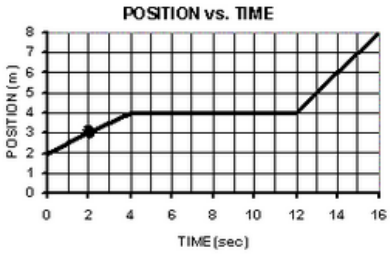
Force & Motion Diagnostic: Description of Motion
POSITION AND DISTANCE

Question: 1

The motion of an object during a 16-second time period is graphed at right.

What is the object's position at the point indicated by the dot on the graph?



[a] ○ 0.5 meters

[b] ○ 1 meter

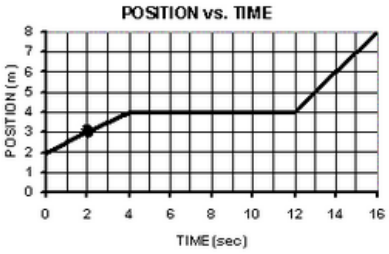
[c] ○ 1.5 meters

[d] ○ 2 meters

[e] ○ 3 meters

Question: 2

How far has the object traveled from the beginning of the motion (t=0s) to the point indicated by the dot on the graph (t=2s)?



[a] ○ 0 meters

[b] ○ 0.5 meters

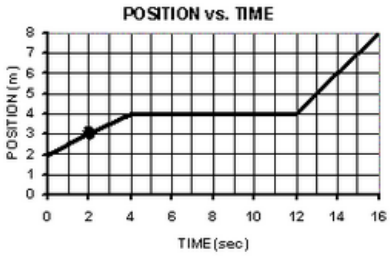
[c] ○ 1 meter

[d] ○ 1.5 meters

[e] ○ 3 meters

Question: 3

Which answer best describes the object's motion at the point indicated by the dot on the graph?



[a] ○ The object is speeding up.

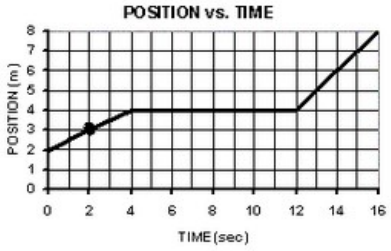
[b] ○ The object is moving at a constant speed.

[c] ○ The object is traveling up hill.

[d] ○ The object is stopped at the point indicated by the dot.

Question: 4

How far did the object travel in the 16 seconds?



[a] ○ 6 meters

[b] ○ 8 meters

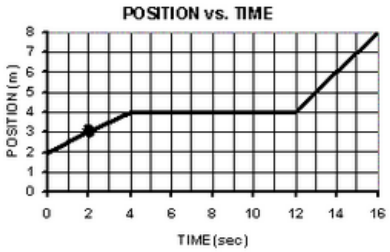
[c] ○ 10 meters

[d] ○ 14 meters

Question: 5

(Paired with Question: 4)

How did you decide how far the object traveled?



[a] ○ Looked at the final position of the object.

[b] ○ Added the initial position to the final position.

[c] ○ Added the initial, middle, and final positions.

[d] ○ Subtracted the initial position from the final position.

Question: 7

Given the position and time data at right, how far did the object travel in the five seconds?

Position (meters)	Time (seconds)
5	0
10	1
10	2
10	3
20	4
30	5

[b] ○ 25 meters

[c] ○ 30 meters

[d] ○ 65 meters

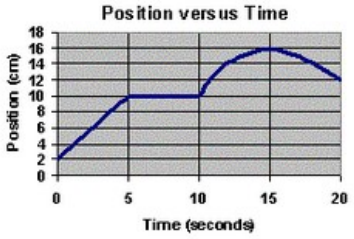
[e] ○ 85 meters

CHANGE IN DIRECTION

Question: 1

The position versus time graph below is of an ant walking along a road.

What is the total distance that the ant traveled?



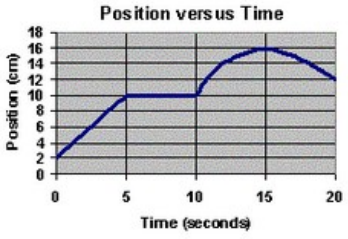
Type your answer in the box below. Your answer must be a number.

[ ] cm

Question: 2

(Paired with Question: 1)

How did you decide how far the ant traveled?



[b] ○ Looked at where the ant was at the end of the trip

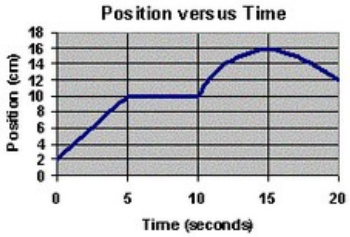
[c] ○ Added the distance traveled in both directions

[d] ○ Took the place the ant ended and subtracted where it started

[e] ○ Added up the ant's positions every 5 seconds

Question: 3

Which statement below best describes the motion of the ant?



[a] ○ The ant started at the 2 cm point and moved up a hill, along a flat section, then up and over another hill.

[c] ○ The ant started at 0 cm, moved away, paused, and continued moving away.

[d] ○ The ant started at the 2 cm point, moved away, stopped, then moved away again before turning back toward the starting point.

Question: 4

Another ant walks along the same road. The graph of its motion is shown below.

For the last 10 seconds of the second ant's trip, what was this ant's change in position?

Type your answer in the box below. Your answer must be a number.

[ ] cm

Question: 5

The table at right shows the position versus time of a dog chasing a frisbee thrown by its person.

How far did the dog run?

Note: The position is measured from the person.

Position (m)	Time (sec)
1	0
1	3
2	5
5	10
8	15
4	20

[a] ○ 3 meters

[b] ○ 4 meters

[c] ○ 8 meters

[d] ○ 11 meters

[e] ○ 19 meters

Question: 6

The data table at right shows a dog's motion.

Which statement best describes the motion of the dog?

Position (m)	Time (sec)
1	0
1	3
2	5
5	10
8	15
4	20

[a] ○ While running away, the dog speeded up and then slowed down.

[b] ○ The dog ran away from its owner and then back toward its owner.

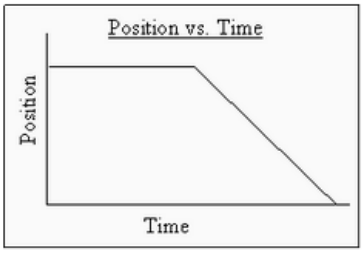
[c] ○ The dog ran away from its owner at different speeds.

DETERMINING SPEED

Question: 1

A **position versus time** graph of an car is shown at right.

Which statement best describes the motion of the car?



[a] ○ The car is first moving at a constant speed, and then it slows down and stops.

[b] ○ The car is first traveling along a flat section of road, then it is going down a hill.

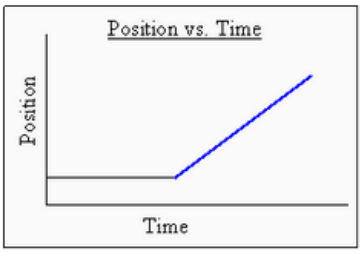
[c] ○ The car is first at rest, then it moves with a constant speed.

[d] ○ Cannot say anything because the graph has no numbers.

Question: 2r

This is a **position versus time** graph of the car.

What can you say about the speed of the car during the blue section of the graph?



[a] ○ The speed is increasing because the blue section has a positive slope.

[b] ○ The speed is constant because the blue section has a constant slope.

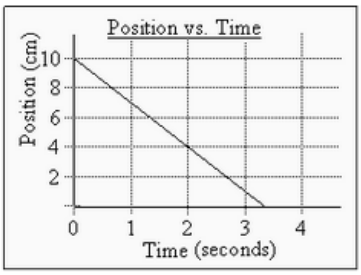
[c] ○ The speed is decreasing because the car is going up a hill.

[d] ○ The speed is zero because the blue section is the end of the trip.

Question: 3

A **position versus time** graph of the motion of a toy car is shown at right.

What is the speed of the car at t=2 seconds?



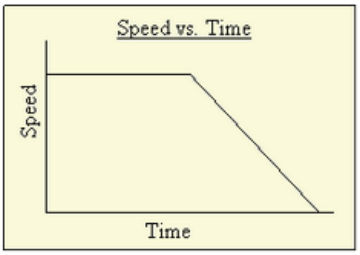
Type your answer in the box below. Your answer must be a number.

[ ] cm/sec

Question: 4

A **speed versus time** graph of bicycle's motion is shown at right.

Which statement best describes the motion of the bike?



[a] ○ The bike is first traveling with a high constant speed, then it slows down to a stop.

[b] ○ The bike starts from rest, then moves with a constant speed, then slows to a stop.

[c] ○ The bike is first traveling along a flat road, then it begins to go down a hill.

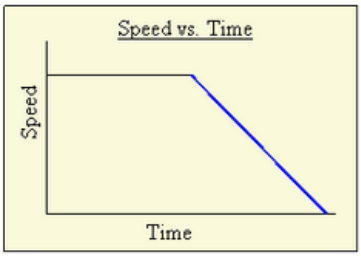
[d] ○ The bike starts from rest because the slope is zero, then speeds up toward the origin.

[e] ○ The bike is slowing down for the entire trip.

Question: 5

A **speed versus time** graph of the bicycle's motion is shown at right.

What can you say about the speed of the bike during the **blue section** of the graph?



[a] ○ The speed is decreasing because the graph section has a negative slope.

[b] ○ The speed is constant because the graph section has a constant slope.

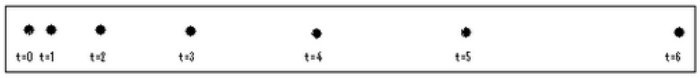
[c] ○ Cannot say anything because the graph has no numbers.

CHANGE IN SPEED

Question: 1

The diagram below shows the position of an object at each second for 6 seconds of motion.

Which statement best describes the motion of the object in the diagram?



[a] ○ The object starts moving and then eventually stops.

[b] ○ The object's speed changes.

[c] ○ The object's speed is increasing.

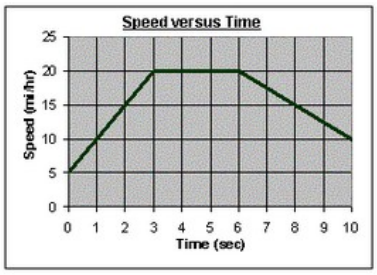
[d] ○ The object is moving very fast.

Question: 2

For a school project, Joe gathers speed data for the motion of his mom's car as she drives him to school.

Using a stopwatch, Joe writes down the speedometer reading every second for 10 seconds and plots the information on a graph (shown at right.)

Which description below best fits the motion of the car?



[a] ○ The car moves, then stops, and then moves again.

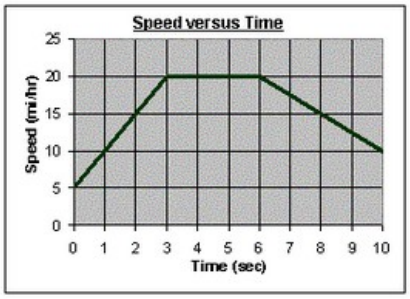
[b] ○ The car speeds up, moves at constant speed, then slows down.

[c] ○ The car goes up a hill, then across a flat section, and then down a hill.

Question: 3

The graph Joe made of his ride to school is shown at right.

What was the car's change in speed from t=0 seconds to t=3 seconds?



[a] ○ (20-5)/3 = 5 mi/hr

[b] ○ 20/3 = 6.7 mi/hr

[c] ○ (20+5)/2 = 12.5 mi/hr

[d] ○ 20-5 = 15 mi/hr

[e] ○ 20 mi/hr

AVERAGE SPEED

Question: 1

John and his friends watch their radio-controlled car move along a straight path at their school track. John's friends mark the **position** of the car as it travels down the track. Some of the data are shown in the table at right.

Determine the car's average speed for the time interval shown in the table.

Type your answer in the box below. Your answer must be a number.

Position (m)	Time (sec)
10	2
15	3
18	4
21	5
23	6
24	7
25	8

[ ] meters/second

Question: 2

In the previous question, the speed of the radio-controlled car changed over time from a high of 5 m/s from t =2s to t = 3s to a low of 1 m/s during the final second.

If John and his friends wanted to make their radio-controlled car go at a constant speed while covering the same distance in the same amount of time, what speed should they choose?

[a] ○ The speed found by dividing the time by the final position.

[b] ○ The speed found by dividing the final position by the final clock reading.

[c] ○ The speed found by dividing the distance traveled by the time interval.

[d] ○ The speed of the car at halfway through the motion.

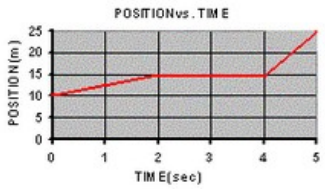
[e] ○ The speed found by adding the initial and final speeds and dividing by two.

Question: 3

The graph at right shows the position of a moving object at different times.

What is the object's average speed during its 5-second journey?

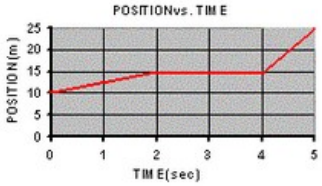
Type your answer in the box below. Your answer must be a number.



meters/second

Question: 4

Which statement below describes how you would find the average speed when given a position versus time graph?



[a] ○ Divide the final position by the final time reading.

[b] ○ Determine the speed during the last second.

[c] ○ Divide the change in the clock reading by the change in position.

[d] ○ Divide the total distance traveled by the total time traveled.

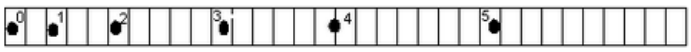
[e] ○ Add the initial and final speeds; then divide by two.

Question: 5

The diagrams below plot "trips" taken by four insects by showing the locations of each insect at different times. The dots show where an insect is at a given time and the number next to the dots indicates the time (in seconds) when the insect is at that point.

At t = 0, all four insects are moving in straight lines from left to right.

Which insect had the highest average speed for the 5-second trip?

[a] ○ 

[b] ○ 

[c] ○ 

[d] ○