Please show **all** your work! Write answers in spaces provided. You have 24 minutes to complete this exam.

Name:_____

1. A car is initially travelling at 30 m/s in a westward direction before beginning to accelerate at a rate of 10 m/s^2 towards the east.

   (a) What is the velocity of the car after 4 seconds?

   Answer:_____

   (b) Is the car not moving at any point in time?

   Answer:_____

   (c) If the car stops accelerating when its speed is 60 m/s, how long did it accelerate for?

   Answer:_____

2. The year is 2075 and Ottawa has decided to open phase 7 of its public transportation rail network — a bullet train that maxes out at 175 m/s. Assuming the train is originally moving at maximum speed, how far before the station must the train begin slowing down in order to not accelerate the discomfort point of 35 m/s^2?

3. You get into a race with your younger sister. Since she's 5 years younger than you, you give her a 30 meter head start. You run at an average speed of 6 m/s and she runs with an average speed of 5 m/s. You reach the finish line in 20 seconds. How far is the finish line from where you started? Did she beat you?

Answer:_____

4. A high impact probe is launched downwards (initial velocity 500 m/s) from a spacecraft hovering 15,000 m above the surface of Mars. Assuming a constant gravitational acceleration of 3.7 m/s^2, does the probe reach the required impact velocity of 650 m/s? If not, how high would it need to be launched from in order to achieve this?

Answer:_____

The End.