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Acceleration Problems

Name: _____ Date: _____

Useful equations:

$$a = \frac{\Delta v}{\Delta t} = \frac{v_2 - v_1}{\Delta t} \qquad v_{av} = \frac{v_1 + v_2}{2} \qquad v = \frac{\Delta d}{\Delta t}$$

Solving kinematics problems without the full set of kinematics equations.

1. [5 marks] Avery accelerates his motorbike quickly down the highway. The bike accelerated at a rate of 2 m/s/s for 10 s. Its final speed was found to be 30 m/s. Calculate his initial speed. Calculate his average speed and the distance travelled during this acceleration.

2. [5 marks] James is flying in a rocket ship is accelerating at a rate of 56 m/s/s. The ship's initial speed was 300 m/s and its final speed was 900 m/s.
   a) Calculate the time that the ship was accelerating.
   b) Calculate the average speed that the ship was travelling at during this time.
   c) Using the average speed, calculate how far the ship travelled in this time.

3. [5 marks] Super Turtle runs 500m down the street. His initial speed was 10 m/s and his final speed was 40 m/s. Calculate the time it took him to travel the 500 m.

4. [5 marks] Crazy Camel is moving through the desert. He starts his motion at 12 m/s. After 40 seconds and over a distance of 1200m he is moving at a new speed. Calculate this speed and acceleration.

5. [5 marks] A cat runs down an alley. The cat is moving at 5 m/s when it passes a dog. The cat accelerates to a speed of 23 m/s over a distance of 19 m. Calculate the cat's acceleration.

6. *Quick research:* What is the value of the acceleration due to gravity near the surface of Earth (approximately)?

7. [5 marks] Brianna is standing on top of a building. She drops a water balloon from rest from the top of the building. If it took 4.8 seconds to reach the ground, calculate the height of the building.