**Write your name, centre number and candidate number in the boxes below.**

| Surname | Other names |
|---|---|
| | |

Centre number | | | | | |

Candidate number | | | | |

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# Pressure in liquids

Time allowed: 25 minutes

**Subject code** **0625**

# Physics

## Questions from Paper 1, Paper 2 and Paper 4

**You must have:** a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.

Total marks

**/ 22**

### Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.

### Information

- This paper has 10 questions worth 22 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

### Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

**1** The equation $\Delta p = \rho g \Delta h$ can be used for a liquid.

What is the meaning of the term $\rho$?

**A** pressure due to the liquid

**B** density of the liquid

**C** total pressure due to the liquid and the air above the liquid

**D** density of an object placed in the liquid

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**2** Which row describes how the pressure beneath the surface of a liquid depends on the depth below the surface and on the density of the liquid?

| | depth below surface | density of liquid |
|---|---|---|
| **A** | pressure decreases with increasing depth | pressure decreases with increasing density |
| **B** | pressure decreases with increasing depth | pressure increases with increasing density |
| **C** | pressure increases with increasing depth | pressure decreases with increasing density |
| **D** | pressure increases with increasing depth | pressure increases with increasing density |

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**3** When a diver swims down from the surface of the water to a depth of 10 m, the pressure experienced increases from 100 000 N / $m^2$ to 200 000 N / $m^2$.

Which statement explains this increase in pressure?

**A** The density of the water increases with depth.

**B** The gravitational field strength increases with depth.

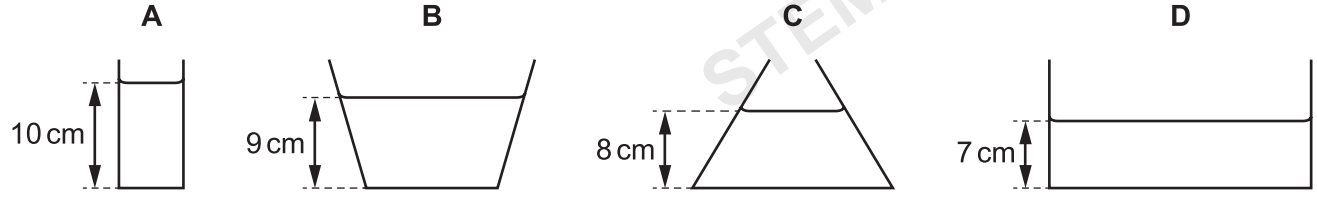
**C** The weight of water above the diver increases with depth.

**D** Water cannot be compressed.

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**4** Four tanks contain water to the depths shown.

At the bottom of which tank is the pressure due to the water greatest?



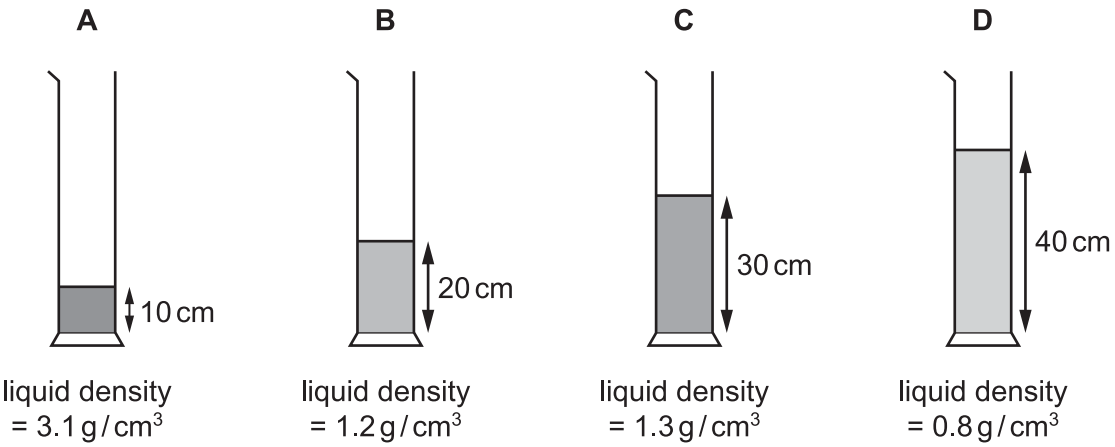

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5 Four different liquids are poured into four containers.

The diagrams show the depth and the density of liquid in each container.

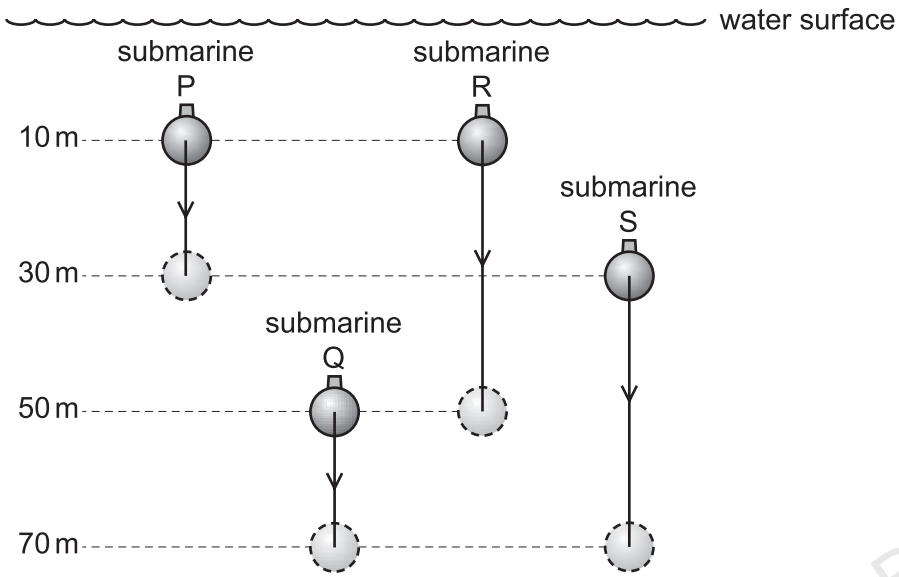
In which container is the pressure on its base the greatest?




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6 Four identical submarines, P, Q, R and S, are lowered from one depth to another in water of a constant density.

The initial and final depths of each submarine are shown.



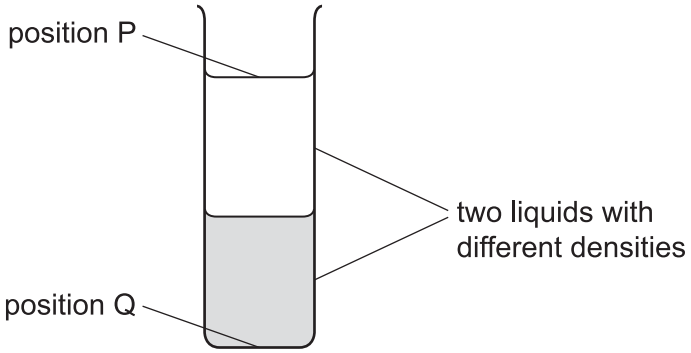

Which row is correct for the difference in pressure from the initial to the final depth of each submarine?

| | least change in pressure | greatest change in pressure |
|---|---|---|
| **A** | submarines P and Q | submarines R and S |
| **B** | submarines P and Q | submarine R only |
| **C** | submarine P only | submarines R and S |
| **D** | submarine P only | submarine R only |

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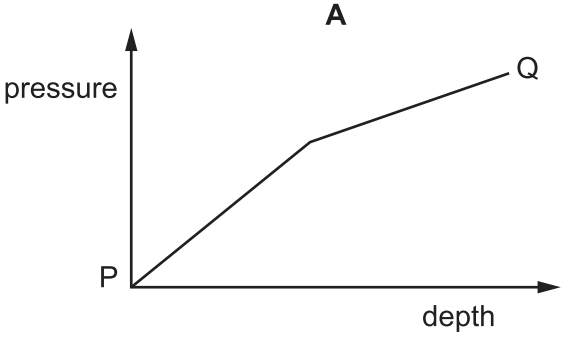
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7 A tall cylinder is partly filled with two liquids which do not mix. The two liquids have different densities. A student measures the pressure due to the liquids at different depths.

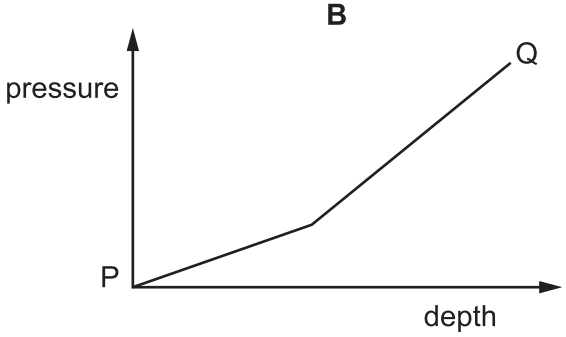



Which graph shows how the liquid pressure varies between positions P and Q?

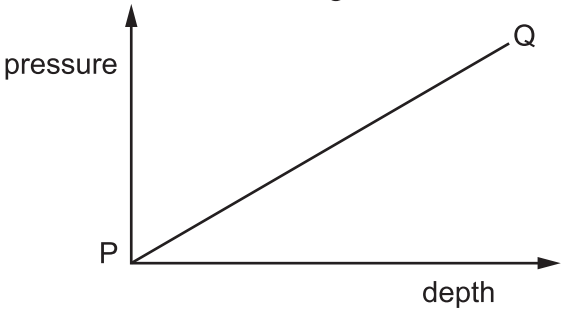
**A**



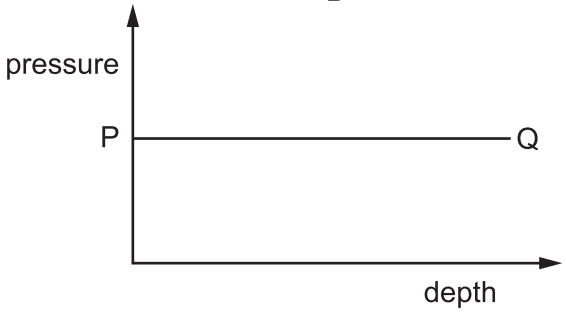

**B**




**C**




**D**




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8 A measuring cylinder of cross-sectional area 4.0 $cm^2$ contains 224 $cm^3$ of liquid.

The pressure of the liquid at the base of the measuring cylinder due to the liquid is 8800 Pa.

What is the density of the liquid?

**A** 224 $kg/m^3$ **B** 385 $kg/m^3$ **C** 1600 $kg/m^3$ **D** 2200 $kg/m^3$

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9 **(a)** A water tank has a rectangular base of dimensions 1.5 m by 1.2 m and contains 1440 kg of water.

Calculate

**(i)** the weight of the water,

weight = ..... [1]

**(ii)** the pressure exerted by the water on the base of the tank.

pressure = ..... [2]

**(b)** Fig. 5.1 shows two water tanks **P** and **Q** of different shape. Both tanks are circular when viewed from above. The tanks each contain the same volume of water. The depth of water in both tanks is 1.4 m.

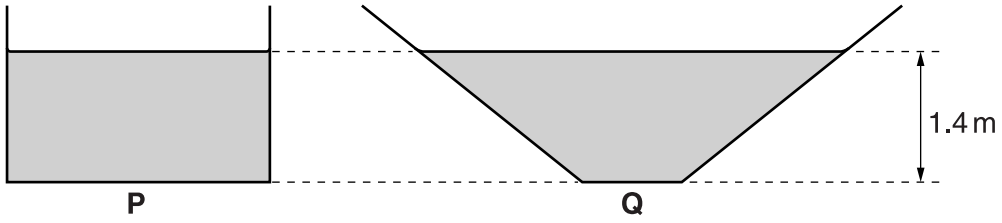



**Fig. 5.1**

**(i)** The density of water is 1000 kg/m$^3$. The pressures exerted by the water on the base of the two tanks are equal.

Calculate this pressure.

pressure = ..... [2]

**(ii)** Equal small volumes of water are removed from each tank.

State which tank, **P** or **Q**, now has the greater water pressure on its base. Explain your answer.

.....

.....

..... [2]

[Total: 7]

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**10** Fig. 2.1 shows a hollow metal cylinder containing air, floating in the sea.

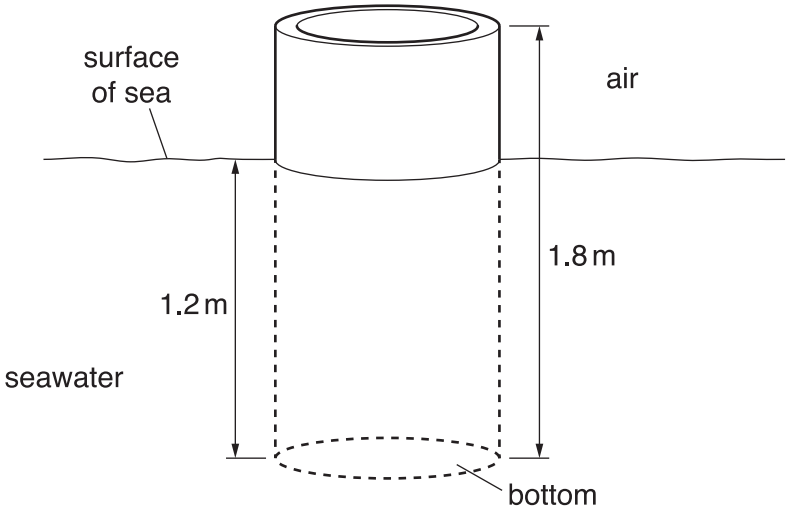



**Fig. 2.1**

**(a)** The density of the metal used to make the cylinder is greater than the density of seawater.

Explain why the cylinder floats.

.....

.....[1]

**(b)** The cylinder has a length of 1.8 m. It floats with 1.2 m submerged in the sea. The bottom of the cylinder has an area of cross-section of 0.80 $m^2$.

The density of seawater is 1020 kg / $m^3$. Calculate the force exerted on the bottom of the cylinder due to the depth of the seawater.

force = .....[4]

**(c)** Deduce the weight of the cylinder. Explain your answer.

weight = .....

explanation .....

.....

[2]

[Total: 7]

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