AP PHYSICS 1 • EXERCISE SHEET

8.2 Pressure

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

Build the skills to answer exam questions on **pressure**.

You must be able to:

- define **pressure** 压强 as force per unit area, $P = \dfrac{F}{A}$
- calculate the pressure due to a column of fluid, $P = \rho g h$
- explain how pressure increases with **depth** and acts in all directions

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ **Pressure**

$P = \dfrac{F}{A}$, measured in pascals (1 Pa = 1 N m^{-2}). The same force over a smaller area gives more pressure.

■ **Pressure in a fluid**

$P = \rho g h$ increases with **depth** h and acts equally in **all directions** at a given depth.

■ **Example**

At 2.0 m depth in water ($\rho = 1000$, $g = 10$): $P = 1000 \times 10 \times 2.0 = 2.0 \times 10^4$ Pa.

2 Practice

2.1 A force of 200 N acts on an area of 0.50 m^2. Find the pressure. [1]

2.2 Find the pressure 5.0 m below the surface of a lake ($\rho = 1000$ kg m^{-3}, $g = 10$ m s^{-2}). [2]

2.3 State how the pressure in a fluid changes with depth. [1]

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3 Exam-style questions

3.1 Pressure is defined as [1]

- **A** force × area
- **B** force ÷ area
- **C** mass ÷ volume
- **D** density × depth only

3.2 The pressure due to a column of fluid depends on [1]

- **A** the shape of the container
- **B** the surface area
- **C** the depth and the fluid density
- **D** the total volume

3.3 A diver is 12 m below the sea surface ($\rho = 1030$ kg m^{-3}, $g = 10$ m s^{-2}).

(a) Find the pressure due to the water. [2]

(b) Find the total pressure if atmospheric pressure is 1.0×10^5 Pa. [1]

4 Go further

- work through the **8.2 Pressure** lesson on the **Learn** page;
- read the **Fluids** section of the AP Physics 1 handout on the **Know** page.

Solutions

2.1 $P = \dfrac{F}{A} = \dfrac{200}{0.50} = 400$ Pa.

2.2 $P = \rho g h = 1000 \times 10 \times 5.0 = 5.0 \times 10^4$ Pa.

2.3 it increases with depth.

3.1 B.

3.2 C.

3.3 (a) $P = \rho g h = 1030 \times 10 \times 12 = 1.24 \times 10^5$ Pa. (b) total $= 1.24 \times 10^5 + 1.0 \times 10^5 = 2.24 \times 10^5$ Pa.