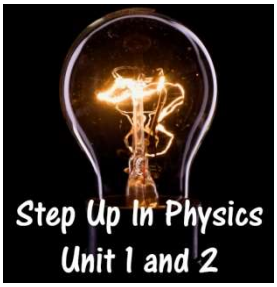
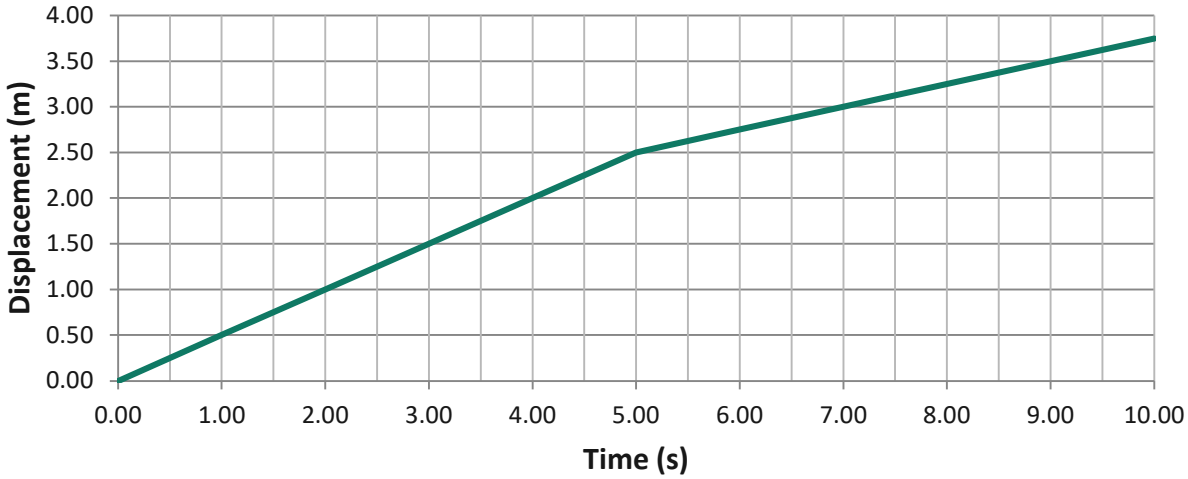
1.4 Graphical Representation of Motion

Problems Worksheet



1. The graph below plots the position of a toy car that is initially moving north.

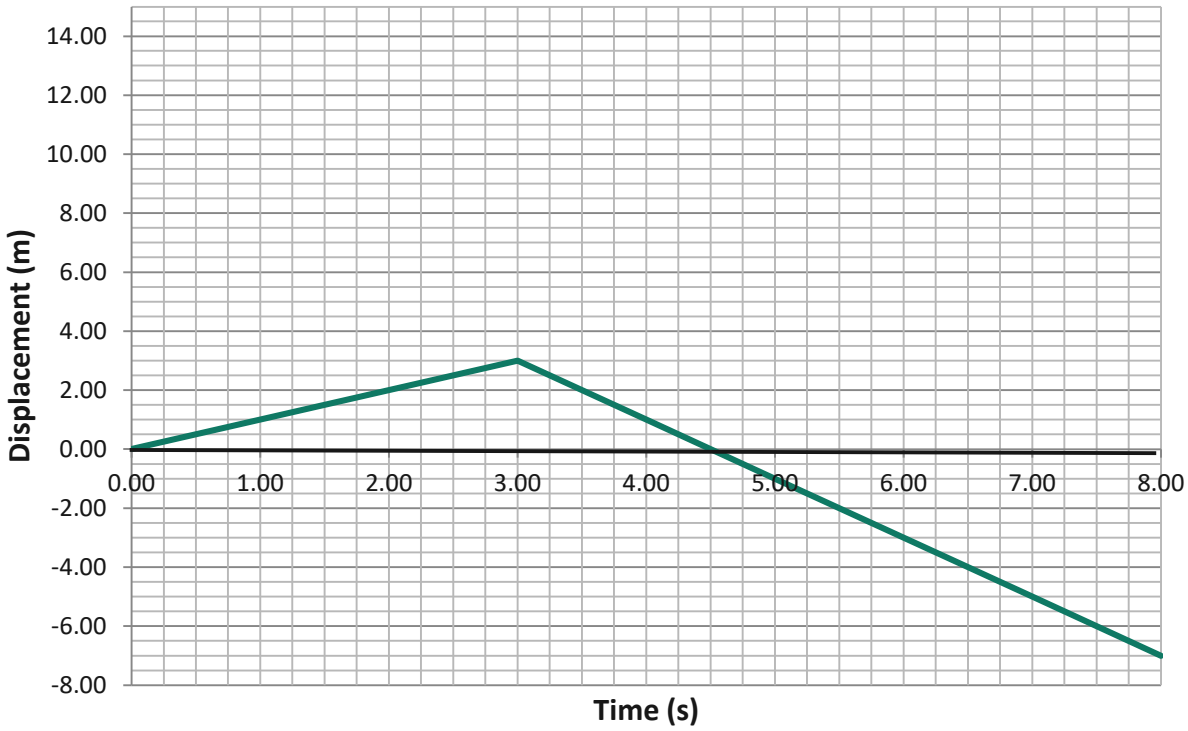


a) Determine the displacement of the car at 7.00 s.

b) Determine the average velocity for the first 9.00 s of motion.

c) Determine the velocity at 7.00 s.

2. A student initially running east in a game of tag makes a sudden turn and heads west. The motion is shown in the graph below.



a) Determine the displacement of the student at 8.00 s.

b) Determine the distance covered by the student during the first 5.50 s.

c) During which time frame was the student moving the fastest? Justify your response.

d) State **all** times when the student was:

i. Moving east

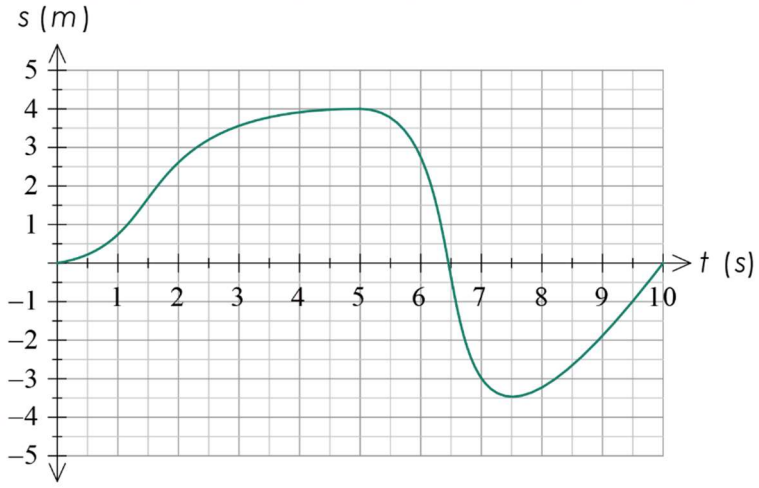
ii. Moving west

iii. Moving away from his starting position

iv. Moving towards his starting position

e) Produce a distance-time graph of the motion, adding it to the same axes above.

3. The displacement of an object over 10 s is shown in the graph below.

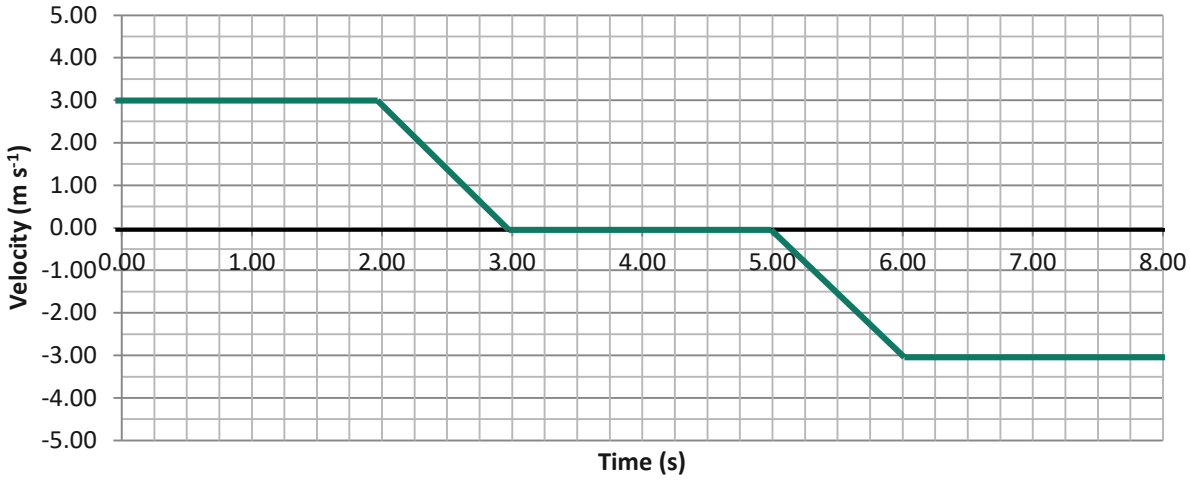


a) Determine the distance covered by the object over the 10 s of motion.

b) State the time(s) the object had zero velocity.

c) Estimate the fastest speed achieved by the object over the motion.

4. For the motion shown in the graph below, consider north to be the positive direction.



a) State the time(s) the object was moving north.

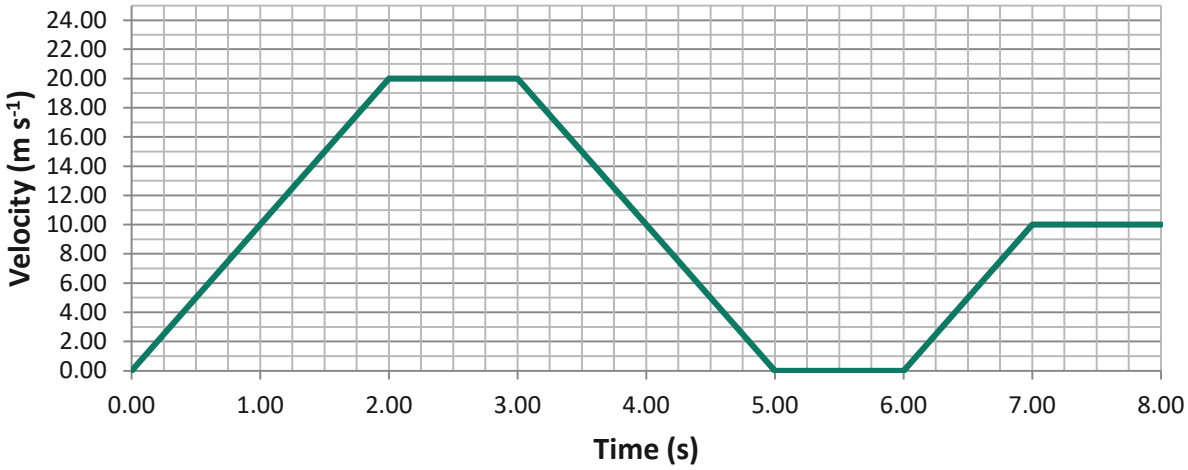
b) State the time(s) the object changed direction.

c) State the time(s) the object had the largest speed.

d) State the time(s) the object was slowing down.

e) State the time(s) the object was increasing its speed.

5. The velocity of a cyclist who starts at the origin and heads south is recorded over 8.00 s.



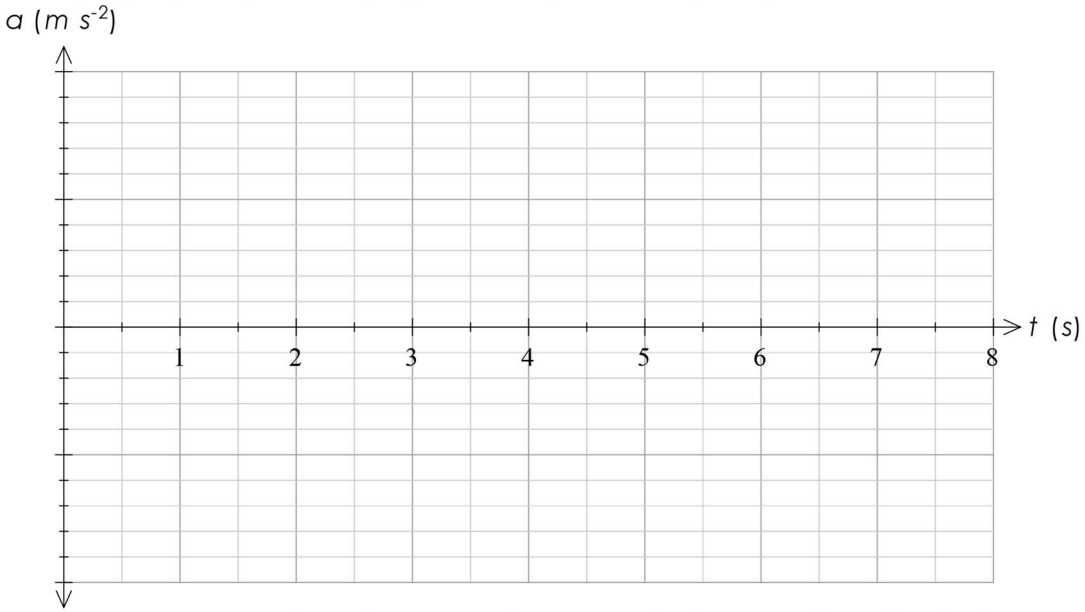
a) State the fastest speed of the cyclist.

b) State the time(s) the cyclist was at the origin.

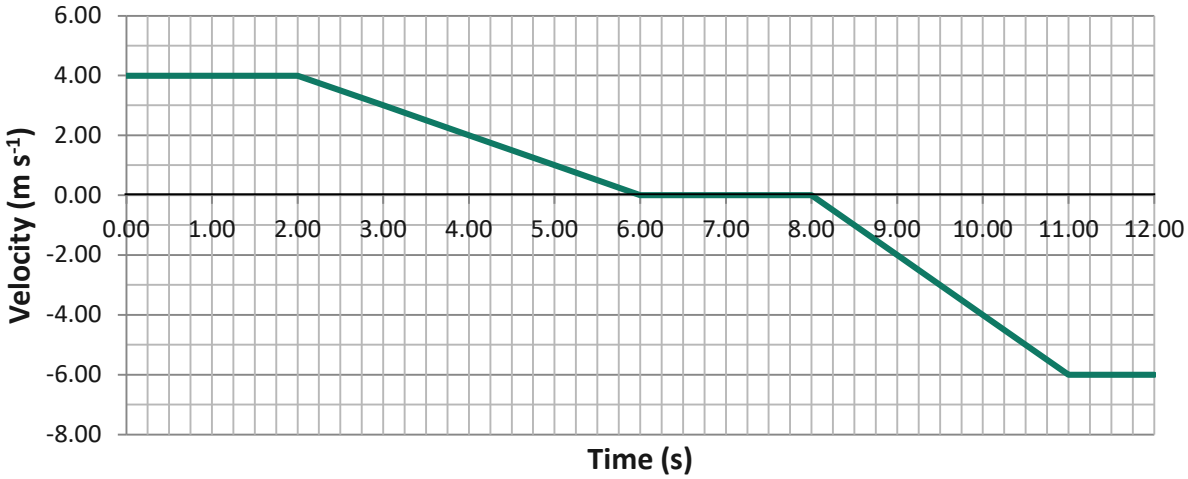
c) Determine the displacement of the cyclist at $t = 2.00\ s$.

d) Determine the displacement of the cyclist at $t = 5.00\ s$.

e) Sketch an acceleration-time graph of the cyclist's motion.



6. You use a laser speed gun to record the motion of a car initialling moving west in a carpark, shown in the graph below. The car started 20.0 m east of you.



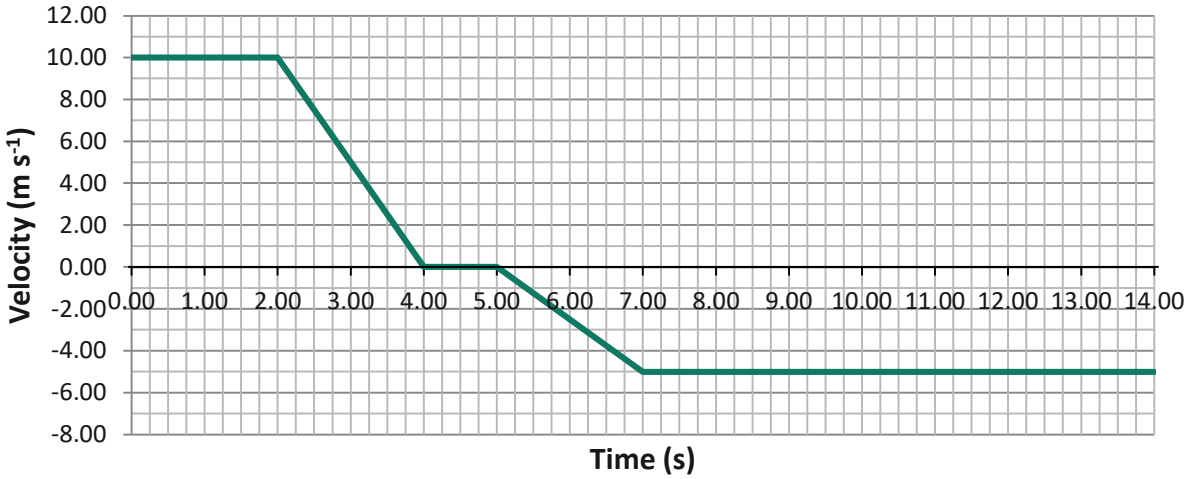
a) Describe the motion presented by the graph.

b) Determine the acceleration of the car when $t = 3.00\ s$.

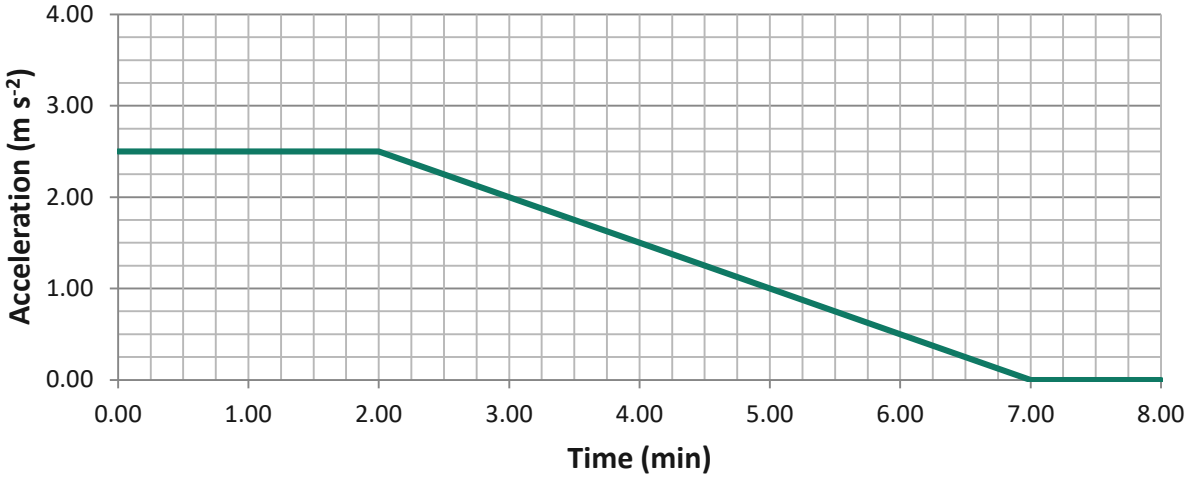
c) Determine the shortest distance between you and the car throughout the motion and state when this occurs.

d) Determine the displacement of the car from yourself at the end of the 12.0 s.

7. A go kart racer moves away from the origin, comes to a stop and then begins to reverse. Using the graph of the kart's motion, determine at what time he returns to the origin.



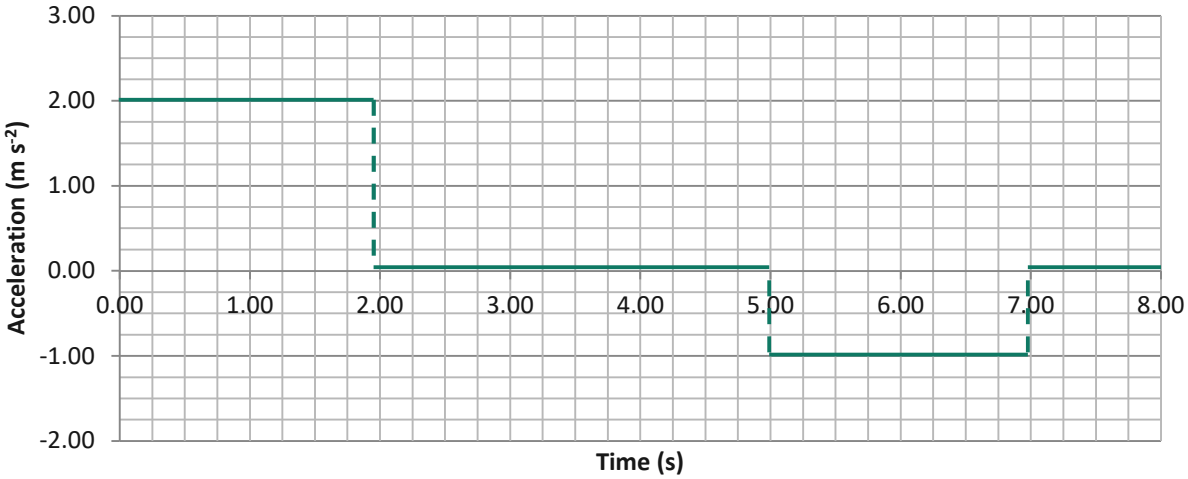
8. The motion of a rocket launching vertically upwards from a launch pad is monitored, with the motion graph seen below.

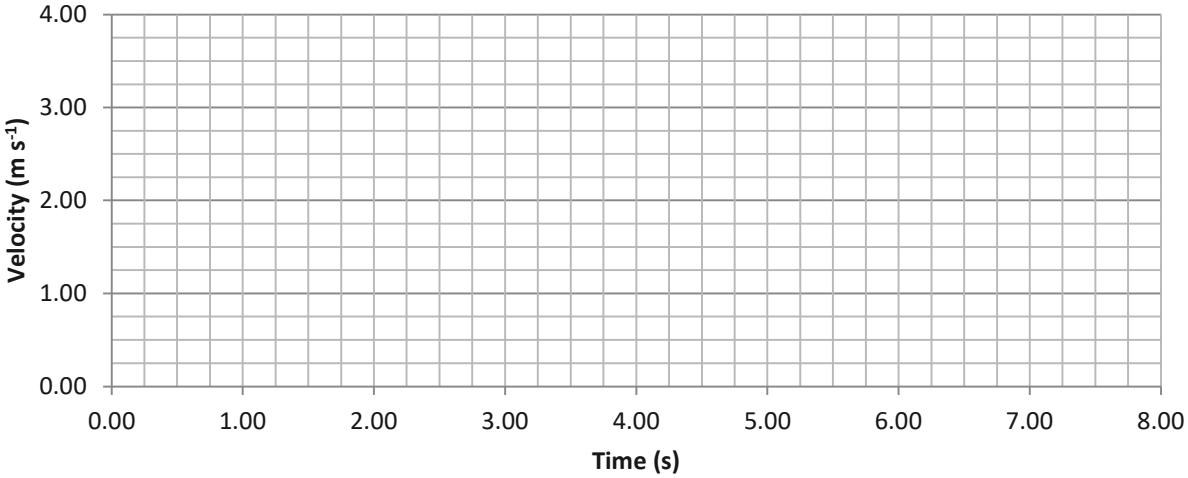


a) Describe the motion of the rocket over the monitored time.

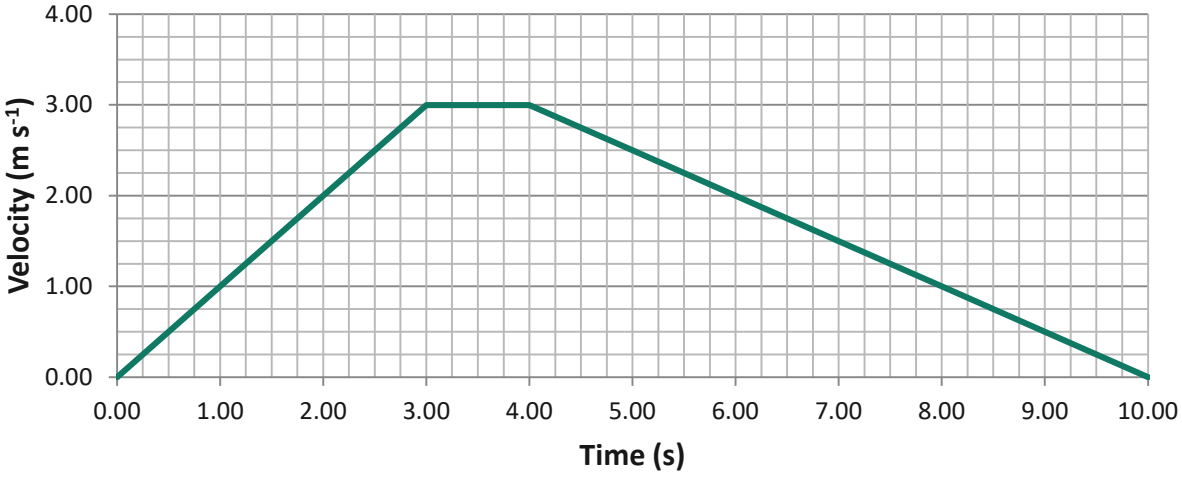
b) Determine the maximum velocity achieved by the rocket.

9. Use the acceleration-time graph below to sketch a velocity-time graph. You may assume the object starts at rest.

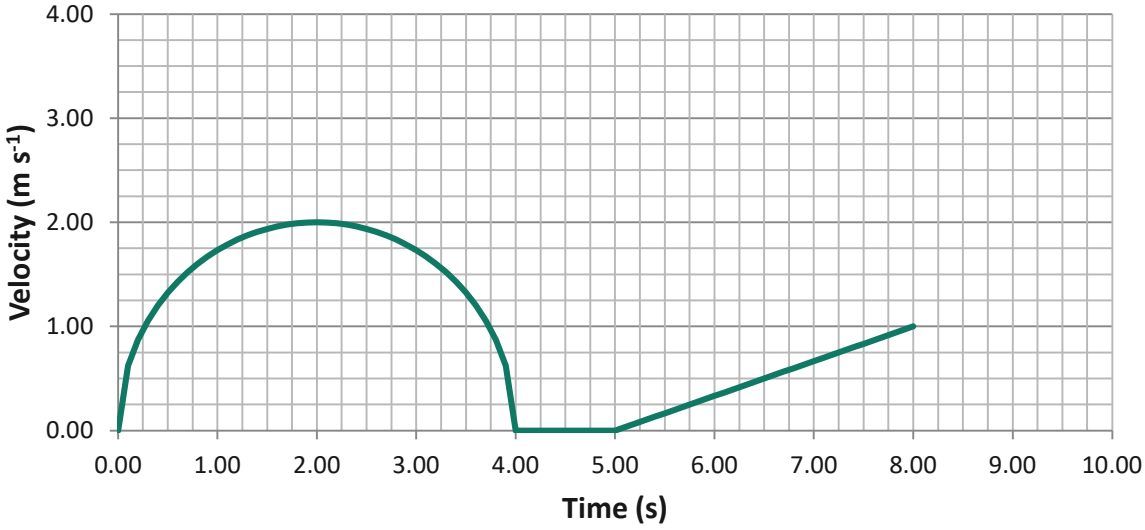




10. The graph below is for a jogger heading east. Use the graph to determine the average velocity of the jogger.



11. Use the graph below to answer the following questions.



a) List all the times when the acceleration was zero.

b) Find the change in displacement shown by the graph.