7.1.3 Final Exam: Physical Science Semester 1   Exam

Physical Science Core Sem 1 (S3089676)   Name: _____

Points possible: 90   Date: _____

Read each question carefully and answer in the space provided. Show your work when necessary.

1. Julie has moved to Great Britain and has to learn a whole new system of units to converse with people there. She writes down all of the conversion factors shown in the table below. Then she creates her own table with things she wants to memorize. Fill in the rest of Julie's table. (Round your answers to the nearest tenth.) Show your work in the space provided. (12 points)

Quantity	Conversion Information
Temperature	$°C = \frac{5}{9}(°F - 32)$
Distance	$1\ mile = 1.61\ km$
Distance	$1\ ft = 0.305\ m$
Distance	$1\ in = 2.54\ cm$
Weight/mass	$1\ kg = 2.2\ lb$
Voltage	$1V = 1V$

Quantities Important to Julie	Numbers (English Units)	Converted Quantities
Her height	5ft 2in	1.725m
Her weight (mass)	105 lbs	47.72 kg
Distance to her school	1.1 mi	1.62 km
Highway speed	65 mph	65 mph
Wall outlet voltage	220 V	220 v
Room temperature	70°F	

2. Complete the following table. Write the numbers in scientific notation or, if they are already in scientific notation, write them out, without using exponents or multiplication. (9 points)

$150,000	

	2.59 x 10^6 m
0.005 in	

3. Draw the Velocity Versus Time graph for an object that is dropped from the top of a building and has no initial speed. Be sure to label your axes with the correct values. Assume there is no air resistance. Hint: The object is moving down. (11 points)
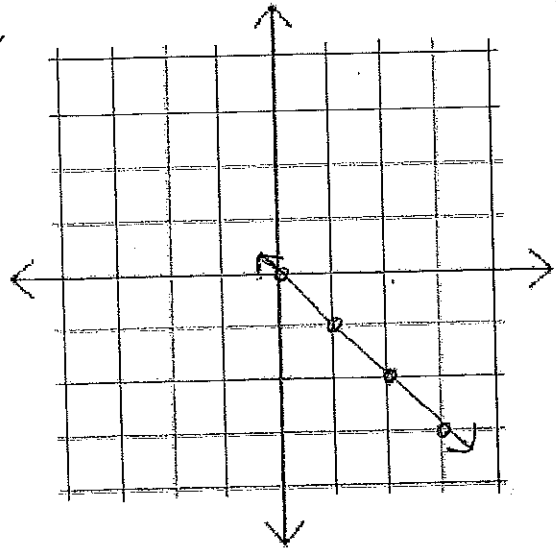
4. A motorcycle with a mass of 200 kg can accelerate from 0 to 30 m/s in 3 seconds.

A. Assuming all of the force generated by the engine goes into acceleration of the motorcycle, how much force is the engine producing? Show your work. (6 points)

B. What would happen if the coefficient of friction between the tire and the pavement increased greatly? Explain what would happen, including whether the acceleration of the motorcycle would stay the same, increase, or decrease, and tell why you think this is. (4 points)

5. The Tower of Doom, at Elitch Gardens in Denver, Colorado, lifts 15 people 50 m into the air. The engineers assume the average person has a mass of 70 kg.

    A. How much rider weight does the ride lift into the air? (Neglect the weight of the cars and air resistance.) (4 points)

    B. How much force must the ride produce to do this? (4 points)

    C. How much work does the ride do to lift the riders up to a height of 50 meters? (4 points)

    D. How much work does gravity do as the riders are lifted up to a height of 50 meters? (4 points)

    E. What is the potential energy of a single, average-weight person at the top of the ride? (4 points)

    F. If the ride slows from its maximum speed of 30 m/s to zero in 2 seconds, how much power did it take? Hint: Use the combined mass of all 15 riders. (4 points)

6. Car A runs a red light and broadsides Car B, which is stopped and waiting to make a left turn. Car A has a mass of 1,800 kg. Car B has a mass of 1,500 kg. After the impact, the cars stick together and slide away at a speed of 7.1m/s. How fast was Car A going when it hit Car B? Show your work. (9 points)
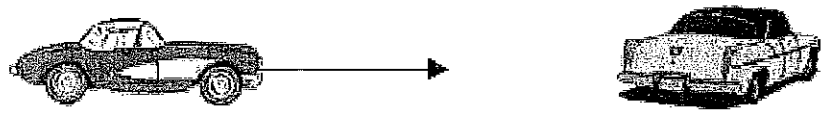
7. An object is placed in front of a concave mirror as shown in the diagram below.

A. Draw at least two rays that demonstrate how this mirror produces an image. (4.points)
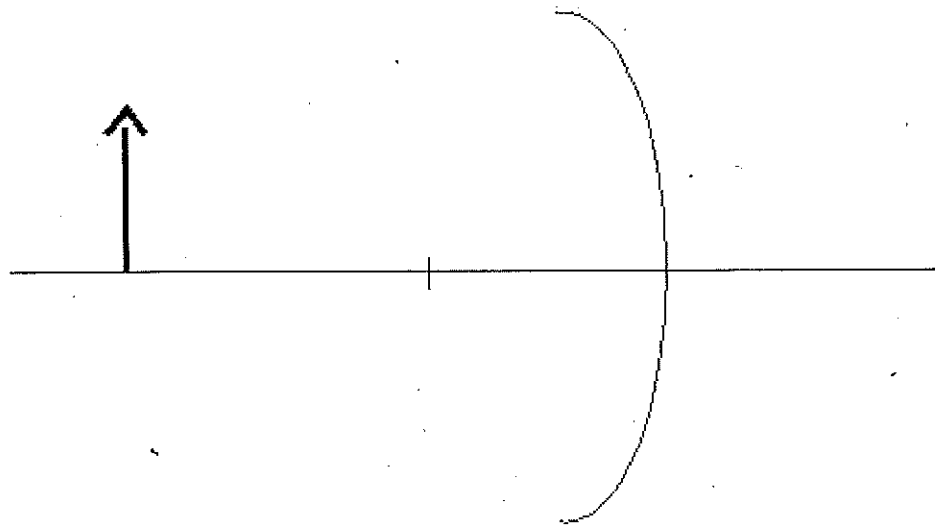
B. Describe the image formed and justify your choices.

i. Is it real or virtual? (2 points)

ii. Is it upright or inverted? (2 points)

    iii. Is it larger or smaller than the original object? (2 points)

8. Steve took a train 30 miles north to Seattle. Then he took a different train 25 miles east. Draw a vector diagram showing Steve's trip, including the resultant vector. Be sure to label all vectors. (5 points)