Pressure

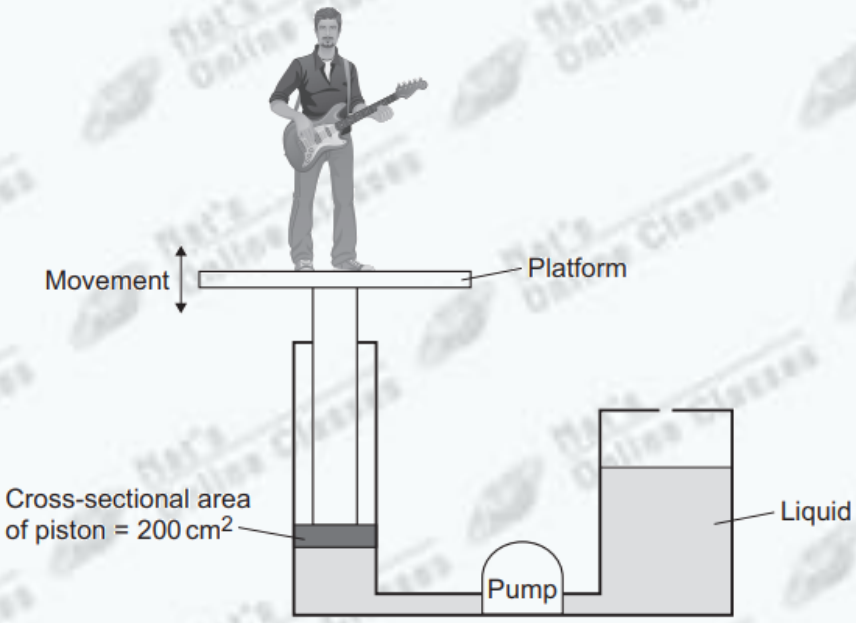
Total Mark- 14

Question: 1

5 Musicians sometimes perform on a moving platform.

Figure 9 shows the parts of the lifting machine used to move the platform up and down.

Figure 9



5 (a) What name is given to a system that uses liquids to transmit forces?

Draw a ring around the correct answer.

[1 mark]

electromagnetic **hydraulic** **ionising**

5 (b) To move the platform upwards, the liquid must cause a force of 1800 N to act on the piston.

The cross-sectional area of the piston is 200 cm^2.

Calculate the pressure in the liquid, in N/cm^2, when the platform moves.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

.....

.....

.....

Pressure = ... N/cm^2

5 (c) A new development is to use oil from plants as the liquid in the machine.

Growing plants and extracting the oil requires **less energy** than producing the liquid usually used in the machine.

Draw a ring around the correct answer to complete the sentence.

[1 mark]

Using the oil from the plants gives

an environmental
an ethical
a social

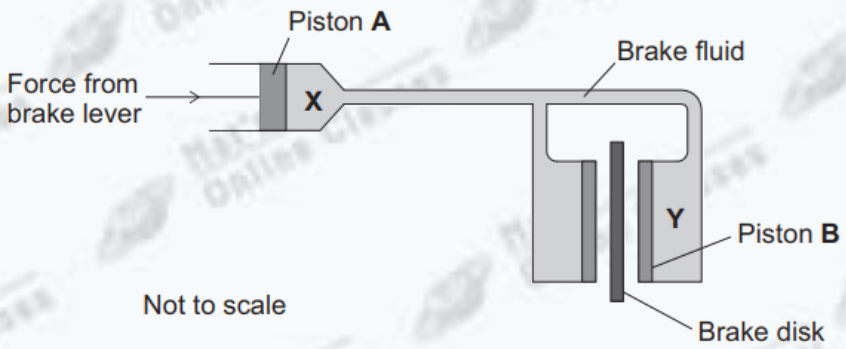
advantage over the liquid usually used.

Question	Answers	Extra information	Mark	AO spec ref
5(a)	hydraulic		1	AO1 3.2.3
5(b)	9	allow **1** mark for a correct substitution, ie $\frac{1800}{200}$ provided no subsequent step	2	AO2 3.2.3c
5(c)	an environmental		1	AO3 SALoSE
Total			**4**	

Question: 2

3 **Figure 4** is a simplified diagram of a hydraulic brake system.

Figure 4



3 (a) Which is the correct statement about the pressure at **X** and the pressure at **Y**?

[1 mark]

Tick (✓) **one** box.

The pressure at **X** is greater than at **Y** ☐

The pressure at **X** is the same as at **Y** ☐

The pressure at **X** is less than at **Y** ☐

3 (b) Piston **B** is larger than piston **A**.

How will this affect the size of the force on piston **B**?

Use the correct answer from the box to complete the sentence.

[1 mark]

smaller than	**the same as**	**larger than**

The force on piston **B** will be _____ the force on piston **A**.

3 (c) (i) A force of 24 N acts on piston **A**. The cross-sectional area of piston **A** is 8 mm^2.

Calculate the pressure in N/mm^2 at position **X**.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

_____

_____

_____

_____

Pressure = _____ N/mm^2

3 (c) (ii) The unit N/mm^2 is not often used to measure pressure.

Which unit is usually used to measure pressure?

[1 mark]

Tick (✓) **one** box.

newton ☐

pascal ☐

watt ☐

3 (d) The liquid used in the hydraulic brake system freezes at –30 °C.

Suggest **one** effect a temperature below –30 °C would have on the brake system.

[1 mark]

_____

_____

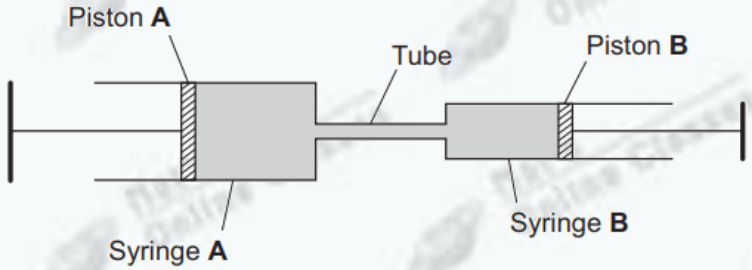
Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	The pressure at X is the same as at Y		1	AO1 3.2.3a
3(b)	larger than		1	AO1 3.2.3b
3(c)(i)	3 (N/mm^2)	accept 3 000 000 Pa (correct unit must be given) allow **1** mark for correct substitution, ie $\frac{24}{8}$ provided no subsequent step	2	AO2 3.2.3c
3(c)(ii)	pascal		1	AO1 3.2.3c
3(d)	the brakes would not work	allow the vehicle (car/bike etc) would not stop accept they would freeze solid **or** seize up	1	AO3 3.2.3
Total			6	

Question: 3

3 A student made a hydraulic system using two syringes filled with water.

The syringes were joined with a tube, as shown in **Figure 4**.

Figure 4



3 (a) What property of water makes it suitable to use in a hydraulic system?

[1 mark]

Tick (✓) **one** box.

It is almost incompressible. ☐

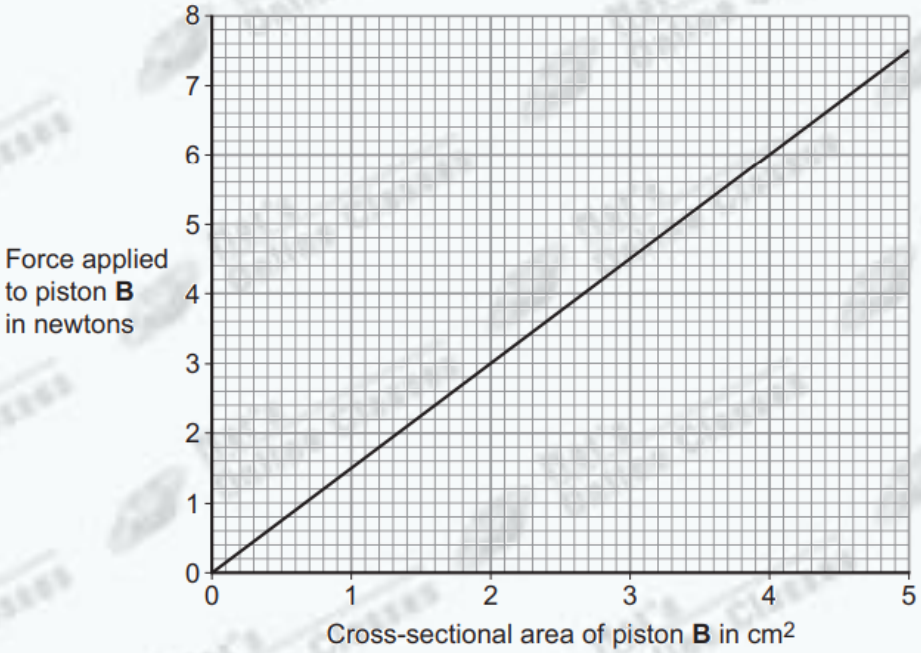
It is a poor electrical conductor. ☐

It is transparent. ☐

3 (b) The student investigated how changing the cross-sectional area of piston **B** affected the force needed to keep piston **B** moving at a constant rate.

The results are shown in **Figure 5**.

Figure 5



3 (b) (i) Describe the relationship between the cross-sectional area of piston **B** and the force applied to piston **B** shown in **Figure 5**.

[2 marks]

_____

_____

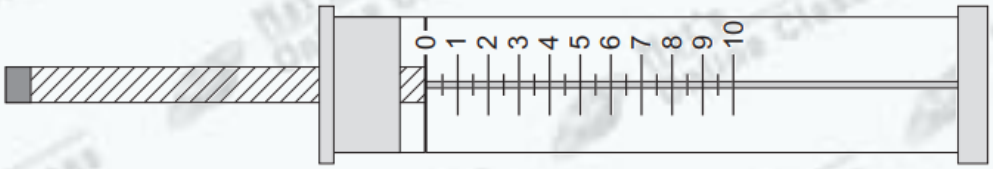
_____

_____

3 (b) (ii) The student used a newton-meter to measure the force applied to piston **B**.

The newton-meter is shown in **Figure 6**.

Figure 6



What is the smallest change in force that can be measured with this newton-meter?

[1 mark]

Tick (✓) **one** box.

0.1 N ☐

0.5 N ☐

1 N ☐

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	It is almost incompressible.		1	AO1 3.2.3a
3(b)(i)	The (cross-sectional) area is directly proportional to the force	accept for **1** mark when the area increases the force increases **or** the pattern is linear **or** a description using numbers positive correlation is insufficient	2	AO3 3.2.3c
3(b)(ii)	0.5 N		1	AO3 3.2.3b
Total			**4**	