**Year 10 Physical Science**

**Mid-Topic Test Revision Questions**

1. Classify the following units of measurement as scalars or vectors.

mass, force, velocity, distance, weight, displacement, time, acceleration, speed

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| **Scalar** | **Vector** |
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1. Ella walked 105m west in 75 seconds to her nearest pokéstop where she stopped for 35 s to spin the stop and catch a squirtle. She then walked 650m east in 8.10 minutes to meet her friends for a 5-star raid battle at a pokégym.
   1. Draw a distance time graph for this scenario on some graph paper.
   2. What total distance did Ella walk?
   3. What was Ella’s average speed?
   4. Draw a vector diagram of this scenario
   5. What was Ella’s final displacement?
   6. Draw a displacement time graph for this scenario on some graph paper.
   7. What was Ella’s average velocity when walking to the pokéstop?
   8. What was Ella’s average velocity when walking to the pokégym?
   9. Draw a velocity time graph for the scenario on some graph paper.
   10. What was the Ella’s average velocity for the entire journey?
2. A car driving at 25 kmh-1 south rounds a corner and accelerates to 60 kmh-1 east in 4.50 seconds.
   1. Draw a vector diagram showing the change in velocity of the car.
   2. Calculate the acceleration of the vehicle.
   3. If the car had a mass of 1100 kg, what net force was required to achieve the acceleration?
   4. What is the weight of the vehicle?
   5. Explain, using physics principles, why the car would take longer to accelerate to the same velocity if it was fully loaded.
   6. The car travelling at 60kmh-1 now brakes suddenly. Explain, using physics principles, what happens to a box sitting on the back seat of the car.
   7. If the car, travelling at 60kmh-1, has a retardation of 9.68 ms-2, how long does it take to come to rest?
3. Sebastian is standing on the balcony of the maths building. James, standing directly below, threw a ball up to Sebastian with a velocity of 8.50 ms-1. Sebastian catches the ball 0.75 seconds later. What is the velocity of the ball as Sebastian catches it?
4. A 20 g bullet is shot out of a rifle barrel in 2.50 milliseconds. The force on the bullet is 3500 N.
   1. What is the speed of the bullet as it leaves the gun barrel?
   2. Explain, using Physics principles, why the gun pushes back into the shoulder of the person firing it when the bullet is fired.