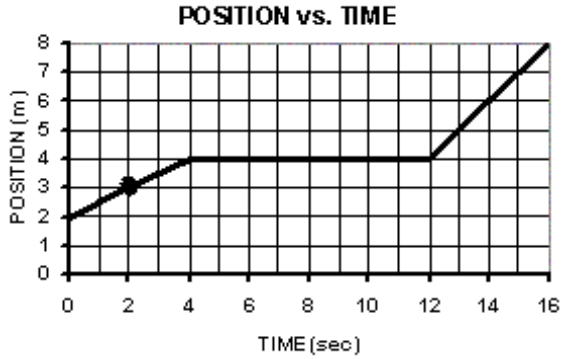
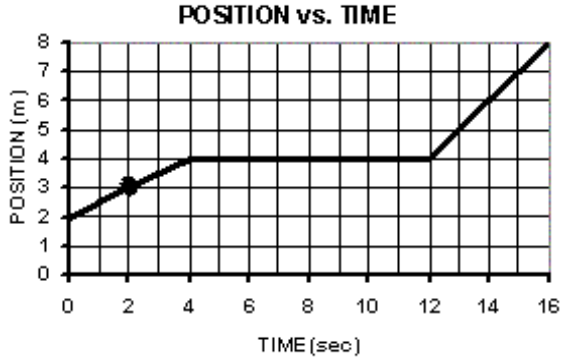
Position and Distance Set 1

Question 1.
The motion of an object during a 16 second time period is graphed below. What is the object's position at the point indicated by the dot on the graph?



(b) 1 meter **[41]**
(c) 2 meters **[Unknown]**
(d) 3 meters **[01]**
(e) 1.5 meters **[Unknown]**
(f) 0.5 meters **[71]**

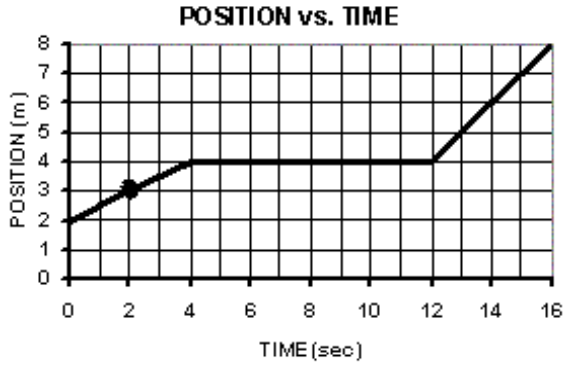
Question 2.
How far has the object traveled from the beginning of the motion (t=0s) to the point indicated by the dot on the graph (t=2s)?



(b) 0 meters **[80]**
(c) 0.5 meters **[72]**
(d) 1 meter **[02]**
(e) 3 meters **[42]**
(f) 1.5 meters **[Unknown]**

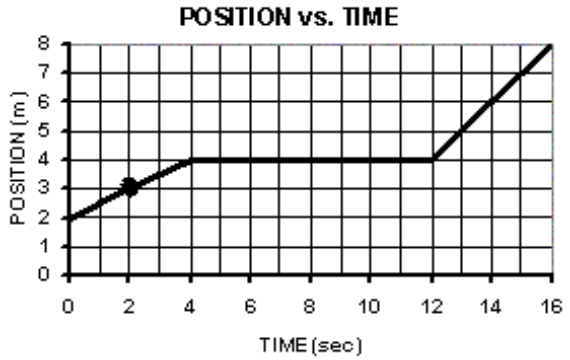
Question 3.

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



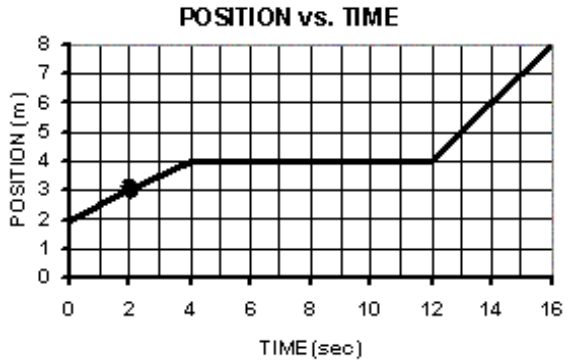
(b) The object is moving at a constant speed. **[00]**
(c) The object is traveling up hill. **[91]**
(d) The object is stopped at point indicated by the dot. **[80]**
(e) The object is speeding up. **[Unknown]**

Question 4.
How far did the object travel in the 16 seconds?



(b) 6 meters **[Paired]** with question: 5
(c) 8 meters **[Paired]** with question: 5
(d) 14 meters **[Paired]** with question: 5
(e) 10 meters **[Paired]** with question: 5

Question 5.
How did you decide how far the object traveled?

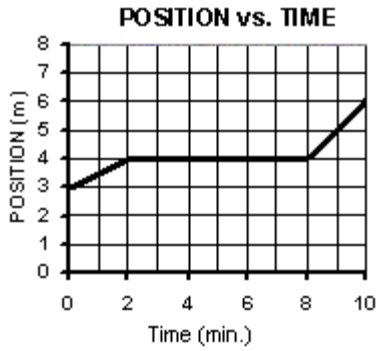


(d:b) Looked at the final position of the object **[60][30]**
(d:c) Subtracted the initial position from the final position **[60][Unknown]**
(d:d) Added the initial, middle, and final positions **[60][60]**
(c:b) Looked at the final position of the object **[30][30]**
(c:c) Subtracted the initial position from the final position **[30][02]**
(c:d) Added the initial, middle, and final positions **[30][60]**
(b:b) Looked at the final position of the object **[02][30]**
(b:c) Subtracted the initial position from the final position **[02][02]**
(b:d) Added the initial, middle, and final positions **[02][60]**
(e:b) Looked at the final position of the object **[60][30]**
(e:c) Subtracted the initial position from the final position **[60][Unknown]**
(e:d) Added the initial, middle, and final positions **[60][60]**
(b:e) Added the initial position to the final position **[02][60]**
(c:e) Added the initial position to the final position **[30][60]**
(d:e) Added the initial position to the final position **[60][60]**
(e:e) Added the initial position to the final position **[60][60]**

Question 6.
Below is a new graph of an object moving during 10 minute interval. What was the object's change in position during the time from t = 2 minutes to t = 8 minutes?

meters

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



(a) Other **[Unknown]**
(b) 0.0-0.0 **[02]**
(c) 4.0-4.0 **[42]**
(d) 6.0-6.0 **[42]**
(e) 3.0-3.0 **[Unknown]**
(f) 0.2-0.8 **[72]**
(g) 7.0-13.0 **[60]**

Question 7.
Given the position and time data below, 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 **[00]**
(c) 30 meters **[42]**
(d) 65 meters **[60]**
(e) 85 meters **[60]**

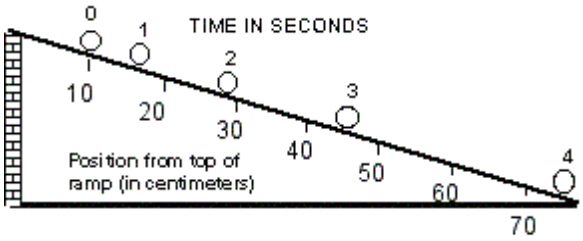
Question 6.
While waiting for a bus, Ida sees an ant at her feet. Two minutes later, the ant was 50 centimeters away from Ida. After three minutes, the ant was still 50 centimeters away. Finally, five minutes after starting, the ant was 80 centimeters away from Ida.

Assuming that the ant walked in only one direction, how far did it travel?

(a) 16 centimeters **[72]**
(b) 80 centimeters **[02]**

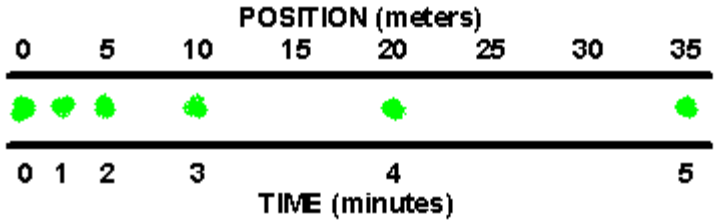
(c) 130 centimeters **[60]**
(d) 180 centimeters **[60]**

Question 4.
How far has the ball traveled in the first 3 seconds?



(a) About 35 cm **[Paired]** with question: 5
(b) About 45 cm **[Paired]** with question: 5
(c) About 90 cm **[Paired]** with question: 5
(d) About 100 cm **[Paired]** with question: 5

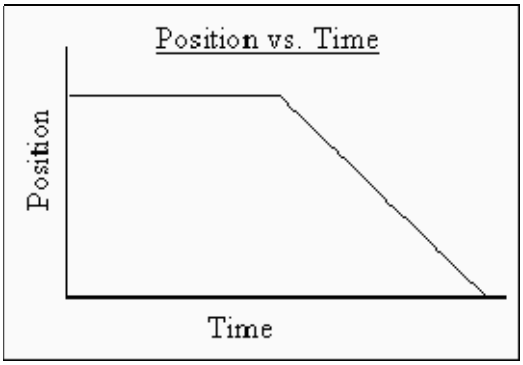
Question 10.
A radio-controlled car travels in one direction down a straight track. A part of the motion is shown in the top view diagram below. Every minute the car sprays a paint dot on the track to mark its position. How would you describe the motion of the car at t = 4 minutes?



(a) The car is moving at 20 meters/minute. **[70]**
(b) The car is speeding up. **[03]**
(c) The car is moving at 5 meters/minute. **[72]**
(d) The car is stopped at the 20 meter mark. **[Unknown]**

NEW Determining Speed Set 1

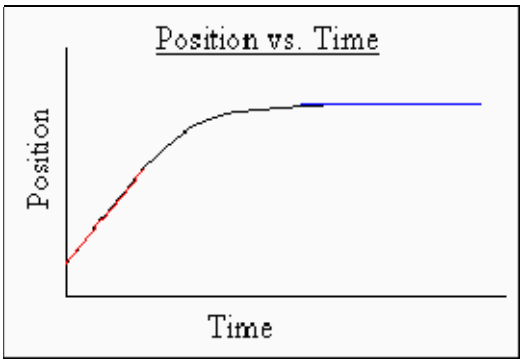
Question 1.
A position versus time graph of an car is shown at right. Which statement best describes the motion of the car?



(a) The car is first moving at a constant speed, and then it slows down and stops. **[82]**
(b) The car is first at rest, then it moves with a constant speed. **[03]**
(c) Cannot say anything because the graph has no numbers. **[Unknown]**
(d) The car is first traveling along a flat section of road, then it is going down a hill. **[90]**

Question 1c.

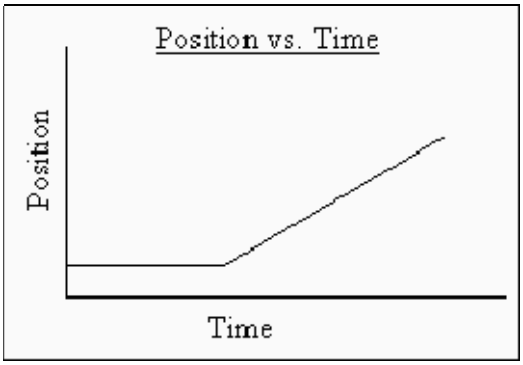
A position versus time graph of a car is shown at right. Which statement below best describes the motion of the car?



(a) The car is moving with a constant speed before it slows down to a stop. **[03]**
(b) The car starts from rest before moving and then eventually stopping. **[50]**
(c) The car is speeding up then moving with a constant speed. **[80]**
(d) The car is moving up a hill that gradually flattens out. **[90]**

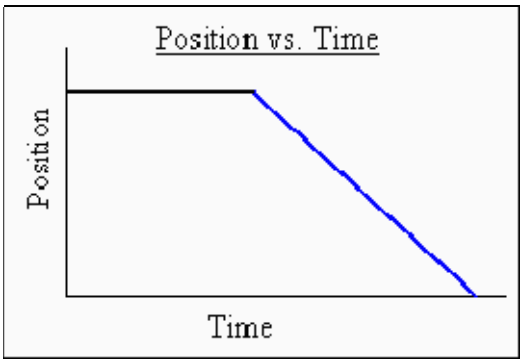
Question 1r.

A position versus time graph of a car is shown at right. Which statement best describes the motion of the car?



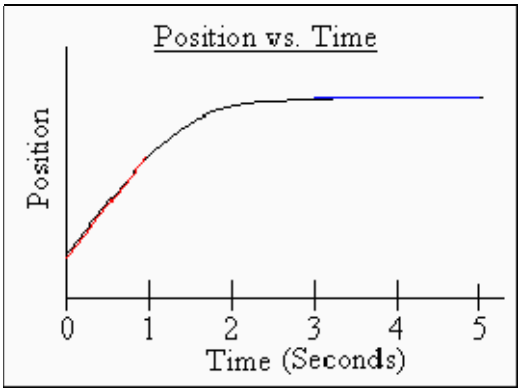
(a) The car is first moving with constant speed, then it speeds up. **[82]**
(b) The car is first traveling along a flat segment of road, then it goes up a hill. **[90]**
(c) The car does not move for a while, then it moves with constant speed. **[03]**
(d) The car does not move for a while, then it speeds up. **[80]**

Question 2.
This is a position versus time graph of a car. What can you say about the speed of the car during the blue section of the graph?



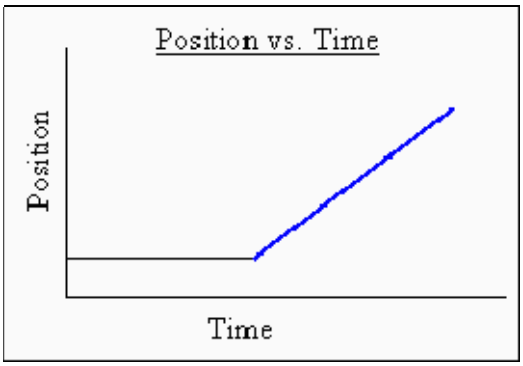
(a) The speed is constant because the graph section has a constant slope. **[02]**
(b) The speed is decreasing because the graph section has a negative slope. **[81]**
(c) Cannot say anything because the graph has no numbers. **[Unknown]**
(d) Cannot answer speed questions using a position graph. **[Unknown]**

Question 2c.
A position versus time graph of a car is shown at right. During which time segment of the motion is the car speeding up?



(a) 0 to 1 Second **[80]**
(b) 1 to 3 Seconds **[80]**
(c) 3 to 5 Seconds **[70]**
(d) Never **[03]**

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?

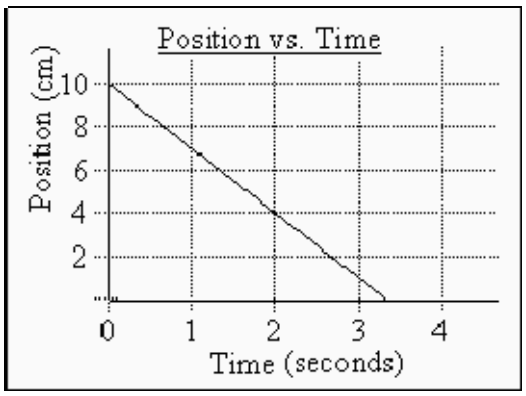


(a) The speed is increasing because the blue section has a positive slope. **[81]**
(b) The speed is constant because the blue section has a constant slope. **[02]**
(c) The speed is decreasing because the car is going up a hill. **[90]**
(d) The speed is zero because the blue section is the end of the trip. **[52]**

Question 3.
Below is a position versus time graph of the motion of a toy car. What is the speed of the car at t = 2 seconds?

cm/sec

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



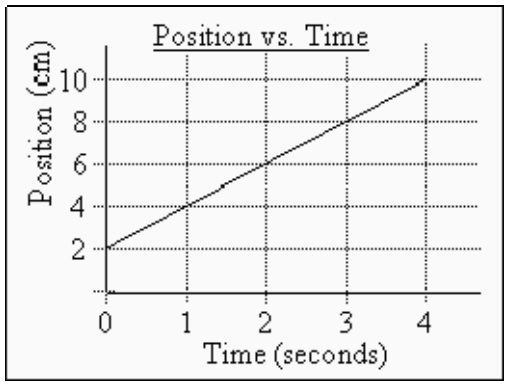
(a) Other **[Unknown]**
(b) 3.0-3.0 **[02]**
(c) 4.0-4.0 **[71]**
(d) 0.0-0.0 **[76]**
(e) 2.0-2.0 **[Unknown]**
(f) 6.0-6.0 **[71]**

Question 3e.
Please explain how you arrived at your answer in the box below.

(a)
Question 3r.
To the right is the position versus time graph of a toy train. What is the speed of the car at 3 seconds?

cm/s

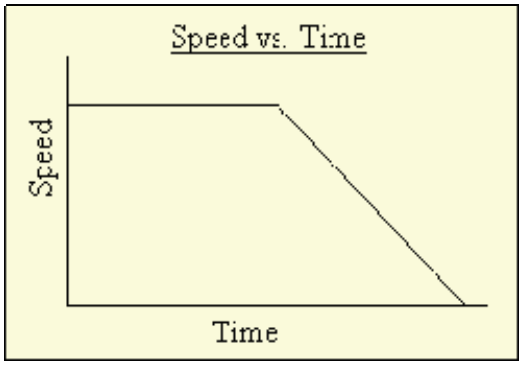
Type your answer in the box below (your answer must be a number).



(a) Other **[Unknown]**
(b) 0.0-0.0 **[76]**
(c) 2.0-2.0 **[02]**
(d) 1.0-1.0 **[Unknown]**
(e) 3.0-4.0 **[Unknown]**
(f) 6.0-10.0 **[71]**

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. **[03]**

(b) The bike starts from rest because the slope is zero, then speeds up toward the origin. **[84]**

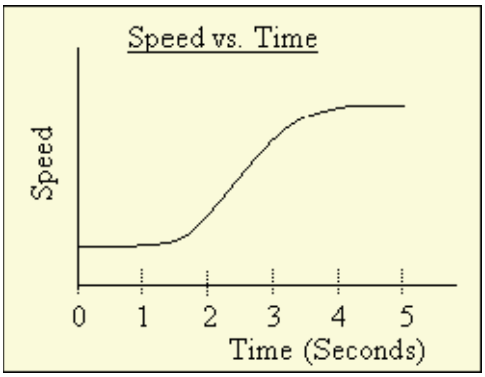
(c) The bike is slowing down for the entire trip. **[42]**

(d) The bike starts from rest, then moves with a constant speed, then slows to a stop. **[51]**

(e) The bike is first traveling along a flat road, then it begins to go down a hill. **[90]**

Question 4c.

A speed versus time graph for a bicycle is shown at right. When is the bicycle at rest (not moving)?



(a) At t=0 seconds **[51]**

(b) 0 to 1 second **[80]**

(c) 2 to 3 seconds **[Unknown]**

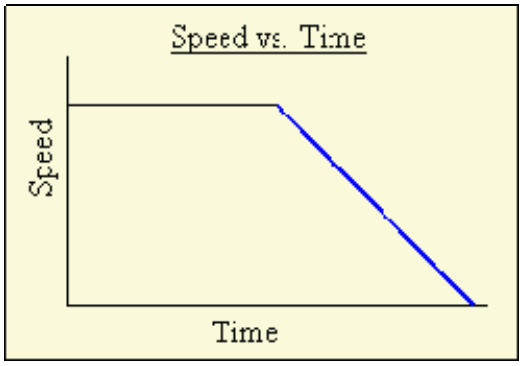
(d) 4 to 5 seconds **[80]**

(e) At all instants **[76]**

(f) Never **[01]**

Question 5.

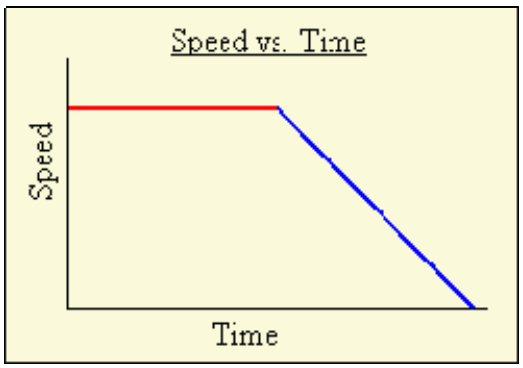
A speed versus time graph of the bicycle's motion is shown at right. What can you say about the speed of the bike during the blue section of the graph?



(a) The speed is decreasing because the graph section has a negative slope. **[03]**
(b) The speed is constant because the graph section has a constant slope. **[83]**
(c) Cannot say anything because the graph has no numbers. **[Unknown]**

Question 5c.

During which segment of the trip does the bike cover the greatest distance?



(a) The first half (red segment) **[03]**
(b) The second half (blue segment) **[84]**
(c) The bike travels the same distance in both segments. **[40]**
(d) There is no way to compare distances on a speed graph. **[Unknown]**

Question 5e.

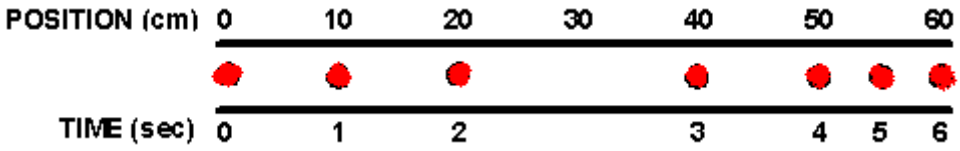
In the space below, breifly explain how you arrived at your previous answer.

(a)

Question 6.

A radio-controlled car travels in one direction down a straight track. A part of the motion is shown in the top view diagram below. Every second the car sprays a paint

dot on the track to mark its position. Which description best fits the motion of the car from t = 4 seconds to t = 6 seconds.



(a) Slows down and stops because the dots stop. **[52]**
(b) Slowing down because the postion/time ratio is getting smaller. **[70]**
(c) Moving fast because the position readings are very high. **[70]**
(d) Moving at a constant speed because the dots are equally spaced. **[03]**

Question 7.
Our radio-controlled car takes another run down the track. This time the speed is measured by a speedometer at the end of each second. The speed and time data is recorded in the table at right. Which description of motion best fits the data in the table?

TIME (sec)

SPEED (cm/sec)

0
1
2
3
4

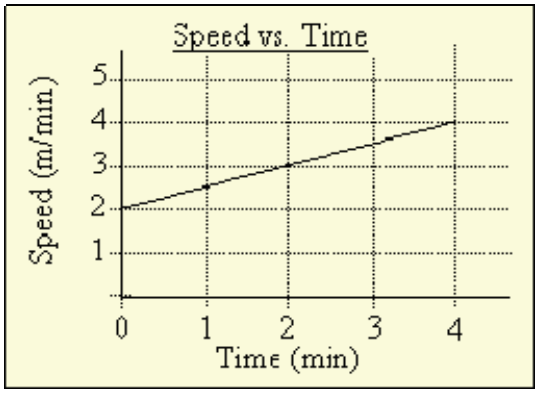
5
0
10
20
20

The car started...

(a) ...from rest and then sped up to 20 cm/second. **[50]**
(b) ...from rest; increased its speed to 20 cm/sec; and then stopped. **[50]**
(c) ...at 5 cm/sec; stopped; and then sped up to 20 cm/second. **[03]**
(d) ...at 5 cm/sec and then traveled at 20 cm/sec for most of the trip. **[41]**

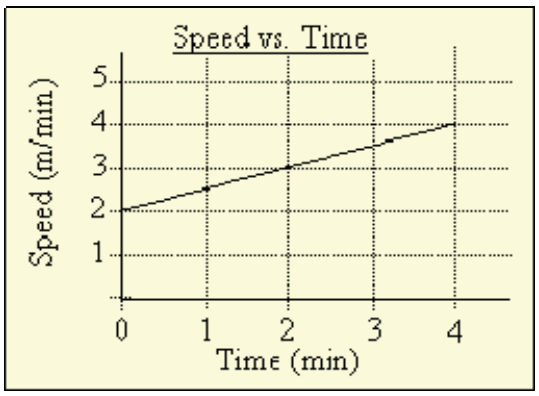
Question 8.

The speed versus time data for a racing turtle is graphed below. What is the speed of the turtle at t = 2 minutes?



(a) 1.0 meter/minute **[Paired]** with question: 8p
(b) 1.5 meters/minute **[Paired]** with question: 8p
(c) 2.5 meters/minute **[Paired]** with question: 8p
(d) 3.0 meters/minute **[Paired]** with question: 8p
(e) 0.5 meters/minute **[Paired]** with question: 8p

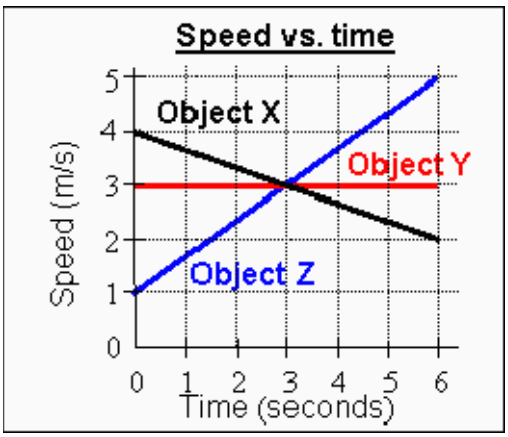
Question 8p.
How did you decide on your answer for the speed of the racing turtle at t = 2 minutes?



(a:a) Took the average of the speeds: 2+3 m/min or 5 m/min divided by 2 **[73][72]**
(a:b) Read the speed value from the y-axis of the graph when t = 2 minutes **[73][01]**
(a:c) Looked at how much the speed changed: from 2 m/min to 3 m/min **[73][73]**
(a:d) Divided the speed by the time: 3 m/min divided by 2 minutes **[73][74]**
(b:a) Took the average of the speeds: 2+3 m/min or 5 m/min divided by 2 **[74][72]**
(b:b) Read the speed value from the y-axis of the graph when t = 2 minutes **[74][01]**
(b:c) Looked at how much the speed changed: from 2 m/min to 3 m/min **[74][73]**
(b:d) Divided the speed by the time: 3 m/min divided by 2 minutes **[74][74]**
(c:a) Took the average of the speeds: 2+3 m/min or 5 m/min divided by 2 **[72][72]**
(c:b) Read the speed value from the y-axis of the graph when t = 2 minutes **[72][01]**
(c:c) Looked at how much the speed changed: from 2 m/min to 3 m/min **[72][73]**

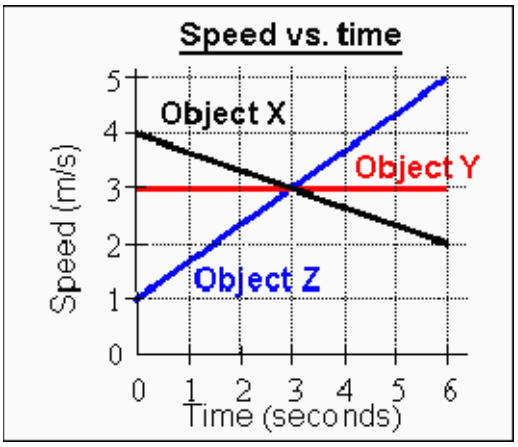
(c:d) Divided the speed by the time: 3 m/min divided by 2 minutes **[72][74]**
(d:a) Took the average of the speeds: 2+3 m/min or 5 m/min divided by 2 **[01][72]**
(d:b) Read the speed value from the y-axis of the graph when t = 2 minutes **[01][01]**
(d:c) Looked at how much the speed changed: from 2 m/min to 3 m/min **[01][73]**
(d:d) Divided the speed by the time: 3 m/min divided by 2 minutes **[01][74]**
(e:a) Took the average of the speeds: 2+3 m/min or 5 m/min divided by 2 **[75][72]**
(e:b) Read the speed value from the y-axis of the graph when t = 2 minutes **[75][01]**
(e:c) Looked at how much the speed changed: from 2 m/min to 3 m/min **[75][73]**
(e:d) Divided the speed by the time: 3 m/min divided by 2 minutes **[75][74]**
(a:e) Took the change in speed and divided it by the time: 1m/min divided by 2 minutes. **[73][75]**
(b:e) Took the change in speed and divided it by the time: 1m/min divided by 2 minutes. **[74][75]**
(c:e) Took the change in speed and divided it by the time: 1m/min divided by 2 minutes. **[72][75]**
(d:e) Took the change in speed and divided it by the time: 1m/min divided by 2 minutes. **[01][75]**
(e:e) Took the change in speed and divided it by the time: 1m/min divided by 2 minutes. **[75][75]**

Question 9.
Given the speed versus time graph for three objects shown at right, which object is going the slowest at t=3 seconds?



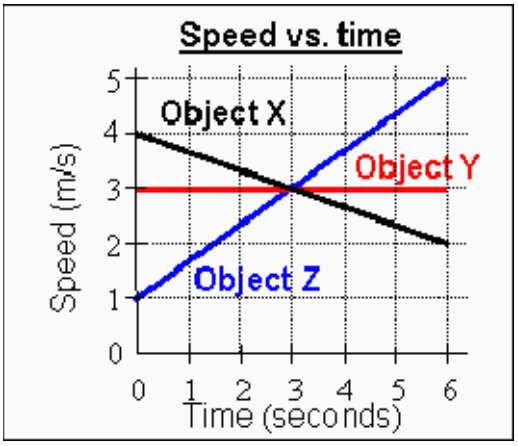
(a) Object X **[Paired]** with question: 9pA
(b) Object Y **[Paired]** with question: 9pB
(c) Object Z **[Paired]** with question: 9pC
(d) They are all moving with the same speed. **[Paired]** with question: 9pD

Question 9pA.
Which statement below best matches the reasoning you used in the previous question?



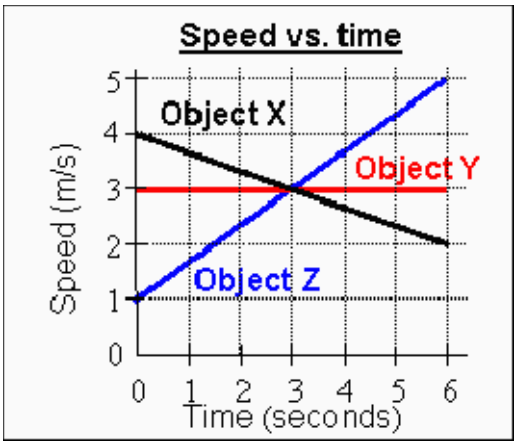
(a:a) Object X is the only object where the speed is decreasing. **[73][73]**
(a:b) The slope of Object X is the smallest. **[83][83]**
(a:c) Object X is going down hill so it must slow down. **[90][90]**
(a:d) Object X ends up the lowest on the graph. **[73][73]**

Question 9pB.
Which statement below best matches the reasoning you used in the previous question?



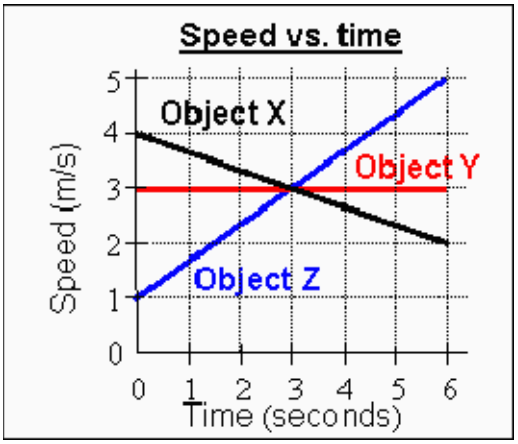
(b:a) Object Y is the slowest because it doesn't move at all. **[84][84]**
(b:b) Object Y is the only one not changing its speed. **[73][73]**
(b:c) Object Y has the least steep slope. **[73][73]**

Question 9pC.
Which statement below best matches the reasoning you used in the previous question?



(c:a) The path for Object Z is longer to get to 3. **[90][90]**
(c:b) Object Z is going the slowest because it is going up a hill. **[91][91]**
(c:c) Object Z is only going 1 m/s at the beginning. **[41][41]**

Question 9pD.
Which statement below best matches the reasoning you used in the previous question?

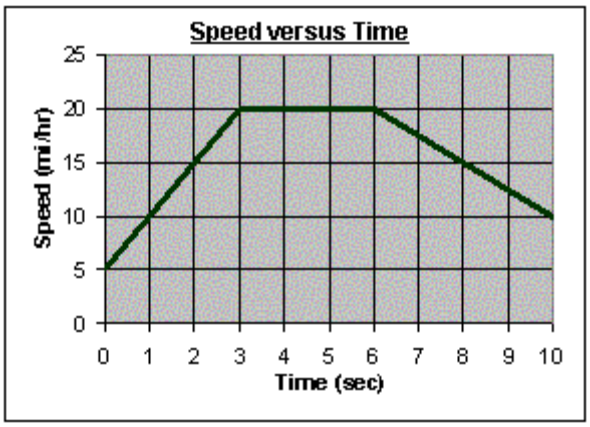


(d:a) All of the objects are at the same position at 3 seconds. **[70][80]**
(d:b) At 3 seconds all the objects are moving at 3 m/s. **[03][03]**
(d:c) At 3 seconds all the objects are moving at 1 m/s. **[80][70]**

Question 10.
What did you like the most and the least about this set of questions about describing the motion of objects?

(a)

Question 3.
The graph Joe made of his ride to school is shown below. What was the car's change in speed from t=0 seconds to t=3 seconds?

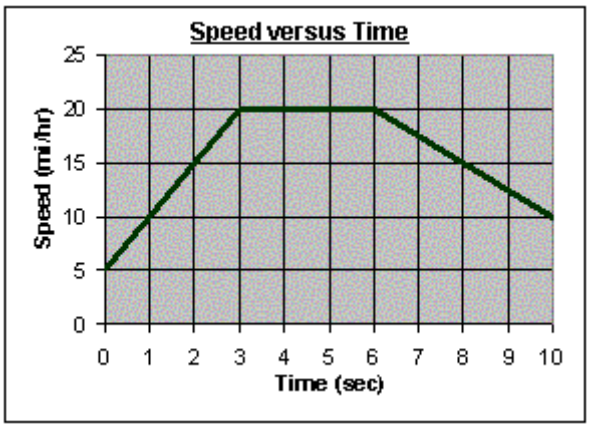


(a) (20-5)/3 = 5 mi/hr **[62]**
(b) 20/3 = 6.7 mi/hr **[61]**
(c) (20+5)/2 = 12.5 mi/hr **[70]**
(d) 20-5 = 15 mi/hr **[10]**
(e) 20 mi/hr **[81]**

Question 4.
The graph below shows the motion of Joe's mother's car. What was the car's change in speed from t=3 seconds to t=6 seconds?

mi/hr

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



(a) Other **[Unknown]**
(b) 0.0-0.0 **[00]**
(c) 3.0-7.0 **[60]**
(d) 20.0-20.0 **[80]**

Question 6.

Since Jill's bike has a speedometer, her lab group is using it in their study of motion. Riding her bike, Jill calls out her speed so that her classmate Tom can record how fast she is moving during the entire trip. Below is a table showing their data. How much does the bicycle's speed change during the time from t=0 seconds to t=4 seconds?

Time (sec)	**Speed (m/sec)**
0	
2	
4	
6	
8	
10	
15	
20	
25	
25	
21	
20	

(a) 2.50 m/sec **[Paired]** with question: 7
(b) 6.25 m/sec **[Paired]** with question: 7
(c) 10 m/sec **[Paired]** with question: 7
(d) 20 m/sec **[Paired]** with question: 7
(e) 5 m/sec **[Paired]** with question: 7
(f) 25 m/sec **[Paired]** with question: 7

Question 7.
The data table at right shows the data from Jill's bicycle trip. How did you determine the change in speed in the last question?

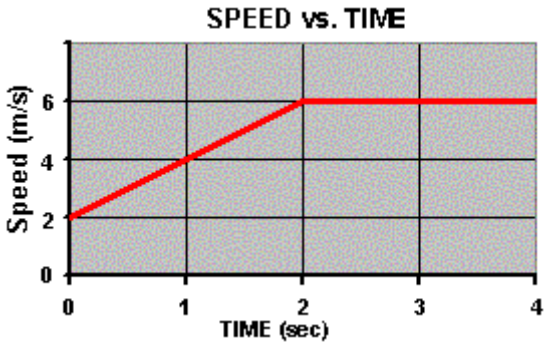
Question 1.
Ed rides his mountain bike down a hillside. During the first 3 seconds, his speed goes from 0 to 4 m/sec. After 3 seconds, Ed travels at 4 m/sec for the rest of his trip down the hill. When was Ed accelerating?

(a) During the entire trip **[90]**
(b) During the entire trip except at t = 0 sec **[70]**
(c) During the first 3 seconds **[00]**
(d) At t = 3 seconds **[50]**
(e) After t = 3 seconds **[91]**

Question 2.
While waiting for a ride to soccer practice, Jamiel kicked his ball so that it rolled up and then back down a hill. When was the ball accelerating?

(a) It was accelerating the whole trip, up and back down the hill. **[00]**
(b) It was accelerating on the way up and on the way down, but not at the top. **[70]**
(c) It was accelerating only on the way down. **[Unknown]**

Question 3.
A **speed versus time** graph of a skateboarder is shown below. When is the skateboarder accelerating?



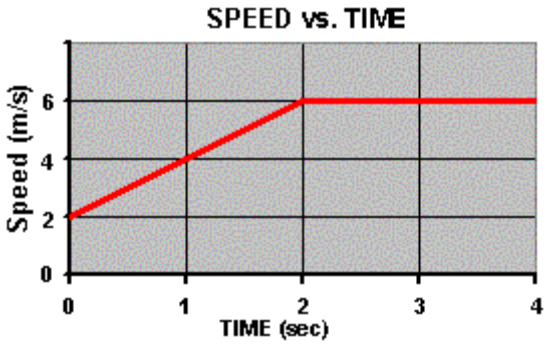
(a) From t = 0 to t = 2 seconds **[Paired]** with question: 4
(c) At t = 2 seconds
[Paired] with question: 4
(d) From t = 2 to t = 4 seconds **[Paired]** with question: 4

Question 4.
How did you decide when the skateboarder was accelerating?

Question 5.
What was the acceleration of the skateboarder during the first two seconds?

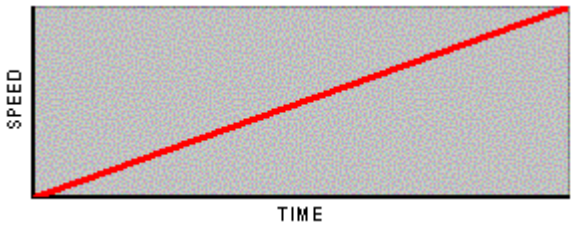
Type your answer in the box below. Your answer should be a number.

m/s/s



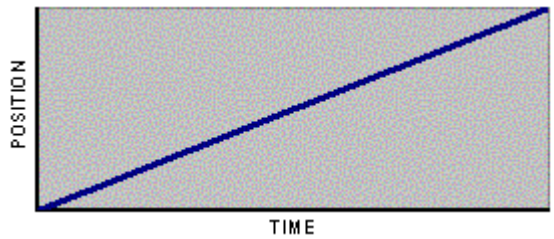
(a) Other **[Unknown]**
(b) 2.0-2.0 **[10]**
(c) 4.0-4.0 **[31]**
(d) 3.0-3.0 **[32]**
(e) 6.0-6.0 **[31]**

Question 8.
Does the speed versus time graph below represent an object that is accelerating? Choose the answer and reasoning that best match your thinking.



(a) Yes; constant positive slope means increasing speed. **[00]**
(b) No; constant positive slope means constant speed. **[83]**
(c) Yes; the position is changing over time. **[62]**
(d) No; when the speed = 0, the acceleration = 0. **[70]**

Question 9.
Does the position versus time graph below represent an object that is accelerating? Choose the answer and reasoning that best match your thinking.



(a) Yes; the position is changing. **[62]**
(b) No; constant slope means constant speed. **[02]**

(c) Yes; constant slope means increasing speed. **[81]**
(d) No; when position = 0, acceleration = 0. **[70]**