Name of the Student:_____

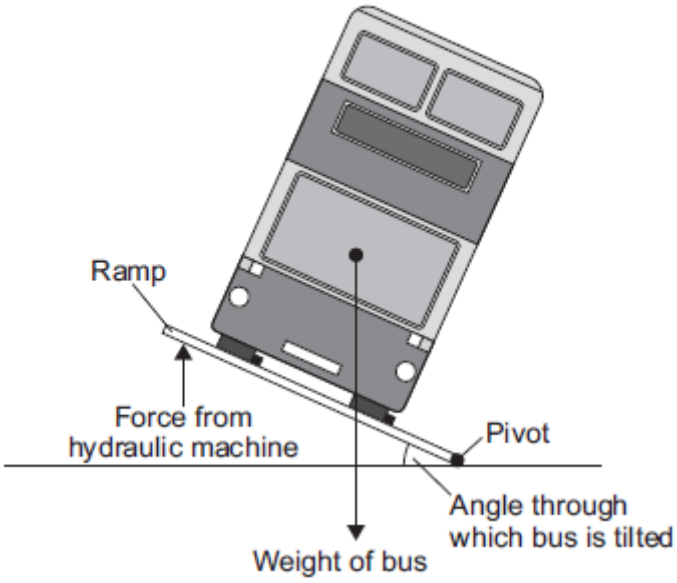
Max. Marks : 18 Marks **Time : 18 Minutes**

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.

_____

_____

_____

_____

(2)

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

Suggest **two** reasons why.

1. _____

_____

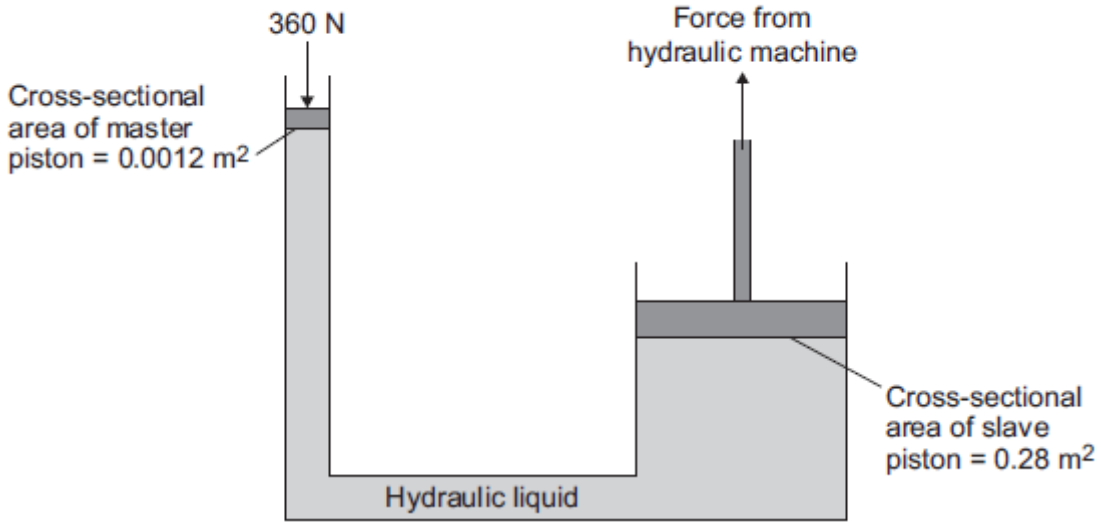
2. _____

_____

(2)

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

Figure 2



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.

_____

(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.

_____

_____

_____

_____

Force = _____ N

(3)

(Total 8 marks)

Q2.

When two objects interact, they exert forces on each other.

(a) Which statement about the forces is correct?

Tick (✓) **one** box.

	Tick (✓)
The forces are equal in size and act in the same direction.	
The forces are unequal in size and act in the same direction.	
The forces are equal in size and act in opposite directions.	
The forces are unequal in size and act in opposite directions.	

(1)

(b) A fisherman pulls a boat towards land.

The forces acting on the boat are shown in **Diagram 1**.

The fisherman exerts a force of 300 N on the boat.
The sea exerts a resistive force of 250 N on the boat.

Diagram 1

(i) Describe the motion of the boat.

_____

_____

_____

_____

(2)

(ii) When the boat reaches land, the resistive force increases to 300 N.
The fisherman continues to exert a force of 300 N.

Describe the motion of the boat.

Tick (✓) **one** box.

Accelerating to the right ☐

Constant velocity to the right ☐

Stationary ☐

(1)

(iii) Explain your answer to part **(b)(ii)**.

_____

_____

_____

_____

(2)

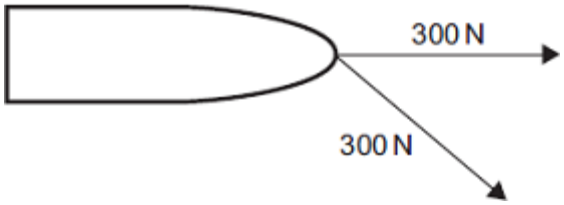
(iv) Another fisherman comes to help pull the boat. Each fisherman pulls with a force of 300 N, as shown in **Diagram 2**.

Diagram 2 is drawn to scale.

Add to **Diagram 2** to show the single force that has the same effect as the two 300 N forces.

Determine the value of this resultant force.

Diagram 2



Resultant force = _____ N

(4)

(Total 10 marks)