Questions are for separate science students only

Q1.

A swimming pool is being filled with water. **(Physics only)**

(a)   Calculate the weight of the water in the swimming pool when the mass of the water is 25 000 kg.

gravitational field strength = 9.8 N/kg

Use the equation:

weight = mass × gravitational field strength

_____

_____

_____

Weight =   _____N

(2)

(b)   When the swimming pool is full, the weight of the water is 1 960 000 N.

The bottom of the swimming pool has an area of 49 m².

Calculate the pressure at the bottom of the swimming pool when it is full.

Use the equation:

$$\text{pressure} = \frac{\text{weight}}{\text{area}}$$
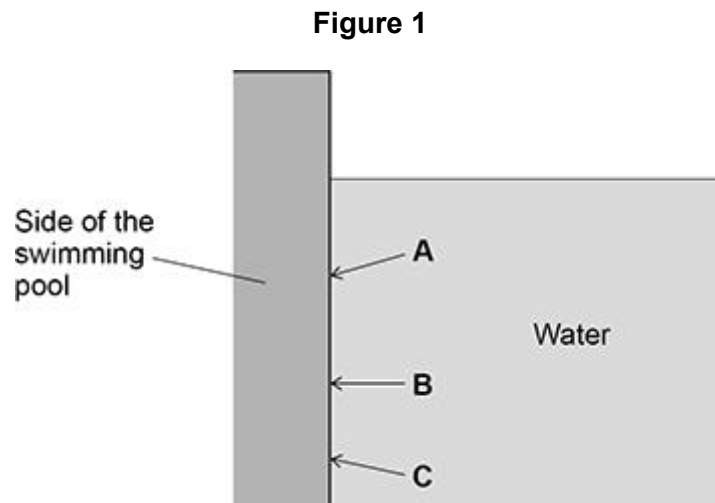
Choose the unit from the box.

m²	m³	N	Pa

_____

_____

_____

_____

_____

Pressure =   _____ Unit   _____

(3)

(c) There is a force acting on the side of the swimming pool because of the water pressure.

Figure 1 shows the side of the swimming pool.

Figure 1

Which arrow shows the direction of the force acting on the side of the swimming pool?

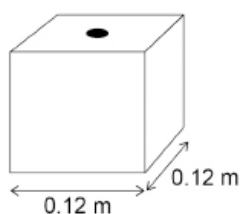Tick (✓) **one** box.

A ☐   B ☐   C ☐

(1)
(Total 6 marks)

Q2.

Figure 2 shows one of the cubes. The cube is filled with water. **(Physics only)**

The weight of the water exerts a pressure on the bottom of the cube.

Figure 2

0.12 m

0.12 m

Use the Physics Equations Sheet to answer parts (f) and (g).

(a)   Which equation correctly links area, force and pressure?

Tick (✓) **one** box.

pressure = force × area²   ☐

pressure = force × area   ☐

$pressure = \dfrac{force}{area}$ ☐

$pressure = \dfrac{area}{force}$ ☐

(1)

(b)   The water pressure at the bottom of the cube is 1500 Pa.

Calculate the force of the water on the bottom of the cube.

_____

_____

_____

_____

_____

Force = _____ N

(4)

(Total 5 marks)

Q3.

The Earth is surrounded by an atmosphere. **(Physics only)**

(a) The radius of the Earth is 6400 km.

Which of the following could be an approximate depth of the Earth's atmosphere?

Tick (✓) **one** box.

100 km ☐

6400 km ☐

100 000 km ☐

640 000 km ☐

(1)

(b) What state of matter is most of the Earth's atmosphere?
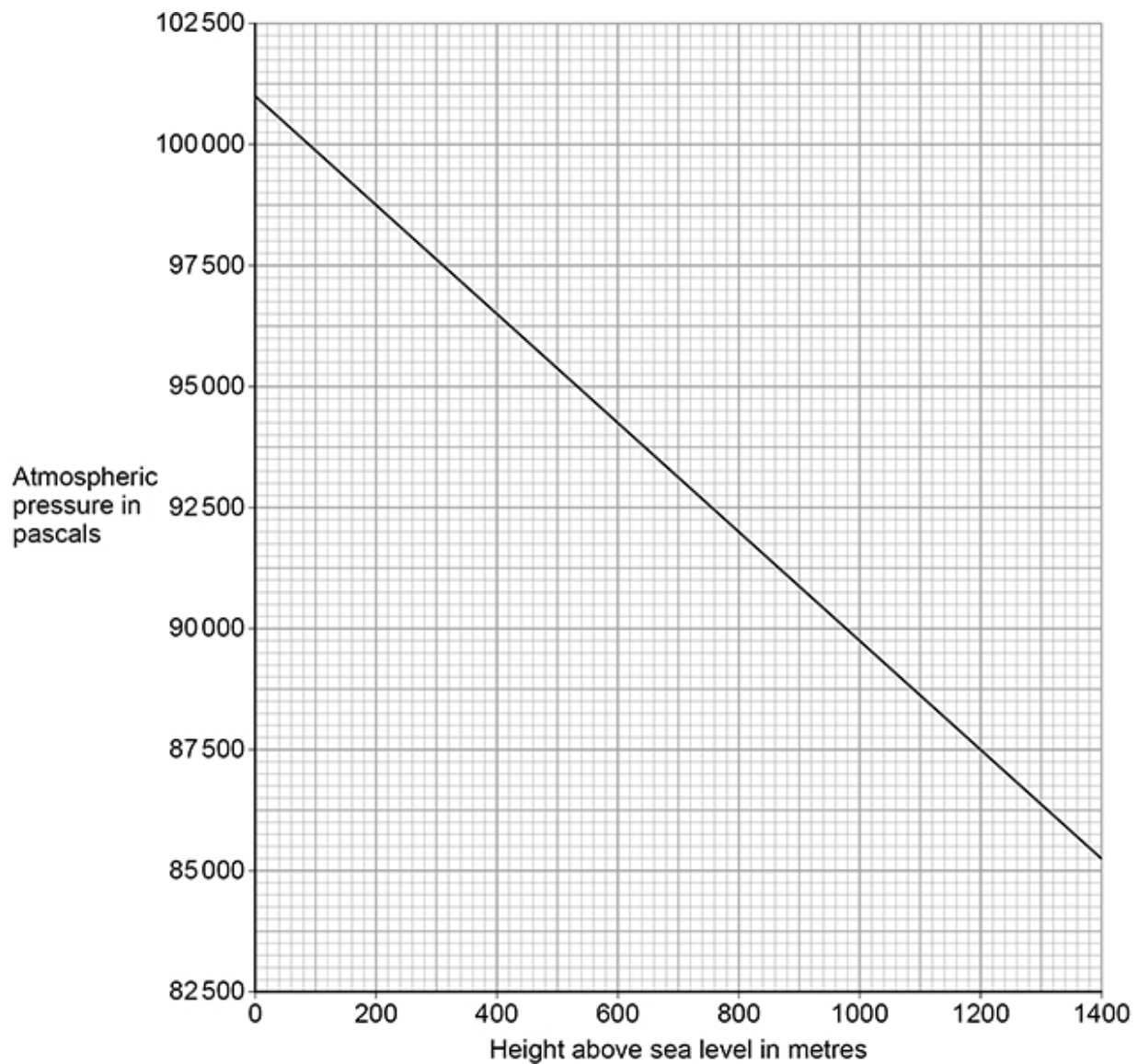
Tick (✓) **one** box.

Gas ☐

Liquid ☐

Solid ☐

(1)

Figure 1 shows how atmospheric pressure varies with height above sea level.

Figure 1

(c) The highest point above sea level in England is the top of a mountain called Scafell Pike.

The height above sea level of Scafell Pike is 978 m.

Determine the atmospheric pressure at the top of Scafell Pike.

Use **Figure 1**.

_____

_____

Atmospheric pressure = _____ Pa

(1)

(d)   Determine the difference between the atmospheric pressure at sea level and at the top of Scafell Pike.

Use **Figure 1** and your answer from part (c)

_____

_____

Difference in atmospheric pressure = _____ Pa

(1)

(e)   A student climbs Scafell Pike.

Why does the atmospheric pressure decrease as the student climbs higher?

Tick (✓) **two** boxes.

The air exerts a greater force on the student. ☐

The density of the air decreases. ☐

The mass of air above the student decreases. ☐

The temperature of the air increases. ☐

The volume of air above the student increases. ☐

(2)

(f)   **Figure 2** shows a mountain lake.

Figure 2

The lake has a surface area of 2000 m².

Atmospheric pressure exerts a force of 188 000 000 N on the surface of the lake.

Calculate the atmospheric pressure at the surface of the lake.

Use the equation:

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

_____

_____

_____

_____

Atmospheric pressure = _____ Pa

(2)
(Total 8 marks)