**SPH3U0 Introduction to Kinematics Worksheet- Speed and Distance Problems Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***Vector and Scalar Quantities***

1. What is the difference between a scalar and vector quantity? Give an example of each type of quantity

2. Complete the chart using the symbols and examples below.

**Symbols:**

**Examples: 1.0 km [West] of Home , 10.0 km, 5.0 km [North], 50.0 km/h, 5.0 m/s [East], 1.0 m/s2 [S]**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Term*** | ***Vector or Scalar?*** | ***Description*** | ***Symbol*** | ***Example*** |
| Displacement |  | Change in position |  |  |
| Distance |  | Total path length travelled. |  |  |
| Position |  | A location specified by a distance and direction from an origin |  |  |
| Speed |  | The rate of change of distance. |  |  |
| Velocity |  | The range of change of displacement. |  |  |
| Acceleration |  | The rate of change of velocity. |  | **1.0 m/s2 [S]** |

***Speed and Distance Questions***

**Recall: Speed formula: Average speed formula:**

1. Find the unknown quantities:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Speed (m/s) | Distance (m) | Time (s) |
| a) | ? | 35 | 0.75 |
| b) | 11.5 | ? | 12.0 |
| c) | 12 | 256 | ? |

**Provide full GRASP solutions to all word problems below. Record all final answers to the appropriate number of significant digits.**

1. How far would a cyclist travel in 5.00 minutes at a constant speed of 12.0 m/s?
2. The radius of the Earth at the equator is 6.38 x 10 6 m. Calculate how many hours it would take a supersonic jet to travel once around the world at a speed of 1.16 x 10 3 km/h.
3. A student is riding her bike to school. How much time will it take her to travel a distance of 1.8 km if she is riding at an average speed of 2.50 m/s?
4. A car is moving at an average speed of 24.0 m/s. What distance will it cover in a time of 15 minutes?
5. While on a school trip to the U.S., a school bus travelled a distance of 150.0 km in 1.50 hours. The bus then stopped at a snack bar for 30.0 minutes. On the final part of the journey, the bus travelled the remaining 200.0 km in a time of 2.75 hours. Find the average speed of the bus over the entire trip.
6. A jogger ran 4.0 km [North] for 25.0 minutes, then 3.0 km [West] for 15.0 minutes, then 2.0 km [South] for 12.0 minutes before stopping to rest. Find their average speed over their entire run in km/h and in m/s.

**Answers: 1. a)47 m/s b) 138 m c) 21 s 2. 3.60 x 10 3 m 3. 34.6 hours**

**4. 720 s or 12 minutes 5. 2.2 x 10 4 m or 22 km 6. 73.7 km/h 7. 1.0 x 10 1 km/h or 2.9 m/s**