

Piston Displacement Lesson 3 Quiz

Name

Key

Solve the following using the cubic inch displacement formula and convert to the indicated unit. Show work and use appropriate units.

1. A V-6 engine block has a bore of 4.25 inches, a stroke of 3.5 inches. Calculate the cubic inch displacement in cubic inches. If the bore is increased by .25 inches, what is the increase in the CID in cubic inches?

$$CID = .7854 \times 4.25^2 \times 3.5 \times 6$$

$$CID = 298 \text{ cubic inches}$$

$$\text{New Bore} = 4.25 + .25 = 4.5 \text{ in}$$

$$\text{New CID} = .7854 \times 4.5^2 \times 3.5 \times 6$$

$$\text{New CID} = 334 \text{ cubic inches}$$

$$CID \text{ increase} = 334 - 298 = \boxed{36 \text{ cubic inches}}$$

2. A V-8 engine block has a bore of 3.125 inches, a stroke of 3.875 inches. Calculate the cubic inch displacement in cubic inches. If the engine is modified with a .5 inch increase in the stroke, what is the increase in the CID in cubic inches?

$$CID = .7854 \times 3.125^2 \times 3.875 \times 8$$

$$CID = 238 \text{ cubic inches}$$

$$\text{New Stroke} = 3.875 + .5 = 4.375 \text{ inches}$$

$$\text{New CID} = .7854 \times 3.125^2 \times 4.375 \times 8$$

$$\text{New CID} = 268 \text{ cubic inches}$$

$$CID \text{ increase} = 268 - 238 = \boxed{30 \text{ cubic inches}}$$

3. A V-8 engine block has a bore of 4.050 inches, a stroke of 3.25 inches. Calculate the cubic inch displacement in Liters. If the bore is increased by .5 inches, what is the increase in the CID in Liters?

$$CID = .7854 \times 4.050^2 \times 3.25 \times 8$$

$$CID = 335 \text{ cubic inches}$$

$$\text{New Bore} = 4.050 + .5 = 4.55$$

$$\text{New CID} = .7854 \times 4.55^2 \times 3.25 \times 8$$

$$\text{New CID} = 423 \text{ cubic inches}$$

$$335 \text{ in}^3 \cdot \frac{16.39 \text{ cc}}{1 \text{ in}^3} \cdot \frac{1 \text{ L}}{1000 \text{ cc}} = 5.5 \text{ L}$$

$$423 \text{ in}^3 \cdot \frac{16.39 \text{ cc}}{1 \text{ in}^3} \cdot \frac{1 \text{ L}}{1000 \text{ cc}} = 6.9 \text{ L}$$

$$CID \text{ increase} = 6.9 - 5.5 = \boxed{1.4 \text{ L}}$$

$$\text{or } 423 - 335 = 88 \text{ in}^3 \cdot \frac{16.39 \text{ cc}}{1 \text{ in}^3} \cdot \frac{1 \text{ L}}{1000 \text{ cc}} = 1.4$$

4. A V-6 engine block has a bore of 3.125 inches, a stroke of 3.25 inches. Calculate the cubic inch displacement in Liters. If the bore is increased by .225 inches, what is the increase in the CID in Liters?

$$CID = .7854 \times 3.125^2 \times 3.25 \times 6$$

$$CID = 150 \text{ cubic inches}$$

$$150 \text{ in}^3 \cdot \frac{16.39 \text{ cc}}{1 \text{ in}^3} \cdot \frac{1 \text{ L}}{1000 \text{ cc}} = 2.5 \text{ L}$$

$$\text{New Bore} = 3.125 + .225 = 3.35 \text{ in}$$

$$\text{New CID} = .7854 \times 3.35^2 \times 3.25 \times 6$$

$$\text{New CID} = 172 \text{ cubic inches}$$

$$172 \text{ in}^3 \cdot \frac{16.39 \text{ cc}}{1 \text{ in}^3} \cdot \frac{1 \text{ L}}{1000 \text{ cc}} = 2.8 \text{ L}$$

$$CID \text{ increase} = 2.8 - 2.5 = \boxed{.3 \text{ L}}$$

$$\boxed{\text{OR}} \quad 172 - 150 = 22 \text{ in}^3 \cdot \frac{16.39}{1 \text{ in}^3} \times \frac{1 \text{ L}}{1000} = .36$$

5. A V-6 engine block has a bore of 3.375 inches, a stroke of 3.25 inches. Calculate the cubic inch displacement in cubic inches. If the bore is increased by .025 inches and the stroke is increased by .5 inches, what is the increase in the CID in cubic inches?

$$CID = .7854 \times 3.375^2 \times 3.25 \times 6$$

$$CID = 174 \text{ cubic inches}$$

$$\text{New Bore} = 3.375 + .025 = 3.4 \text{ in}$$

$$\text{New Stroke} = 3.25 + .5 = 3.75 \text{ in}$$

$$\text{New CID} = .7854 \times 3.4^2 \times 3.75 \times 6$$

$$\text{New CID} = 204 \text{ cubic inches}$$

$$CID \text{ increase} = 204 - 174 = \boxed{30 \text{ cubic inches}}$$