

PART A: PROBLEMS (40 MARKS)

Answer the following questions on a separate sheet of paper. Be sure to be neat, watch your accuracy/precision and show your work.

- {3} 1. A plane flying a triangular pattern flies 150 km[N], then 400 km[E]. What is its total displacement after these two legs? {427 km[N69°E]}
- {6} 2. A fishing boat leaves port at 04:30 h in search of the day's catch. The boat travels 4.50 km[E], then 2.50 km[S], and finally 1.50 km[W] before discovering a large school of fish on the sonar screen at 06:30 h.
(a) Calculate the boat's average speed. {4.25 km/h}
(b) Calculate the boat's average velocity. {1.95 km/h[S50°E]}
- {6} 3. A ball rolling with an initial velocity of 40 m/s[W] undergoes an acceleration of 5.0 m/s²[N] for a period of 6.0 seconds.
(a) What is the final velocity of the ball? {50 m/s[W37°N]}
(b) What is the displacement of the ball in the 6.0 s.? {256 m[W21°N]}
- {3} 4. Mary walks West at 2.0 m/s for 15 seconds, then North at 3.0 m/s for 20 seconds, and then East at 4.0 m/s for 30 seconds. What is her displacement? {108 m[N56°E]}
- {1} 5. A ball is launched from the ground at an angle to the horizontal. What are the ball's horizontal and vertical accelerations at its maximum height? halfway up to its maximum height? halfway down to the ground?
- {6} 6. A stone is thrown horizontally at 4.2 m/s from the top of a cliff that is 13 m high.
(a) How long is the stone in flight? {1.6 s}
(b) How far from the base of the cliff does the stone land? {6.8 m}
- {6} 7. A tennis ball thrown horizontally from the top of a water tower lands 20.0 m from the base of the tower. If the tennis ball is initially thrown at a velocity of 10.0 m/s:
(a) how long does it take the tennis ball to reach the ground? {2.00 s}
(b) how high is the water tower? {19.6 m}
- {9} 8. A championship golfer uses a nine iron to chip a shot right into the cup. If the golf ball is launched at a velocity of 20 m/s at an angle of 60° above the horizontal:
(a) how long was the ball in the air? {3.5 s}
(b) how far away was the golfer from the hole when he hit the ball? {35 m}
(c) what maximum height did the ball reach? {15 m}