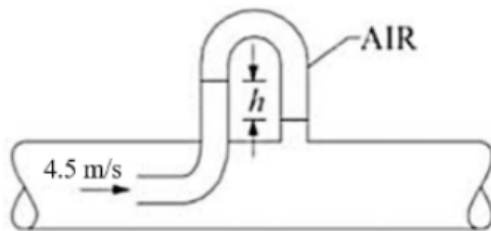# Fluid Mechanics (New Engine)

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1   Multiple Choice   1 point

The pitot tube shown below is placed at a point where the velocity is 4.5 m/s. The specific gravity of the fluid is 2.5, and the upper portion of the manometer contains air.

The reading h (m) on the manometer is most nearly:

- ○ 4.05
- ○ 25.0
- ○ 1.03
- ○ 45.0

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2   Multiple Choice   1 point

If the standard density of water is 1,000 kg/m^3, a fluid having a specific gravity of 1.524 and an absolute dynamic viscosity of 1.3 kg/(m•s) has a kinematic viscosity (m^2/s) of most nearly:

- ○ 8.53 x 10^{-4}
- ○ 1.17 x 10^{-3}
- ○ 1.30 x 10^{-3}
- ○ 1.98 x 10^{-3}

Multiple Choice   1 point

The rectangular homogeneous gate shown below is 6.00 m high x 1.00 m wide and has a frictionless hinge at the bottom.

FLUID   3.00 m

FRICTIONLESS
HINGE
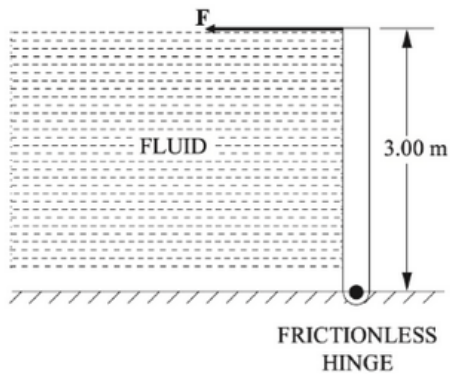
If the fluid on the left side of the gate has a density of 1,750 kg/m³, the magnitude of the force **F** (kN) required to keep the gate closed is most nearly:

- [ ] 24
- [ ] 51
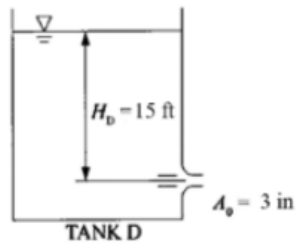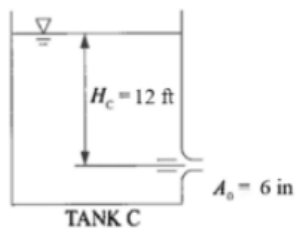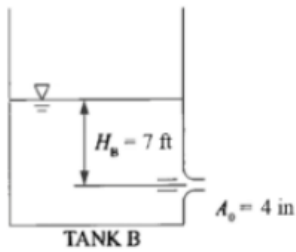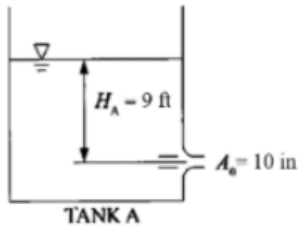- [ ] 154
- [ ] 103

Multiple Choice   1 point

Archimedes' principle states that:

- [ ] the sum of the pressure, velocity, and elevation heads is constant
- [ ] a floating body displaces a weight of fluid equal to its own weight
- [ ] flow passing two points in a stream is equal at each point
- [ ] the buoyant force on a body is equal to the volume displaced by the body

Four water tanks are shown with varying heights H and varying nozzle cross-sectional areas A_0. Assume no minor losses in the discharge and a common coefficient of discharge $C = 0.6$ for all the nozzles.

$H_A = 9$ ft

$A_o = 10$ in

TANK A

$H_B = 7$ ft

$A_o = 4$ in

TANK B

$H_C = 12$ ft

$A_o = 6$ in

TANK C

$H_D = 15$ ft

$A_o = 3$ in

TANK D

List the tanks from lowest to highest magnitude of discharge velocity

○ Tank D, Tank B, Tank C, Tank A

○ Tank D, Tank C, Tank A, Tank B

○ Tank B, Tank A, Tank C, Tank D

○ Tank A, Tank C, Tank B, Tank D

A 1-in-diameter jet of 50°F water is deflected 90° by an angled chute as shown.The water enters with a velocity of 32.5 ft/sec and freely exits into the atmosphere with the same velocity.
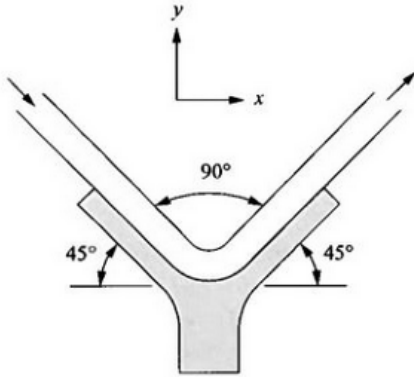
The forces (lb) in the x and y directions of the chute are most nearly:

○ F_x = 15.80 lb

   Fy = 0

○ F_x = 0

   Fy = 7.90 lb

○ F_x = 15.80 lb

   Fy = 15.80 lb

○ F_x = 0

   Fy = 15.80 lb