Exam 1--PHYS 101--Fall 2011

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

_____ 1. Which of these is the appropriate answer for this mathematical operation:

\[
\frac{\frac{3.4}{1.24}}{+6.72}
\]

a. 9.4  

b. 9.46  

c. 9.462  

da. 9  

de. 9.42  

_____ 2. Which of these equations are dimensionally correct? (m: mass; v: velocity; a: acceleration; x: position; t: time)

I. \[v^2 = v_0^2 + 2a(x - x_0)\]

II. \[xma = \frac{1}{2}mv^2 - 4a^2 t^2 m\]

III. \[ma^2 = mxv^2\]

a. I  

b. II  

c. III  

da. I & II  

de. II & III  

_____ 3. Estimate the volume of your closed fist in cubic centimeters.

a. 10 cm\(^3\)  

b. 100 cm\(^3\)  

c. 1000 cm\(^3\)  

da. 10,000 cm\(^3\)  

d. 100,000 cm\(^3\)
4. This graph is relevant to the following 3 questions:

What is the position at t=20 s?

a. 1.5 m  
c. 0 m
b. 30 m  
d. None of these

5. In the figure from the previous question, what is the instantaneous velocity at t=30 s?

a. -0.67 m/s  
c. -1.5 m/s
b. \( \frac{3}{2} \) m/s  
d. 2 m/s

6. In the figure from the previous question, what is the average velocity for the time interval from t=0 to t=40?

a. \( \frac{1}{4} \) m/s  
c. 0 m/s
b. -4 m/s  
d. 10 m/s
7. A building has dimensions of 10.2 feet by 22.3 feet by 8.20 feet. What is the volume of the building in cubic centimeters? (1 meter = 3.28 feet)

a. 6.60x10^-2 cm^3  
b. 5.30x10^7 cm^3  
c. 1870 cm^3  
d. 57,000 cm^3

8. The current standard for the kilogram is a metal cylinder in France. Why are scientists seeking to change the standard we use for the kilogram?

a. It is not accessible to everyone  
b. It is changing  
c. It is not based on some fundamental constant of nature  
d. all of these

9. Which of these has never been a standard for the meter?

a. 10,000,000,000 the distance across the cesium atom  
b. \( \frac{1}{10,000,000} \) the distance from the equator to the North Pole  
c. the length of a particular metal bar in France  
d. the distance light travels in \( \frac{1}{3 \times 10^8} \) s

10. Consider this triangle. What is the angle \( \theta \)?

a. 51°  
b. 53°  
c. 37°  
d. 39°
11. You drop a ball from a height of 12 meters. How fast is the ball travelling when it reaches the ground? (Ignore air resistance.)

- a. 1.6 m/s
- b. 16 m/s
- c. 24 m/s
- d. 32 m/s

12. Consider the motion of the particle described by the following graph. What is the sign of the acceleration of this particle?

- a. zero acceleration
- b. positive
- c. negative
- d. Not enough information
13. What distance is covered by this particle during the time interval from t=20 to 30 seconds?

- a. 50 m
d. 550 m
- b. 700 m
e. 90 m
c. 500 m

14. Does the odometer in a car measure distance or displacement?

- a. displacement
c. neither
- b. distance

15. When throwing a ball straight up, which of the following is true about its velocity **v** and its acceleration **a** at the highest point in its path?

- a. a=0, v≠0
c. a≠0, v≠0
- b. a≠0, v=0
d. a=0, v=0
16. Consider this position versus time graph; the vertical lines mark particular points in the motion. At what point is the velocity zero?

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

17. Which of these are scalar quantities?

I. Speed  
II. Displacement  
III. Mass  
IV. Velocity

a. I  
b. I & III  
c. II  
d. II & IV  
e. III
18. This figure shows the vectors A and B. What is the resultant vector of B-A?

- [Image]

   a. 
   b. 
   c. 
   d. 

19. A little boy is trying to get to a party. He walks 5.0 meters north, 3.0 meters west, and 2.2 meters south. What is the magnitude of his displacement?

   a. 10.2 m  
   b. 4.1 m  
   c. 0.2 m  
   d. 7.8 m
20. In the previous problem, what is the direction of the boy’s displacement?

- 35° above the +x axis
- 47° above the -x axis
- 72° below the -x axis
- 43° above the -x axis

21. When you shoot a basketball, you want the ball to have the least speed when it strikes the basketball hoop. Which of these, then, is the optimal shot? (Assume that the initial velocity of the ball is the same in all 3 scenarios.)

- a
- b
- c
- d. not enough information
22. You kick a soccer ball at an angle of 30.0º from the horizontal, giving it a speed of 20. m/s. How far away does it land?

a. 80. m  

b. 20. m  

c. 69 m  

d. 35 m

23. In the previous problem, what is the maximum height of the ball?

a. 5.1 m  

b. -3.4 m  

c. 11 m  

d. 25 m

24. From the same height (and at the same time), one ball is dropped and another ball is fired horizontally. Which one will hit the ground first?

a. the dropped ball  

b. the fired ball  

c. both hit at the same time  

d. it depends on the speed at which the ball is fired.

25. In the previous problem, which ball has the greater velocity at ground level?

a. the dropped ball  

b. the fired ball  

c. both have the same velocity  

d. it depends on the speed at which the ball is fired.

26. This test is Version A. Mark “A” for this question.

a. A  

b. B  

c. C  

d. D
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Answer Section

MULTIPLE CHOICE

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