6 (a) Figure 13 shows a tank for holding water.

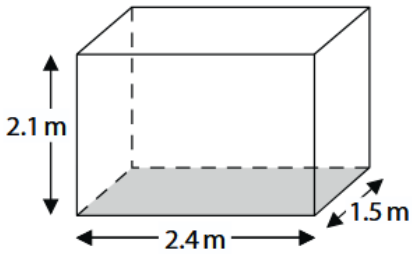


Figure 13

The tank has sides of 2.4 m, 2.1 m and 1.5 m.

The pressure at the bottom of the tank is 12 kPa.

(i) State the equation relating pressure, force and area.

(1)

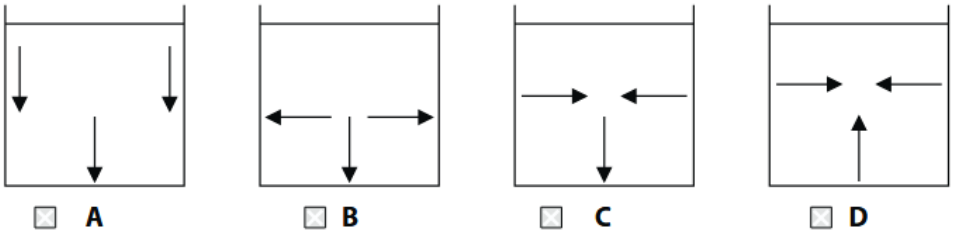
(ii) Calculate the weight of water in the tank.

(4)

weight = ... N

(iii) Which diagram shows the direction of the forces from the water on the inside of the tank?

(1)



☒ **A** ☒ **B** ☒ **C** ☒ **D**

(b) A student makes the following hypothesis:

'When I increase the pressure on a fixed mass of gas, the volume of the gas decreases.'

She has the equipment shown in Figure 14.

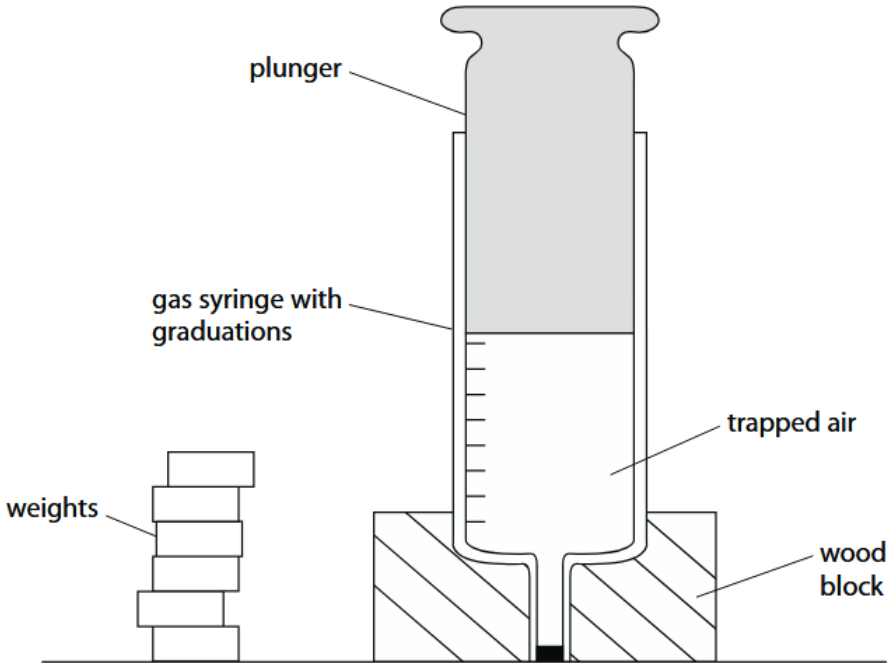


Figure 14

She measures the area of the plunger.

Devise a plan to test her hypothesis.

(4)

(Total for Question 6 = 10 marks)

Question number	Answer	Mark
6(a)(i)	pressure = force ÷ area	(1)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	rearrangement (1) (F =) $P \times A$ calculation of area (1) 2.4 × 1.5 = 3.6 substitution (1) (F =)12 000 × 3.6 answer (1) 43 200 (N)	award full marks for correct numerical answer without working maximum 3 marks if kPa not converted to Pa	(4)

Question number	Answer	Mark
6(a)(iii)	B	(1)

Question number	Answer	Mark
6(b)	An answer that combines the following points to provide a plan: • put weights on the plunger to increase the pressure of the trapped air (1) • use scale on syringe to measure the volume of trapped air (1) • calculate the pressure from P = weight added/area of plunger (1) • compare the increase in pressure to the volume of trapped air (1)	(4)