## Ratio Assignment Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## MATH A104

DRAFT DRAFT DRAFT Megan, put in how many points all the questions are worth! 2, 5, 5, 1, 2, 3, 4, 3, 2, 2, 4, 3 or 4? Total of 36 pts?

We are going to think about the following mathematical situation over several steps: When a bullet is fired from a loosely held rifle, the ratio of the mass of the bullet to that of the rifle equals the negative reciprocal of the ratio of the velocity of the bullet to that of the rifle.

1. Write a ratio of the mass of a bullet to the mass of a rifle. Be sure to label your variables!
2. Write a ratio of the velocity of a bullet to the velocity of a rifle. Again, label those variables.
3. Write down the negative reciprocal of the ratio you found in question #2.
4. Write a proportion (an equation) where the ratio of the mass of the bullet to that of the rifle equals the negative reciprocal of the ratio of the velocity of the bullet to that of the rifle.
5. Using the proportion you developed in #4, If a 3.0 kg rifle fires a 5.0-g bullet and the velocity of the bullet is 300 m/s, what is the recoil velocity of the rifle?
6. Why is your answer negative?
7. Let’s see what happens if we increase the mass of the bullet. MAKE A TABLE WITH DIFFERENT BULLETS WEIGHTS If a 3.0 kg rifle fires a 6.0-g bullet and the velocity of the bullet is 300 m/s, what is the recoil velocity of the rifle?
8. Is this relationship linear (constant rate of change) or not linear (constant step increases by varying amounts)
9. What if we increase the mass of the rifle? MAYBE MAKE ANOTHER TABLE? If a 5.0 kg rifle fires a 5.0-g bullet and the velocity of the bullet is 300 m/s, what is the recoil velocity of the rifle?
10. Explain how cross multiplying works.
11. Extra credit question (1 point): go to <https://what-if.xkcd.com/21/> to answer the question on if we can build a jetpack using downward firing machine guns. To show you read the article, please write the name of the gun referenced in leaping mountains.