

Manipulating the Variable to Change Compression Ratios

Lesson 10

Remember:

Pretty **P**lease **M**y **D**ear **A**unt **S**ally

(From left to right; **P**arentheses; **P**ower; **M**ultiply; **D**ivide; **A**dd, **S**ubtract)

Identify The Math, Math Terms, Vocabulary, Description Or Definitions

This lesson will follow our previous lesson learning how to calculate compression ratios. The problems that you are solving here use the same procedure that you used in the previous lesson.

- What affects compression ratio?
- Why is compression ratio when you are rebuilding an engine?
- What happens to the compression ratio if the piston displacement is increased and the chamber volume stays the same? What is the term for this?
- What happens to the compression ratio if the chamber volume is raised and the piston displacement stays the same? What is the term for this?
- What is the difference between **DIRECT VARIATION** and **INDIRECT VARIATION**?

DIRECT VARIATION — when two variables in an expression increase or decrease together.

INDIRECT VARIATION — when an increase in one variable in an expression causes another variable in the equation change to decrease and vice versa.

$$\text{Compression Ratio (CR)} = \frac{\text{Piston Displacement (PD)} + \text{Chamber Volume (CV)}}{\text{Chamber Volume (CV)}}$$

Remember: CID = CC/16.39 and CC = CID x 16.39

1. What is the **compression ratio** of a V-8, 5.0 L Mustang with a piston displacement of 302cu.in., and a combustion chamber volume of 75cc? If only the piston displacement were increased to 318cu.in., would the compression ratio increase or decrease? Find the new compression ratio.

Is the change in **compression ratio** a direct variation and indirect variation?

2. What is the **compression ratio** of a V-8, 5.0 L Mustang with a piston displacement of 302cu.in and a combustion chamber volume of 68 cc?. If only the combustion chamber volume were increased to 80 cc, would the compression ratio increase or decrease? Find the new compression ratio.

Is the change in **compression ratio** a direct variation and indirect variation?

3. Given the formula $HP = \frac{d \cdot w}{33,000}$, what happens to HP (horse power) as the d (distance) increases?

Is this direct or indirect variation?

4. Given the formula $E = \frac{W}{I}$, what happens to the volts (E) when the watts (W) is increased?

Is this direct or indirect variation?

5. Assume that $\frac{P}{T} = K$, does P vary directly with K? Will it increase or decrease?

Is this direct or indirect variation?

6. What is the **compression ratio** of a V8 engine with a cylinder volume of 283 cu.in., and a combustion chamber volume of 35 cc? If we increased the chamber volume, will the compression ratio increase or decrease from the value just calculated? Calculate the compression ratio with a chamber volume of 42 cc leaving everything else the same.

Is this direct or indirect variation?

7. What is the **compression ratio** of a V8, 5.0 L Mustang with a piston displacement of 302cu.in and a combustion chamber volume of 68 cc?. Find the new compression ratio if we decrease the combustion chamber volume to 58 cc.

Is the change in **compression ratio** a direct variation and indirect variation?

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Lesson 10 Worksheet – Compression Ratio

Name: _____ AM-1: _____ PM _____ Date: _____

$$\text{Compression Ratio (CR)} = \frac{\text{Piston Displacement (PD)} + \text{Chamber Volume (CV)}}{\text{Chamber Volume (CV)}}$$

1. Using the Ohm's Law formula $R = \frac{E}{I}$, what happens to the ohms (R) when the amps (I) are increased?

Is this a direct or indirect variation?

2. What is the compression ratio of a V-12 engine with a piston displacement of 427 cu.in., and a combustion chamber volume of 80 cc?. Find the new compression ratio if the combustion chamber volume were decreased to 70 cc, and cylinder volume was increased to 465 cu.in. Would the compression ratio increase, decrease, or stay the same?

If there is a change to the compression ratio is it a direct variation and indirect variation?

3. What is the compression ratio of an in-line 6-cylinder engine with a piston displacement of 225cu.in., and a combustion chamber volume of 85cc? If only the piston displacement were increased to 235 cu.in., would the compression ratio increase or decrease? Find the new compression ratio.

Is the change in compression ratio a direct variation and indirect variation?

4. What is the compression ratio of a V-10 engine with a piston displacement of 396 cu.in., and a combustion chamber volume of 68 cc?. If only the combustion chamber volume were increased to 80 cc, would the compression ratio increase or decrease? Find the new compression ratio.

Is the change in compression ratio a direct variation and indirect variation?

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Lesson 10 Homework – Compression Ratio

Name: _____ AM-1: _____ PM _____ Date: _____

$$\text{Compression Ratio (CR)} = \frac{\text{Piston Displacement (PD)} + \text{Chamber Volume (CV)}}{\text{Chamber Volume (CV)}}$$

1. Using the Ohm's Law formula $R = \frac{E}{I}$, what happens to the ohms (R) when the amps (I) are decreased? Is this a direct or indirect variation?

2. What is the compression ratio of a V8 engine with a piston displacement of 302cu.in., and a combustion chamber volume of 75cc? If only the piston displacement were increased to 318cu.in., would the compression ratio increase or decrease? Find the new compression ratio. Is the change in compression ratio a direct variation and indirect variation?

3. What is the compression ratio of a V8 engine with a piston displacement of 396 cu.in., and a combustion chamber volume of 68 cc?. If only the combustion chamber volume were increased to 80 cc, would the compression ratio increase or decrease? Find the new compression ratio.

Is the change in compression ratio a direct variation and indirect variation?

4. What is the compression ratio of a V-10 engine with a piston displacement of 427 cu.in., and a combustion chamber volume of 70 cc?. Find the new compression ratio if the combustion chamber volume were increased to 80 cc, and cylinder volume was increased to 465 cu.in., would the compression ratio increase, decrease, or stay the same?

If there is a change to the compression ratio is it a direct variation and indirect variation?