Physics Review for 1st Semester and CBA 2

Place the answer, in the blank, that best completes the following. Show any work or well-labeled diagrams required.

2 pts each unless marked otherwise.

Identify the number of significant digits in the following:

1. 2,000
2. 0.004
3. 33.00
4. 5 students
5. 3.0 \times 10^4

7. A term that means several measurements are close to each other is ________________.
8. A term that means several measurements are close to the correct value is ________________.
9. What is the length of the line, to the correct significant figures?

8.19 cm to
8.20 cm

10. What quantities are conserved in a perfectly inelastic collision?

11. What quantities are conserved in a perfectly elastic or elastic collision?

12. The weight of a person, who is 200.0 kg is ___ N.

13. The mass of an 888 N person is ___ kg.

14. When a weight is attached to a spring and dropped, the elastic potential energy ___ while the gravitational potential energy ___, total potential energy remains ___.

15. When broken glass is cleaned up properly in lab it should go in the ___.

16. When a battery is used and is no longer useful it should be ___.

17. An object is moving in a circle, at a constant speed. It has no ___.

18. Centripetal acceleration points to ___.

19. Draw a diagram that shows the results of each of the following vector operations:

\[ \begin{align*}
10 \text{ N} & \quad + \quad 10 \text{ N} \\
10 \text{ N} & \quad + \quad 5 \text{ N} \\
14 \text{ N} & \quad + \quad 6 \text{ N} \\
\end{align*} \]

20. Show a mathematical solution for the magnitude of the resultant of first operation.

\[ \sqrt{10^2 + 10^2} = \sqrt{200} = 14.1 \text{ N} \]

21. Show the results of 1st operation, but subtract the second vector instead of adding it. (Show the results with a resultant.)

22. What one word would best summarize Newton's 1st law?

23. What formula best sums up Newton's Second law?

24. State Newton's 3rd Law → For every action there is an =

25. You are swinging a rubber stopper on a string. Show a diagram of the path before and after the string is cut.

26. You set two objects in the same sunlight, A and B. They are the same mass and color. Object A gets to a higher temperature than B. Object A must have a ________.
27. You are standing on a scale, in an elevator. When the elevator goes up, the scale reads _____.
(higher, lower, the same) weight.

28. You are standing on a scale, in an elevator. When the elevator goes down, the scale reads _____.
(higher, lower, the same) weight.

29. You are standing on a scale, then you jump up. The instant you jump, the scale reads _____.
(higher, lower, the same) weight.

30. Heat transferred by direct contact is transferred by _____.

31. Heat transferred through space is transferred by _____.

32. When ice freezes, it (loses or gains) entropy.

Solve the following. Show any formulas used. Show all work to receive credit.

Box your final answer, with correct units and significant figures.

33. If a diver is at 10.0 m from the water, what speed will he be traveling, as he strikes the water, after stepping off of the platform?

\[ v = \sqrt{2gh} \]

34. A 200 kg person and a 500 kg person step off of the 10.0 m platform. Ignoring air friction, which one will hit the water first?

\[ F_{at} = \Delta P = (20N)(0.01s) \]

35. A golfer applies a 20 N force to a .2 kg golf ball, and follows through to keep contact for .001 s. What is the change in momentum of the golf ball.

36. A 100.0 kg student has a force of 200.0 N. His acceleration is _____.

37. An 80.0 kg object crashes into a wall moving at 20.0 m/s. It is brought to a stop in .10 seconds. What is the force exerted on the object?

\[ F_{at} = \Delta P \Rightarrow F = \frac{\Delta P}{\Delta t} = \frac{(80.0)(20.0)}{0.10} \]

38. How much work is done lifting a 50.0 kg weight vertically 10.0 m?

\[ W = F \cdot d = mg \cdot g \cdot (10.0 m) \]

39. Two 10.0 cm vectors are added at 3 angles, 45°, 90°, and 180°. Which angle provides the greatest resultant. (Show all 3, with resultants.)

\[ 2.0 \times 10^w \]

40. A 10.0 N force is required to lift an object 10.0 m in 5.0 seconds. What power lifted the object?

\[ P = \frac{W}{\Delta t} = \frac{mgd}{\Delta t} \]

41. A 10.0 N force is pulling a box left. A 20.0 force is pulling the box to the right. Show a force diagram with the box and the two vectors.

\[ 200.0 \text{ N right} \]

a) What is the net force?

\[ \begin{align*}
F &= \frac{10.0}{10.0} \\
&= (20.0)(10.0) \\
&= (20.0)(10.0) \\
&= 1960 \text{ J}
\end{align*} \]

b) If the box is 20.0 kg, what is the acceleration?

\[ a = \frac{F}{m} = \frac{10.0}{20.0} \\
&= 10.0 \text{ m/s}^2 \\
&= (10.0)(100) \\
&= 1000 \text{ J}
\]

42. A 2,222 kg car is moving right at a velocity of 20.0 m/s. What is the momentum of the car?

\[ P = mv = (2222 \text{ kg})(20.0 \text{ m/s}) \]

43. How long will it take a car to accelerate from 10.0 to 20.0 m/s, if its acceleration is 2.0 m/s²?

\[ t = \frac{v_f - v_i}{a} = \frac{20.0 - 10.0}{2.0} = 5.0 \text{ s} \\
&= 5.0 \text{ s} \\
&= (20.0)(10.0) \\
&= 1960 \text{ J}
\]

44. A 20.0 kg object is at 10.0 m, from the ground. How much gravitational potential energy does it have?