

***Be sure to provide the source code and at least one sample run for each question***

Question #1: Write a program in Scratch the prompts a user for the number of kilograms of fuel (under 70 MPa(s) [approximately 10,153 PSI] of pressure at 59 degrees Fahrenheit) purchased at a hydrogen fueling station and converts the value to gallons. Be sure to perform error checking, i.e. the value entered is greater than or equal to zero.

Note: 1 kg of hydrogen gas stored under a pressure of 70 MPa at 59 degrees Fahrenheit uses a volume of about 6.83 gallons.

Question #2: Write a program in Scratch that prompts a user for the radii and center of two circles. Based on the information provided, determine if the circles intersect and output the result.

Question #3: Write a program in Scratch that prompts a user for the radii and center of two spheres. Based on the information provided, determine if the spheres intersect and output the result.

Question #4: Write a program that calculates the factorial of a value. For example, 4 factorial (written as 4!) is equivalent to  $4 \times 3 \times 2 \times 1 = 24$ .

Note that the values grow quickly, e.g.  $10! = 3628800$ ,  $20! = 2432902008176640000$  or about  $2.43 \times 10^{18}$  and 69! equals:

$69! = 17112245242814131137246833888127283909227054489352036939364804092325727975414064742400000000000000$

Or approximately  $1.71 \times 10^{98}$ .