11 and 12 Physics Revision

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

____ 1. An applied force F accelerates an object from rest to a
   a. ½ mv^2
   b. mgh
   c. ½ kx^2
   d. mFd
   e. Zero

____ 2. Listening to your favorite radio station involves which area of physics?
   a. optics
   b. thermodynamics
   c. vibrations and wave phenomena
   d. relativity

____ 3. A hiker uses a compass to navigate through the woods. Identify the area of physics that this involves.
   a. thermodynamics
   b. relativity
   c. electromagnetism
   d. quantum mechanics

____ 4. According to the scientific method, why does a physicist make observations and collect data?
   a. to decide which parts of a problem are important
   b. to ask a question
   c. to make an interpretation
   d. to solve all problems

____ 5. According to the scientific method, how does a physicist formulate and objectively test hypotheses?
   a. by defending an opinion
   b. by interpreting graphs
   c. by experiments
   d. by stating conclusions

____ 6. In the steps of the scientific method, what is the next step after formulating and objectively testing hypotheses?
   a. interpreting results
   b. stating conclusions
   c. conducting experiments
   d. making observations and collecting data

____ 7. Which statement about models is *not* correct?
   a. Models describe only part of reality.
   b. Models help build hypotheses.
   c. Models help guide experimental design.
   d. Models manipulate a single variable or factor in an experiment.

____ 8. The most appropriate SI unit for measuring the length of an automobile is the
   a. micron.
   b. kilometer.
   c. meter.
   d. nanometer.

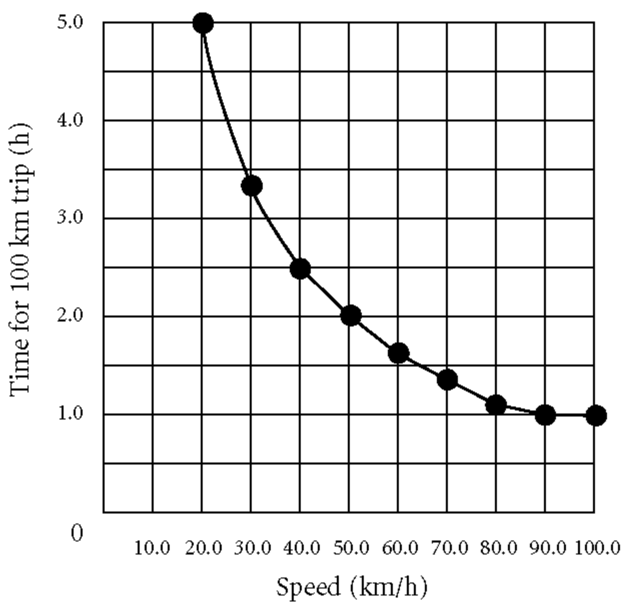
____ 9. Three values were obtained for the mass of a metal bar: 8.83 g; 8.84 g; 8.82 g. The known mass is 10.68 g. The values are
   a. accurate.
   b. precise.
   c. both accurate and precise.
   d. neither accurate nor precise.

____ 10. Calculate the following, and express the answer in scientific notation with the correct number of significant figures: 21.4 + 15 + 17.17 + 4.003

a. 5.7573×10^1
b. 5.757×10^1
c. 5.75×10^1
d. 5.8×10^1

Hour	Temperature (°C)
1:00	30.0
2:00	29.0
3:00	28.0
4:00	27.5
5:00	27.0
6:00	25.0

____ 11. A weather balloon records the temperature every hour. From the table above, the temperature
a. increases.
b. decreases.
c. remains constant.
d. decreases and then increases.



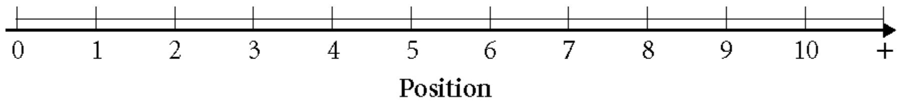
____ 12. The time required to make a trip of 100.0 km is measured at various speeds. From the graph above, what speed will allow the trip to be made in 2 hours?
a. 20.0 km/h
b. 40.0 km/h
c. 50.0 km/h
d. 90.0 km/h

____ 13. Which of the following expressions gives units of kg•m^2/s^2?
a. $m^2 \bullet \Delta x / (\Delta t)^2$
b. $m \bullet (\Delta x)^2 / (\Delta t)^2$
c. $m \bullet (\Delta x)^2 / \Delta t$
d. $(\Delta t)^2 / m \bullet (\Delta x)^2$

____ 14. Which of the following is the equation for average velocity?
a. $v_{avg} = \frac{\Delta x}{\Delta t}$
b. $v_{avg} = \frac{\Delta t}{\Delta x}$
c. $v_{avg} = \Delta x \Delta t$
d. $v_{avg} = \frac{v_i - v_f}{2}$

____ 15. Which of the following units is the SI unit of velocity?

a. meter
b. meter•second
c. meter per second
d. second per meter



____ 16. In the graph above, what is the correct description of any location to the left of the zero?

a. negative displacement
b. negative distance
c. negative position
d. negative change of displacement

____ 17. In the graph above, a toy car rolls from +3 m to +5 m. Which of the following statements is true?

a. $x_f = +3$ m
b. $x_i = +3$ m
c. $\Delta x = +3$ m
d. $v_{avg} = 3$ m/s

____ 18. The written abbreviation, $\vec{a}$, represents a quantity that has which of the following abbreviations in the text?

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

____ 19. Identify the following quantities as scalar or vector: the mass of an object, the number of leaves on a tree, wind velocity.

a. vector, scalar, scalar
b. scalar, scalar, vector
c. scalar, vector, scalar
d. vector, scalar, vector

____ 20. For the winter, a duck flies 10.0 m/s due south against a gust of wind with a speed of 2.5 m/s. What is the resultant velocity of the duck?

a. 12.5 m/s south
b. –12.5 m/s south
c. 7.5 m/s south
d. –7.5 m/s south

____ 21. Which of the following is the best coordinate system to analyze a painter climbing a ladder at an angle of 60° to the ground?

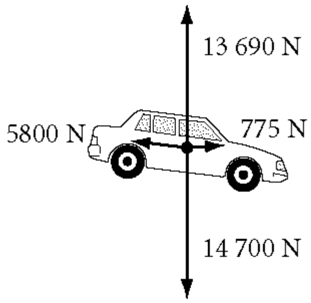
a. *x*-axis: horizontal along the ground; *y*-axis: along the ladder
b. *x*-axis: along the ladder; *y*-axis: horizontal along the ground
c. *x*-axis: horizontal along the ground; *y*-axis: up and down
d. *x*-axis: along the ladder; *y*-axis: up and down

____ 22. In a coordinate system, a vector is oriented at angle θ with respect to the *x*-axis. The *y* component of the vector equals the vector's magnitude multiplied by which trigonometric function?

a. $\cos\theta$
b. $\cot\theta$
c. $\sin\theta$
d. $\tan\theta$

____ 23. What causes a moving object to change direction?

a. acceleration
b. velocity
c. inertia
d. force



____ 24. The free-body diagram shown above represents a car being pulled by a towing cable. In the diagram, the 5800 N force is
a. the gravitational force acting on the car.
b. the backward force the road exerts on the car.
c. the upward force the road exerts on the car.
d. the force exerted by the towing cable on the car.

____ 25. A car goes forward along a level road at constant velocity. The additional force needed to bring the car into equilibrium is
a. greater than the normal force times the coefficient of static friction.
b. equal to the normal force times the coefficient of static friction.
c. the normal force times the coefficient of kinetic friction.
d. zero.

____ 26. A net force of 6.8 N accelerates a 31 kg scooter across a level parking lot. What is the magnitude of the scooter's acceleration?
a. 0.22 m/s^2 c. 3.2 m/s^2
b. 0.69 m/s^2 d. 4.6 m/s^2

____ 27. There are six books in a stack, and each book weighs 5 N. The coefficient of static friction between the books is 0.2. With what horizontal force must one push to start sliding the top five books off the bottom one?
a. 1 N c. 3 N
b. 5 N d. 7 N

____ 28. A crate is carried in a pickup truck traveling horizontally at 15.0 m/s. The truck applies the brakes for a distance of 28.7 m while stopping with uniform acceleration. What is the coefficient of static friction between the crate and the truck bed if the crate does not slide?
a. 0.400 c. 0.892
b. 0.365 d. 0.656

____ 29. Which of the following energy forms is associated with an object due to its position?
a. potential energy c. total energy
b. positional energy d. kinetic energy

____ 30. Which of the following equations expresses the work-kinetic energy theorem?
a. $ME_i = ME_f$ c. $\Delta W = \Delta KE$
b. $W_{net} = \Delta PE$ d. $W_{net} = \Delta KE$

____ 31. Which of the following is a true statement about the conservation of energy?
a. Potential energy is always conserved.
b. Kinetic energy is always conserved.
c. Mechanical energy is always conserved.

d. Total energy is always conserved.

____ 32. Which of the following equations is *not* an equation for power, *P*, in terms of work, *W*, displacement, *d*, time interval, Δt, force, *F*, and/or velocity, *v?*

a. $P = F\dfrac{d}{\Delta t}$
b. $P = \dfrac{W}{\Delta t}$
c. $P = Fv$
d. $P = \dfrac{Fv}{\Delta t}$

____ 33. A person sitting in a chair with wheels stands up, causing the chair to roll backward across the floor. The momentum of the chair

a. was zero while stationary and increased when the person stood.
b. was greatest while the person sat in the chair.
c. remained the same.
d. was zero when the person got out of the chair and increased while the person sat.

____ 34. Which of the following situations is an example of a visible change in momentum?

a. A hiker walks through a spider's web.
b. A car drives over a pebble.
c. A volleyball hits a mosquito in the air.
d. A baseball is hit by a bat.

____ 35. A ball with a momentum of 4.0 kg•m/s hits a wall and bounces straight back without losing any kinetic energy. What is the change in the ball's momentum?

a. –8.0 kg•m/s
b. –4.0 kg•m/s
c. 0.0 kg•m/s
d. 8.0 kg•m/s

____ 36. A 20 kg shopping cart moving at a velocity of 0.5 m/s collides with a store wall and stops. The momentum of the shopping cart

a. increases.
b. decreases.
c. remains the same.
d. is conserved.

____ 37. Two objects with different masses collide and bounce back after an elastic collision. Before the collision, the two objects were moving at velocities equal in magnitude but opposite in direction. After the collision,

a. the less massive object had gained momentum.
b. the more massive object had gained momentum.
c. both objects had the same momentum.
d. both objects lost momentum.

____ 38. Two swimmers relax close together on air mattresses in a pool. One swimmer's mass is 48 kg, and the other's mass is 55 kg. If the swimmers push away from each other,

a. their total momentum triples.
b. their momenta are equal but opposite.
c. their total momentum doubles.
d. their total momentum decreases.

____ 39. Two objects stick together and move with a common velocity after colliding. Identify the type of collision.

a. elastic
b. nearly elastic
c. inelastic
d. perfectly inelastic

____ 40. After colliding, objects are deformed and lose some kinetic energy. Identify the type of collision.

a. elastic
b. nearly elastic
c. inelastic
d. perfectly inelastic

____ 41. Which of the following best describes the momentum of two bodies after a two-body collision if the kinetic energy of the system is conserved?

a. must be less
c. might also be conserved

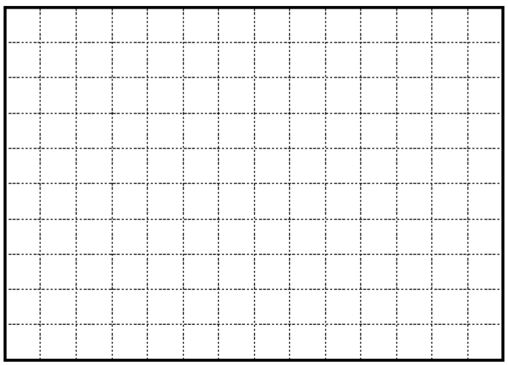
b. must also be conserved

d. is doubled in value

44. Convert 92×10^3 km to decimeters using scientific notation.

45. Convert 1 μm to meters using scientific notation.

46. What are two possible uses for physics equations?



Speedometer reading (km/h)	Time for 100 km trip (h)
20.0	5.00
30.0	3.33
40.0	2.50
50.0	2.00
60.0	1.67
70.0	1.43
80.0	1.25
90.0	1.11
100.0	1.00

47. Using the data above, construct a graph of the time required to make a trip of 100 km measured at various speeds.

48. If the position of a car does not change with respect to a fixed frame of reference, describe the motion of the car.

49. What quantity describes the difference between an object’s initial position and the object’s final position?

50. Distinguish between the displacement of a traveler who takes a train from New York to Boston and the displacement of a traveler who flies from Boston to New York.

51. What is a scalar quantity?

52. Which is a scalar quantity, instantaneous velocity or average speed?

53. The newton is the SI unit of what physical quantity?

54. The amount of force equal to 1 kg•m/s^2 defines what SI unit?

55. What happens to an object in motion when it experiences a nonzero net external force?

56. What term is used to describe the vector sum of all the forces acting on an object?

57. In the following sentence, is the everyday meaning or the scientific meaning of work intended?
A student works on a term paper.

58. In the following sentence, is the everyday meaning or the scientific meaning of work intended?
A coach does work on the bleachers by moving them into place before the basketball game.

59. How is work related to force and displacement?

60. Is work a vector quantity or a scalar quantity?

61. How are work and power related?

62. Which motor performs more work in the same amount of time—a 10 kW motor or a 20 kW motor? How much more work can it do?

63. A student walks to class at a velocity of 3 m/s. To avoid walking into a door as it opens, the student slows to a velocity of 0.5 m/s. Now late for class, the student runs down the corridor at a velocity of 7 m/s. At what point in this scenario does the student have the least momentum?

64. Is it possible for a spaceship traveling with constant velocity to experience a change in momentum? Explain your answer.

65. After colliding, objects are deformed and lose some kinetic energy. Identify the type of collision.