Density and Pressure – 2021 AS

1. June/2021/Paper_11/No.14

Water of depth 9.0 cm is covered by oil of depth 5.0 cm in a measuring cylinder.

The density of the water is 1000 kg m^{-3} and the density of the oil is 800 kg m^{-3}.

What is the total pressure exerted on the base of the measuring cylinder due to the oil and water?

A 390 Pa **B** 880 Pa **C** 1200 Pa **D** 1300 Pa

2. June/2021/Paper_12/No.14

Each foot of an elephant has a circular cross-section with a circumference of 1.4 m. The elephant has a mass of 5400 kg.

The elephant is standing still with all four feet on the ground. Assume the pressure under each foot is the same.

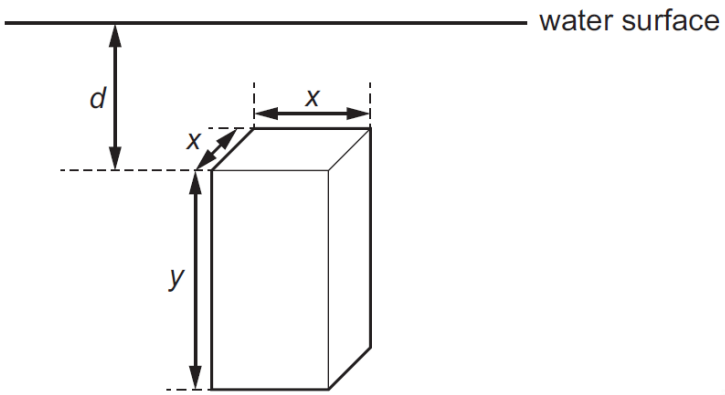
What is the approximate pressure exerted on the ground by each of the elephant's feet?

A 8.7 kPa **B** 35 kPa **C** 85 kPa **D** 340 kPa

3. Nov/2021/Paper_11/No.11

A uniform solid block is fully submerged in a tank of water.

The dimensions of the block are *x* and *y*, as shown.



The block is held vertically in the position shown. The density of the block is the same as the density of the water.

If the block is always held at the same depth *d* below the surface of the water, which single change would **increase** the magnitude of the upthrust force on the block?

A decrease the density of the block

B hold the block horizontally

C increase dimension *y*

D increase the density of the block

4. Nov/2021/Paper_11/No.14

A bird dives to a depth of 1.50 m below the surface of a lake. Atmospheric pressure is 101 kPa. The density of water is 1000 kg m^{-3}.

What is the pressure at this depth?

A 14.7 kPa **B** 86.3 kPa **C** 103 kPa **D** 116 kPa

5. Nov/2021/Paper_12/No.11

A cylindrical block of wood has cross-sectional area A and weight W. It is totally immersed in water with its axis vertical. The block experiences pressures p_t and p_b at its top and bottom surfaces respectively.

What is the upthrust on the block?

A $(p_b - p_t)$

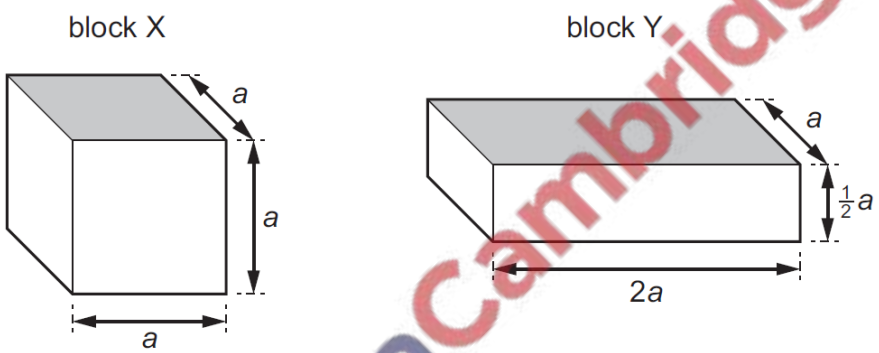
B $(p_b - p_t)A$

C $(p_b - p_t)A - W$

D $(p_b - p_t)A + W$

6. Nov/2021/Paper_13/No.15

The diagram shows two blocks X and Y.



Block X has sides of length a. When block X is placed in a liquid of density ρ with the shaded face level with the liquid surface, it experiences an upthrust U.

Block Y has horizontal sides of length a and $2a$ and height $\frac{1}{2}a$. Block Y is placed in a liquid of density 2ρ, also with the shaded face level with the liquid surface.

What is the upthrust on block Y?

A $\frac{1}{2}U$ **B** U **C** $2U$ **D** $4U$