

Joint and combined variation
02/29/2012

Student Name: _____

Class: _____

Date: _____

Instructions: **Read each question carefully and select the correct answer.**

1. The volume (V) of a pyramid varies jointly with the area of the base (B) and height (h) of the pyramid. The equation that represents this relationship is given by

$$V = kBh$$

where k is the pyramid constant. A pyramid with a base area of 600 square feet and a height of 20 feet has a volume of 4,000 cubic feet. What is the volume of a pyramid with a base area of 200 square feet and a height of 15 feet?

- A. 750 ft³
B. 850 ft³
C. 925 ft³
D. 1,000 ft³
2. The heat loss (H) through a glass window varies jointly with the difference between the indoor and outdoor temperature (d) and the area of the window (A). The equation that represents this relationship is given by

$$H = kdA$$

where k is the heat loss constant for a particular type and thickness of glass. If the heat loss through a 1.5 meter by 2 meter window is 1,008 BTUs when the temperature difference is 21° C, what is the heat loss through the same window when the temperature difference is 38° C?

- A. 1,265 BTUs
B. 1,456 BTUs
C. 1,824 BTUs
D. 1,988 BTUs

3. The volume (V) of a given mass of helium varies directly with its temperature (T), and inversely with its pressure (P). The equation that represents this relationship is given by

$$V = \frac{kT}{P}$$

where k is a helium constant. If a given amount of helium occupies a volume of 189 liters when the temperature is 20°C and the pressure is 121,000 Pascals, what is the volume of the helium when the temperature is 10°C and the pressure is 100,000 Pascals? Round your answer to the nearest tenth.

- A. 114.3 liters
 - B. 121.7 liters
 - C. 135.2 liters
 - D. 149.6 liters
4. The time (T) it takes to empty a 5-gallon container of ice cream at a barbecue varies directly with the number of guests (g) requesting ice cream, and indirectly with the number of helpers (h) serving it. The equation that represents this relationship is given by

$T = \frac{k g}{h}$ where k is the barbecue constant. If it takes 1.5 hours to empty a container of ice cream when 75 guests request it and there are 3 helpers serving, how long will it take to empty the container if 24 guests request ice cream and 2 helpers are serving?

- A. 0.48 hours
- B. 0.72 hours
- C. 0.95 hours
- D. 1.2 hours