SPH3U

K:	/5	A:	/20	C:	/5	TI:	/7
15%		20%		15%		20%	

Kinematics – Unit Assessment

Name: _____ Date: ___**March 30, 2020**_____

List of Potentially Useful Equations:

$v_2 = v_1 + a\Delta t$ $\Delta d = v_1\Delta t + \frac{1}{2}a\Delta t^2$ $v_{av} = \frac{\Delta d}{\Delta t} = \left(\frac{v_1+v_2}{2}\right)$

$v_2^2 = v_1^2 + 2a\Delta d$ $\Delta d = v_2\Delta t - \frac{1}{2}a\Delta t^2$

1. **True or False:** If the answer is false *correct it* so the statement is true. [5 marks (K)]

   T F The slope of the line of best fit on a distance-time graph represents the acceleration of the object.

   T F The slope of a speed-time graph is the velocity.

   T F A ball is thrown straight up into the air; the acceleration of the ball when it reaches its maximum height is zero.

   T F The acceleration of an object due to gravity is dependent on the mass of the object.

   T F The velocity of an object increases or decreases when the acceleration is not zero.

2. [5 marks (A)] An astronaut drives a vehicle on Mars. Using the speedometer, the astronaut measures the change in speed between two Martian rocks 15 m apart. The speed at the first rock was 3.5 m/s and at the second point it was triple this speed. Calculate the acceleration of the vehicle.

3. [5 marks (A)] A bat is chasing a bug (he is very hungry). He uses his sonar to search and find the bug. He moves 80m [E] then abruptly turns and flies 50m [S] and then flies west for 150 m. The trip took 4.5 seconds; calculate the resultant velocity of the bat.

4. [2 marks (C)] *Which has the greater acceleration:* an object that increases its speed from 30 km/hr to 60 km/hr or an object that goes from 0 km/hr to 30 km/hr in the same time? Explain your answer clearly (use equations if it helps).

5. [5 marks (A)] Thomas is driving a Ferrari on the 407. He accelerates from rest uniformly at 4.5 m/s/s for 4.8 s, then moves with a uniform velocity for another 8s. Calculate the total distance that he travels in that time.

6. [3 marks (C)] What is the value of the acceleration of all objects near the surface of the Earth? In a short paragraph explain why there is a misconception that the acceleration of an object is dependent on its mass.

7. [5 marks (TI)] A physics' student flies off to a distant planet and performs some experiments about the gravity there. The student notices there is very little atmosphere so very little air resistance. The student takes a 5 kg object and throws it upwards at 3m/s from the top of a 5.76 m tall cliff. The student astronaut measures that it takes 2.4 seconds to reach the ground. Calculate the acceleration of gravity on this planet. Include a diagram.

Direction you are making positive

8. [5 marks (A)] A physics student fires a gun straight up in the air. The muzzle velocity (initial velocity) was found to be 436 m/s. Calculate how long it will take it to reach its highest point and what the maximum height of the bullet is.

Direction you are making positive

9. [2 marks (TI)] The driver of a car is moving at a constant speed when suddenly a cat runs onto the road exactly 60 m in front of the car and freezes in fear. The driver takes 0.3 seconds to react and then slams on the brakes. The braking motion is graphed below on the velocity-time graph. How far from the cat does the driver stop?