

Solution for the day

Aug 14, 2018

6th Class :

➤ **Mathematics:** Ans : (D)

➤ **Physics:**

Sol : (B) Density of paper = $\frac{15\text{g}}{40\text{cm}^3} = 0.375\text{g} / \text{cm}^3$

$$\text{Density of stone} = \frac{50\text{g}}{75\text{m}^3} = \frac{50\text{g}}{75 \times 10^6 \text{cm}^3}$$

$$= \frac{50}{75000000} = \frac{5}{7500000} = 6.67 \times 10^{-7} \text{g} / \text{cm}^3$$

$$\text{Density of (paper + stone)} = (0.375 + (6.67 \times 10^{-7})) = 0.375\text{g} / \text{cm}^3$$

$$\text{The density of kerosene oil} = 0.8\text{g} / \text{cm}^3$$

So, the paper boat floats on kerosene oil

➤ **Chemistry:** Ans: (C)

➤ **Biology:** Ans: (B)

7th Class :

➤ **Mathematics:** Ans (C)

➤ **Physics:**

Sol: (i) S.I unit of heat is 1J(= 1kgm²s⁻²) and its CGS unit is 1 erg (= 1gcm²s⁻²)

(ii) erg g⁻¹ °C⁻¹, J kg⁻¹ K⁻¹

➤ **Chemistry:** Ans: (D)

➤ **Biology:** (A)

8th class

➤ **Mathematics:**

Sol: (B) $\sin 600^\circ \cos 330^\circ + \cos 120^\circ \sin 150^\circ$

$$= \sin(360 + 240)^\circ \cos(360 - 30)^\circ + \cos(90 + 30)^\circ \sin(90 + 60)^\circ$$

$$= \sin 240^\circ \cos 30^\circ - \sin 30^\circ \cos 60^\circ$$

$$= -\sin 60^\circ \cos 30^\circ - \sin 30^\circ \cos 60^\circ = -1$$

➤ **Physics:** Sol : (B)

➤ **Chemistry:** Ans : (A)

➤ **Biology:** Ans : (B)

9th Class :

➤ Mathematics:

Sol : (A) We have,

$$\cos(\alpha + \beta) = \frac{4}{5} \text{ and } \sin(\alpha - \beta) = \frac{5}{13}$$

$$\Rightarrow \tan(\alpha + \beta) = \frac{3}{4} \text{ and } \tan(\alpha - \beta) = \frac{5}{12}$$

$$\tan 2\alpha = \tan(\alpha + \beta + \alpha - \beta)$$

$$= \frac{\tan(\alpha + \beta) + \tan(\alpha - \beta)}{1 - \tan(\alpha + \beta)\tan(\alpha - \beta)} = \frac{\frac{3}{4} + \frac{5}{12}}{1 - \frac{3}{4} \cdot \frac{5}{12}} = \frac{56}{33}$$

➤ Physics:

Sol: (A) The magnitude of the momenta of the cars are :

$$p_1 = m_1 v_1 = (1200\text{kg})(22\text{m/s}) = 2.64 \times 10^4 \text{ kg} \cdot \text{m/s}$$

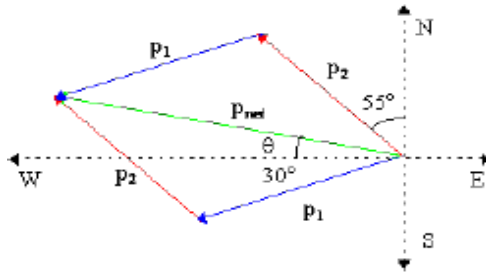
$$p_2 = m_2 v_2 = (1450\text{kg})(18\text{m/s}) = 2.61 \times 10^4 \text{ kg} \cdot \text{m/s}$$

Therefore

$$p_1 = 2.64 \times 10^4 \text{ kg} \cdot \text{m/s} \text{ at } 30.0^\circ \text{ S of W}$$

$$p_2 = 2.61 \times 10^4 \text{ kg} \cdot \text{m/s} \text{ at } 55.0^\circ \text{ W of N}$$

(b) For vector problems, we first draw a neat sketch of the vectors and the vector operation of interest. Here we are adding two vectors.



Then to solve the problem numerically, we break the vectors into their components:

$$p_1 = i[-(2.64 \times 10^4)\cos(30^\circ)] + j[-(2.64 \times 10^4)\sin(30^\circ)] = i[-2.2863 \times 10^4] + j[-1.3200 \times 10^4]$$

$$p_2 = i[-(2.61 \times 10^4)\sin(55^\circ)] + j[-(2.61 \times 10^4)\cos(55^\circ)] = i[-2.1380 \times 10^4] + j[1.4970 \times 10^4]$$

Next we add them to get the components of vector P_{net} .

$$P_{net} = i[-2.2863 \times 10^4 + -2.1380 \times 10^4] + j[-1.3200 \times 10^4 + 1.4970 \times 10^4]$$

$$= i[-4.4243 \times 10^4] + j[0.1770 \times 10^4]$$

Then we convert to polar coordinate form <> Using Pythagoras Theorem

$$P_{net} = \left[(4.4243 \times 10^4)^2 + (0.1770 \times 10^4)^2 \right]^{1/2} = 4.428 \times 10^4 \text{ kg} \cdot \text{m/s}$$

$$\text{The angle } \theta = \arctan\left(\left| \frac{p_{net y}}{p_{net x}} \right| \right) = \arctan(0.1770 / 4.4243)$$

Thus the net momentum of the two cars 4.428×10^4 .

➤ Chemistry: (B)

➤ Biology: Ans: (A)

10th Class :

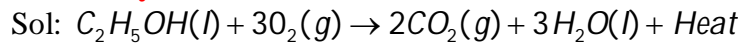
➤ Mathematics:

Sol : (C) The given expression

$$\begin{aligned} &= \frac{1}{4}(3 \cos \theta + \cos 3\theta) + 3 \cos(120^\circ + \theta) \\ &+ \cos(360^\circ + 3\theta) + 3 \cos(240^\circ + \theta) + \cos(720^\circ + 3\theta) \\ (\because \cos^3 \theta &= \frac{1}{4}9 \cos 3\theta + 3 \cos \theta) \\ &= \frac{1}{4}(3 \cos 3\theta) + \frac{3}{4}(\cos \theta + \cos(120^\circ + \theta) + \cos(240^\circ + \theta)) \\ [\because \cos(2n\pi + \theta) &= \cos \theta] \\ &= \frac{3}{4} \cos 3\theta + \frac{3}{4}[\cos \theta + 2 \cos(180^\circ + \theta) \cos 60^\circ] \\ &= \frac{3}{4} \cos 3\theta + \frac{3}{4}[\cos \theta + 2 \cdot \frac{1}{2}(-\cos \theta)] = \frac{3}{4} \cos 3\theta \end{aligned}$$

➤ Physics: Ans : (A)

➤ Chemistry:



➤ Biology:

Ans: (C)

Reasoning :

Sol: Ans : (B)

In all the pairs, the difference of two numbers is 8 and both are even number, but in option (B) both numbers are odd (not divisible by 2).