7. Fluid Mechanics

Starter Quiz ·

University Mechanical Engineering Name: _____ Score: _____

1. Gauge pressure 2.5 m below a water surface (one decimal, kPa)?

   _____ kPa

2. 12 L/s through a 30 mm nozzle: jet speed (one decimal, m/s)?

   _____ m/s

3. Ideal venturi flow, 40 mm throat, beta = 0.5, dp = 14.8 kPa (two decimals, L/s)?

   _____ L/s

4. How many dimensionless groups for F, rho, V, D, mu in M, L, T?

   _____

5. Oil, nu = 1.0e-4 m2/s, 0.5 m/s, 20 mm bore: Re?

   _____

6. Skin-friction drag is calculated with:

   ☐ the frontal area

   ☐ the volume

   ☐ the cross-section of the wake

   ☐ the wetted area

7. On a submerged vertical gate, the centre of pressure is:

   ☐ at the bottom edge

   ☐ above the centroid

   ☐ at the centroid

   ☐ below the centroid

8. At the nozzle, which term is larger?

   ☐ they are equal

   ☐ neither acts

   ☐ the momentum gain

   ☐ the inlet pressure force

9. A sharp orifice plate and a venturi give the same reading. The orifice flow is:

   ☐ much less

- ☐ the same
- ☐ zero
- ☐ much more

10. Water at Re = 1.9 x 10^5 in a pipe is:
    - ☐ turbulent
    - ☐ transitional
    - ☐ it depends on the pipe length
    - ☐ laminar

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Answers ·

University Mechanical Engineering

1. **24.5 kPa**

   rho g h = 998 x 9.81 x 2.5.

2. **17.0 m/s**

   Q over the area 7.069e-4 m2.

3. **7.07 L/s**

   A2 times root of 2 dp over rho (1 - beta^4).

4. **2**

   5 variables minus 3 dimensions.

5. **100**

   VD over nu.

6. **the wetted area**

   Shear acts over every wetted surface.

7. **below the centroid**

   Pressure grows with depth, so the resultant sits lower than the centroid.

8. **the inlet pressure force**

   708.6 N of pressure against 174.7 N of momentum gain.

9. **much less**

   Its discharge coefficient is near 0.61 against 0.98.

10. **turbulent**

    Far above 4000.