Exam 1--PHYS 101--F15

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

1. A mid-sized car has an approximate volume of:
   a. 15 m$^3$
   b. 150 m$^3$
   c. 1500 m$^3$
   d. 15000 m$^3$
   e. none of these are reasonable

2. A guy in a kayak can travel approximately what distance in 10 minutes?
   a. 6 m
   b. 600 m
   c. 6000 m
   d. 60,000 m

3. Which of these equations is dimensionally correct?
   I. $v^2 = v_0^2 + 2ax$
   II. $\frac{1}{2}mv^2 + xma = mx^2 \frac{1}{t}$
   III. $v = \frac{x}{t}$
   a. I & III
   b. II
   c. II & III
   d. III
   e. all of these are correct

4. Consider this equation. The units for the variables are as follows: (t: s; v: m/s; a: m/s$^2$; x: m) What must be the units for B if the equation is dimensionally correct?

   $3\pi \frac{mv}{t} = B \frac{m}{a} v$

   a. $\frac{kg}{s}$
   b. $\frac{m}{s^3}$
   c. $3\pi s^2$
   d. $s^{-2}$

5. Which of these is the proper solution, in decimal notation and with proper significant figures, of this calculation?

   $\frac{(3.40)(12.25)}{4.92} = 8.465447$

   a. 8.4654
   b. 8.465
   c. 8.47
   d. 8.5
   e. 9

6. Which of these is the standard for measurement of the meter?
   a. the distance that light travels in a particular amount of time
   b. a fraction of the Earth’s orbit around the Sun
   c. a bar in France
   d. a multiple of the oscillation length for the cesium atom
7. Consider the following right triangle. What is the angle, \( \theta \)?

![Right Triangle](image)

- a. 30°
- b. 15°
- c. 70°
- d. 20°

8. Consider the triangle in the previous problem. What is the length of the hypotenuse?

- a. 21 m
- b. 12 m
- c. 9.0 m
- d. 82 m

9. Acceleration is the rate of change of velocity. A car accelerates at a rate of 12 m/s\(^2\). What is this in miles/hour\(^2\)? (1 mile=1609 meters)

- a. 19,000 mi/hr\(^2\)
- b. 97,000 mi/hr\(^2\)
- c. 0.0075 mi/hr\(^2\)
- d. 27 mi/hr\(^2\)
- e. 0.0015 mi/hr\(^2\)

10. A European sports car dealer claims that his product will accelerate at a constant rate from rest to a speed of 100 km/hr in 8.00 s. What is the speed after the first 5.00 s of acceleration? (*Hint:* First convert the speed to m/s.)

- a. 34.7 m/s
- b. 17.3 m/s
- c. 44.4 m/s
- d. 28.7 m/s

11. A ball is pushed with an initial velocity of 4.0 m/s. The ball rolls down a hill with a constant acceleration of 1.6 m/s\(^2\). The ball reaches the bottom of the hill in 8.0 s. What is the ball's velocity at the bottom of the hill?

- a. 17 m/s
- b. 10 m/s
- c. 16 m/s
- d. 12 m/s

12. You throw a ball up with an initial speed of 30 m/s. How long does it take for the ball to return to your hand?

- a. 2 s
- b. 3 s
- c. 4 s
- d. 6 s
- e. 9 s
13. You throw a ball up with an initial speed of 30 m/s. What is its maximum height?

a. 15 m
b. 30 m
c. 45 m
d. 140 m
e. 210 m

14. You and your dog go for a hike. You walk on the path, but your dog runs all over, crossing your path many times. Your dog’s average velocity is __________.

a. more than your average velocity.
b. equal to your average velocity.
c. less than your average velocity.
d. it depends on the breed of the dog.

15. You throw a ball in the air. It requires 10 seconds to travel to its maximum height. How long does it take to return to your hand?

a. less than 10 seconds
b. 10 seconds
c. more than 10 seconds
d. it depends on the acceleration due to gravity

16. If the velocity of a car is non-zero (v≠0), can the acceleration of the car be zero?

a. Absolutely yes!
b. Surely not!
c. it depends on the velocity

17. Which of these statements represent the motion represented in this plot?

a. increasing speed, positive velocity
b. decreasing speed, positive velocity
c. increasing speed, negative velocity
d. decreasing speed, negative velocity

18. Consider this position versus time graph. Which of the following best represents the velocity versus time graph for the object described in the position versus time graph?

a. a
b. b
c. c
d. d
19. Consider the following graph. What is the velocity at t=8.5s?

![Position vs Time Graph]

- a. -0.67 m/s
- b. 16 m/s
- c. 3 m/s
- d. 0.06 m/s

20. Consider the graph in the previous question. What is the average velocity between points E & H (t=6 and 11 seconds, respectively)?

- a. 0.4 m/s
- b. 6 m/s
- c. -3 m/s
- d. 2 m/s
- e. -5 m/s

21. A car begins at a velocity of -30 m/s and ends at a velocity of -50 m/s. Which of these position versus time graphs represent this motion?

- a. a
- b. b
- c. c
- d. d
22. Consider this graph of velocity versus time. What distance has this particle traveled between t=0 and t=4 seconds?

![Graph of velocity versus time]

a. 210 m  
b. 25 m  
c. 13 m  
d. 0 m

23. Consider the graph of velocity versus time in the previous question. What is the acceleration at t=3.5 s?

a. 0 m/s²  
b. -12 m/s²  
c. 2 m/s²  
d. -6 m/s²  
e. -18 m/s²

24. A vector has a magnitude of 12 m and is 20.0 degrees above the x-axis. What is the y-component of the vector?

a. 11 m  
b. 20 m  
c. 4.4 m  
d. 4.1 m

25. Consider these 2 vectors. What is the magnitude of their sum, \( \vec{A} + \vec{B} \)?

\( \vec{A} = 11 \) units along the +x axis  
\( \vec{B} = 24 \) units at 60.0 degrees above the +x axis

a. 35 units  
b. 44 units  
c. 16 units  
d. 31 units
26. Consider these vectors. What is \( \vec{B} - \vec{A} \)?

\[ \begin{array}{c|c}
\vec{A} & \vec{B} \\
\hline
\vec{B} - \vec{A} & \ ? \\
\end{array} \]

a) \hspace{0.5cm} b)

c) \hspace{0.5cm} d)

27. A vector has a positive x-component and a negative y-component. The magnitude of the y-component is bigger than the x-component. Which of these is the only appropriate angle, measured from the +x axis, for this vector?

a. \( 350^\circ \)
b. \( 190^\circ \)
c. \( 125^\circ \)
d. \( 230^\circ \)
e. \( 290^\circ \)

28. Who is Dr. Young’s favorite student???

a. the guy next to me
b. the lady on the front row
c. Bill Thornton
d. me!
MULTIPLE CHOICE

1. ANS: A  PTS: 1  REF: F15-4M
2. ANS: B  PTS: 1  REF: F15
3. ANS: A  PTS: 1  REF: F15
4. ANS: B  PTS: 1  REF: F15-4M
5. ANS: C  PTS: 1  REF: F15-4M
6. ANS: A  PTS: 1  REF: F15-4M
7. ANS: D  PTS: 1  REF: F15
8. ANS: C  PTS: 1  REF: F15
9. ANS: B  PTS: 1  REF: F15
10. ANS: B  PTS: 1  DIF: 2  REF: F15-4M
11. ANS: A  PTS: 1  REF: F15
12. ANS: D  PTS: 1  REF: F15
13. ANS: C  PTS: 1  REF: F15
14. ANS: B  PTS: 1  REF: F15-4M
15. ANS: B  PTS: 1  DIF: F15-4M
16. ANS: A  PTS: 1  REF: F15
17. ANS: C  PTS: 1  REF: F15
18. ANS: A  PTS: 1  REF: F15
19. ANS: B  PTS: 1  REF: F15
20. ANS: B  PTS: 1  REF: F15
21. ANS: C  PTS: 1  REF: F15-4M
22. ANS: C  PTS: 1  REF: F15
23. ANS: D  PTS: 1  REF: F15
24. ANS: D  PTS: 1  REF: F15-4M
25. ANS: D  PTS: 1  REF: F15-4M
26. ANS: C  PTS: 1  REF: F15-4M
27. ANS: E  PTS: 1  REF: F15-4M
28. ANS: D  PTS: 1