

Just In Time Quick Check
Standard of Learning (SOL) AII.10

Strand: Statistics

Standard of Learning (SOL) AII.10

The student will represent and solve problems, including practical problems, involving inverse variation, joint variation, and a combination of direct and inverse variations.

Grade Level Skills:

- Given a data set or practical situation, write the equation for an inverse variation.
- Given a data set or practical situation, write the equation for a joint variation.
- Solve problems, including practical problems, involving inverse variation, joint variation, and a combination of direct and inverse variations.

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Just in Time Quick Check Teacher Notes

Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
 - [AII.10 – Types of Variation](#) (Word) / [PDF Version](#)
- VDOE Word Wall Cards: [Algebra II](#) (Word)/ [PDF Version](#)
 - Direct Variation, Inverse Variation, Joint Variation

Supporting and Prerequisite SOL: [All.6a](#), [A.1a](#), [A.3a](#), [A.3b](#), [A.6b](#), [A.8](#)

SOL AII.10 - Just in Time Quick Check

- Determine whether each equation represents direct, inverse, or joint variation.
 - $gh = -5$
 - $\frac{1}{4}m = np$
 - $\frac{x}{y} = 4.65$
 - $2ab = c$
- Assuming temperature remains constant, the volume of a gas, V , varies inversely as its pressure, P .
 - What is the constant of proportionality if a container has a volume of 6 liters under a pressure of 220 psi?
 - What is the volume of the gas when the pressure is increased to 330 psi?
- The area of a trapezoid varies jointly as its height and the sum of its bases. A trapezoid with a height of 8 feet and bases with lengths 10 feet and 15 feet has an area of 100 square feet.
 - Write an equation to represent the area of the trapezoid, A , in terms of its height, h , and the lengths of the bases, b_1 and b_2 .
 - Use your equation from part a to find the area of a trapezoid with a height of 16 feet and bases with lengths of 10 feet and 8 feet.

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Common Errors/Misconceptions and their Possible Indications

1. Determine whether each equation represents direct, inverse, or joint variation.

a) $gh = -5$

b) $\frac{1}{4}m = np$

c) $\frac{x}{y} = 4.65$

d) $2ab = c$

A common error that some students may make is to assume that equations that contain a fraction represent inverse variations and those without must be direct or joint variations, incorrectly assuming that a) might represent a direct variation, while b) and c) are inverse variations. This may indicate that students are unable to distinguish how the operations between the variables in the equation distinguishes the type of relationship that exists. Teachers may wish to compare and contrast direct, inverse, and joint variation equations and how each can be written using an equivalent form.

2. Assuming temperature remains constant, the volume of a gas, V , varies inversely as its pressure, P .

a) What is the constant of proportionality if a container has a volume of 6 liters under a pressure of 220 psi?

b) What is the volume of the gas when the pressure is increased to 330 psi?

Students may calculate the correct constant of proportionality, however a common error that some students may make is to inadvertently switch the values of the increased pressure and the constant of proportionality when calculating the new volume, and erroneously obtain 0.25 liters versus 4 liters. This may indicate that students recognize that as the pressure increases the volume will decrease, but do not recognize the role of the constant of variation in the inverse relationship. Teachers may wish to provide additional ways to represent the inverse variation, such as using tables or graphs, to recognize the relationship between the values of the two quantities based on the constant of proportionality.

3. The area of a trapezoid varies jointly as its height and the sum of its bases. A trapezoid with a height of 8 feet and bases with lengths 10 feet and 15 feet has an area of 100 square feet.

a) Write an equation to represent the area of the trapezoid, A , in terms of its height, h , and the lengths of the bases, b_1 and b_2 .

b) Use your equation from part a to find the area of a trapezoid with a height of 16 feet and bases with lengths of 10 feet and 8 feet.

A common error that some students may make is to fail to use the initial information provided to determine the equation in part a, possibly resulting in $A = h(b_1 + b_2)$. This may indicate that students do not recognize that the relationship between the three variables includes a constant of proportionality of $\frac{1}{2}$. Students may not necessarily connect the concept of joint variation with direct variation. Teachers may wish to utilize the VDOE Algebra II Vocabulary Word Wall cards to review the concepts of direct, inverse, and joint variation.