

Instructions to students: Use your Text Book and attempt these questions.

Due Date: 16-09-2018

Unit 2

Chapter 8 Test Scalars and vectors

Total marks 50

Name: _____ **Class:** _____ **Date:** _____

Section A

Select the best answer for each question. (1 mark per question)

- 1** In the study of motion, displacement can be defined as:
 - A** how far a body travels.
 - B** the change in position of a body in a given direction.
 - C** the location of an object.
 - D** the distance travelled by an object that is moving in a straight line.

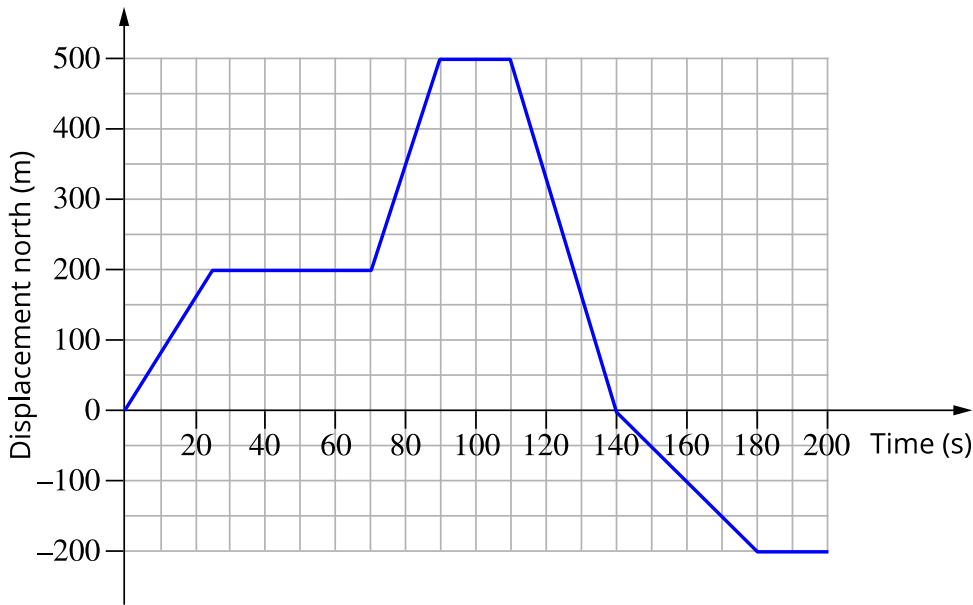
- 2** Which of the lists below contains only vector quantities?
 - A** displacement, velocity, acceleration, force
 - B** displacement, speed, acceleration, weight
 - C** distance travelled, velocity, acceleration, force
 - D** displacement, velocity, acceleration, mass.

- 3** Which of the following is a vector measurement?
 - A** 16.0
 - B** 16.0 m

- C** 16.0 km
- D** 16.0 km north.

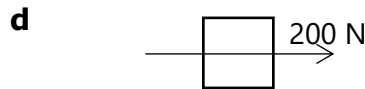
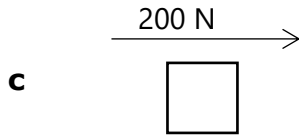
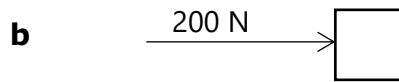
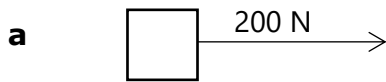
The following information applies to Questions 4 and 5.

The graph below shows the displacement of a farmer on a motorcycle, riding north (positive) and south (negative) along a boundary of her property while counting livestock.

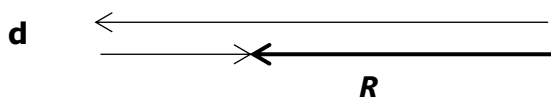
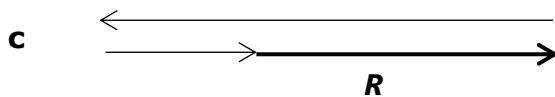
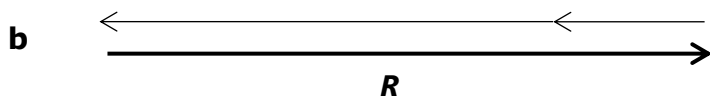
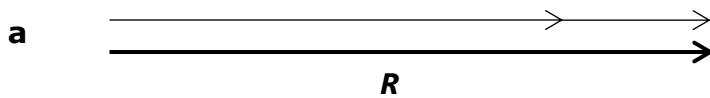


- 4 What was the total distance travelled by the farmer over the entire period?
- 500 m
 - 300 m
 - 700 m
 - 1200 m
- 5 What was the total displacement of the farmer over the entire period?
- 200 m
 - 0 m
 - 1200 m
 - 1200 m
- 6 Which of the following best represents the vectors F_1 and F_2 , if F_1 is 10 N to the right and F_2 is 5 N to the left?
- F_1 \longrightarrow F_2 \longrightarrow
 - F_1 \longrightarrow F_2 \longleftarrow
 - F_1 \longrightarrow F_2 \longrightarrow

7 Which diagram best represents a force of 200 N to the right acting on the box?



8 Which vector diagram show the correct addition of 15 N west and 5 N east, and the correct resultant vector R ?



9 If a sign convention is used, where to the right is positive and to the left is negative, then the correct vector sum of 25.0 N right and 13.0 N left is:

a $(+25.0) + (-13.0)$

b $(-25.0) + (-13.0)$

c $(-25.0) + (+13.0)$

d $(+25.0) + (+13.0)$

10 A super-bouncy ball hits a wall with a velocity of 7.0 m s^{-1} east and rebounds with a velocity of 6.0 m s^{-1} west. Determine the change in velocity of the ball.

a 1 m s^{-1} west.

b 13 m s^{-1} east.

c 13 m s^{-1} west.

d 1 m s^{-1} east.

Section B

1 Use a sign convention to calculate the resultant vector for the following vector sums:

- a** 24.5 N west + 12.0 N east + 15.2 N east + 7.50 N west. (2 marks)

- b** 17.5 N north + 10.0 N south. (2 marks)

2 A car goes 5.00 km east, 3.00 km south, 2.00 km west and 1.00 km north.

- a** How far north or south has the car gone? (2 marks)

- b** How far east or west has the car gone? (2 marks)

- c** Find the resultant displacement of the car. (2 marks)

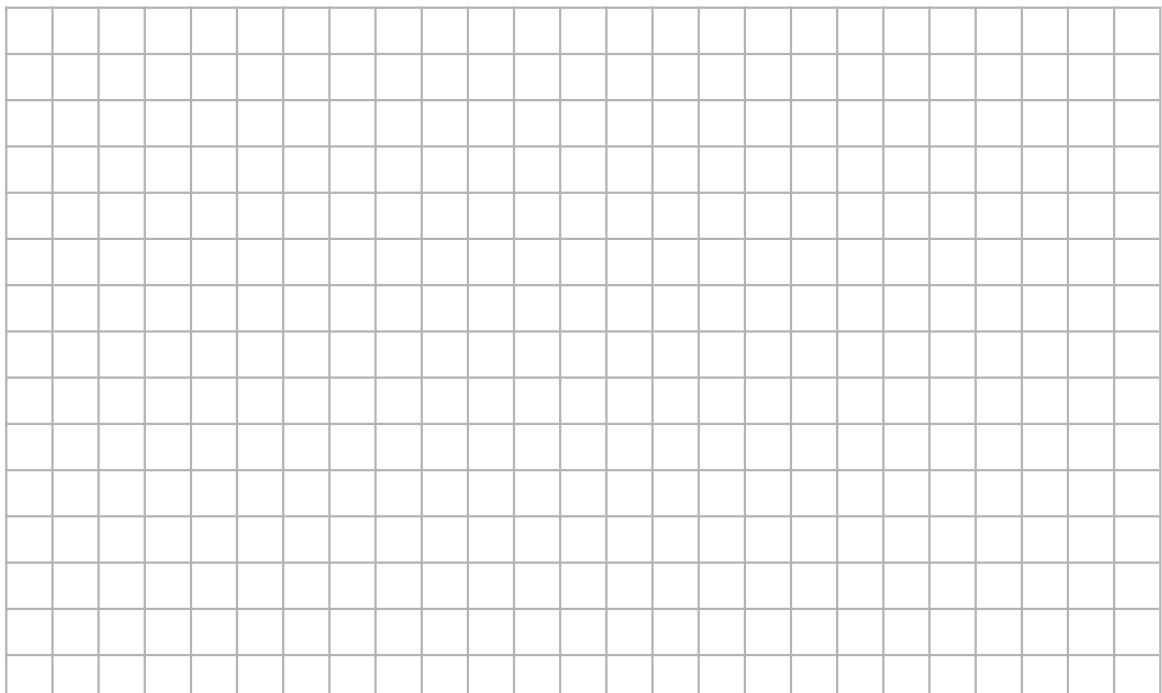
3 A radio-controlled toy car starts next to a rubbish bin on the school oval. It travels 20 m north and then travels 15 m east.

a What is the total distance travelled by the car? (1 mark)

b Fully describe the car's final displacement from the rubbish bin. (2 marks)

4 On an early morning walk, Tom leaves his home and walks at a constant velocity covering 1.50 m every second towards the west. He proceeds at this velocity for 15.0 seconds along a straight footpath until coming to a road. He stops at the road for 10.0 seconds, and then he crosses the road covering 2.50 m every second for 5.0 seconds. After this time he continues at constant velocity covering 1.50 m every second towards the west for 25.0 seconds, at which time he immediately turns around and without changing speed proceeds back to the road and then stops again.

a Plot a graph of Tom's displacement versus time to represent the motion from his home to his final return to the road. (4 marks)

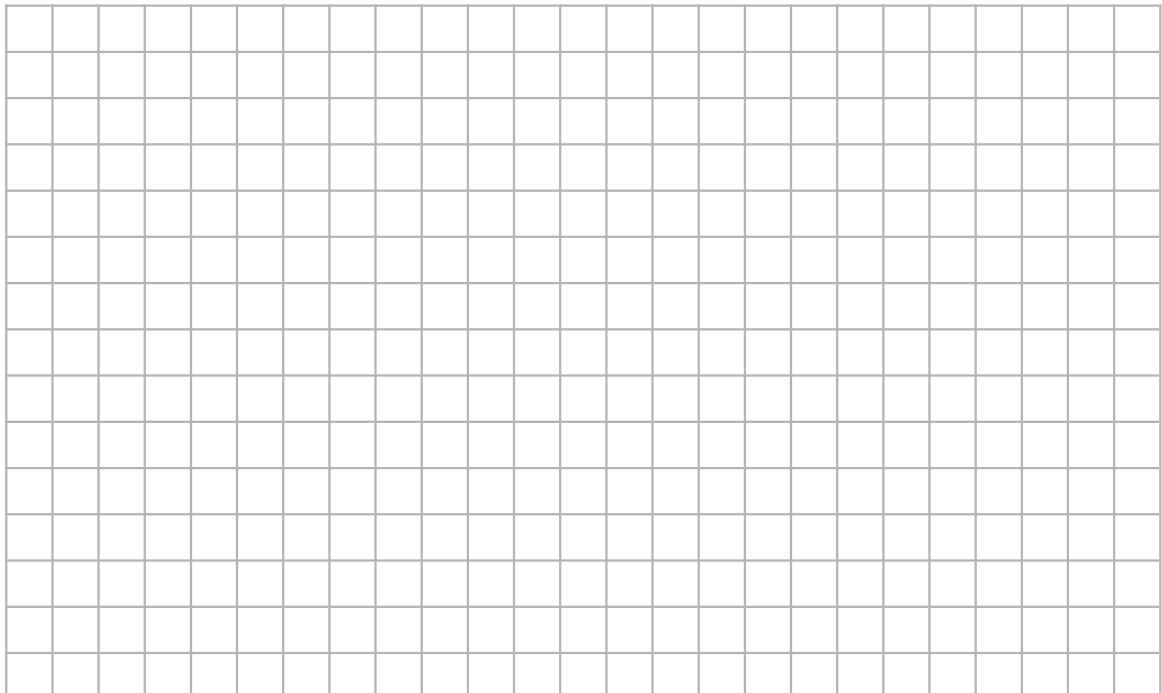


b Determine the total distance he covered during this time. (2 marks)

c What was his final displacement from his home? (2 marks)

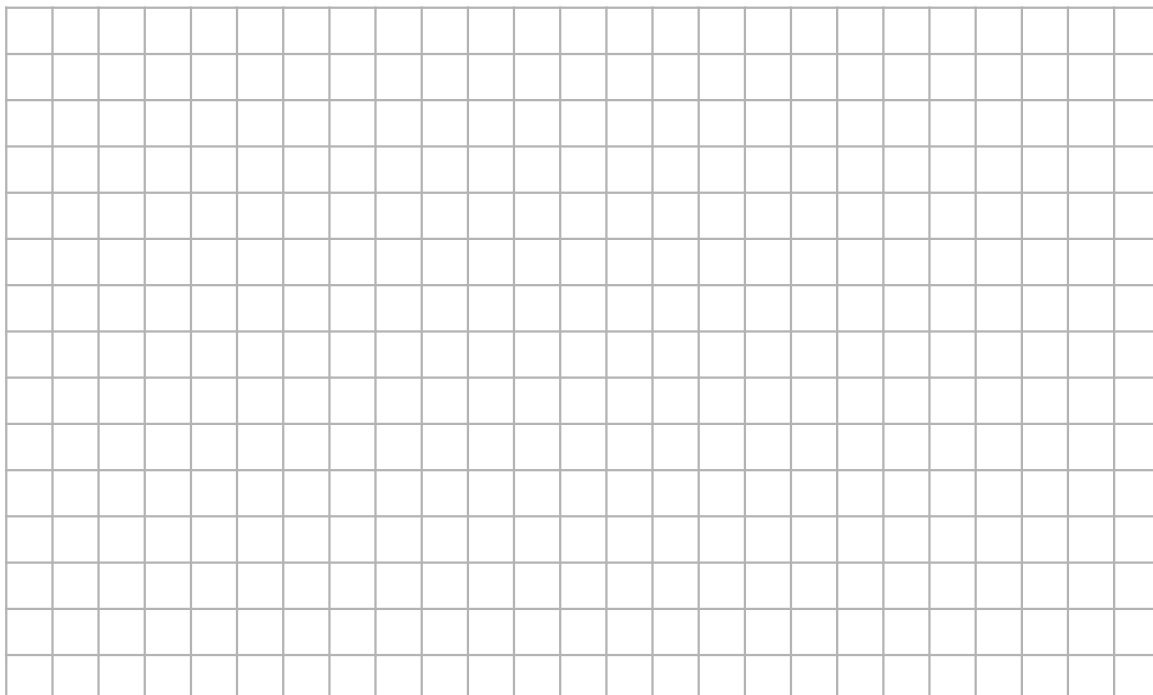
5 A girl walks 100 m in 40 seconds. She then runs back to her starting point in 15 seconds. She rests for 10 seconds. She then walks the 100 m in 50 seconds and runs back in 20 seconds.

a Plot a distance–time graph. (3 marks)



b Plot a displacement–time graph.

(3 marks)



6 In rugby, a tactic a team uses to gain ground is for one player to kick the ball very high and then quickly run in the same direction to catch the ball before it hits the ground. When this tactic is used and the player catches the ball, which (if any) has the greater displacement, the football or the footballer? Explain your answer. (3 marks)

- 7 a** Three tractors are connected by chains to the same point. The force exerted by tractor A is 3000 N north, tractor B is 4000 N south-west and tractor C is 2000 N south. Use a scaled vector diagram to find the magnitude of the resultant of these three forces at that point. (4 marks)

- b** Two tow trucks exert forces of 4000 N north and 3500 N east on a bogged car. Calculate the resultant force acting on the bogged car. (2 marks)

- 8** The steepest residential street in the world is Baldwin St, Dunedin in NZ. This has an incline of 20° . **A car of mass 750 kg is parked on this street as shown below. The handbrake on the car is securely on.**

On the diagram carefully draw and label all of the forces acting *on* the car and show the direction (if any) of the net force. (4 marks)

