00130

Question 1 (10 marks)– please circle the correct answer

MC1

A particle is oscillating with simple harmonic motion. The frequency of the motion is 10 Hz and the amplitude of the motion is 5.0 cm. As the particle passes through the equilibrium position, the acceleration of the particle is:

a)50 cm/s^2 b) 500 cm/s^2 c)Zero d)-50 cm/s^2 e)-500 cm/s^2

MC2

Ice (density 0.92 g/cm^3) is in a glass of alcohol (density 0.80 g/cm^3. When the ice melts, does the fluid level go up, down or stay the same?

a) up b) down c) stays the same

MC3

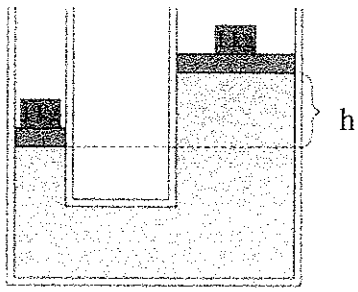
A horizontal pipe narrows from a diameter of 10 cm to 5 cm. For water flowing from the larger diameter to the smaller,

a) the velocity and pressure both increase.
b) The velocity increases and pressure decreases
c) The velocity decreases and the pressure increases
d) The velocity and pressure both decrease
e) either the velocity or the pressure changes but not both

MC4

Consider a standard hydraulic lift system where the right side has twice the radius of the left side. A mass of 1 kg is placed on each side leading to a height difference, h, as shown. If you then add a 1-kg-mass to the left side and a 2-kg-mass to the right-hand side, the height difference h between the two sides

a) increases.
b) decreases.
c) remains the same.
d) is zero.



MC5

A diver descends in the ocean to a depth of 50 m. How does the buoyant force on the diver change as she descends?

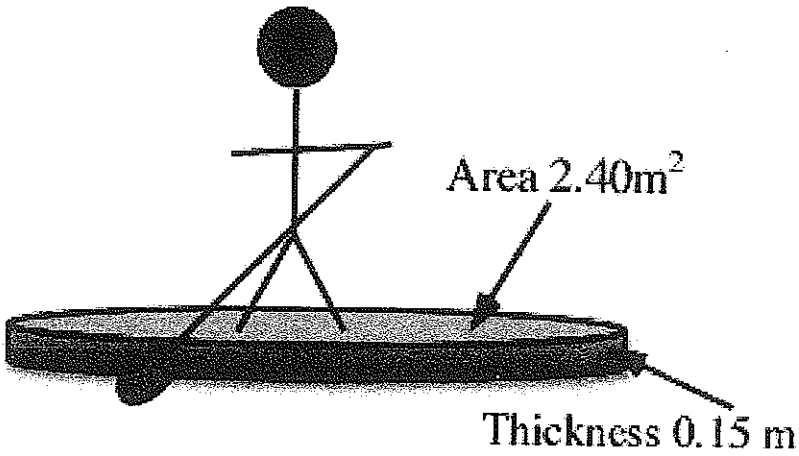
a) It decreases linearly with depth
b) It increases linearly with depth
c) It increases quadratically with depth.
d) It decreases quadratically with depth
e) It does not change.

00130

Question 2 (10 marks)

You are down at the lake trying out your new stand-up paddleboard.

When you place it in the water, you notice that the board floats so that it is 10.0 cm above the surface of the water. Assume the density of water is 1000 kg/m^3. The cross-sectional area and thickness of the board are given in the diagram.



a) What is the average density of the paddleboard?

ρ_{sup}= _____

A group of children want to join you on your board. Your mass is 60 kg and assume the mass of each child is 20 kg.

b) What is the maximum number of children that can join you and the board still floats?

c) If you had your board at the ocean, would the number of children who could join you change?

The number would increase/decrease/stay the same.

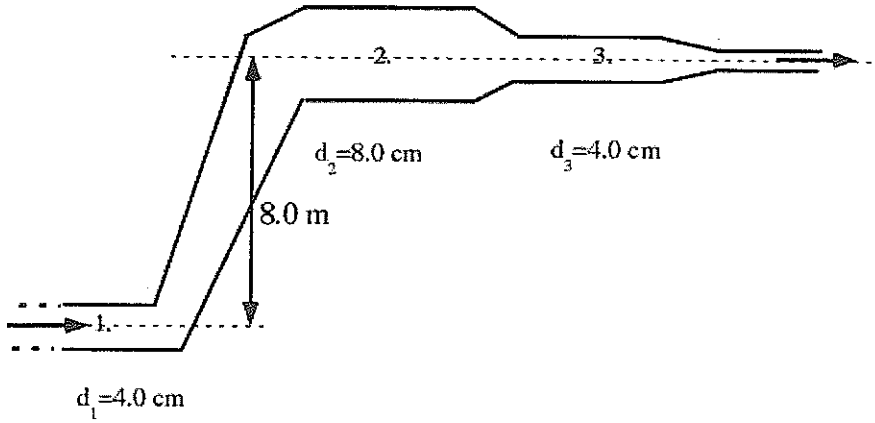
Explain:

00130

Question 3 (8 marks)

Water flows through the closed pipe system, part of this system is shown below. The diameters of the different sections of the pipe are given. Assume the density of water is 1000 kg/m^3.

The speed of the water at point 1 is 12.0 m/s and the pressure is 1000 kPa. Determine the speed and pressure of the water at points 2 and 3.

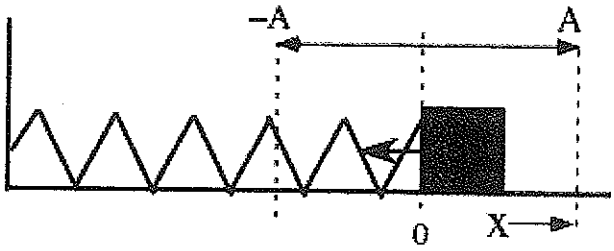


Point	1	2	3
Diameter (cm)	4.00	8.00	4.00
Speed (m/s)	12.0		
Pressure (kPa)	1000		

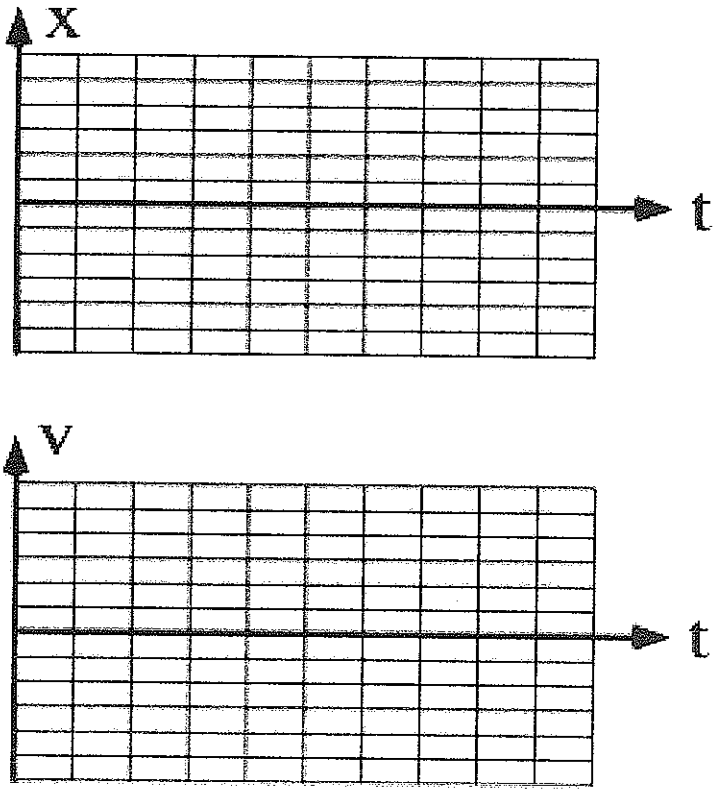
00130

Question 4 (12 marks)

A 1.00 kg block is oscillating on a frictionless surface as shown. The amplitude of the motion is 10.0 cm and period of oscillation is 2.00 s. At t = 0, the block is at the equilibrium position (x=0) and is moving to the left.



a) Below, sketch graphs of displacement and velocity as a function of time. On the graphs clearly indicate the scale used.



b) Write the equation describing the displacement as a function of time with all constants evaluated.

c) What is the value of the spring constant?

d) If the spring with 1.00 kg mass was hung vertically, how much would the spring be stretched from its unstretched length (no oscillation)?