

Unit 06:  
Analysis  
of Simple  
Flow Geometries  
(Pipe Flow  
and Boundary

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Stephanie Redfern and Tuan Dinh. Fluid Mechanics. The Saylor Foundation,  
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## 1. Unit 06: Analysis of Simple Flow Geometries (Pipe Flow and Boundary Layers)

## 4. Chapter: Unit 06: Analysis of Simple Flow Geometries (Pipe Flow and Boundary Layers)

### 1. Unit 06: Analysis of Simple Flow Geometries (Pipe Flow and Boundary Layers) Questions

#### 4.1.1. Consider fully turbulent flow of water in a 90 degree bend in a 4-i...

Author: Stephanie Redfern

Consider fully turbulent flow of water in a 90 degree bend in a 4-inch ID pipe. The radius of curvature of the bend is 12 cm. The flow rate is 50 ft<sup>3</sup>/min. Which of the following most closely matches the pressure drop through the bend?

Please choose only one answer:

- 7.5 atm
- 75 Pa
- 750 psi
- 750 Pa

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#### 4.1.2. Estimate (through calculation) the time required for a 2 mm diamete...

Author: Stephanie Redfern

Estimate (through calculation) the time required for a 2 mm diameter brass ball bearing to fall through 30 cm of 100% glycerol at 20 degrees C. Which of the following values best matches your estimate?

Please choose only one answer:

- 1 minute
- 5 minutes
- 30 minutes
- 1 hour

Check the answer of this question online at [QuizOver.com](http://www.quizover.com):

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#### 4.1.3. Consider a conceptual model of a flagpole exposed to wind. We will ...

Author: Stephanie Redfern

Consider a conceptual model of a flagpole exposed to wind. We will approximate the flagpole as a smooth 3 inch OD cylinder 15 m long. The flagpole is exposed to hurricane force winds at 75 mph. Estimate the total transverse force on the flagpole. Which of the following ranges most closely matches your estimate?

Please choose only one answer:

- 20-100 N
- 300-900 N
- 3000-5000 N
- 1-5 N
- 100-300 N

Check the answer of this question online at QuizOver.com:

Question: [Consider a conceptual model of a flagpole Stephanie @The Saylor Fluid](#)

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#### 4.1.4. Which of the following is true for Hagen-Poiseuille flow or fully d...

Author: Stephanie Redfern

Which of the following is true for Hagen-Poiseuille flow or fully developed laminar pipe flow?

- I.  $P = 128 L Q / (R^{4})$
- II. Fluid velocity depends upon axial and radial positions in the pipe.
- III. The velocity profile may be parabolic or almost plug (flat) like.
- IV. The pressure drop is proportional to viscosity, pipe length, and flow rate, and inversely proportional to the fourth power of the pipe diameter.
- V. Fluid velocity only depends upon radial position in the pipe.

Please choose only one answer:

- IV and V only
- I only
- I and II only
- III only
- I, II, and III only

Check the answer of this question online at QuizOver.com:

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#### 4.1.5. Consider steam flowing at $100 \text{ ft}^3/\text{min}$ in a 4 inch diamet...

Author: Stephanie Redfern

Consider steam flowing at  $100 \text{ ft}^3/\text{min}$  in a 4 inch diameter pipe. The inlet temperature of the steam is 400 F. The inlet pressure of the steam to the pipe is 50 psia. The pipe is well insulated. The surface roughness of the pipe given by  $e/D = 0.01$ . Which of the following most closely represents the pressure drop of the steam over a 40 m section of the pipe?

Please choose only one answer:

- 40 psi
- 0.4 atm
- 400 Pa
- 4 Pa

Check the answer of this question online at QuizOver.com:

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#### 4.1.6. At approximately which value of Re does flow change from laminar to...

Author: Stephanie Redfern

At approximately which value of Re does flow change from laminar to turbulent in a smooth pipe?

Please choose only one answer:

- $5 \times 10^4$
- $2 \times 10^3$
- $5 \times 10^3$
- $2 \times 10^2$

Check the answer of this question online at QuizOver.com:

Question: [At approximately which value of Re does Stephanie Redfern @The Fluid](#)

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