PHYSICS

Inside a pressurized cabin, a 1m long barometer tube held vertically in a mercury tub has 700 mm long mercury column in the tube. There is some air above the mercury column in the tube. The tube is slowly tilted by an angle $60°$ with the vertical. The mercury column now is 900 mm along the length of the tube. The value of pressure in the cabin in units of mm of mercury is

A 760   **B** 825   **C** 800   **D** 900

A submarine, 400 m under water, spots an enemy helicopter which is actually flying 1 km above the water surface. If the helicopter is 5.0 m long, to the submarine observer, it appears to be

A 750 m above the water surface and 5.0 m long.
B 750 m above the water surface and 3.75 m long.
C 1.33 km above the water surface and 6.7 m long.
D 1.33 km above the water surface and 5.0 m long.

In an experiment, two quantities A and B are measured with percentage errors 1% and 2%, respectively. Their measured values are 20.0 cm and 15.0 cm, respectively. The maximum percentage error in the quantity $Q = A - B$ is

A 3%   **B** 1%   **C** 2%   **D** 10%

A cart of length ℓ is moving at constant speed of V on a straight track. A ball is rolled along the surface of the cart from one end to another in the forward direction with a constant speed u relative to the cart. It is then rolled back to the initial point with the same constant speed u. For an observer on the ground

A the time for forward journey equals the time for backward journey
B the distance covered in the forward journey equals the distance covered in the backward journey
C the speed for the forward journey equals the speed for the backward journey
D All quantities: time, distance and speed are identical for the forward and backward journeys

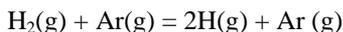A helium filled spherical balloon has a radius equal to 12 m. The

balloon, cables and basket all have a total mass of 196 kg. The maximum load that the balloon can carry will be

$$\text{(given } \rho_{He} = 0.160 \text{ kgm}^{-3}, \quad \rho_{air} = 1.25 \text{ kgm}^{-3})$$

A 9000 kg   **B** 7690 kg   **C** 160kg   **D** 125 kg

CHEMISTRY

The rate of the chemical reaction ,

$H_2(g) + Ar(g) = 2H(g) + Ar (g)$

at 3000 K is $- dC_{H_2}/dt = 2 \times 10^{-4} \text{ mol}^{-1} \text{ L s}^{-1}$

when Ar concentration used in the reaction is 4×10^{-4} mol L^{-1}. The concentration of the Ar needed to double the rate of the reaction at the same temperature is

A 4×10^{-4} mol L^{-1} **C** 64×10^{-4} mol L^{-1}
B 8×10^{-4} mol L^{-1} **D** 16×10^{-4} mol L^{-1}

The volume of water required to dilute 2 ml of 12M H_2SO_4 to change its strength to 0.1 M, is

A 240 ml   **B** 120 ml   **C** 480 ml   **D** 238 ml

Two metals A and B form compounds with the formulae $ASiO_4$ and $B_3(PO_4)_2$. The formulae for the corresponding sulfate and iodide will, respectively, be

A A_2SO_4 and BI   **C** $A(SO_4)_2$ and BI_2
B A_2SO_4 and BI_3 **D** $A(SO_4)_2$ and BI_3

Upon passing SO_2 gas through acidic potassium dichromate solution, the color of the solution changes from orange to green. The resulting solution contains

A SO_3^{2-} and $Cr_2O_7^{2-}$ ions   **C** SO_3^{2-} and Cr^{3+} ions
B SO_4^{2-} and Cr^{3+} ions   **D** SO_4^{2-} and CrO_4^{-} ions

On heating CH_3COOH with soda lime (3 parts of NaOH and 1 part of CaO) a colorless gas is formed along with a sodium salt. The gas and the salt are,

A CH_4 and $NaHCO_3$ **C** C_2H_6 and $NaHCO_3$
B CH_4 and Na_2CO_3 **D** C_2H_6 and Na_2CO_3

BIOLOGY

For a motion picture, the film has to be shot at the speed of 24 frames per second, because,

A the neurons in the brain cannot respond faster than this
B the eye blinks every $1/24^{th}$ of a second
C persistence of vision is $1/24^{th}$ of a second
D higher speeds are not economical since they need sophisticated equipment

What is the difference between pasteurization and sterilization of milk ?

A sterilization kills all bacteria whereas pasteurization kills only certain bacteria
B pasteurization stabilizes milk proteins while sterilization does not
C sterilization curdles milk while pasteurization does not
D pasteurization kills bacteria whereas sterilization does not

In the eye defect called myopia,

A the rays of light come to a focus in between retina and iris
B the rays of light do not enter the eye at all
C the rays of light come to a focus at the back of the retina
D the rays of light come to a focus in front of the retina

A woman with colour blindness marries a man with normal vision. She has two girls who also marry men with normal vision. What percentage of the woman's grandchildren will be colour blind?

A 100% of her male grandchildren.
B 50% of her male grandchildren.
C 100% of her female grandchildren.
D 50% of her female grandchildren.

The difference between identical and fraternal twins is that,

A identical twins are produced from different eggs and fraternal twins are produced from the same egg.

B identical twins are produced from a single egg and fraternal twins are produced from different eggs.

C identical twins acquire similar characteristics during gestation and fraternal twins do not.

D identical twins are in the same sac and fraternal twins are in different sacs.