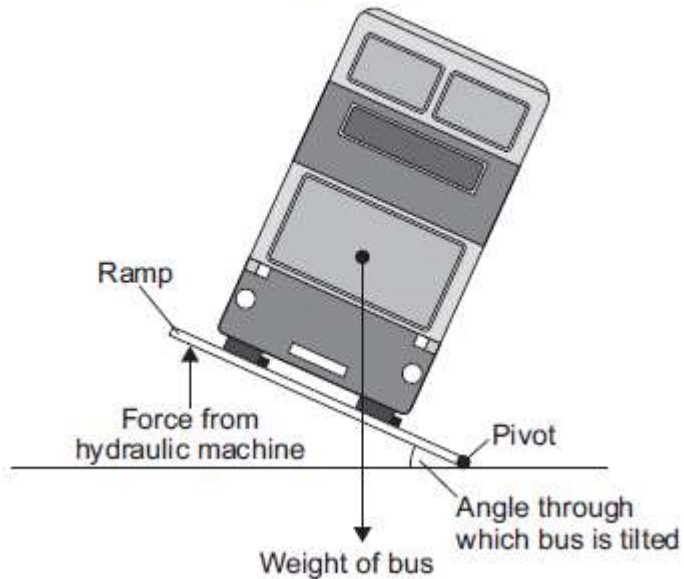
Percentage: /100

Q1. Before a new bus can be used on the roads, it must pass a stability test.

Figure 1 shows how the bus is tested.

Figure 1

Front view



(a) (i) The bus will topple over if the ramp is tilted at too great an angle.

Explain why.

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(2)

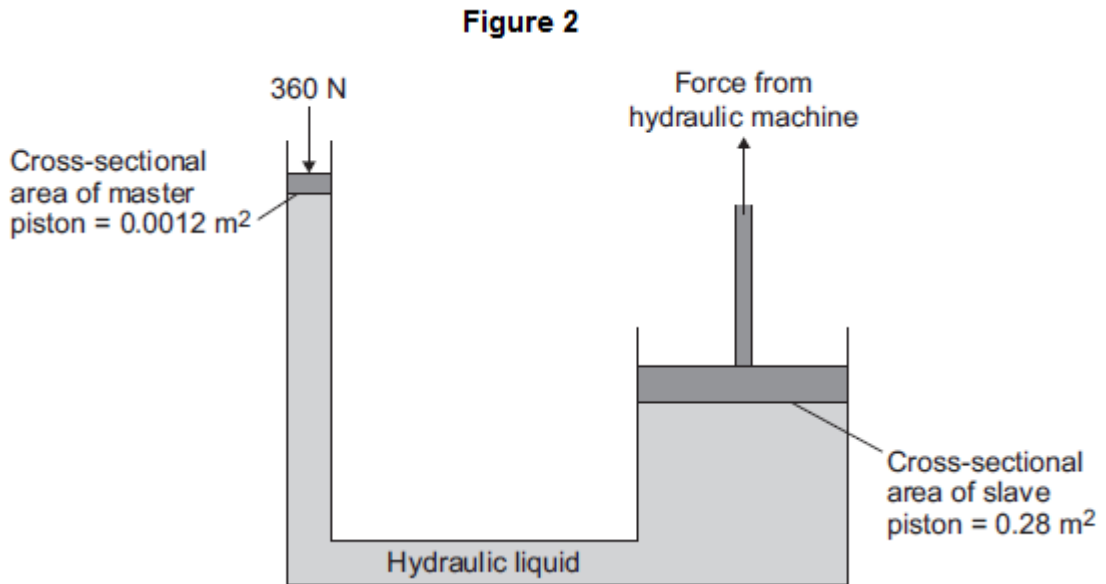
(ii) The bus is tested to angles of tilt far greater than it would experience in normal use.

Suggest **two** reasons why.

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2.....
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(2)

- (b) **Figure 2** shows the hydraulic machine that is used to make the ramp tilt.



The pressure applied to the hydraulic liquid at the master piston is the same as the pressure applied by the hydraulic liquid to the slave piston.

- (i) State the property of the liquid that keeps the pressure at both pistons the same.

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(1)

- (ii) A 360 N force acts on the master piston.

Use information from **Figure 2** to calculate the force applied by the hydraulic liquid to the slave piston.

Use the correct equation from the Physics Equations Sheet

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Force = N

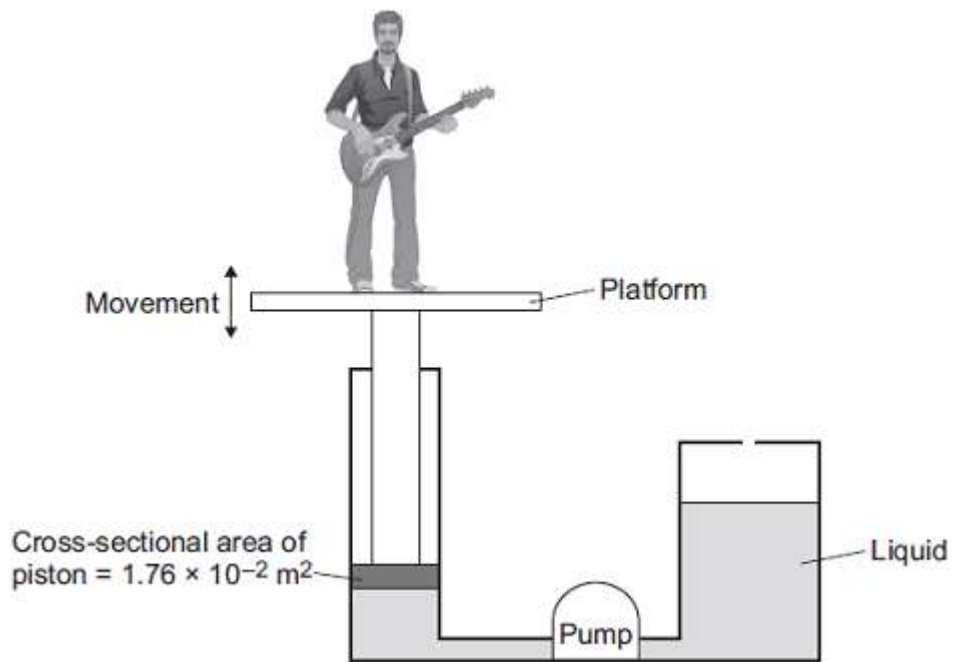
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(Total 8 marks)

Q2. Musicians sometimes perform on a moving platform.

Figure 1 shows the parts of the lifting machine used to move the platform up and down.

Figure 1



(a) What type of system uses a liquid to transmit a force?

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(1)

(b) The pump creates a pressure in the liquid of $8.75 \times 10^4 \text{ Pa}$ to move the platform upwards.

Calculate the force that the liquid applies to the piston.

Use the correct equation from the Physics Equations Sheet.

.....

Force = N

(2)

- (c) The liquid usually used in the machine is made by processing oil from underground wells. A new development is to use plant oil as the liquid.

Extracting plant oil requires less energy than extracting oil from underground wells.

Suggest an environmental advantage of using plant oil.

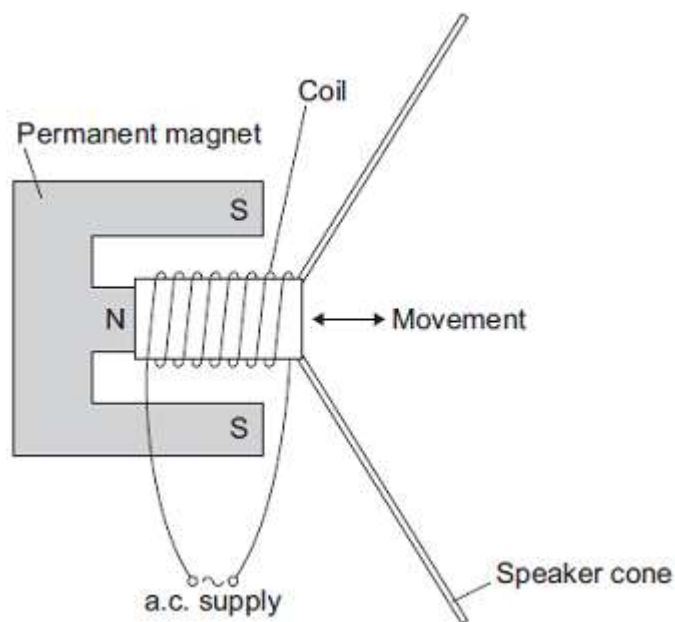
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(1)

- (d) Musicians often use loudspeakers.

Figure 2 shows how a loudspeaker is constructed.

Figure 2



The loudspeaker cone vibrates when an alternating current flows through the coil.

Explain why.

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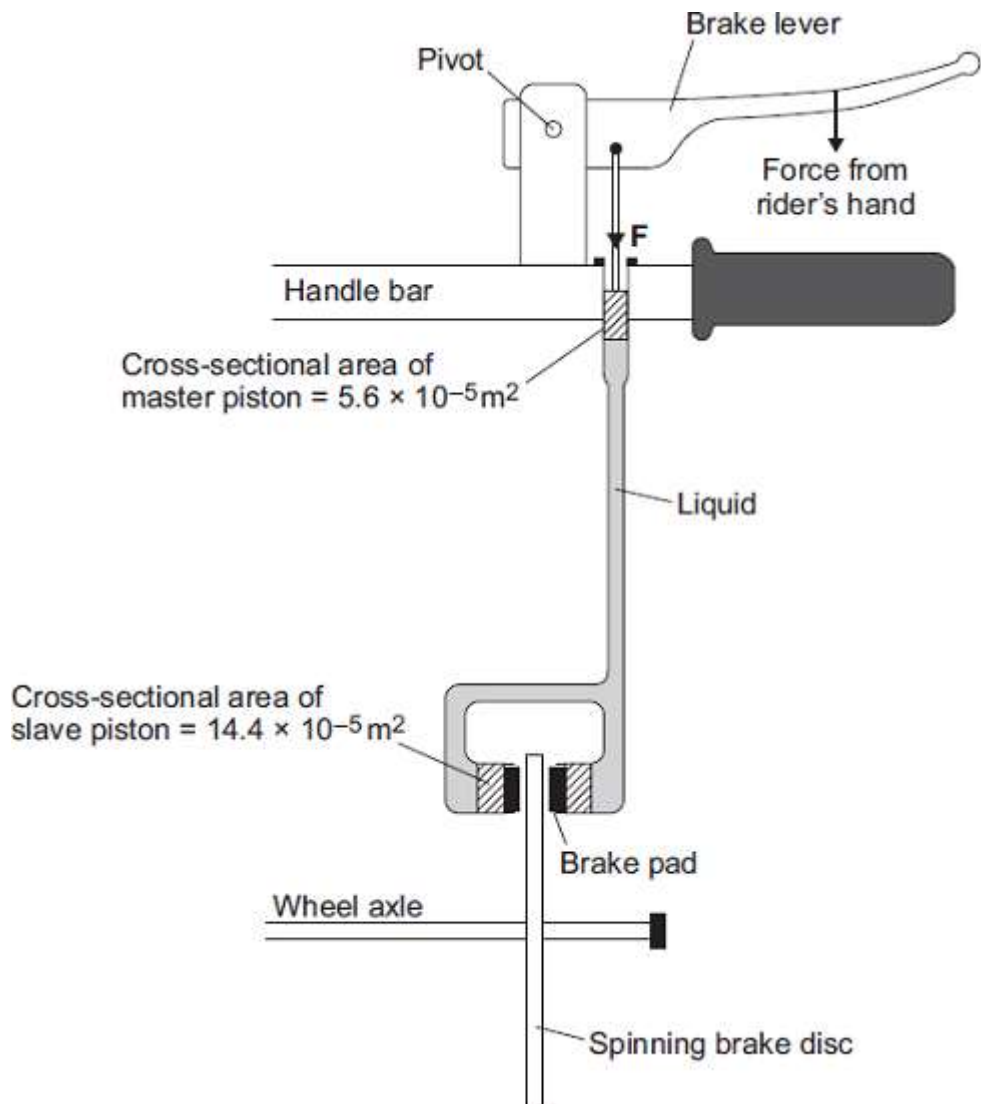
(4)
(Total 8 marks)

Q3.Mountain bike riders use brakes to slow down.



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Some mountain bikes have hydraulic brakes.



(a) What property of a liquid enables a hydraulic brake system to work?

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(1)

(b) When the rider's hand pulls on the brake lever, the master piston applies a pressure of 1.5×10^6 pascals to the liquid.

Using information from the diagram, calculate the force F exerted on the liquid by the master piston.

Use the correct equation from the Physics Equations Sheet.

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Force **F** = N

(2)

(c) The pressure in the liquid applies a force to move each slave piston.

How does the size of this force compare to the force **F** applied by the master piston?

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Give a reason for your answer.

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(2)

(Total 5 marks)