AP Physics Ch 1-3 Test Prep **Name**___________________________________

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

CHAPTER 1 STARTS HERE – Answers are at the end.

1. The current definition of the standard meter of length is based on
   A) the length of a particular object kept in France.
   B) the distance between the earth's equator and north pole.
   C) the distance between the earth and the sun.
   D) the distance traveled by light in a vacuum.

2. The current definition of the standard second of time is based on
   A) the oscillation of a particular pendulum kept in France.
   B) the duration of one year.
   C) the earth's rotation rate.
   D) the frequency of radiation emitted by cesium atoms.

3. The current definition of the standard kilogram of mass is based on
   A) the mass a particular object kept in France.
   B) the mass of a cesium–133 atom.
   C) the mass of the earth.
   D) the mass of the sun.

4. If a woman weighs 125 lb, her mass expressed in kilograms is x kg, where x is
   A) less than 125.
   B) greater than 125.

5. If a tree is 15 m tall, its height expressed in feet is x ft, where x is
   A) greater than 15.
   B) less than 15.

6. If a flower is 6.5 cm wide, its width expressed in millimeters is x mm, where x is
   A) greater than 6.5.
   B) less than 6.5.

7. If an operatic aria lasts for 5.75 min, its length expressed in seconds is x s, where x is
   A) less than 5.75.
   B) greater than 5.75.

8. Scientists use the metric system chiefly because it is more accurate than the English system.
   A) True
   B) False

9. When adding two numbers, the number of significant figures in the sum is equal to the number of significant figures in the least accurate of the numbers being added.
   A) True
   B) False

10. When determining the number of significant figures in a number, zeroes to the left of the decimal point are never counted.
    A) True
    B) False

11. The exhaust fan on a typical kitchen stove pulls 600 CFM (cubic feet per minute) through the filter. Given that 1.00 in. = 2.54 cm, how many cubic meters per second does this fan pull?
    A) 0.328 m^3/sec
    B) 32.8 m^3/sec
    C) 3.05 m^3/sec
    D) 0.283 m^3/sec

12. In addition to 1 m = 39.37 in., the following exact conversion equivalents are given: 1 mile = 5280 ft , 1 ft = 12 in , 1 hour = 60 min, and 1 min = 60 s. If a particle has a velocity of 6.5 miles per hour,its velocity, in m/s, is closest to
    A) 2.6 m/s. B) 3.2 m/s. C) 3.5 m/s. D) 2.9 m/s. E) 2.3 m/s.

13. The period of a pendulum is the time it takes the pendulum to swing back and forth once. If the only dimensional quantities that the period depends on are the acceleration of gravity, g, and the length of the pendulum, ℓ, what combination of g and ℓ must the period be proportional to? (Acceleration has SI units of $\mathrm{m \cdot s^{-2}}$.).
    A) g/ℓ B) $\sqrt{\ell/g}$ C) $g\ell$ D) $g\ell^2$ E) $\sqrt{g\ell}$

CHAPTER 2 STARTS HERE

14. If the acceleration of an object is negative, the object must be slowing down.
    A) True B) False

15. If the graph of the position as a function of time for an object is a horizontal line, that object cannot be accelerating.
    A) True B) False

16. If an object is accelerating toward a point, then it must be getting closer and closer to that point.
    A) True B) False

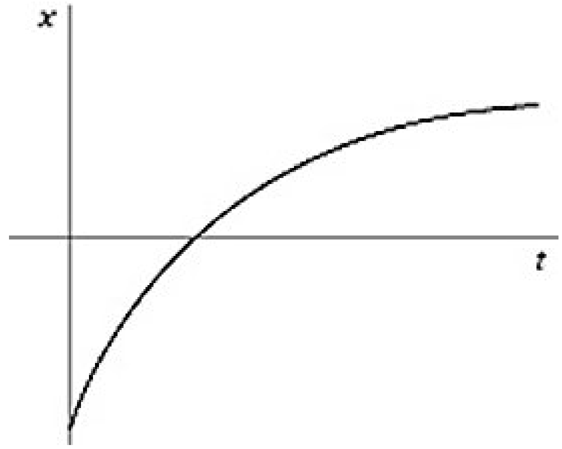
17. When can we be certain that the average velocity of an object is always equal to its instantaneous velocity?
    A) never
    B) only when the acceleration is changing at a constant rate
    C) only when the velocity is constant
    D) always
    E) only when the acceleration is constant

18. Suppose that an object is moving with constant nonzero acceleration. Which of the following is an accurate statement concerning its motion?
    A) A graph of its position as a function of time has a constant slope.
    B) A graph of its velocity as a function of time is a horizontal line.
    C) In equal times its speed changes by equal amounts.
    D) In equal times its velocity changes by equal amounts.
    E) In equal times it moves equal distances.

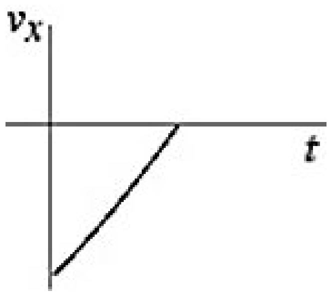
19. Suppose that a car traveling to the west (the $-x$ direction) begins to slow down as it approaches a traffic light. Which statement concerning its acceleration in the x direction is correct?
    A) Both its acceleration and its velocity are positive.
    B) Both its acceleration and its velocity are negative.
    C) Its acceleration is negative but its velocity is positive.
    D) Its acceleration is positive but its velocity is negative.

20. An object is moving with constant non–zero acceleration along the $+x$–axis. A graph of the velocity in the x direction as a function of time for this object is
   A) a horizontal straight line.
   B) a straight line making an angle with the time axis.
   C) a parabolic curve.
   D) a vertical straight line.

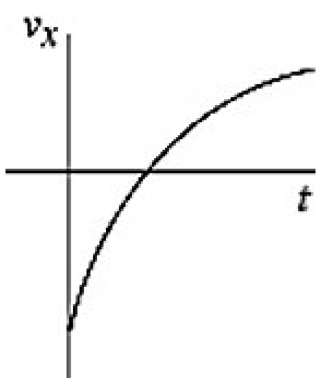
21. The figure shows the graph of the position x as a function of time for an object moving in the straight line (the x–axis). Which of the following graphs best describes the velocity along the x–axis as a function of time for this object?



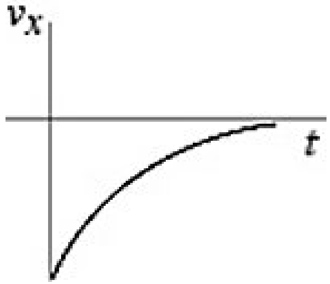
A)



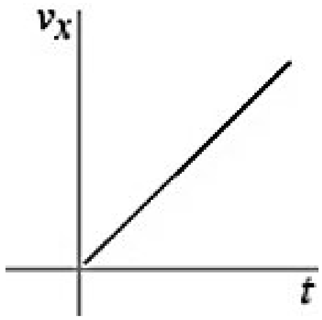
B)



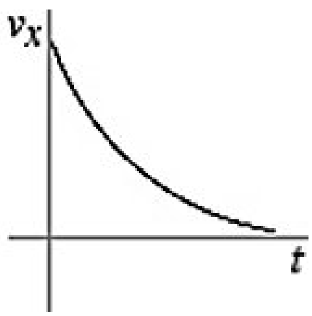
C)



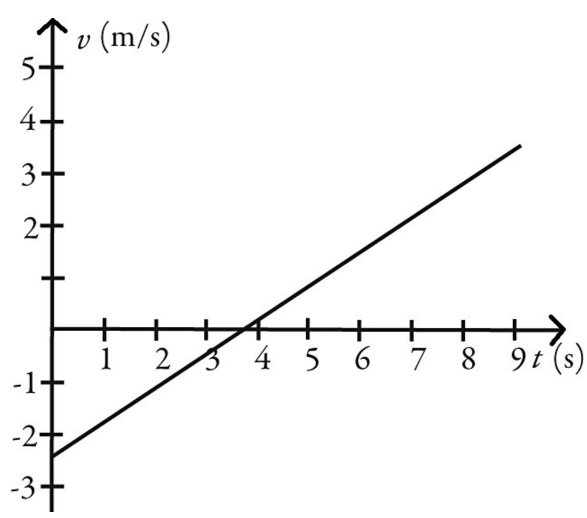
D)



E)

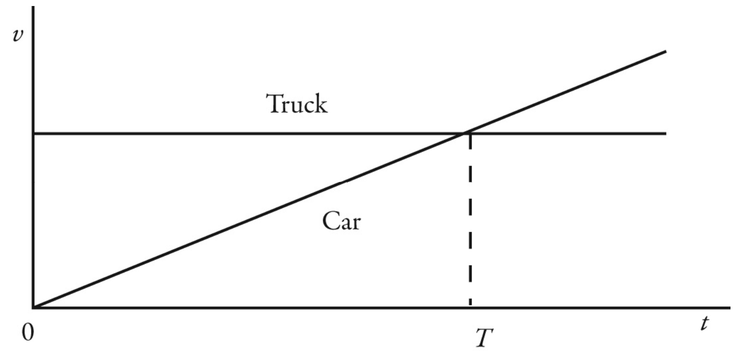


22. The motion of a particle is described in the velocity versus time graph shown in the figure. We can say that its speed



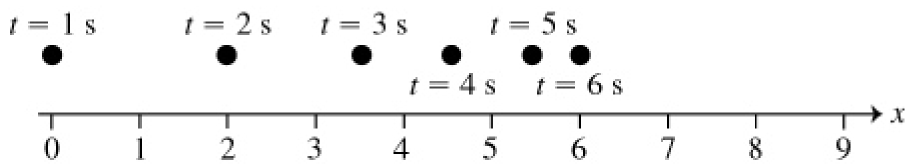
A) decreases and then increases.
B) decreases.
C) increases and then decreases.
D) increases.

23. The motions of a car and a truck along a straight road are represented by the velocity–time graphs in the figure. The two vehicles are initially alongside each other at time $t = 0$. At time T, what is true about these two vehicles since time $t = 0$?



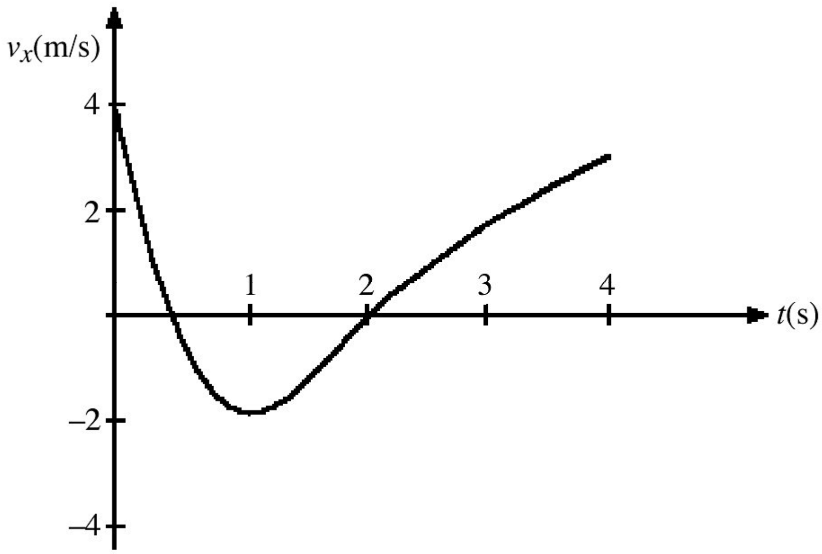
A) The truck and the car will have traveled the same distance.
B) The car will be traveling faster than the truck.
C) The truck will have traveled further than the car.
D) The car will have traveled further than the truck.

24. The figure shows the position of an object (moving along a straight line) as a function of time. Assume two significant figures in each number. Which of the following statements about this object is true over the interval shown?



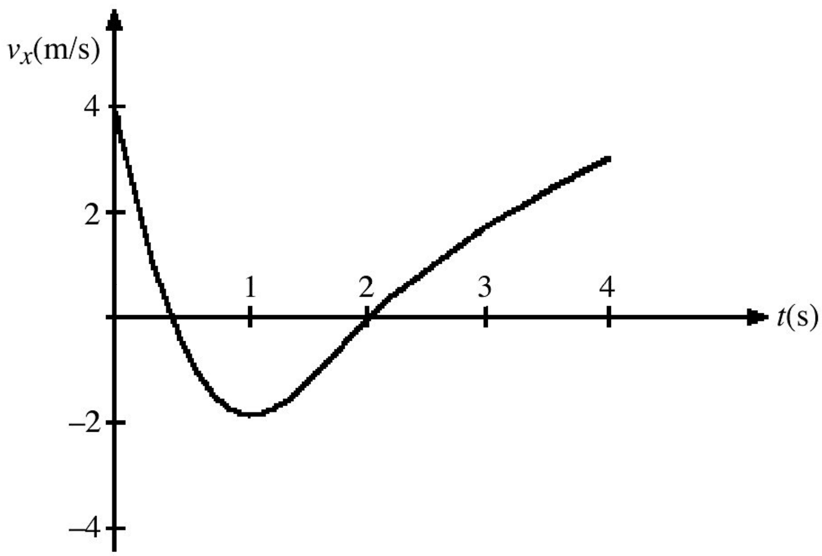
A) The average speed of the object is 1.0 m/s.
B) The acceleration of the object is in the same direction as its velocity.
C) The object is accelerating to the left.
D) The object is accelerating to the right.

25. The figure shows the velocity of a particle as it travels along the x–axis. What is the direction of the acceleration at $t = 0.5$ s?



A) in the $-x$ direction B) in the $+x$ direction C) The acceleration is zero.

26. The figure represents the velocity of a particle as it travels along the x–axis. At what value (or values) of t is the instantaneous acceleration equal to zero?



A) $t = 0.5$ s and $t = 2$ s B) $t = 0$ C) $t = 1$ s

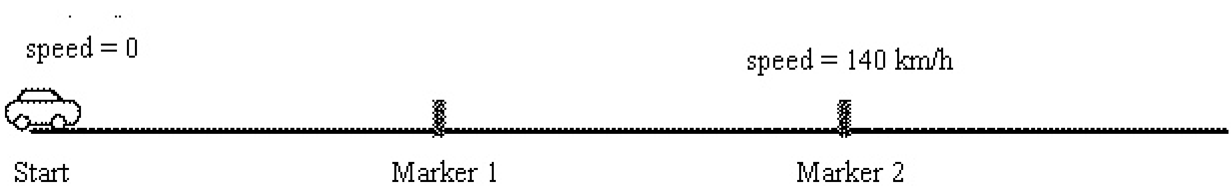
27. A ball is thrown directly upward and experiences no air resistance. Which one of the following statements about its motion is correct?
   A) The acceleration is downward during the entire time the ball is in the air.
   B) The acceleration of the ball is upward while it is traveling up and downward while it is traveling down.
   C) The acceleration of the ball is downward while it is traveling up and upward while it is traveling down.
   D) The acceleration of the ball is downward while it is traveling up and downward while it is traveling down but is zero at the highest point when the ball stops.

28. Two objects are thrown from the top of a tall building and experience no appreciable air resistance. One is thrown up, and the other is thrown down, both with the same initial speed. What are their speeds when they hit the street?
   A) The one thrown down is traveling faster.
   B) The one thrown up is traveling faster.
   C) They are traveling at the same speed.

29. Two objects are dropped from a bridge, an interval of 1.0 s apart, and experience no appreciable air resistance. As time progresses, the DIFFERENCE in their speeds
   A) decreases.
   B) decreases at first, but then stays constant.
   C) remains constant.
   D) increases.
   E) increases at first, but then stays constant.

30. If the fastest you can safely drive is 65 mi/h, what is the longest time you can stop for dinner if you must travel 508 mi in 10.1 h total?
   A) 1.8 h
   B) 2.3 h
   C) 2.5 h
   D) You can't stop at all.

31. A racing car accelerates uniformly from rest along a straight track. This track has markers spaced at equal distances along it from the start, as shown in the figure. The car reaches a speed of 140 km/h as it passes marker 2. Where on the track was the car when it was traveling at 70 km/h?



   A) Between marker 1 and marker 2
   B) Before marker 1
   C) At marker 1

32. The position of an object as a function of time is given by $x = bt^2 - ct$, where $b = 2.0$ m/s^2 and $c = 6.7$ m/s, and x and t are in SI units. What is the instantaneous velocity of the object when $t = 2.3$?
   A) 3.3 m/s
   B) 2.8 m/s
   C) 2.5 m/s
   D) 2.0 m/s

33. The position of an object is given by $x = at3 - bt2 + ct$, where $a = 4.1$ m/s^3, $b = 2.2$ m/s^2, $c = 1.7$ m/s, and x and t are in SI units. What is the instantaneous acceleration of the object when $t = 1.2$ s?
   A) –13 m/s^2
   B) 25 m/s^2
   C) 14 m/s^2
   D) 2.9 m/s^2

34. The velocity of an object as a function of time is given by $v(t) = 2.00$ m/s + (3.00 m/s)t – (1.0 m/s^2) t^2. Determine the instantaneous acceleration of the object at time $t = 4.00$ s.
   A) 0.00 m/s^2
   B) –1.00 m/s^2
   C) –2.00 m/s^2
   D) 1.00 m/s^2
   E) –5.00 m/s^2

35. The velocity of an object is given by the expression $v(t) = 3.00\ \text{m/s} + (2.00\ \text{m/s}^3)t^2$, where t is in seconds. Determine the position of the object as a function of time if it is located at $x = 1.00$ m at time $t = 0.000$ s.

A) $(3.00\ \text{m/s})t + (0.667\ \text{m/s3})t^3$
B) 0.667 m
C) $(2.00\ \text{m/s})t$
D) $(2.00\ \text{m/s})t + 1.00$ m
E) $1.00\ \text{m} + (3.00\ \text{m/s})t + (0.667\ \text{m/s}^3)t^3$

36. The acceleration of an object as a function of time is given by $a(t) = (3.00\ \text{m/s}^3)t$, where t is in seconds. If the object is at rest at time $t = 0.00$ s, what is the velocity of the object at time $t = 3.00$ s?

A) 27.0 m/s B) 0.00 m/s C) 3.00 m/s D) 9.00 m/s E) 13.5 m/s

37. The acceleration of an object as a function of time is given by $a(t) = (3.00\ \text{m/s}^3)t$, where t is in seconds. If the object has a velocity 1.00 m/s at time $t = 1.00$ s, what is the displacement of the object between time $t = 2.00$ s and time $t = 4.00$ s?

A) 33.0 m B) 27.0 m C) 36.0 m D) 30.0 m

38. A car accelerates from 8.0 m/s to 21.0 m/s at a rate of $3.00\ \text{m/s}^2$. How far does the car travel while accelerating?

A) 189 m B) 107 m C) 63 m D) 38.0 m

39. A dragster starts from rest and travels 1/4 mi in 7.60 s with constant acceleration. What is its velocity when it crosses the finish line?

A) 166 mi/h B) 261 mi/h C) 237 mi/h D) 119 mi/h

40. A airplane that is flying level needs to accelerate from a speed of 2.00×10^2 m/s to a speed of 2.40×10^2 m/s while it flies a distance of 1.20 km. What must be the acceleration of the plane?

A) $7.33\ \text{m/s}^2$ B) $1.34\ \text{m/s}^2$ C) $2.45\ \text{m/s}^2$ D) $4.44\ \text{m/s}^2$ E) $5.78\ \text{m/s}^2$

41. A runner maintains constant acceleration after starting from rest as she runs a distance of 60.0 m. The runner's speed at the end of the 60.0 m is 9.00 m/s. How much time did it take the runner to complete the 60.0 m distance?

A) 10.2 s B) 9.80 s C) 6.67 s D) 13.3 s E) 15.0 s

42. An object starts from rest at time $t = 0.00$ s and moves in the $+x$ direction with constant acceleration. The object travels 3.00 m from time $t = 1.00$ s to time $t = 2.00$ s. What is the acceleration of the object?

A) $-1.00\ \text{m/s}^2$ B) $6.00\ \text{m/s}^2$ C) $2.00\ \text{m/s}^2$ D) $-3.00\ \text{m/s}^2$ E) $1.00\ \text{m/s}^2$

43. A car starts from rest and accelerates with a constant acceleration of $1.00\ \text{m/s}^2$ for 3.00 s. The car continues for 5.00 s at constant velocity. How far has the car traveled from its starting point?

A) 9.00 m B) 4.50 m C) 15.0 m D) 24.0 m E) 19.5 m

44. A ball rolls across a floor with an acceleration of $0.100\ \text{m/s}^2$ in a direction opposite to its velocity. The ball has a velocity of 4.00 m/s after rolling a distance 6.00 m across the floor. What was the initial speed of the ball?

A) 5.21 m/s B) 4.60 m/s C) 5.85 m/s D) 4.15 m/s E) 3.85 m/s

45. A car is 200 m from a stop sign and traveling toward the sign at 40.0 m/s. At this time, the driver suddenly realizes that she must stop the car. If it takes 0.200 s for the driver to apply the brakes, what must be the magnitude of the constant acceleration of the car after the brakes are applied so that the car will come to rest at the stop sign?

A) 2.08 m/s^2 B) 3.42 m/s^2 C) 4.17 m/s^2 D) 2.89 m/s^2 E) 3.89 m/s^2

46. A speeding car is traveling at a constant 30.0 m/s when it passes a stationary police car. If the police car delays for 1.00 s before starting, what must be the magnitude of the constant acceleration of the police car to catch the speeding car after the police car travels a distance of 300 m?

A) 1.45 m/s^2 B) 3.70 m/s^2 C) 6.00 m/s^2 D) 7.41 m/s^2 E) 3.00 m/s^2

47. A package is dropped from a helicopter moving upward at 15 m/s. If it takes 7.0 s before the package strikes the ground, how high above the ground was the package when it was released if air resistance is negligible?

A) 140 m B) 110 m C) 160 m D) 350 m

48. A ball is projected upward at time $t = 0.0$ s, from a point on a roof 90 m above the ground. The ball rises, then falls and strikes the ground. The initial velocity of the ball is 37.0 m/s if air resistance is negligible. The time when the ball strikes the ground is closest to

A) 10 s B) 9.2 s C) 9.5 s D) 8.9 s E) 9.8 s

49. At the same moment from the top of a building 3.0×10^2 m tall, one rock is dropped and one is thrown downward with an initial velocity of 18 m/s. Both of them experience negligible air resistance. How much EARLIER does the thrown rock strike the ground?

A) 1.4 s B) 1.6 s
C) 1.1 s D) They land at exactly the same time.

50. Two identical objects A and B fall from rest from different heights to the ground and feel no appreciable air resistance. If object B takes TWICE as long as object A to reach the ground, what is the ratio of the heights from which A and B fell?

A) $h_A/h_B = 1/8$ B) $h_A/h_B = 1/4$ C) $h_A/h_B = 1/2$ D) $h_A/h_B = 1/\sqrt{2}$

51. A rock is dropped from the top of a vertical cliff and takes 3.00 s to reach the ground below the cliff. A second rock is thrown vertically from the cliff, and it takes this rock 2.00 s to reach the ground below the cliff from the time it is released. With what velocity was the second rock thrown, assuming no air resistance?

A) 12.3 m/s upward
B) 5.51 m/s downward
C) 4.76 m/s downward
D) 12.3 m/s downward
E) 4.76 m/s upward

52. To determine the height of a flagpole, Abby throws a ball straight up and times it. She sees that the ball goes by the top of the pole after 0.50 s and then reaches the top of the pole again after a total elapsed time of 4.1 s. How high is the pole above the point where the ball was launched? (You can ignore air resistance.)

A) 10 m B) 16 m C) 13 m D) 26 m E) 18 m

53. A test rocket is fired straight up from rest with a net acceleration of 20.0 m/s^2. After 4.00 seconds the motor turns off, but the rocket continues to coast upward with no appreciable air resistance. What maximum elevation does the rocket reach?

A) 327 m B) 487 m C) 320 m D) 160 m E) 408 m

54. A toy rocket is launched vertically from ground level ($y = 0.00$ m), at time $t = 0.00$ s. The rocket engine provides constant upward acceleration during the burn phase. At the instant of engine burnout, the rocket has risen to 90 m and acquired a velocity of 60 m/s. The rocket continues to rise in unpowered flight, reaches maximum height, and falls back to the ground with negligible air resistance. The speed of the rocket upon impact on the ground is closest to

A) 67 m/s B) 60 m/s C) 73 m/s D) 82 m/s E) 89 m/s

55. A ball is projected upward at time $t = 0.00$ s, from a point on a roof 70 m above the ground and experiences negligible air resistance. The ball rises, then falls and strikes the ground. The initial velocity of the ball is 77.3 m/s. Consider all quantities as positive in the upward direction. The velocity of the ball when it is 39 m above the ground is closest to

A) –97 m/s. B) –32 m/s. C) –65 m/s. D) –81 m/s. E) –49 m/s.

56. On the earth, when an astronaut throws a 0.250-kg stone vertically upward, it returns to his hand a time T later. On planet X he finds that, under the same circumstances, the stone returns to his hand in $2T$. In both cases, he throws the stone with the same initial velocity and it feels negligible air resistance. The acceleration due to gravity on planet X (in terms of g) is

A) $g/\sqrt{2}$ B) $g/4$. C) $2g$. D) $g/2$. E) $g\sqrt{2}$

57. Two identical stones are dropped from rest and feel no air resistance as they fall. Stone A is dropped from height h, and stone B is dropped from height $2h$. If stone A takes time t to reach the ground, stone B will take time

A) $t\sqrt{2}$ B) $4t$. C) $t/2$. D) $2t$. E) $t/\sqrt{2}$

CHAPTER 3 STARTS HERE

58. Which of the following is an accurate statement?

A) Rotating a vector about an axis passing through the tip of the vector does not change the vector.
B) Even though two vectors have unequal magnitudes, it is possible that their vector sum is zero.
C) The magnitude of a vector can be zero even though one of its components is not zero.
D) The magnitude of a vector is independent of the coordinate system used.
E) It is possible to add a scalar quantity to a vector.

59. If $\vec{A} - \vec{B} = 0$, then the vectors $\vec{A}$ and $\vec{B}$ have equal magnitudes and are directed in the opposite directions from each other.

A) True B) False

60. Under what condition is $|\vec{A} - \vec{B}| = A + B$?

A) The magnitude of vector $\vec{B}$ is zero.

B) Vectors $\vec{A}$ and $\vec{B}$ are in perpendicular directions.

C) Vectors $\vec{A}$ and $\vec{B}$ are in opposite directions.

D) Vectors $\vec{A}$ and $\vec{B}$ are in the same direction.

E) The statement is never true.

61. If $A > B$, under what condition is $|\vec{A} - \vec{B}| = A - B$?

A) Vectors $\vec{A}$ and $\vec{B}$ are in opposite directions.

B) Vectors $\vec{A}$ and $\vec{B}$ re in perpendicular directions.

C) The statement is never true.

D) Vectors $\vec{A}$ and $\vec{B}$ are in the same direction.

E) The statement is always true.

62. The magnitude of a vector can never be less than the magnitude of one of its components.

A) False B) True

63. If the magnitude of vector $\vec{A}$ is less than the magnitude of vector $\vec{B}$, then the x component of $\vec{A}$ is less than the x component of $\vec{B}$.

A) False B) True

64. If the eastward component of vector $\vec{A}$ is equal to the westward component of vector $\vec{B}$ and their northward components are equal. Which one of the following statements about these two vectors is correct?

A) Vector $\vec{A}$ is parallel to vector $\vec{B}$.

B) The magnitude of vector $\vec{A}$ is twice the magnitude of vector $\vec{B}$.

C) Vector $\vec{A}$ is perpendicular to vector $\vec{B}$.

D) The magnitude of vector $\vec{A}$ is equal to the magnitude of vector $\vec{B}$.

E) Vectors $\vec{A}$ and $\vec{B}$ point in opposite directions.

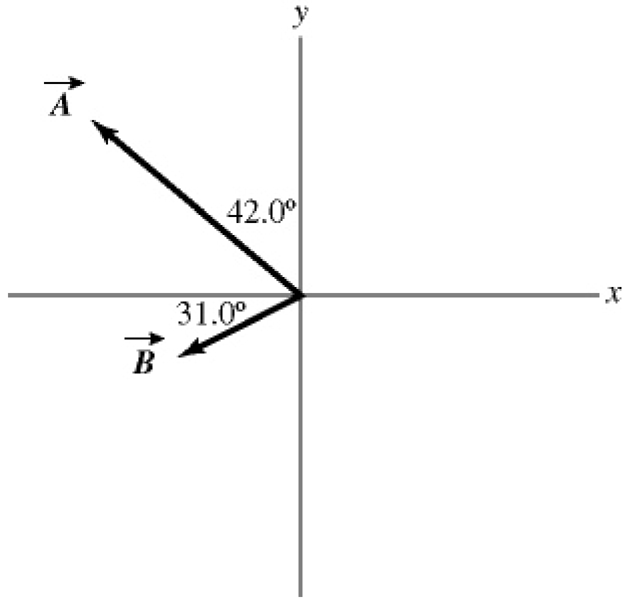
65. If all the components of a vector are equal to 1, then that vector is a unit vector.

A) True B) False

66. You walk 53 m to the north, then turn 60° to your right and walk another 45 m. How far are you from where you originally started?

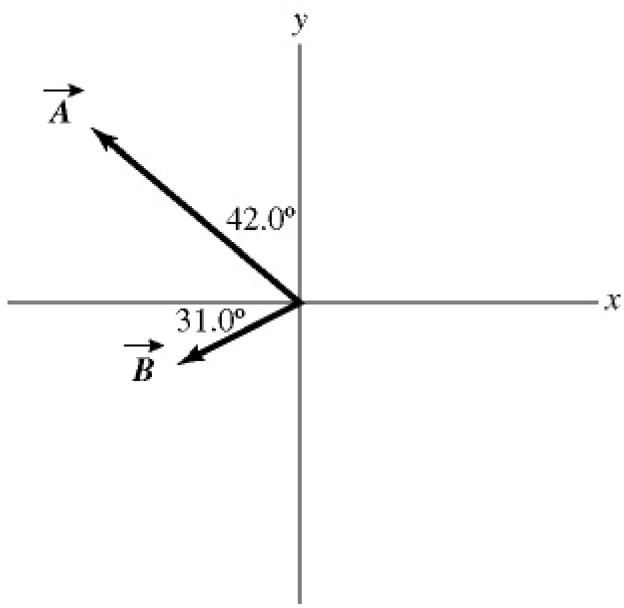
A) 92 m B) 45 m C) 49 m D) 85 m

67. Vectors $\vec{A}$ and $\vec{B}$ are shown in the figure. Vector $\vec{C}$ is given by $\vec{C} = \vec{B} - \vec{A}$. The magnitude of vector $\vec{A}$ is 16.0 units, and the magnitude of vector $\vec{B}$ is 7.00 units. What is the magnitude of vector $\vec{C}$?



A) 16.2 B) 17.5 C) 9.00 D) 15.5 E) 9.53

68. Vectors $\vec{A}$ and $\vec{B}$ are shown in the figure. Vector $\vec{C}$ is given by $\vec{C} = \vec{B} - \vec{A}$. The magnitude of vector $\vec{A}$ is 16.0 units, and the magnitude of vector $\vec{B}$ is 7.00 units. What is the angle of vector $\vec{C}$, measured counterclockwise from the +x-axis?



A) 22.4° B) 73.1° C) 287° D) 292° E) 16.9°

69. A rabbit trying to escape a fox runs north for 8.0 m, darts northwest for 4.0 m, then drops 1.0 m down a hole into its burrow. What is the magnitude of the net displacement of the rabbit?
A) 8.9 m B) 81 m C) 11 m D) 13 m

70. You walk 63 m to the north, then turn 60° to your right and walk another 45 m. Determine the direction of your displacement vector. Express your answer as an angle relative to east.
A) 72° N of E B) 59° N of E C) 52° N of E D) 65° N of E

71. Vector $\vec{A}$ has a magnitude 5.00 and points in a direction 50.0° clockwise from the negative y axis. What are the x and y components of vector $\vec{A}$.
A) $A_x = 3.21$ and $A_y = -3.83$
B) $A_x = -3.83$ and $A_y = 3.21$
C) $A_x = 2.16$ and $A_y = 1.78$
D) $A_x = -3.83$ and $A_y = -3.21$
E) $A_x = 3.21$ and $A_y = 3.83$

72. The components of vector $\vec{A}$ are $A_x = +3.90$ and $A_y = -4.00$. What is the angle measured counterclockwise from the +x–axis to vector $\vec{A}$?
A) 136° B) 314° C) 46.0° D) 134° E) 224°

73. A helicopter is flying horizontally with a speed of 454 m/s over a hill that slopes upward with a 2% grade (that is, the "rise" is 2% of the "run"). What is the component of the helicopter's velocity perpendicular to the sloping surface of the hill?
A) 9.1 m/s B) 445 m/s C) 230 m/s D) 454 m/s

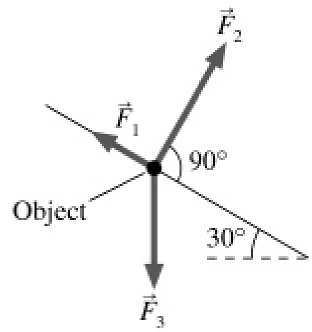
74. An apple falls from an apple tree growing on a 20° slope. The apple hits the ground with an impact velocity of 4.6 m/s straight downward. What is the component of the apple's impact velocity parallel to the surface of the slope?
A) 4.3 m/s B) 1.6 m/s C) 2.5 m/s D) 3.4 m/s

75. The components of vector $\vec{A}$ are $A_x = +3.4$ and $A_y = -5.5$, and the components of vector $\vec{B}$ are given are $B_x = -3.1$ and $B_y = -4$. What is the magnitude of the vector $\vec{B} - \vec{A}$?
A) 1.5 B) 45 C) 1.4 D) 9.5 E) 6.7

76. The components of vector $\vec{B}$ are $B_x = -9.7$ and $B_y = -5.6$, and the components of vector $\vec{C}$ are $C_x = -5.8$ and $C_y = +9.7$. What is the angle (less than 180 degrees) between vectors $\vec{B}$ and $\vec{C}$?
A) 91° B) 29° C) 89° D) 151° E) 90°

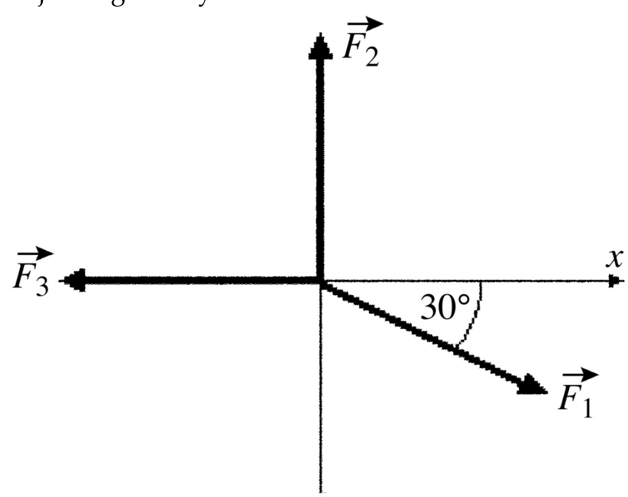
77. An airplane undergoes the following displacements: First, it flies 66 km in a direction 30° east of north. Next, it flies 49 km due south. Finally, it flies 100 km 30° north of west. Using vector components, determine how far the airplane ends up from its starting point.
A) 78 km B) 79 km C) 76 km D) 81 km E) 82 km

78. Three forces are exerted on an object placed on a tilted floor. Forces are vectors. The three forces are directed as shown in the figure. If the forces have magnitudes $F_1 = 6.0$ N, $F_2 = 15.0$ N and $F_3 = 9.0$ N, where N is the standard unit of force, what is the component of the *net force* $\vec{F}_{\text{net}} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3$ parallel to the floor?



A) 1.8 N　　B) 1.5 N　　C) 3.0 N　　D) 5.3 N

79. As shown in the figure, three force vectors act on an object. The magnitudes of the forces as shown in the figure are $F_1 = 80.0$ N, $F_2 = 60.0$ N, and $F_3 = 40.0$ N, where N is the standard SI unit of force. The resultant force acting on the object is given by



A) 180 N at an angle 60.0° with respect to $+x$–axis.
B) 40.0 N at an angle 60.0° with respect to $-x$–axis.
C) 20.0 N at an angle 34.3° with respect to $+x$–axis.
D) 60.0 N at an angle 90.0° with respect to $+x$–axis.
E) 35.5 N at an angle 34.3° with respect to $+x$–axis.

80. A teacher sends her students on a treasure hunt. She gives the following instructions:
1. Walk 300 m north
2. Walk 400 m northwest
3. Walk 700 m east–southeast and the treasure is buried there.

As all the other students walk off following the instructions, Jane physics student quickly adds the displacements and walks in a straight line to find the treasure. How far and in what direction does Jane need to walk?
A) 187 m in a direction 67.3° north of east
B) 399 m in a direction 52.5° north of east
C) 284 m in a direction 28.2° west of north
D) 481 m in a direction 40.9° north of east
E) The treasure position cannot be reached in one straight walk.

81. Vector $\vec{A} = -3.00\hat{i} + 3.00\hat{j}$ and vector $\vec{B} = 3.00\hat{i} + 4.00\hat{j}$. What is vector $\vec{C} = \vec{A} + \vec{B}$?
A) $0.00\hat{i} + 3.00\hat{j}$
B) $0.00\hat{i} + 7.00\hat{j}$
C) $-3.00\hat{i} - 3.00\hat{j}$
D) $7.00\hat{i} + 7.00\hat{j}$
E) $-3.00\hat{i} + 7.00\hat{j}$

82. Vector $\vec{A} = 1.00\hat{i} + -2.00\hat{j}$ and vector $\vec{B} = 3.00\hat{i} + 4.00\hat{j}$. What are the magnitude and direction of vector $\vec{C} = \vec{A} + \vec{B}$?
A) 6.00 in a direction 63.4° counterclockwise from the positive x axis
B) 7.21 in a direction 33.7° counterclockwise from the positive x axis
C) 4.47 in a direction 6.34° counterclockwise from the positive x axis
D) 7.21 in a direction 56.3° counterclockwise from the positive x axis
E) 4.47 in a direction 26.6° counterclockwise from the positive x axis

83. What is the magnitude of $\vec{A} + \vec{B} + \vec{C}$, where $\vec{A} = 1.00\hat{i} + 4.00\hat{j} - 1.00\hat{k}$, $\vec{B} = 5.00\hat{i} - 1.00\hat{j} - 4.00\hat{k}$ and $\vec{C} = -1.00\hat{i} + 1.00\hat{j}$?
A) 12.14 B) 8.12 C) 7.87 D) 9.49 E) 4.00

84. If $\vec{A} = +4\hat{i} - 2\hat{j} - 2\hat{k}$ and $\vec{C} = -2\hat{i} - 2\hat{j} - 3\hat{k}$, which of the following numbers is closest to the magnitude of $\vec{A} - \vec{C}$?
A) 5 B) 6 C) 9 D) 8 E) 7

85. Vector $\vec{A} = -1.00\hat{i} + -2.00\hat{j}$ and vector $\vec{B} = 3.00\hat{i} + 4.00\hat{j}$. What are the magnitude and direction of vector $\vec{C} = 3.00\vec{A} + 2.00\vec{B}$?
A) 3.61 in a direction 33.7° counterclockwise from the positive x–axis
B) 3.61 in a direction –56.3° counterclockwise from the positive x–axis
C) 6.72 in a direction 34.4° counterclockwise from the positive x–axis
D) 5.00 in a direction 56.3° counterclockwise from the positive x axis
E) 3.61 in a direction 56.3° counterclockwise from the positive x–axis

Answer Key
Testname: APC PRACTICE TEST CH 1–3 17–18

1. D
2. D
3. A
4. A
5. A
6. A
7. B
8. B
9. B
10. B
11. D
12. D
13. B
14. B
15. A
16. B
17. C
18. D
19. D
20. C
21. E
22. A
23. C
24. C
25. A
26. C
27. A
28. C
29. C
30. B
31. B
32. C
33. B
34. E
35. E
36. E
37. B
38. C
39. C
40. A
41. C
42. C
43. E
44. D
45. C
46. D
47. A
48. C
49. B
50. B
51. D
52. A
53. B
54. C
55. D
56. D
57. A
58. D
59. B
60. C
61. D
62. B
63. A
64. D
65. B
66. D
67. A
68. C
69. C
70. D
71. D
72. B
73. A
74. B
75. E
76. C
77. B
78. B
79. E
80. D
81. B
82. E
83. B
84. B
85. A