Question 1
A bug starts at point A, crawls 8.0 cm east, then 5.0 cm south, 3.0 cm west, and 4.0 cm north to point B. (a) How far north and east is B from A? (b) Find the displacement from A to B both graphically and algebraically.

A) (a) 5.0 cm - EAST, 1.0 cm - SOUTH, (b) 5.10 cm - 11.3° SOUTH OF EAST
B) (a) 11.0 cm - EAST, 1.0 cm - SOUTH, (b) 11.1 cm - 5.2° SOUTH OF EAST
C) (a) 5.0 cm - EAST, 1.0 cm - NORTH, (b) 5.1 cm - 11.3° NORTH OF EAST
D) (a) 5.0 cm - EAST, 9.0 cm - SOUTH, (b) 10.1 cm - 60.9° SOUTH OF EAST

Question 2
What displacement must be added to a 50 cm displacement in the +x-direction to give a resultant displacement of 85 cm at 25 degrees?

A) 69 cm at 90°
B) 45 cm at 37°
C) 62 cm at 82°
D) 45 cm at 53°

Question 3
Starting at the origin of coordinates, the following displacements are made in the xy-plane (that is, the displacements are coplanar): 60 mm in the +y-direction, 30 mm in the -x-direction, 40 mm at 150°, and 50 mm at 240°. Find the resultant displacement both graphically and algebraically.

A) 97 mm at 158°
B) 134 mm at 153°
C) 157 mm at 142°
D) 97 mm at 22°

Question 4
Compute algebraically the resultant of the following coplanar forces: 100 N at 30 degrees, 141.4 N at 45°, and 100 N at 240°. Check your result graphically.

A) 0.341 kN at 0°
B) 0.335 kN at 45°
C) 0.15 kN at 65°
D) 0.15 kN at 25°

Question 5
What displacement at 70° has an x-component of 450 m? What is its y-component?

A) (a) 1.3 km, (b) 1.2 km
B) (a) 0.48 km, (b) 0.16 km
C) (a) 0.15 km, (b) 0.45 km
D) (c) 0.42 km, (b) 0.42 km

Question 6
A runner travels 1.5 laps around a circular track in a time of 50 s. The diameter of the track is 40 m and its circumference is 126 m. Find (a) the average speed of the runner and (b) the magnitude of the runner's average velocity. Be careful here; average speed

depends on the total distance traveled, whereas average velocity depends on the displacement at the end of the particular journey.

A) (a) 3.8 m/s, (b) 0.8 m/s
B) (a) 2.5 m/s, (b) 1.3 m/s
C) (a) 0.8 m/s, (b) 3.8 m/s
D) (a) 75 m/s, (b) 200 m/s

Question 7
During a race on an oval track, a car travels at an average speed of 200 km/h. (a) How far did it travel in 45.0 min? (b) Determine its average velocity at the end of its third lap.

A) (a) 9000 km, (b) 200 km/h
B) (a) 150 km, (b) zero
C) (a) 267 km, (b) 200 km/h
D) (a) 4.4 km, (b) 9000 km/h