

## Example Questions for Quiz 2

Here are some questions that are similar to what will be on Quiz 2.  
The quiz will have two 5 point questions and others to make up 20 points.

1. (2 points) How are speed and velocity different?
2. (2 points) If your car odometer indicates you have driven 150 km during the past 2 hours, what has been your average speed?
3. (2 points) A satellite is moving at a speed of 25000 km/h. What is its speed in m/s?
4. (4 points) A rocket accelerates in a straight line from 0 km/h to 1800 km/h in 25 s, what is its average acceleration in  $\text{m/s}^2$ ?
5. (2 points) A drag racer accelerates from standing still at a uniform rate of  $8 \text{ m/s}^2$  for 10 s, how fast is it moving at the end?
6. (2 points) A drag racer accelerates from standing still at a uniform rate of  $8 \text{ m/s}^2$  for 10 s, how far has it traveled?
7. (2 points) Why is a satellite moving around the earth at a constant speed of 8 km/s said to be accelerating?
8. (2 points) A driver puts on the brakes and stops the car. The speed has changed and the car is said to have undergone an acceleration. What is special about the value of its acceleration?
9. (5 points) Use Newton's Law of Gravitation to calculate the force between the Moon (  $m_{\text{Moon}} = 7.35 \times 10^{22} \text{ kg}$  ) and the Earth (  $m_{\text{Earth}} = 5.97 \times 10^{24} \text{ kg}$  ) using their separation distance of  $d = 3.84 \times 10^8 \text{ m}$  . Use your equation sheet to find Newton's Law of Gravitation with the value for its universal constant  $G$ .

10. (4 points) A rock is dropped off a bridge and hits the water 5 s later. How high is the bridge above the water?
11. (5 points) Calculate the local acceleration of gravity on the Mars ( $m_{\text{Mars}} = 6.42 \times 10^{23} \text{ kg}$ ). At the surface of the Mars, objects are a distance  $d = r_{\text{Mars}} = 3.39 \times 10^6 \text{ m}$  from the center of the Mars. Your result will give you the value  $g_{\text{Mars}}$  which is significantly less than  $g_{\text{Earth}} = 9.80 \text{ m/s}^2$ .
12. (2 points) An object moves around a circle of 2 m radius. What is the distance it must move to complete one trip around the circle?
13. (2 points) An object moves around a circle of 2 m radius in 3 s. What is its speed?
14. (2 points) An object moves around a circle of 2 m radius with a velocity of 5 m/s. What is the magnitude of its centripetal acceleration?
15. (2 points) A object with a mass of 2 kg moving in a circle experiences a centripetal acceleration of  $10 \text{ m/s}^2$ . What centripetal force must be causing its circular motion?
16. (2 points) You are in an amusement park ride that lets you free fall in a seat for a few seconds, during that time you hold a ball in front of you and then let it go without throwing it. What will you see?
17. (2 points) You are an astronaut in orbit around the earth and you demonstrate how a ball in front of you just floats without moving toward the center of the earth even though you and it are being pulled by the gravity of the earth. Why is that so?
18. (2 points) Near-earth satellites move around the earth every 90 minutes. The Moon is much farther away and goes around the earth once a month. At a special intermediate distance a satellite can go around the earth once a day. Why is that useful?
19. (4 points) A 200 kg cannon fires a 5 kg cannonball at horizontal speed of 10 m/s. How fast does the cannon recoil?