Very Voracious Vectors

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period 3 Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Three dogs (Rex, Max and Fifi) finally get their wish and are pulling on a 70 kg mail carrier. If Rex pulls at 16 N [N30°E], Max pulls at 20 N [S25°E] and Fifi pulls at

65 N [W20°N], what is the net force and heading of the mail carrier? [5 marks]

2. A pilot (Isaac) must fly due East, a distance of 1550 km in a time of 3.35 hours. The wind is from the North at 75.0 km/h. Find the correct heading and air speed for Isaac so he ends up where he wants to go. [3 marks]

3. Jonathan and Hayden can both swim at 3.0 m/s. The river they want to swim across is flowing at 1.0 m/s to the west. The river is 15.0 m wide. They are standing on the south shore to start.

a. Jonathan swims facing north at all times (goes with the flow). What is his velocity relative to the ground?

b. Hayden swims so that he ends up directly across from where he started. What is his velocity relative to the ground?

c. How long does it take each to cross the river?

d. What is the distance separating them when they reach the opposite bank? [8 marks]

4. Kayla is watching an old (but good) episode of MacGyver™. The bad guys are in the helicopter and MacGyver is in the jeep rushing to the treasure. The initial position of the helicopter and MacGyver are the same. The helicopter has an airspeed of 140 km/h. The wind is blowing 75 km/h [NW]. The jeep has an average speed of 100 km/h and must follow the trail. Which one arrives at the treasure first? Do not worry about the take-off and landing time of the helicopter. [6 marks]

Start

250 m

X Treasure

250 m

5. Nick shines a laser beam at 15.95° above the horizontal at a mirror 11 648 m away. It glances off the mirror and continues for an additional 8570 m at 11.44° below the horizon until it hits its target. What is the resultant displacement of the beam to the target?

[3 marks]