Worked Solutions for ENGAA Papers by Topic

Section 2

Topic: Algebra

Section 2 Topic	Number of S2 Questions 2016 - 2020
Algebra	2
Electricity	18
Energy	3
Forces	7
Geometry	4
Kinematics	13
Materials	4
Mechanics	21
Waves	14

ENGAA S2 2018 - Question 2

2 Two liquids P and Q can be mixed together in any proportion.

The density of liquid P is ρ_P and the density of liquid Q is ρ_Q.

A volume V_P of liquid P and a volume V_Q of liquid Q are mixed together to produce a volume that is equal to $V_P + V_Q$.

What is the density of the mixture?

A $\dfrac{\rho_P + \rho_Q}{2}$

B $\dfrac{\rho_P V_P + \rho_Q V_Q}{V_P + V_Q}$

C $\left(\dfrac{\rho_P}{V_P} + \dfrac{\rho_Q}{V_Q}\right)(V_P + V_Q)$

D $\dfrac{\rho_P V_Q + \rho_Q V_P}{V_P + V_Q}$

E $\dfrac{\left(\dfrac{\rho_P}{V_P} + \dfrac{\rho_Q}{V_Q}\right)}{V_P + V_Q}$

F $\left(\dfrac{\rho_P}{V_Q} + \dfrac{\rho_Q}{V_P}\right)(V_P + V_Q)$

ENGAA S2 2018 - Question 2 - Worked Solution

$$\rho = \frac{M}{V}$$

$$\begin{aligned} total\ mass &= m \\ &= M_Q + M_P \\ &= \rho_P V_P + \rho_Q V_Q \end{aligned}$$

$$\begin{aligned} total\ volume &= v \\ &= V_P + V_Q \end{aligned}$$

$$\begin{aligned} total\ density &= \rho \\ &= \frac{\rho_P V_P + \rho_Q V_Q}{V_P + V_Q} \end{aligned}$$

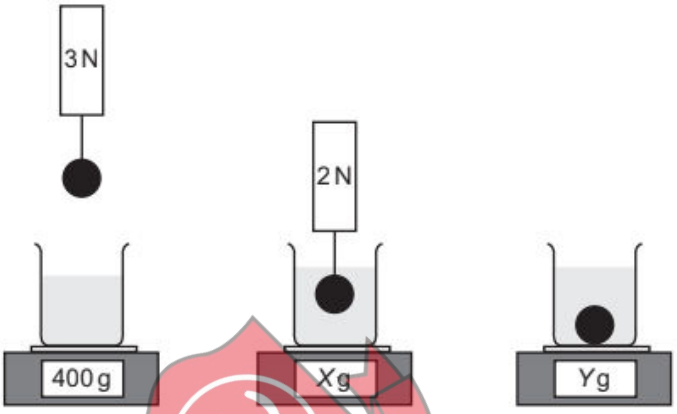
Answer is B.

ENGAA S2 2018 - Question 5

5 A stone is suspended from a newtonmeter and the meter reads 3 N. A beaker of water is placed on a top pan balance and the top pan balance reads 400 g.

The stone is lowered into the water so that it is at rest and fully submerged, but not touching the bottom of the beaker. The reading on the newtonmeter is now 2 N and the top pan balance reads *X* g.

The stone is detached from the newtonmeter and allowed to rest under water on the base of the beaker. The top pan balance now reads *Y* g.



What are the values of *X* and *Y*?

(gravitational field strength = 10 N kg^{-1})

	X	*Y*
A	400	500
B	400	600
C	400	700
D	500	500
E	500	600
F	500	700

ENGAA S2 2018 - Question 5 - Worked Solution

Weight at ball doesn't change ⇒Buogancy = 1N

$$X = 400g + \frac{1}{10}kg$$
$$= 500g$$

$$Y = 400g + mass\ of\ ball$$
$$= 400g + \frac{3}{10}$$
$$= 700g$$

Answer is F.