

**PART A: MULTIPLE CHOICE (10 MARKS)**

Choose the best response in each case and place your answer in the appropriate space on your answer sheet.

- A passenger on a bus walks towards the front of the bus at 3.0 km/h relative to the bus, while the bus travels south at 15 km/h. The passenger's velocity relative to the road is:
  - 18 km/h[N]
  - 18 km/h[S]
  - 12 km/h[N]
  - 12 km/h[S]
- Which of the following motions is not uniform?
  - A satellite in orbit around the Earth.
  - A ball rolls along a table without changing velocity.
  - A jogger runs 50 m along a straight track at a constant speed.
  - An elevator moves vertically upward at zero acceleration.
- A scalar quantity is one which does not have a:
  - numeral
  - unit
  - direction
  - displacement
- Which of the following includes an example of a vector quantity?
  - Juanita walks 2 km north to get water.
  - The density of aluminum is 2700 kg/m<sup>3</sup>.
  - A jogger runs 3 km around the track.
  - Grimsby is 24 km from Hamilton.
- A car located 150 km[W] of Toronto travels to a point 400 km[W] of Toronto. The resultant displacement of the car is:
  - 250 km
  - 250 km[W]
  - 550 km
  - 550 km[W]
- An athlete completes two laps of a circular track of circumference 100 m. At the end of the run the athlete's total distance travelled is:
  - 0 m
  - 50.0 m
  - 100 m
  - 200 m
- A bear searching for food walks 15 km[E], 5.0 km[S], 3.0 km[W], and 5.0 km[N]. The bear's resultant displacement is:
  - 12 km
  - 12 km[E]
  - 28 km
  - 28 km[E]
- A ball rolls 3.0 m[S], stops and then rolls 4.0 m[W]. The resultant displacement of the ball is:
  - 7.0 m[S37°W]
  - 7.0 m[S53°W]
  - 5.0 m[S37°W]
  - 5.0 m[S53°W]
- A car travels 4.0 km[N] and then 3.0 km[S]. If the total trip requires 15 min, the average speed of the car for the trip is:
  - 4.0 km/h
  - 4.0 km/h[N]
  - 28 km/h
  - 28 km/h[N]
- An object travels  $6.0 \times 10^4$  m with a uniform speed of  $1.5 \times 10^3$  m/s. The time it takes is:
  - $4.0 \times 10^{-1}$  s
  - 2.5 s
  - $4.0 \times 10^1$  s
  - $4.0 \times 10^7$  s

**PART B: MATCH (5 MARKS)**

Match the definition from the 1<sup>st</sup> column to the best term in the 2<sup>nd</sup> column and place the matching letter in the appropriate space on your answer sheet.

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|---|----------------------|
| 1. Total displacement of an object per unit time  | A) displacement      |
| 2. Location of object relative to reference point.                                      | B) distance          |
| 3. Quantity that has magnitude, but no direction.                                       | C) nonuniform motion |
| 4. Total length of path travelled by an object as it moves from one position to another | D) position          |
| 5. Type of motion that involves a constant speed in a straight line.                    | E) scalar quantity   |
|   | F) speed             |
|   | G) ticker tape timer |
|   | H) uniform motion    |
|   | I) vector quantity   |
|   | J) velocity          |

**PART A: MULTIPLE CHOICE (10 MARKS)**

1	2	3	4	5	6	7	8	9	10
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**PART B: MATCH (5 MARKS)**

1	2	3	4	5
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**PART C: SHORT ANSWER (10 MARKS)**

Answer the following questions in the space provided.

- {4} 1. Classify the following as (S) scalar or (V) vector quantities.
- (a) 12 m/s[N] \_\_\_\_\_
- (b) 40 min \_\_\_\_\_
- (c) 4.2 km \_\_\_\_\_
- (d) 5.5 N[S] \_\_\_\_\_
- {6} 2. A marathon runner in training runs 5.0 km[S] and then 18 km[N]. Assume the entire run takes 1.3 h.
- (a) What is the total displacement for the run? \_\_\_\_\_
- (b) What is the average velocity? \_\_\_\_\_
- (c) What is the total distance travelled? \_\_\_\_\_
- (d) What is the average speed? \_\_\_\_\_

**PART D: PROBLEMS (25 MARKS)**

Answer the following questions on a separate sheet of paper. You may use the back of this sheet if you wish.

1. Helen starts from home and walks in a straight line 140 m[W] to a friend's house. Helen and her friend then walk 65 m[E] on the same sidewalk to school.
- {3} (a) Draw a diagram showing the (i) position vectors and (ii) resultant displacement vector in this situation.
- {3} (b) Determine Helen's total distance and total displacement.
2. A dog, initially sitting next to its owner, runs first to a position 2.8 m[W] of its owner, and then secondly to a position 12.6 m[E] of its owner.
- {3} (a) Draw a diagram showing the (i) position vectors and (ii) resultant displacement vector in this situation.
- {3} (b) Determine the dog's total distance and total displacement.
3. A jogger takes 3.5 min to run once around a square city block that is 220 m on each side.
- {2} (a) Draw a sketch of the motion.
- {2} (b) Determine the jogger's average speed in m/s.
- {2} (c) Determine the jogger's average velocity upon returning to the starting position?
- {7} 4. R.R. Hood is travelling to visit her grandmother. First, she travels at an average speed of 12 km/h for 10 km. Then she travels at 8.0 km/h for another 1.25 h. Calculate her average speed for the entire trip to grandma's house? (Don't worry about the return trip - she catches a ride with B.B. Wolf)