Physics Practice test

Modified True/False

Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.

____ 1. Distance is measured along the actual path taken.

____ 2. The average velocity of an object on a round-trip journey is 0 m/s.

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 3. A bus travels at a constant velocity of +26 m/s. The driver applies the brakes as the vehicle approaches a yellow light, reducing the bus's velocity to +12 m/s. If the average acceleration of the bus during the braking is -5 m/s^2, how long does the driver apply the brakes?

a. 0.4 s
b. 2.4 s
c. 2.8 s
d. 5.2 s

____ 4. If a car accelerates from rest at a constant +6.5 m/s^2, how long will it take for the car to reach a velocity of +30 m/s?

a. 0.2 s
b. 4.6 s
c. 30 s
d. 195 s

____ 5. A car accelerates uniformly at +2 m/s^2 for 3 s. If the car's initial velocity was 12 m/s, how far did the car travel in 3 s?

a. +9 m
b. +25 m
c. +36 m
d. +45 m

____ 6. A rock released from rest falls freely off a cliff and accelerates at -9.8 m/s^2 under the influence of gravity. What is the average velocity of the object after 2 s have passed?

a. -19.6 m/s
b. -9.8 m/s
c. -4.9 m/s
d. -2 m/s

____ 7. After accelerating at +4.8 m/s^2 for 1.6 s, a vehicle's velocity was +16 m/s. What was the vehicle's initial velocity?

a. +3.33 m/s
b. +8.32 m/s
c. +23.68 m/s
d. +25.6 m/s

____ 8. A tennis ball is thrown upward with an initial velocity of +18 m/s. What is the tennis ball's velocity after 4 s? Assume the acceleration due to gravity is 9.8 m/s^2 downward.

a. -21.2 m/s
b. +21.2 m/s
c. +57.2 m/s
d. +72 m/s

____ 9. A roller coaster at an amusement park starts at rest and is in free fall for 1.5 s. What would be the roller coaster's velocity after 1.5 s? Assume the upward direction is positive and the acceleration due to gravity is 9.8 m/s^2 downward.

a. -14.7 m/s
c. -0.15 m/s

b. -6.5 m/s
d. +14.7 m/s

____ 10. A construction worker accidentally drops a hammer from a high scaffold. What is the velocity of the hammer after it has fallen for 5 s? Assume the upward direction is positive and the acceleration due to gravity is 9.8 m/s^2 downward.
a. -49 m/s
b. -9.8 m/s
c. -1.96 m/s
d. -0.51 m/s

____ 11. A supersonic jet flying at +150 m/s experiences uniform acceleration at the rate of +23 m/s^2 for 20 s. What is the jet's final velocity?
a. +173 m/s
b. +310 m/s
c. +460 m/s
d. +610 m/s

____ 12. A car with a velocity of +24 m/s accelerates uniformly at a rate of +1.8 m/s^2 for 7 s. What is the car's final velocity?
a. -11.4 m/s
b. +25.8 m/s
c. +27.8 m/s
d. +36.6 m/s

____ 13. The acceleration due to gravity on Mars is about one third that on Earth. How would a ball dropped by an astronaut on Mars compare with a ball dropped from the same height on Earth?
a. Both balls would have the same velocity.
b. Both balls would have the same acceleration.
c. The ball dropped on Mars would have a lesser velocity.
d. The ball dropped on Mars would have a greater velocity.

____ 14. A bird endures tremendous acceleration as it digs insects out of a tree. Its beak moves at a velocity of +5.7 m/s but is reduced to 0 m/s within 0.006 s by the impact with the tree. What acceleration does the bird's brain withstand?
a. -950 m/s^2
b. +0.001 m/s^2
c. +0.034 m/s^2
d. +950 m/s^2

____ 15. A boy on a bike starts from rest and reaches a velocity of 20.2 m/s [N] in 4.2 s. What is the boy's average acceleration?
a. 4.8 m/s^2 [N]
b. 0.2 m/s^2 [N]
c. 84.84 m/s^2 [N]
d. 24.4 m/s^2 [N]

____ 16. An object goes from +50 m/s to +30 m/s in 4 s. What is the average acceleration of the object?
a. -0.2 m/s^2
b. -5 m/s^2
c. +5 m/s^2
d. +20 m/s^2

____ 17. A motorcycle accelerates at a constant rate from rest, reaching +45 m/s in 5 s. What is the motorcycle's average acceleration?
a. +0.11 m/s^2
b. +9 m/s^2
c. +45 m/s^2
d. +225 m/s^2

____ 18. A cheetah is resting under a tree when it sees a gazelle. The cheetah reaches a velocity of +28 m/s in 5 s in pursuit of the gazelle. What is the cheetah's average acceleration?
a. +0.18 m/s^2
b. +5.6 m/s^2
c. +28 m/s^2
d. + 140 m/s^2

____ 19. A salmon swimming at a velocity of 0.45 m/s [E] sees a shrimp and increases its velocity to 2.15 m/s [E] in 0.6 s. What is the salmon's average acceleration?

a. 1.02 m/s^2 [E]
b. 2.83 m/s^2 [E]
c. 3.58 m/s^2 [E]
d. 4.33 m/s^2 [E]

____ 20. A race car's velocity increases from +6 m/s to +42 m/s over a 4 s time interval. What is its average acceleration?

a. +7 m/s^2
b. +9 m/s^2
c. +10.5 m/s^2
d. +11.5 m/s^2

____ 21. A snowboarder is travelling downhill at a velocity of +6 m/s. Her speed increases to +18 m/s in 3 s as the ski hill gets steeper. What is the snowboarder's average acceleration?

a. +2 m/s^2
b. +4 m/s^2
c. +6 m/s^2
d. +18 m/s^2

____ 22. A race car heading east on a racetrack at 46 m/s slows at a constant rate to a velocity of 24 m/s over 10 s. What is the car's average acceleration?

a. -22 m/s^2
b. -2.4 m/s^2
c. -2.2 m/s^2
d. +2.2 m/s^2

____ 23. The velocity of a truck is increased uniformly from 25 m/s [N] to 35 m/s [N] in 4 s. What is the truck's average acceleration in the 4 s interval?

a. 0.4 m/s^2 [N]
b. 2.5 m/s^2 [N]
c. 8.75 m/s^2 [N]
d. 10 m/s^2 [N]

____ 24. A vehicle travelling at a velocity of +35 m/s is brought to rest in 0.6 s. What is the average acceleration of the vehicle during this time interval?

a. -58 m/s^2
b. -21 m/s^2
c. +21 m/s^2
d. +58 m/s^2

____ 25. What is the average acceleration that causes a car's velocity to change from +85 m/s to +40 m/s in a 6 s period?

a. -7.5 m/s^2
b. +7.5 m/s^2
c. +10.4 m/s^2
d. +20.8 m/s^2

____ 26. A baseball pitcher throws a fastball with a velocity of 42 m/s [W]. The batter hits the baseball, and the ball travels at a velocity 54 m/s [E]. What was the average acceleration of the ball during the 0.002 s when it was in contact with the bat?

a. 6000 m/s^2 [E]
b. 42 000 m/s^2 [W]
c. 48 000 m/s^2 [E]
d. 54 000 m/s^2 [E]

____ 27. Three cars in the Grand Prix start off at the same time and in the same direction. Car X goes from 0 m/s to +18 m/s in 4 s; car Y goes from 0 m/s to +22 m/s in 3.5 s; and car Z goes from 0 m/s to +27 m/s in 6 s. Which of the following ranks the three cars from greatest acceleration to least acceleration?

Greatest Acceleration → Least Acceleration

a. Car X Car Z Car Y

b.	Car Y	Car X	Car Z
c.	Car Y	Car Z	Car X
d.	Car Z	Car Y	Car X

a. a
b. b
c. c
d. d

____ 28. What is the average acceleration of a car that slows down from +50 km/h to +30 km/h as it enters a school zone in 3.8 s?
a. -5.26 m/s^2
b. -1.46 m/s^2
c. +1.46 m/s^2
d. +5.85 m/s^2

____ 29. Which of the following describes an object with negative acceleration?

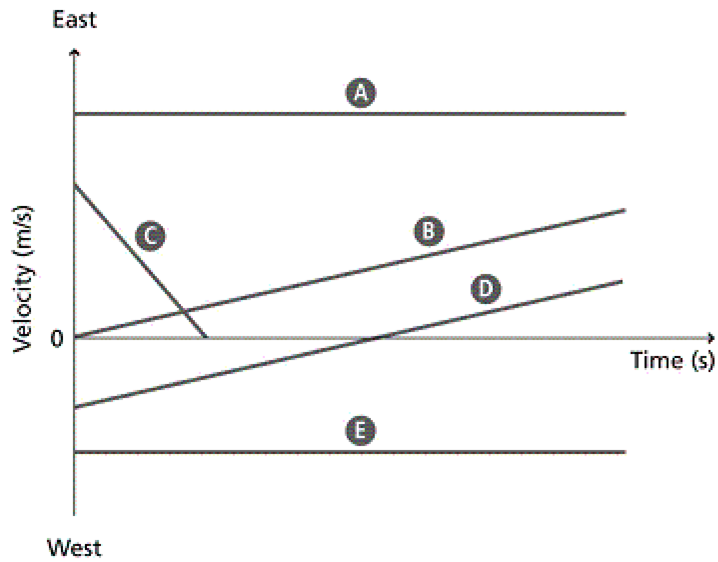
I. An object is going in the negative direction and is speeding up.
II. An object is going in the positive direction and is slowing down.
III. An object is changing from moving in the negative direction to the positive direction.

a. I. and II. only
b. I. and III. only
c. II. and III. only
d. I., II., and III.

____ 30. A fighter jet's velocity goes from +140 km/h to a complete stop in 2 s. What is the average acceleration of the fighter jet?
a. +19.4 m/s^2
b. -19.4 m/s^2
c. -70 km/h^2
d. -140 km/h^2

____ 31. A tennis player throws a ball upward with a velocity of +5 m/s. To what maximum height does the ball reach?
a. +0.78 m
b. +1.3 m
c. +4.9 m
d. +5.1 m

Use the following velocity-time graphs to answer the next two questions.



____ 32. Which of the above graphs shows both positive velocity and positive acceleration?

a. graph A
b. graph B
c. graph C
d. graph D

____ 33. Which of the following statements correctly compares graph A and graph E shown above?

I. They show motion in opposite directions.
II. They show motion with constant velocity.
III. They show motion with zero acceleration.

a. I. and II. only
b. I. and III. only
c. II. and III. only
d. I., II., and III.

Use the following information about data collected from a lab to answer the next question.

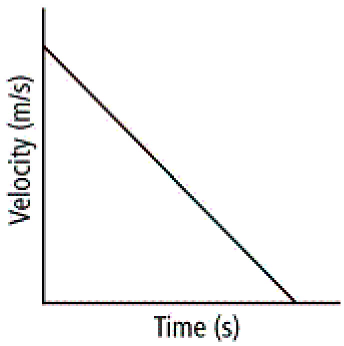
As a marble rolls across a classroom floor, a student measures the marble's velocity every second and records the data in the table shown below.

Time (s)	Velocity (m/s)
0	+0
1	+3
2	+6
3	+9
4	+12

____ 34. Using the data shown above, what is the average acceleration of the marble during the 4 s interval?

a. $+0.3\ m/s^2$
b. $+1\ m/s^2$
c. $+3\ m/s^2$
d. $+12\ m/s^2$

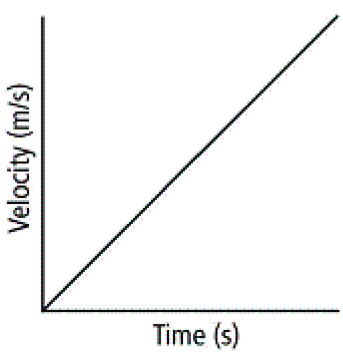
____ 35. Which of the following are shown by the velocity-time graph below?



I. The acceleration is positive.
II. The acceleration and velocity are in opposite directions.
III. The motion begins with a positive velocity, slows down, and then stops.

a. I. and II. only
b. I. and III. only
c. II. and III. only
d. I., II., and III.

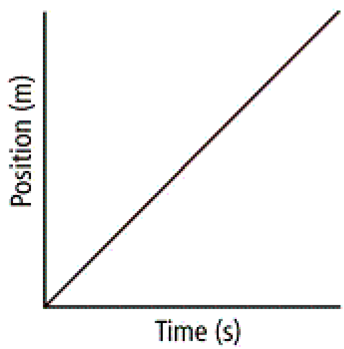
____ 36. Which of the following describes the motion shown by the velocity-time graph below?



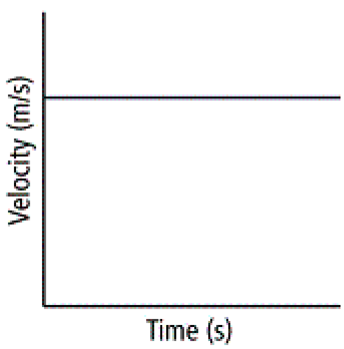
I. increased speed
II. positive velocity
III. constant, positive acceleration

a. I. and II. only
b. I. and III. only
c. II. and III. only
d. I., II., and III.

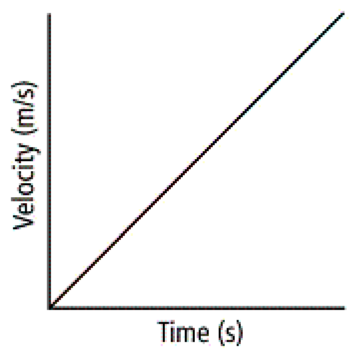
Use the following position-time graph to answer the next question.



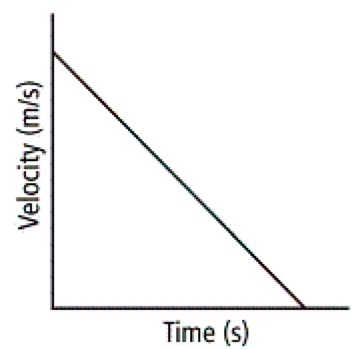
____ 37. Which of the following velocity-time graphs represents the same motion as the position-time graph shown above?



Graph I



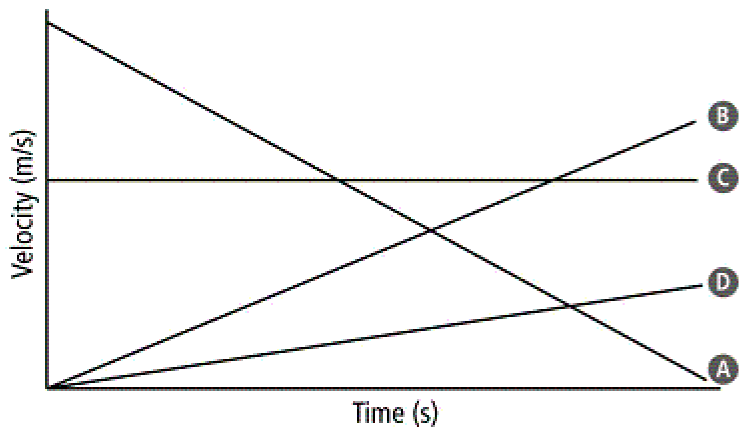
Graph II



Graph III

a. Graph I. only
b. Graph II. only
c. Graphs I. and II. only
d. Graphs I., II., and III.

Use the following graph showing the relationship between velocity and time of travel for four cars travelling in a straight-line motion to answer the next two questions.



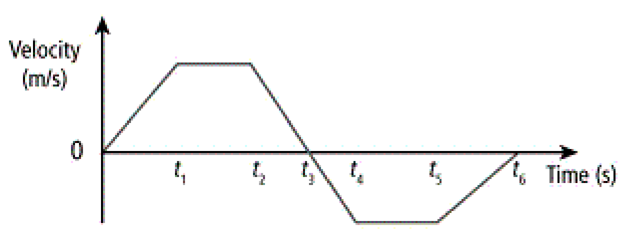
____ 38. Which car represented above has the greatest positive acceleration?

a. A
b. B
c. C
d. D

____ 39. Which car represented above is travelling at constant deceleration?

a. A
b. B
c. C
d. D

Use the following velocity-time graph showing the motion of an object to answer the next three questions.



____ 40. Which of the following compares the velocity and the acceleration of the object in the graph shown above during time intervals 0 to t_1 and t_5 to t_6?

	Time Interval 0 to t_1	Time Interval t_5 to t_6
a.	Velocity is positive. Acceleration is positive.	Velocity is positive. Acceleration is positive.
b.	Velocity is positive. Acceleration is positive.	Velocity is negative. Acceleration is negative.
c.	Velocity is positive. Acceleration is positive.	Velocity is negative. Acceleration is positive.
d.	Velocity is positive. Acceleration is negative.	Velocity is negative. Acceleration is positive.

ive.

a. a b. b c. c d. d

____ 41. Which of the following compares the acceleration and the motion of the object in the graph shown above during time intervals t_3 to t_4 and t_5 to t_6?

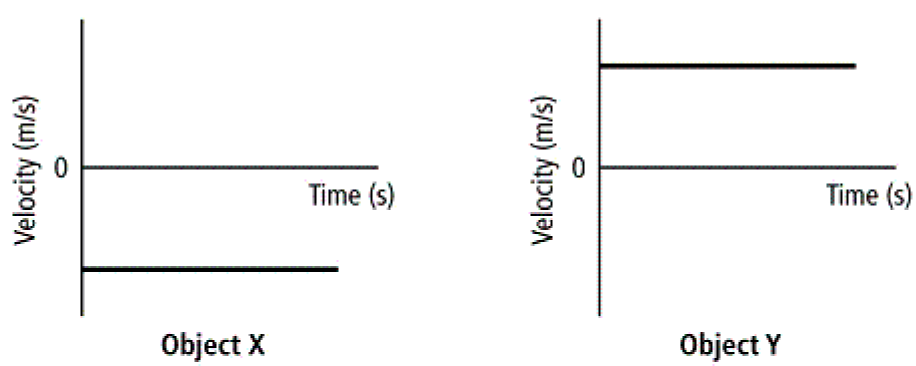
	Time Interval t_3 to t_4	Time Interval t_5 to t_6
a.	Acceleration is negative. Object is slowing down.	Acceleration is negative. Object is slowing down.
b.	Acceleration is negative. Object is speeding up.	Acceleration is positive. Object is slowing down.
c.	Acceleration is negative. Object is speeding up.	Acceleration is negative. Object is slowing down.
d.	Acceleration is negative. Object is slowing down.	Acceleration is positive. Object is speeding up.

a. a b. b c. c d. d

____ 42. During which time interval in the graph shown above is the object moving backward at a constant velocity?

a. t_2 to t_3
b. t_3 to t_4
c. t_4 to t_5
d. t_5 to t_6

Use the following velocity-time graphs showing the motion of objects X and Y to answer the next question.

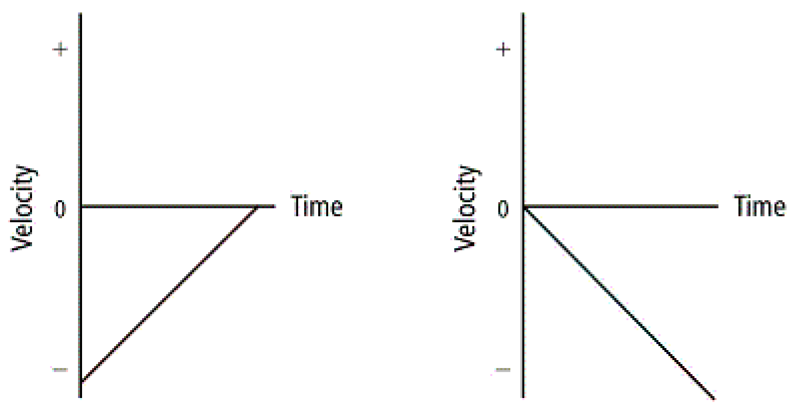


____ 43. Which of the following accurately compares objects X and Y in the graphs shown above?

I. Both objects have uniform motion.
II. Both objects have zero acceleration.
III. Object X has a negative velocity, while Object Y has a positive velocity.

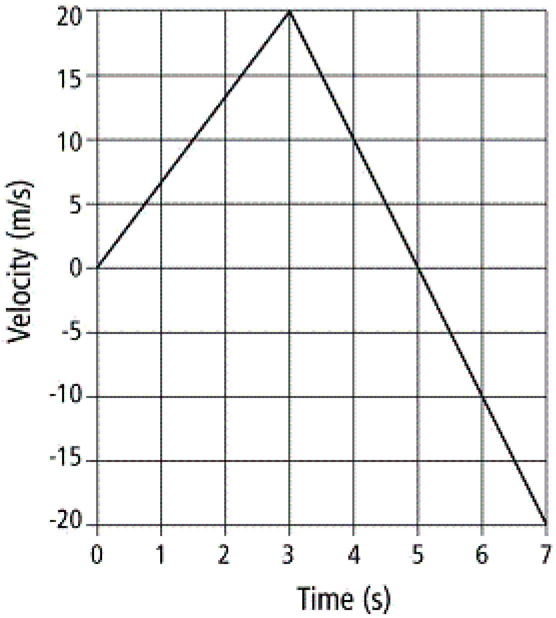
a. I. and II. only
b. I. and III. only
c. II. and III. only
d. I., II., and III.

Use the following velocity-time graphs showing the motion of two objects to answer the next question.



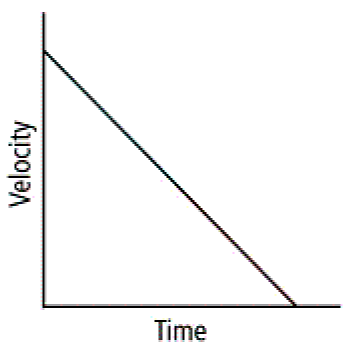
____ 44. Which of the following describes the motion of the two objects in the graphs shown above?
a. Both objects are speeding up.
b. Both objects are slowing down.
c. Both objects are moving with a negative velocity.
d. Both objects are moving with a negative acceleration.

____ 45. Using the velocity-time graph shown below, what is the average acceleration during the time interval 3 s to 7 s?



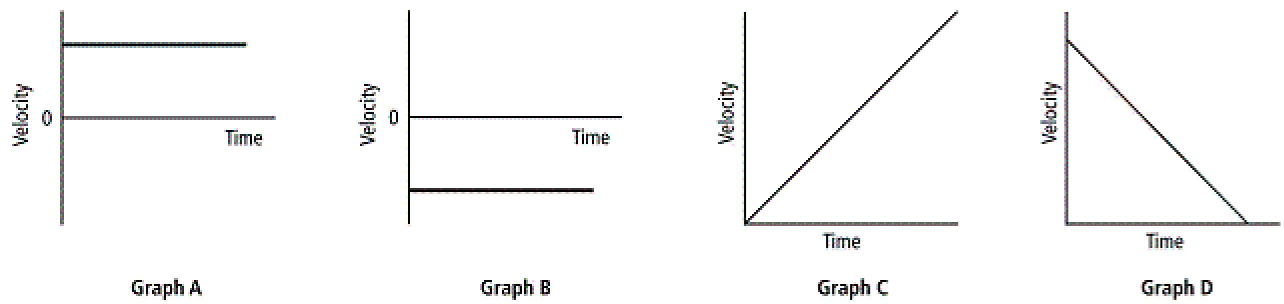
a. $-13.3\ m/s^2$
b. $-10\ m/s^2$
c. $-5.7\ m/s^2$
d. $-5\ m/s^2$

____ 46. What does the following velocity-time graph illustrate about acceleration?



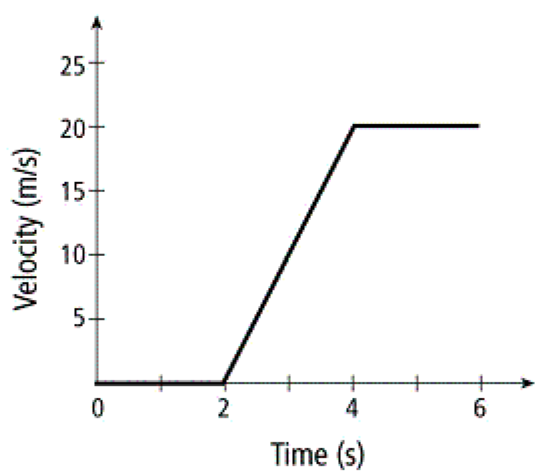
a. The acceleration is zero.
b. The acceleration is positive.
c. The acceleration is negative.
d. The acceleration is changing.

____ 47. A car was moving when an observer started monitoring it, and the car's velocity had not changed when the observations finished. Which of the following velocity-time graphs describes the car moving steadily to the observer's left?



a. Graph A
b. Graph B
c. Graph C
d. Graph D

____ 48. The velocity-time graph shown below represents the motion of a ball. Which of the following correctly compares the acceleration of the ball during the time interval 0 to 2 s and 4 to 6 s?



a. The ball has zero acceleration during both time intervals.
b. The ball has positive acceleration during both time intervals.
c. The ball has zero acceleration between 0 to 2 s and positive acceleration between 4 to 6 s.
d. The ball has negative acceleration between 0 to 2 s and positive acceleration between 4 to 6 s.

Matching

Match the term with the appropriate scenario. Each term may be used more than once.

a. zero acceleration
b. positive acceleration
c. negative acceleration

____ 49. a cat sitting on a fence

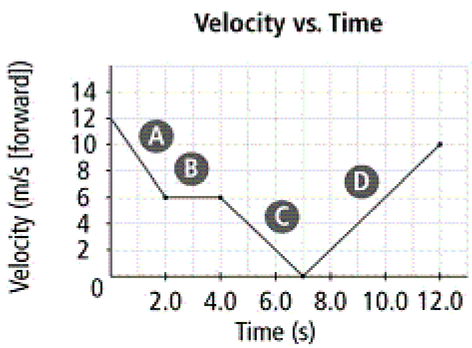
____ 50. a space shuttle taking off

____ 51. a motorcycle travelling at constant velocity

____ 52. a ball's acceleration in the opposite direction to its velocity

____ 53. a car travelling at a velocity of 50 km/h [E] with an acceleration 10 km/h^2 [E]

Match the segment of the velocity-time graph with the appropriate description. Each segment of the velocity-time graph may be used more than once.



____ 54. speeding up

____ 55. slope = -2 m/s^2

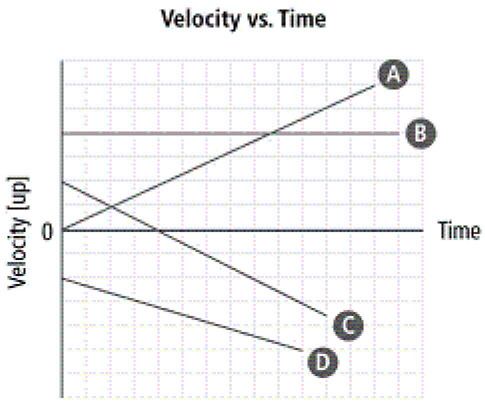
____ 56. uniform motion

____ 57. zero acceleration

____ 58. positive acceleration

____ 59. acceleration = 3 m/s^2 [backward]

Match the segment of the velocity-time graph with the appropriate description. Each segment of the velocity-time graph may be used more than once.



____ 60. speeding up

____ 61. constant velocity

____ 62. negative acceleration and speeding up

____ 63. positive velocity and zero acceleration

____ 64. positive velocity and positive acceleration

____ 65. negative velocity and negative acceleration

Match the description with the appropriate term. Each description may be used only once.

a. rate of change in velocity
b. moving at constant velocity
c. slope of this graph represents acceleration
d. acceleration that is opposite to the direction of motion

____ 66. acceleration

____ 67. deceleration

____ 68. zero acceleration

____ 69. velocity-time graph

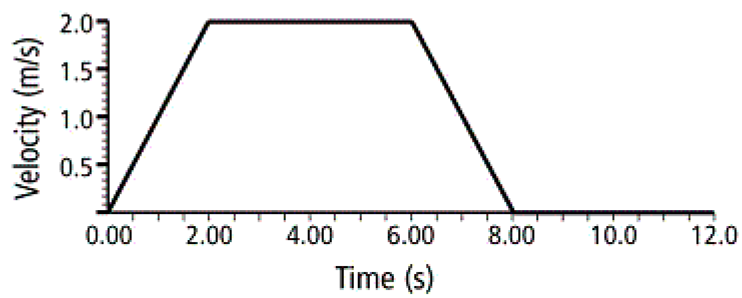
Short Answer

70. A boy throws a stone upward at +15 m/s. What is the stone's velocity after 2 s? Assume the acceleration due to gravity is 9.8 m/s^2 downward.

71. A train accelerates from rest with an acceleration of +5 m/s^2 in 10 s. What is the train's velocity at 10 s?

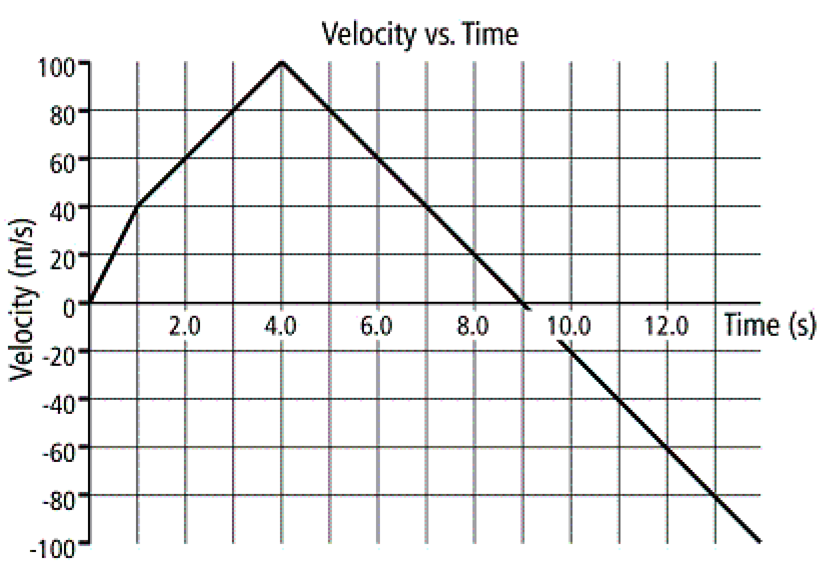
72. A truck that has an initial velocity of 16 m/s [E] slows down uniformly to 6 m/s [E] in 4 s. What is the average acceleration of the truck during the 4 s interval?

73. The velocity-time graph shown below represents the motion of an object.



Describe the motion of the object for the different time intervals. For each of the following time intervals (0 to 2 s; 2 to 6 s; 6 to 8 s; and 8 to 12 s) make reference to:
a) the direction of the object's motion (positive or negative direction)
b) the velocity of the object
c) the acceleration of the object
d) the changes in the object's speed (speeding up, slowing down, or having constant speed)

74. The velocity-time graph shown below represents the motion of a car moving in a straight line north.

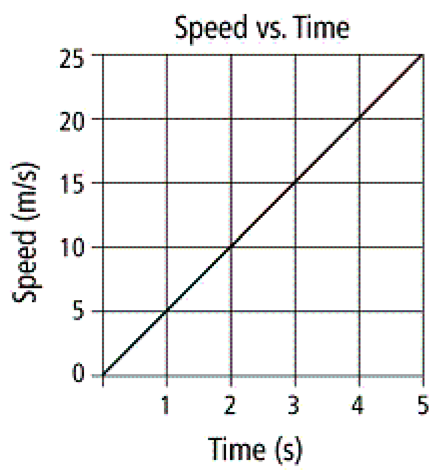


a) What is the velocity of the car at 7 s?
b) During what time interval is the acceleration of the car the greatest?

c) What is the acceleration of the car in the time interval from 4 to 9 s?
d) Describe the motion, velocity, and acceleration of the car during the time interval 9 to 13 s.

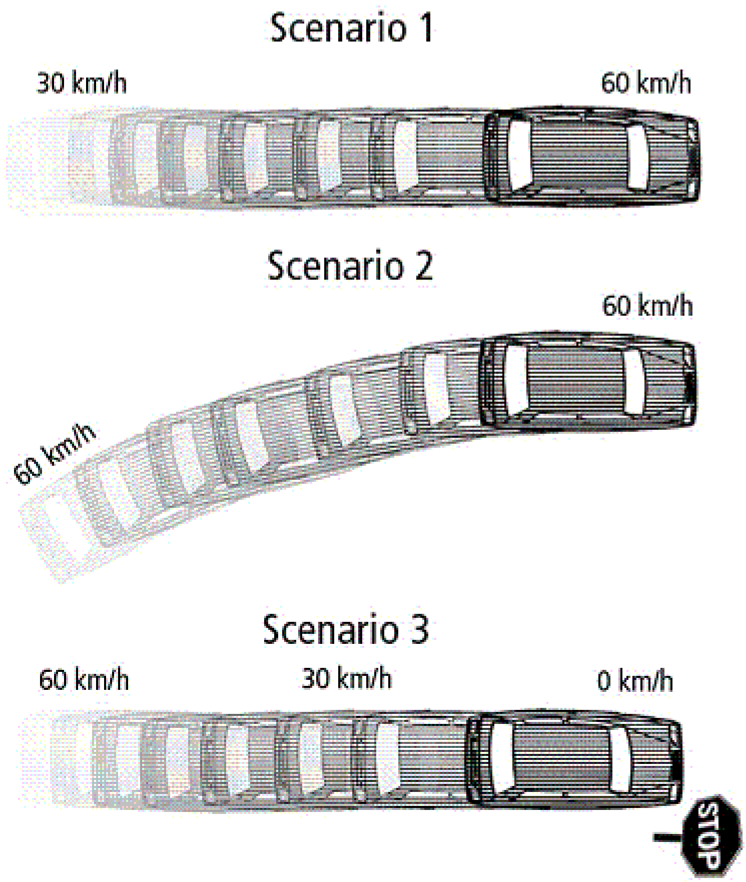
75. A car is travelling at a constant speed of 60 km/h. As it approaches a school zone, it slows down to 30 km/h. Draw a velocity-time graph to represent the motion of the car.

Use the following speed-time graph representing the motion of an object to answer the next question.



76. What is the total distance travelled by the object shown above during the first 3 s?

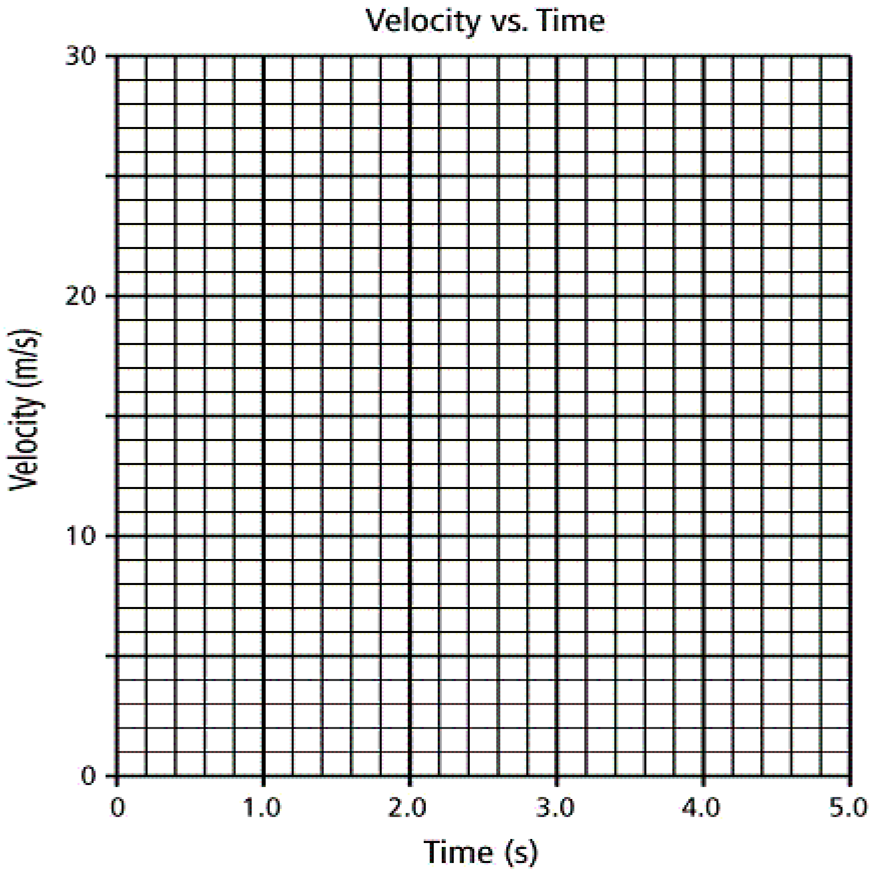
77. The diagrams below show the motion of three cars. Explain why all three scenarios show that the car is accelerating.



78. A truck is travelling at 26 m/s [E] on a straight highway. The driver sees an accident on the highway and starts to slow down. The following data table shows the velocity of the truck as it is brought to a complete stop.

Time (s)	Velocity (m/s [E])
0	26
1	18
2	12
3	8
4	3
5	0

a) Plot the data points on the velocity-time graph below, and draw a best-fit line.



b) What is the average acceleration of the car during the time interval 1 to 4 s?
c) Describe the velocity and the acceleration of the car during the 5 s time interval.

79. The following four tables represent the velocity of an object during a 4 s time interval. Describe the direction of motion, the velocity, and the acceleration of the object in each of the following scenarios.
a) Scenario 1

Time (s)	Velocity (m/s)
0	0
1	4
2	8
3	12
4	16

b) Scenario 2

Time (s)	Velocity (m/s)

0	-16
1	-12
2	-8
3	-4
4	0

c) Scenario 3

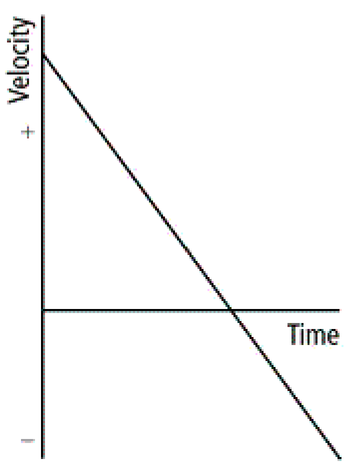
Time (s)	Velocity (m/s)
0	16
1	12
2	8
3	4
4	0

d) Scenario 4

Time (s)	Velocity (m/s)
0	0
1	-4
2	-8
3	-12
4	-16

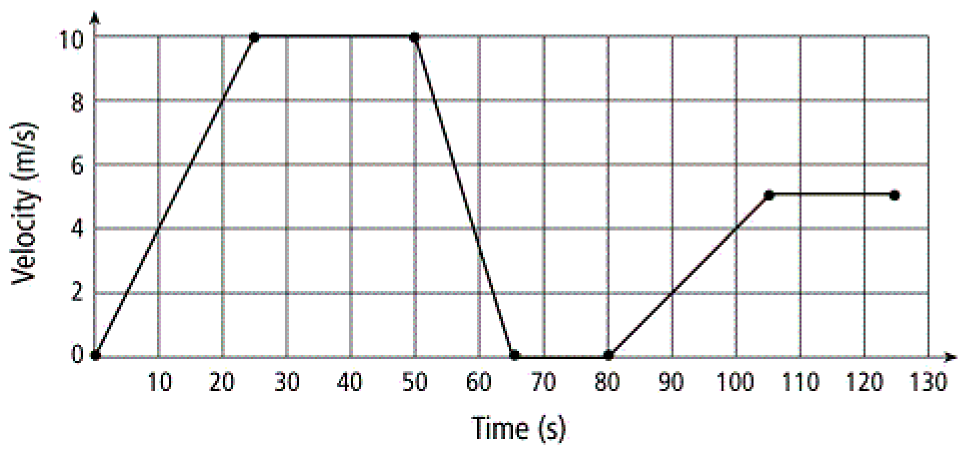
Problem

80. The velocity-time graph below shows the motion of a child on a trampoline. Describe the motion of the child.



81. In each situation described below, identify whether the object or person has positive acceleration, negative acceleration, or zero acceleration.
a) a rocket taking off from the ground
b) a car parked in front of a parking meter
c) a motorcycle slowing down as it approaches a yellow light
d) a racehorse starting a race
e) a vehicle travelling at a constant velocity on a highway

Use the following velocity-time graph showing the motion of a vehicle to answer the next six questions.



82. Using the graph shown above, determine the following.
a) What is the velocity of the vehicle at 10 s?
b) What is the velocity of the vehicle at 40 s?
c) What is the velocity of the vehicle at 70 s?
d) What is the velocity of the vehicle at 90 s?
e) What is the velocity of the vehicle at 110 s?

83. Using the graph shown above, determine the acceleration for each time interval in the table below.

Time Interval	Acceleration
0 to 25 s	
25 to 50 s	
50 to 65 s	
65 to 80 s	
80 to 105 s	
105 to 125 s	

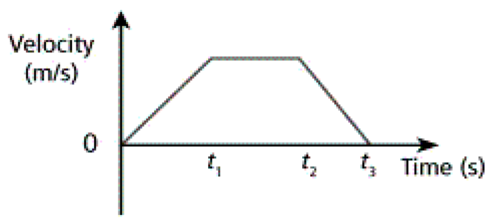
84. During which time interval in the above table was the acceleration the greatest?

85. Use the above graph to answer the following.
a) Describe the vehicle's motion during the time interval 25 to 50 s.
b) Describe the vehicle's motion between 65 s and 80 s.

86. According to the above graph, when did the vehicle have negative acceleration?

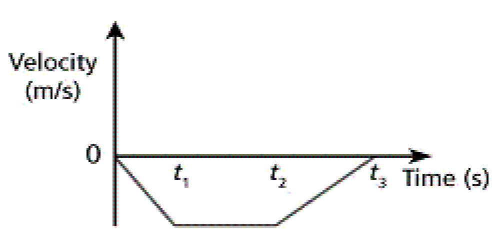
87. According to the above graph, how far did the vehicle travel during the first 20 s?

88. Complete the following table by describing the velocity, acceleration, and motion for each time interval in the velocity-time graph shown below.
a) For velocity, indicate whether it is positive or negative.
b) For acceleration, indicate whether it is positive, negative, or zero.
c) For motion, indicate whether the object is speeding up, is slowing down, or has uniform motion.



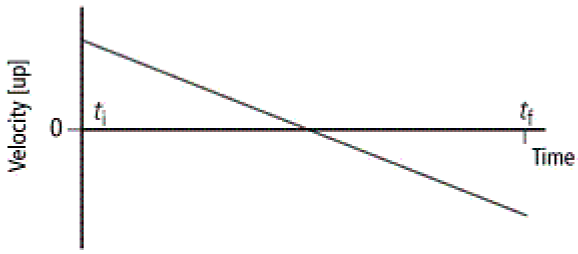
Time Period	0 to t_1	t_1 to t_2	t_2 to t_3
a) Velocity			
b) Acceleration			
c) Motion			

89. Complete the following table by describing the velocity, acceleration, and motion for each time interval in the velocity-time graph shown below.
a) For velocity, indicate whether it is positive or negative.
b) For acceleration, indicate whether it is positive, negative, or zero.
c) For motion, indicate whether the object is speeding up, is slowing down, or has uniform motion.



Time Period	0 to t_1	t_1 to t_2	t_2 to t_3
a) Velocity			
b) Acceleration			
c) Motion			

90. The velocity-time graph shown below shows the motion of a coin tossed in the air. Use the graph to answer the following questions.
a) Which part of the graph shows the coin at its highest point?
b) When does the coin have zero velocity?
c) Describe the speed of the coin on its way up.
d) Describe the speed of the coin on its way down.
e) What direction is the acceleration when the coin is moving up and when the coin is moving down?
f) Use the graph to summarize the motion of the coin that is tossed upward and then falls back down to the thrower.



Physics Practice test

Answer Section

MODIFIED TRUE/FALSE

1. ANS: T PTS: 1 DIF: Easy
LOC: C6-1 TOP: The Language of Motion KEY: distance
MSC: K
2. ANS: T PTS: 1 DIF: Average
LOC: C6-1 TOP: Average Velocity KEY: velocity
MSC: U

MULTIPLE CHOICE

3. ANS: C PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: time | acceleration
MSC: U
4. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: time | velocity | acceleration
MSC: U
5. ANS: D PTS: 1 DIF: Difficult LOC: C7-3
TOP: Calculating Acceleration KEY: displacement | acceleration | initial velocity
MSC: U
6. ANS: A PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: velocity | acceleration | gravity
MSC: U
7. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: initial velocity | acceleration
MSC: U
8. ANS: A PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: final velocity | acceleration | gravity
MSC: U
9. ANS: A PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: final velocity | acceleration | gravity
MSC: U
10. ANS: A PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: final velocity | acceleration | gravity
MSC: U

11. ANS: D PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: final velocity | acceleration
MSC: U
12. ANS: D PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: final velocity | acceleration
MSC: U
13. ANS: C PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration | gravity
MSC: U
14. ANS: A PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
15. ANS: A PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
16. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
17. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
18. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
19. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
20. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
21. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
22. ANS: C PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
23. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
24. ANS: A PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
25. ANS: A PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
26. ANS: C PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
27. ANS: C PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
28. ANS: B PTS: 1 DIF: Difficult LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration | unit conversion
MSC: H
29. ANS: A PTS: 1 DIF: Average LOC: C7-2
TOP: Describing Acceleration KEY: acceleration | negative acceleration
MSC: U
30. ANS: B PTS: 1 DIF: Difficult LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration | unit conversion
MSC: H
31. ANS: B PTS: 1 DIF: Difficult LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration | final position
MSC: H

32. ANS: B PTS: 1 DIF: Average LOC: C7-1
TOP: Calculating Acceleration KEY: velocity-time graph | velocity | acceleration
MSC: U
33. ANS: D PTS: 1 DIF: Difficult LOC: C7-1
TOP: Calculating Acceleration KEY: zero acceleration | velocity-time graph
MSC: H
34. ANS: C PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: acceleration MSC: U
35. ANS: C PTS: 1 DIF: Difficult LOC: C7-3
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: H
36. ANS: D PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: U
37. ANS: A PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: U
38. ANS: B PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: U
39. ANS: A PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | deceleration
MSC: U
40. ANS: D PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | deceleration
MSC: H
41. ANS: B PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | deceleration
MSC: H
42. ANS: C PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | deceleration
MSC: H
43. ANS: D PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration | velocity
MSC: H
44. ANS: C PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration | velocity
MSC: H
45. ANS: B PTS: 1 DIF: Average LOC: C7-3
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration | velocity
MSC: U
46. ANS: C PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: U
47. ANS: B PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: acceleration | velocity-time graph
MSC: H
48. ANS: A PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: acceleration | velocity-time graph

MSC: U

MATCHING

49. ANS: A PTS: 1 DIF: Average LOC: C7-2
TOP: Describing Acceleration KEY: acceleration | zero acceleration
MSC: U
50. ANS: B PTS: 1 DIF: Average LOC: C7-2
TOP: Describing Acceleration KEY: acceleration | positive acceleration
MSC: U
51. ANS: A PTS: 1 DIF: Average LOC: C7-2
TOP: Describing Acceleration KEY: acceleration | zero acceleration
MSC: U
52. ANS: C PTS: 1 DIF: Average LOC: C7-2
TOP: Describing Acceleration KEY: acceleration | negative acceleration
MSC: U
53. ANS: B PTS: 1 DIF: Average LOC: C7-2
TOP: Describing Acceleration KEY: acceleration | positive acceleration
MSC: U

54. ANS: D PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: U
55. ANS: C PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: U
56. ANS: B PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration | uniform motion
MSC: U
57. ANS: B PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: U
58. ANS: D PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: U
59. ANS: A PTS: 1 DIF: Average LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | acceleration
MSC: U

60. ANS: A PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | velocity | acceleration
MSC: H
61. ANS: B PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | velocity | acceleration
MSC: H
62. ANS: D PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | velocity | acceleration
MSC: H
63. ANS: B PTS: 1 DIF: Difficult LOC: C7-2

TOP: Calculating Acceleration KEY: velocity-time graph | velocity | acceleration
MSC: H

64. ANS: A PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | velocity | acceleration
MSC: H

65. ANS: D PTS: 1 DIF: Difficult LOC: C7-2
TOP: Calculating Acceleration KEY: velocity-time graph | velocity | acceleration
MSC: H

66. ANS: A PTS: 1 DIF: Easy LOC: C7-1
TOP: Describing Acceleration KEY: acceleration MSC: K

67. ANS: D PTS: 1 DIF: Easy LOC: C7-1
TOP: Describing Acceleration KEY: acceleration | deceleration
MSC: K

68. ANS: B PTS: 1 DIF: Easy LOC: C7-1
TOP: Describing Acceleration KEY: acceleration MSC: K

69. ANS: C PTS: 1 DIF: Easy LOC: C7-3
TOP: Describing Acceleration KEY: acceleration | velocity-time graph
MSC: K

SHORT ANSWER

70. ANS:
-4.6 m/s

PTS: 1 DIF: Average LOC: C7-3 TOP: Calculating Acceleration
KEY: final velocity | acceleration MSC: U

71. ANS:
+50 m/s

PTS: 1 DIF: Average LOC: C7-3 TOP: Calculating Acceleration
KEY: acceleration | final velocity MSC: U

72. ANS:
2.5 m/s^2 [W]

PTS: 1 DIF: Average LOC: C7-3 TOP: Calculating Acceleration
KEY: acceleration MSC: U

73. ANS:
Time Interval (0 to 2 s):
a) Object starts from rest and increases speed in the positive direction.
b) positive velocity
c) positive acceleration
d) speeding up
Time Interval (2 to 6 s):
a) Object travels in the positive direction.
b) positive velocity
c) zero acceleration
d) uniform motion (constant speed)

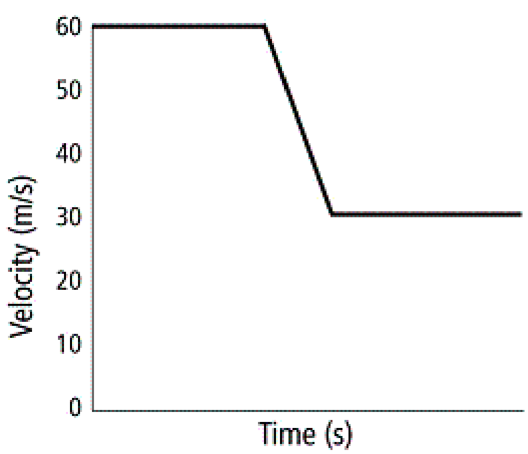
Time Interval (6 to 8 s):
a) Object still travels in the positive direction.
b) positive velocity
c) negative acceleration
d) slowing down
Time Interval (8 to 12 s):
a) Object has come to a complete stop (is at rest).
b) zero velocity
c) zero acceleration
d) object is at rest

PTS: 12 DIF: Average LOC: C7-2 TOP: Calculating Acceleration
KEY: velocity | acceleration | velocity-time graph MSC: U

74. ANS:
a) 40 m/s (1 Point)
b) 0 to 1 s (1 Point)
c) -20 m/s^2 (1 Point)
d) car is speeding up, negative velocity, negative acceleration (3 Points)

PTS: 6 DIF: a) Average, b) Average, c) Average, d) Difficult
LOC: C7-2, 3 TOP: Calculating Acceleration
KEY: velocity | acceleration | velocity-time graph MSC: a) U, b) U, c) U, d) H

75. ANS:



PTS: 1 DIF: Average LOC: C7-2 TOP: Calculating Acceleration
KEY: velocity | acceleration | velocity-time graph MSC: U

76. ANS:
22.5 m

PTS: 1 DIF: Difficult LOC: C7-2 TOP: Calculating Acceleration
KEY: speed-time graph | distance MSC: H

77. ANS:
i) Scenario 1: The car is accelerating because its velocity is increasing.
ii) Scenario 2: The car is accelerating because its direction is changing as it turns. This means that its velocity is changing even though its speed stays constant.
iii) Scenario 3: The car is accelerating because its velocity is decreasing. This represents negative acceleration.

PTS: 3 DIF: Average LOC: C7-2 TOP: Calculating Acceleration
KEY: acceleration MSC: U

78. ANS:
a) The best-fit line should have a negative slope intersecting the y-axis at 26 and the x-axis at 5. (3 Points)
b) -5 m/s^2 (1 Point)
c) positive velocity, negative acceleration (1 Point)

PTS: 5 DIF: Average LOC: C7-2, 3 TOP: Calculating Acceleration
KEY: acceleration | velocity | velocity-time graph MSC: U

79. ANS:
a) positive direction, positive velocity, speeding up, positive acceleration (3 Points)
b) negative direction, negative velocity, slowing down, positive acceleration (3 Points)
c) positive direction, positive velocity, slowing down, negative acceleration (3 Points)
d) negative direction, negative velocity, speeding up, negative acceleration (3 Points)

PTS: 12 DIF: Difficult LOC: C7-2 TOP: Calculating Acceleration
KEY: velocity | acceleration MSC: H

PROBLEM

80. ANS:
The child was initially moving upward but his speed decreased steadily as gravity slowed him down. The upward motion stopped for an instant at the peak of the jump. Then, the child moved downward at increasing speed as gravity pulled him back down to Earth.

PTS: 2 DIF: Difficult LOC: C7-2 TOP: Calculating Acceleration
KEY: velocity-time graph | acceleration MSC: H

81. ANS:
a) positive acceleration (1 Point)
b) zero acceleration (1 Point)
c) negative acceleration (1 Point)
d) positive acceleration (1 Point)
e) zero acceleration (1 Point)

PTS: 5 DIF: Average LOC: C7-2 TOP: Describing Acceleration
KEY: acceleration MSC: U

82. ANS:
a) 4 m/s (1 Point)
b) 10 m/s (1 Point)
c) 0 m/s (1 Point)

d) 2 m/s (1 Point)
e) 5 m/s (1 Point)

PTS: 5 DIF: Average LOC: C7-2 TOP: Calculating Acceleration
KEY: velocity MSC: U

83. ANS:

Time Interval	Acceleration
0 to 25 s	+0.4 m/s^2
25 to 50 s	0 m/s^2
50 to 65 s	-0.66 m/s^2
65 to 80 s	0 m/s^2
80 to 105 s	+0.2 m/s^2
105 to 125 s	0 m/s^2

PTS: 6 DIF: Average LOC: C7-3 TOP: Calculating Acceleration
KEY: acceleration MSC: U

84. ANS:
50 to 65 s

PTS: 1 DIF: Average LOC: C7-3 TOP: Calculating Acceleration
KEY: acceleration MSC: U

85. ANS:
a) The vehicle has zero acceleration and is travelling at a constant velocity. (1 Point)
b) The vehicle is at rest or not moving. (1 Point)

PTS: 2 DIF: Average LOC: C7-2 TOP: Calculating Acceleration
KEY: acceleration MSC: U

86. ANS:
50 to 65 s

PTS: 1 DIF: Average LOC: C7-2 TOP: Calculating Acceleration
KEY: acceleration MSC: U

87. ANS:
80 m

PTS: 1 DIF: Difficult LOC: C7-3 TOP: Calculating Acceleration
KEY: displacement MSC: H

88. ANS:

Time Period	0 to t_1	t_1 to t_2	t_2 to t_3
a) Velocity	positive	positive	positive
b) Acceleration	positive	zero	negative
c) Motion	speeding up	uniform motion	slowing down

PTS: 9 DIF: Difficult LOC: C7-2 TOP: Calculating Acceleration
KEY: velocity | acceleration MSC: H

89. ANS:

Time Period	0 to t_1	t_1 to t_2	t_2 to t_3
a) Velocity	negative	negative	negative
b) Acceleration	negative	zero	positive
c) Motion	speeding up	uniform motion	slowing down

PTS: 9 DIF: Difficult LOC: C7-2 TOP: Calculating Acceleration
KEY: velocity | acceleration MSC: H

90. ANS:
a) The coin is at its highest point when the graph intersects the x-axis. (1 Point)
b) The coin has zero velocity when it is at the highest point of the throw for an instant since the direction of the coin is changing. (1 Point)
c) The speed of the coin decreases on its way up. (1 Point)
d) The speed of the coin increases on its way down. (1 Point)
e) The acceleration is always toward the ground. (1 Point)
f) The coin was initially moving upward, but the speed decreased steadily as gravity slowed it down. The upward motion stopped for a moment at the peak of the throw. The coin then moved downward at increasing speed as gravity pulled it back down to the thrower. (3 Points)

PTS: 8 DIF: a) Average, b) Average, c) Average, d) Average, e) Average, f) Difficult
LOC: C7-2 TOP: Calculating Acceleration KEY: velocity | speed | acceleration
MSC: a) U, b) U, c) U, d) U, e) U, f) H