Chapter 1: A Physics Toolkit

1 - The standard SI unit of mass is the ___________.

A) kilometer B) kilogram C) pound D) kilomole

2 - If one were to divide 3.90 by 7.2, what would the answer be with the correct number of significant digits?

A) 0.54 B) 0.542 C) 1 D) 0.5417

3 - The valid digits in a measurement are called ________.

A) uncertain digits B) significant digits C) powers of 10 D) valid digits

4 - Solve the following problem and express the answer in scientific notation: 4.75×10^3 kg + 8.24×10^3 kg.

A) $1.299\text{x}10^3$ kg B) 1.299×10^4 kg C) 1299×10^3 kg D) 12,990 kg

5 - Convert 243 ng to its equivalent in kilograms.

A) 2.43×10^{-10} kg B) 2.43×10^{-11} kg C) 2.43×10^9 kg D) 2.43×10^{-7} kg

6 - The multiplier for SI units with the prefix pico is _________.

A) 10^{-15} B) 10^{-12} C) 10^{-9} D) 10^{-6}

7 - The SI base unit of length is the _________.

A) foot B) meter C) kilometer D) candela

8 - In order to convert a quantity expressed in one unit into the same quantity in a different unit, use a(n) _________.

A) calculation coefficient B) notation factor C) conversion factor D) algebraic quantity

9 - The multiplier for SI units with the prefix mega is _________.

A) 10^6 B) 10^9 C) 10^{12} D) 1,015

10 - Convert 57.7 kg to grams.

A) $5.77 \text{ x } 10^5$ g B) 5.77×10^3 g C) 5.77×10^4 g D) 5.77×10^6 g

11 - Combinations of SI base units are called _________.

A) significant units B) base units C) calculated units D) derived units

12 - Which of the following operations would yield an answer of 0.5417 to the correct number of significant digits?

A) 3.900/7.200 B) 3.9000/ 7.20 C) 3.900/7.20 D) 3.9000 / 7.2000

13 - The multiplier for SI units with the prefix micro is _________.

A) 10^{-15} B) 10^{-12} C) 10^{-9} D) 10^{-6}

14 - Convert 1.45 km to meters.

A) 14.5×10^{3} m B) 1.45×10^{-3} m C) 0.145×10^{-3} m D) 1.45×10^{3} m

15 - The multiplier for SI units with the prefix femto is _________.

A) 10^{-15} B) 39733 C) 10^{-9} D) 10^{-6}

16 - The standard SI unit of time is the _________.

A) minute B) hour C) millisecond D) second

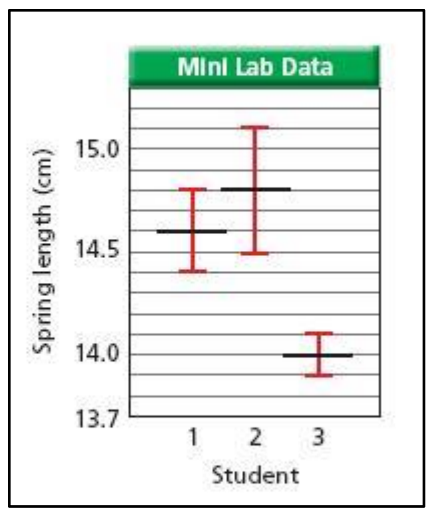
17 - The multiplier for SI units with the prefix deci is _________.

A) 10^{1} B) 10^{2} C) 10^{-1} D) 10^{-2}

18 - The apparent shift in the position of an object when it is viewed from different angles is caused by _________.

A) imprecise measurement B) inaccuracy C) parallax D) faulty instruments

19 - In the figure below, if a fourth student measured the spring's length to be 14.2 ± 0.2 cm, would this agree with any of the other students' measurements?



A) Yes, it agrees with only student 1. B) Yes, it agrees only with student 3

C) Yes, it agrees with students 1 and 3. D) No.

20 - _________ describes how well the results of an experiment agree with the standard value.

A) Significance B) Accuracy C) Certainty D) Precision

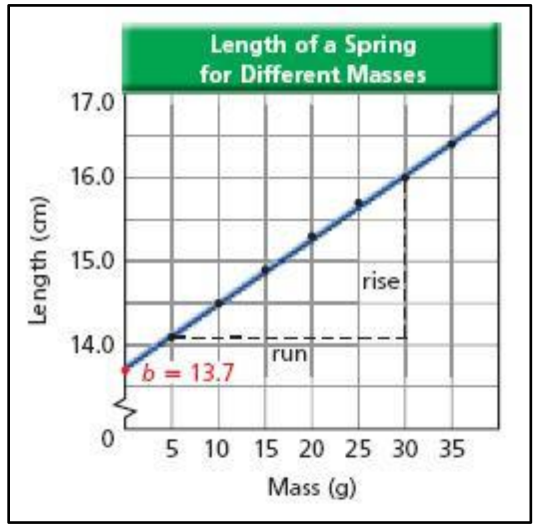
21 - _________ describes the degree of exactness in a measurement.

A) Precision B) Significance C) Certainty D) Accuracy

22 - The property of a straight line on a graph that is the ratio of the vertical difference between two points to the horizontal difference between the same two points is the _________.

A) slope B) rise C) intercept D) tangent

23 - Extrapolating from the figure below, if a mass of 45.0 g were hung on the spring, how long would the spring be?



A) 17.3 cm B) 576 cm

C) 3.6 cm D) 46.1 cm

24 - What value is calculated by dividing rise by run?

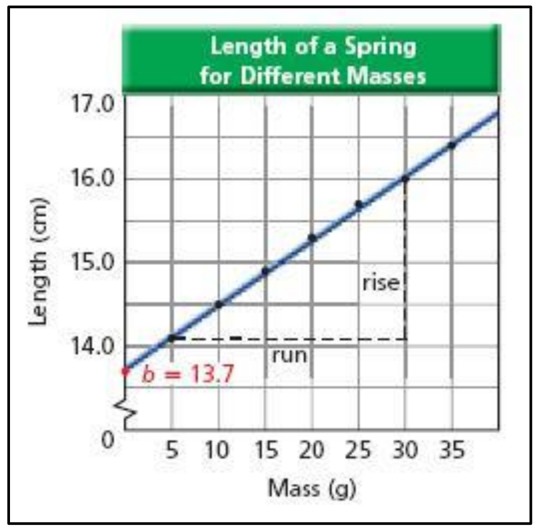
A) acceleration of a moving object exhibiting uniform motion

B) angular velocity

C) the slope of a straight line

D) the angle of a straight line

25 - In the figure below, what is the physical meaning of the value for b?



A) It is the distance from the bottom of the spring to the suspended mass.

B) It is the length of the spring when no masses are suspended from it.

C) It is the length of the spring when the experiment is over.

D) It is the distance from the top of the spring to the suspended mass.

Chapter 2: Representing Motion

1 - A(n) _________ is a series of images of a moving object that records its position after equal time intervals.

A) frame B) operational definition C) motion diagram D) association

2 - The vector that represents the sum of two or more vectors is called the _________.

A) displacement B) speed C) resultant D) direction

3 - In the particle model, the _________ of the object are (is) ignored.

A) internal motions B) motion diagram C) position D) acceleration

4 - The length of the position vector on a motion diagram is proportional to the _________.

A) distance of the object from the origin B) distance of the object from the vertical intercept

C) average speed D) velocity

5 - A motion diagram is a series of images of a moving object that records its position after _________.

A) 1/30 s B) equal time intervals C) it comes to rest D) an acceleration

6 - The _________ is the point at which all variables in a coordinate system have zero magnitude.

A) axis B) origin C) intercept D) coordinate system

7 - Which of the following correctly describes the displacement of an object that moves from position di to df?

A) $\Delta d = df - di$ B) $v = \Delta d/\Delta t$ C) $\Delta df = di - df$ D) $\Delta d = df + di$

8 - Which of the following is not a scalar quantity?

A) 314.7 g B) 150 km southwest C) 25°C D) 2 hours 27 minutes

9 - To subtract two vectors, _________.

A) reverse the direction of the second vector and then add them B) use the equation $R_2 = A_2 - B_2$

C) use the same process as for adding them, then change the sign of the final value

D) subtract 180° from θ, then use the Law of Cosines

10 - Displacement is a change in _________.

A) speed B) position C) distance D) velocity

11 - The magnitude of a vector is always _________.

A) a positive quantity B) equal to the direction C) equal to the displacement D) a negative quantity

12 - When an object is in motion, its _________ must change.

A) position B) shape C) size D) acceleration

13 - Two displacements are equal when _________.

A) the two magnitudes and directions are the same B) the two directions are the same

C) they end at the same point D) they begin at the same point

14 - The difference between ti and tf is the _________.

A) displacement B) velocity C) time interval D) average speed

15 - To calculate the distance traveled continuously in a straight line, _________.

A) divide the distance traveled by the time needed to travel the distance

B) subtract the cosine of the angle between the starting and finishing positions from the square of the distance traveled

C) divide the change in velocity by the time over which the change occurs

D) subtract starting position from final position.

16 - A(n) _________ tells you where the zero point of the variable you are studying is located and the direction in which the values increase.

A) coordinate system B) origin C) axis D) intercept

17 - On a position-time graph, run = _________.

A) Δa B) Δv C) Δt D) Δd

18 - On a position-time graph, rise = _________.

A) Δd B) Δt C) Δs D) Δv

19 - You and a friend leave school at the same time. You drive at a constant 5.5x10^1 km/h and your friend drives 7.0×10^1 km/h. How long does it take each car to reach a mall that is 25 km from the school?

A) you: 1 hour 40 minutes, your friend 36 minutes B) you: 2.2 hours, your friend: 2.8 hours

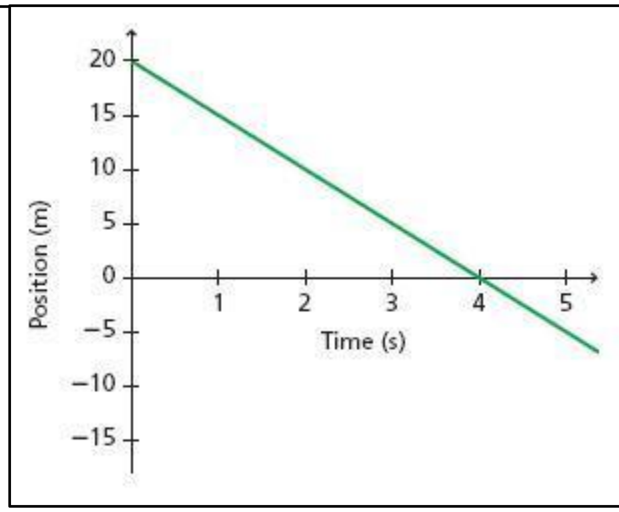
D) you: 21 minutes, your friend: 27 minutes C) you: 27 minutes, your friend: 21 minutes

20 - You drive a car for 2.0 h at 60 km/h, then for another 3.0 h at 85 km/h. What is your average velocity?

A) 75 km/h^2 B) 73 km/h C) 75 km/h D) 73 km/h

21 - The slope of the line tangent to the curve on a position-time graph at a specific time is the _________.

A) instantaneous acceleration B) instantaneous velocity C) average velocity D) displacement



22 - Extrapolating from the graph below, where would the object be at t = 7 s?

A) 15 meters

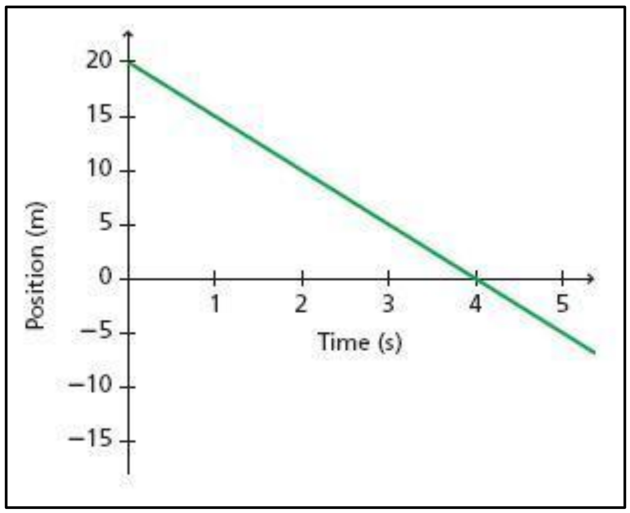
B) -15 meters

C) - 7 meters

D) - 10 meters

23 - The _________ is the ratio of the total distance traveled to the time interval.

A) displacement B) average speed C) acceleration D) instantaneous velocity



24 - Based on the graph below, what is the object's velocity at t = 4 s?

A) 0 m/s B) 5 m/s

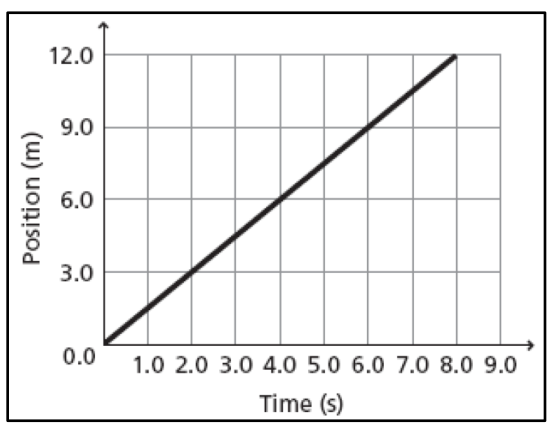
C) -5 m/s D) 4 m/s

25 - Which of the following equations can be used to find the position of an object moving at constant velocity?

A) d = df – vt B) Δd = df – di

C) df = di + vt D) tan θ = Ry/Rx

1 - Refer to the following position-time graph to answer the questions 1-6



1. What is independent quantity?

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2. What is dependent quantity?

....

3. What is the position of the object at 6.0 s?

....

4. How long does it take to travel from origin to 6.0 m?

....

5. How far does the object travel for every second it is in motion?

....

6. If the object continues at this speed, when will the object reach 18.0 m?

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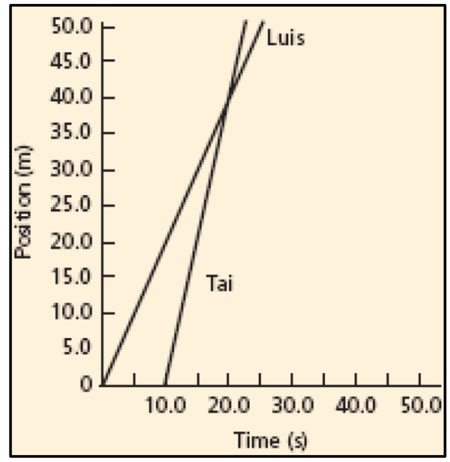
2 - Luis goes for a walk. Sometime later, his friend Tai starts to walk after her. Their motions are represented by the position-time graphs.



a. How long had Luis been walking when Tai started his walk?

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b. At what time and Position Tai will pass by the Luis?

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c. Who is moving faster? How can you tell?

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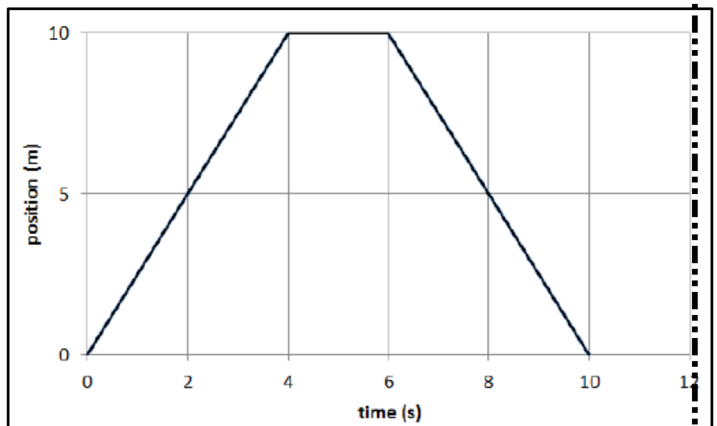
3 - Refer to the diagram below to answer the following questions



a. What is the speed of the object during time interval 0 to 4 seconds? ....

b. Describe the motion of the object during time interval 4 to 6 seconds. ....

c. Compare the motion of the object during time interval 0 to 4 seconds to that from 6 to 10 seconds...

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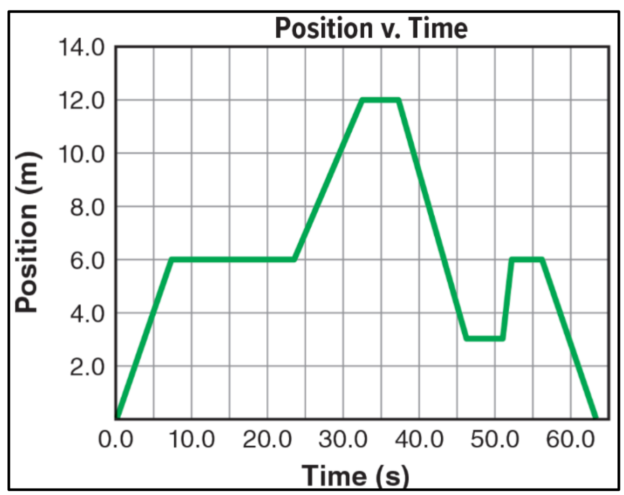
4 - The graph in **Figure**depicts Jim's movement along a straight

A . path. The origin is at one end of the path.



Write a story describing Jim's movements along the path that would correspond to the motion represented by the graph.

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B . When is Jim 6.0 m from the origin?

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C . How much time passes between when Jim starts moving and when he is 12.0 m from the origin?

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D . What is Jim's average velocity between 37.0 s and 46.0 s?

Chapter 3: Accelerated Motion

1 - _________ is the change in velocity divided by the time needed for the change to occur.

A) Displacement B) Average velocity C) Average acceleration D) Speed

2 - Acceleration describes the rate of change in _________.

A) position B) velocity C) mass D) gravity

3 - _________ means that equal displacements occur during successive equal time intervals.

A) Average speed B) Uniform motion C) Average acceleration D) Uniform acceleration

4 - If a car travels 100 km in a straight line in the first hour of its trip, 100 km in a straight line in the next hour, and continues in this way, its motion is _________.

A) accelerated B) dynamic C) irregular D) uniform

5 - The slope of the line tangent to the curve on a velocity-time graph at a specific instant of time is the _________.

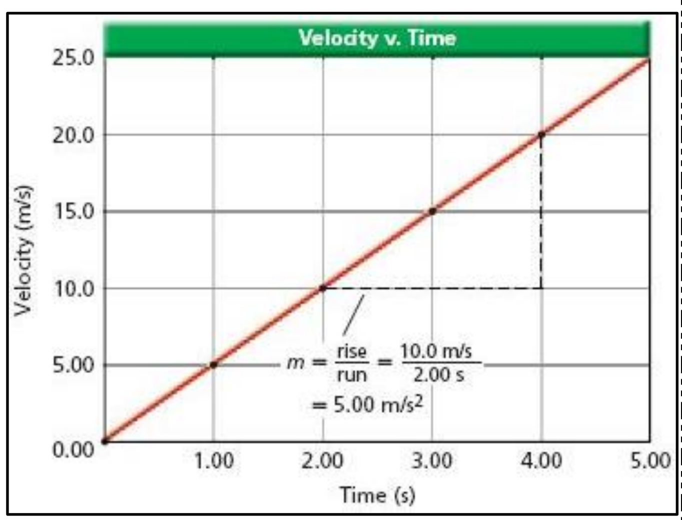
A) average velocity B) instantaneous velocity C) instantaneous acceleration D) displacement

6 - A car moving north at 80 km/h turns and travels south at 65 km/h. What are the magnitude and direction of the change in velocity?

A) 145 km/h, south to north B) 145 km/h, north to south

C) 25 km/h, north to south D) 25 km/h, south to north

7 - If the motion in the figure below continued on at that same acceleration, what would the object's speed be at t = 10.00 s?



A) 25.0 m/s B) 100.0 m/s

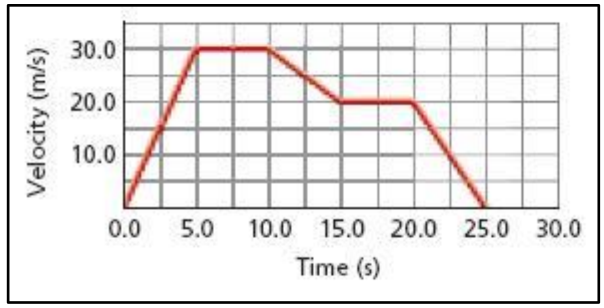
C) 50.0 m/s D) 40.0 m/s

8 - How far does a car travel in 30.0 s while its velocity is changing from 50.0 km/h to 80.0 km/h at a uniform rate of acceleration?

A) 1.95×10^3 m B) 252 m

C) 5.41×10^2 D) 1.08×10^3 m

9 - In the figure below, what is the displacement of the object between 0.0 and 5.0 s?



A) 75.0 m B) 5.0 m

C) 150.0 m D) 30.0 m

10 - A car with a velocity of 30 m/s accelerates uniformly at the rate of 2.0 m/s^2 for 10 s. What is its final velocity?

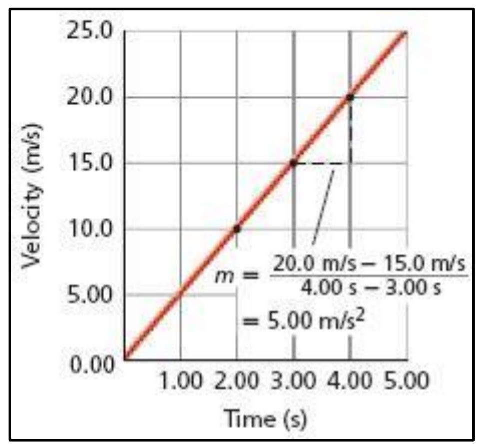
A) 50 m/s^2 B) 40 m/s^2 C) 40 m/s

D) 50 m/s

11 - How long will it take an airplane at rest that accelerates uniformly at 2.5 m/s^2 to reach the ground velocity of 7.0×10^1 m/s that is required for take off?

A) 28 s B) 35 s C) 11 s D) 4 s

12 - A car accelerates uniformily at a rate of 0.50 m/s^2 for 1.0×101 s. Its final velocity is 23 m/s. What is the initial velocity?



A) 18 m/s^2 B) 28 m/s

C) 28 m/s^2 D) 18 m/s

13 - The a-t graph corresponding to the v-t graph below would be a ____.

A) straight line with a constant positive slope

B) line beginning at the origin with increasing positive slope

C) straight vertical line

D) straight horizontal line above the t axis

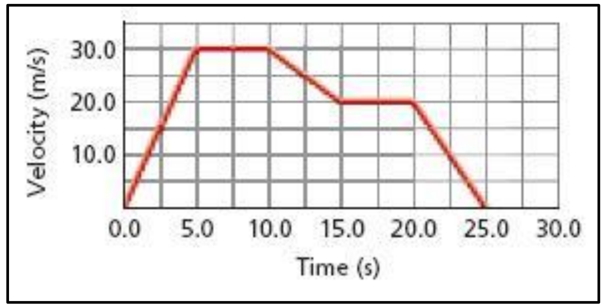
14 - What is the minimum length runway needed to accommodate airplanes that can accelerate uniformly at 2.7 m/s^2 and must reach a ground velocity of 64 m/s before they can take off?

A) 7.6×10^2 m B) 1.5×10^2 m C) 7.6×10^3 m D) 1.5×10^3 m

15 - Find the uniform acceleration that would cause a car's velocity to change from 27 m/s to 45 m/s in a 6.0-s period.

A) 3.0 m/s B) 18.0 m/s C) 18.0 m/s^2 D) 3.0 m/s^2

16 - In the graph below, what is the total displacement of the object?



A) 75.0 m B) 0 m C) -25.0 m D) 500.0 m

17 - A 75-kg swimmer steps off a 10.0-m tower. What is the swimmer's velocity on hitting the water?

A) -14.0 m/s B) 27.1 m/s C) 38.3 m/s D) 0.25

18 - A ball falls freely from rest for 15.0 s. Calculate the ball's velocity after 15.0 s.

A) -78 m/s B) 78 m/s C) 0 m/s D) -147 m/s

19 - A tennis ball is dropped from 1.5 m above the ground, touches the ground for 0.008 s and rebounds to a height of 0.75 m. What is the ball's velocity when it hits the ground?

A) -5.4 m/s^2 B) -5.4 m/s C) -3.8 m/s D) 3.8 m/s^2

20 - A bicycle rider travels 15 km in 1.25 hours. What is the rider's average speed?

A) 10.5 km/h B) 13.75 km/h C) 12 km/h D) 22.5 km/h

21 - Displacement is a change in _________.

A) speed B) position C) velocity D) distance

22 - A track runner begins running from the starting line and reaches his race pace of 4-minutes per mile in 5 seconds. What is the runner's acceleration?

A) 1.33 m/s^2 B) 6.67 m/s^2 C) 0.05 m/s^2 D) 0.001 m/s

1 - If a car accelerates (speeds up) uniformly from 5 m/s to 15 m/s in 2 seconds, calculate the car's acceleration?

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2 - : If a bus retards (slows down) uniformly from 14 m/s to 4 m/s in 5 seconds, find the acceleration of the bus?

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3 - An automobile starts at rest and accelerates at 3.5 m/s2 after a traffic light turns green. How far will it have gone when it is travel in get 25 m/s?

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4 - A race car travels on a straight racetrack with a forward velocity of 44 m/s and slows at a constant rate to a velocity of 22 m/s over 11 s. How far does it move during this time?

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5 - A car with an initial velocity of 24.5 m/s east has an acceleration of 4.2 m/s2 west. What is its displacement at the moment that its velocity is 18.3 m/s east?

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6 - You are driving a car, traveling at a constant velocity of 25 m/s along a straight road, when you see a child suddenly run onto the road. It takes 0.45 s for you to react and apply the brakes. As a result, the car slows with a steady acceleration of 8.5 m/s2 in the direction opposite your motion and comes to a stop. What is the total displacement of the car before it stops?

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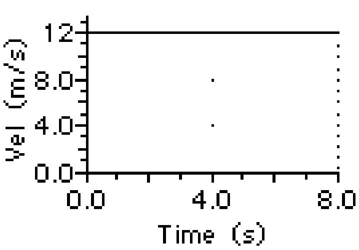
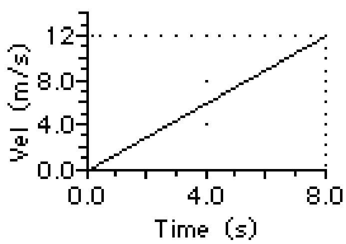
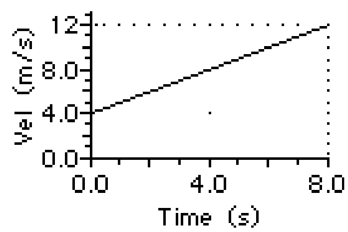
7 - Find the displacement of the objects represented by the following velocity-time graphs







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8 - A construction worker accidentally drops a brick from a high scaffold.

a. What is the velocity of the brick after 4.0 s?

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b. How far does the brick fall during this time?

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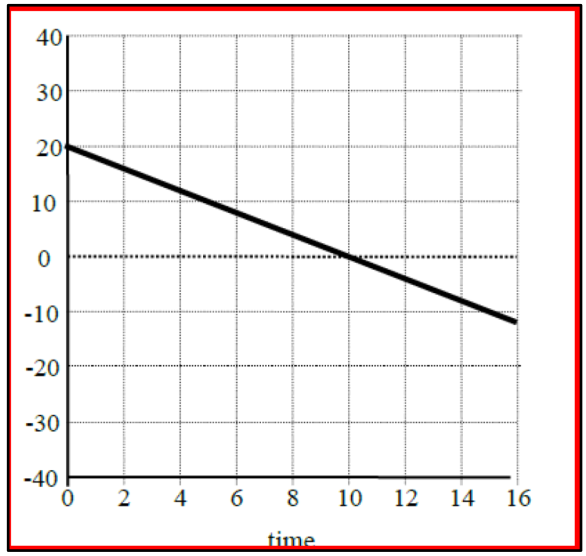
9 - A different rock is thrown with an initial upward speed of 20 m/s and the **graph** shown to the right is obtained

a. What is the acceleration of the rock? ....

b. Is the rock being thrown on Earth? ....

c. What is the speed of the rock when it reaches its highest point? ....

e. What is the displacement of the rock when it reaches its highest point?..



قوانين عاشر عام ف 1			
A Physics Toolkit 1 - مدخل الى الفيزياء			
Slope $= m = \frac{rise}{run} = \frac{\Delta y}{\Delta x}$	$y = mx + b$	$y = a x^2 + bx + c$	$y = \frac{a}{x}$
REPRESENTING MOTION 2 - وصف الحركة			
$R = A + B$ $R = A - B$	$\Delta t = t_f - t_i$ $\Delta X = x_f - x_i$	$Slop = \vec{v}_{avg} = \frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{t_f - t_i}$	
$Average\ Speed = v_{avg} = \frac{\Delta x}{\Delta t} = \left\lvert \frac{x_f - x_i}{t_f - t_i} \right\rvert$		$x_f = vt + x_i$	
Accelerated motion 3 - الحركة المتسارعة			
$a_{avg} = slop = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i}$	معادلات الحركة بعجلة ثابتة	معادلات الحركة للسقوط الحر	
	$v_f = v_i + a\,t$ $v_f^2 = v_i^2 + 2a\,\Delta x$ $\Delta x = \frac{1}{2}(v_i + v_f)\,t$ $\Delta x = v_i\,t + \frac{1}{2}\,a\,t^2$	$v_f = v_i + g\,t$ $v_f^2 = v_i^2 + 2g\,\Delta y$ $\Delta y = \frac{1}{2}(v_i + v_f)\,t$ $\Delta y = v_i\,t + \frac{1}{2}\,g\,t^2$	
g = - 9.81 m/s^2			