Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Final Exam Review

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

____ 1. Which of the following is an area of physics that studies motion and its causes?
a. thermodynamics
b. mechanics
c. quantum mechanics
d. optics

____ 2. 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

____ 3. 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

____ 4. According to the scientific method, how should conclusions be stated?
a. so that no one can refute the conclusion
b. so that it works with only one set of data
c. so that it is completely correct, with no mistakes
d. in a form that can be evaluated by others

____ 5. Diagrams are NOT designed to
a. show relationships between concepts.
b. show setups of experiments.
c. measure an event or situation.
d. label parts of a model.

____ 6. The symbol mm represents a
a. micrometer.
b. millimeter.
c. megameter.
d. manometer.

____ 7. The SI base unit used to measure mass is the
a. meter.
b. second.
c. kilogram.
d. liter.

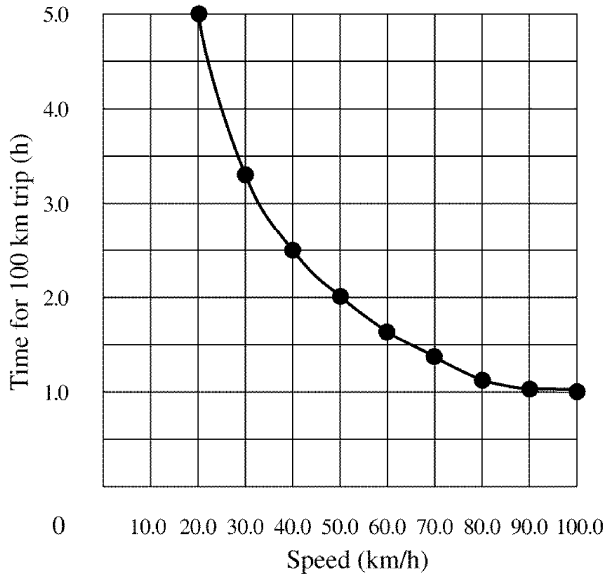
____ 8. The SI base unit for time is
a. 1 day.
b. 1 hour.
c. 1 minute.
d. 1 second.

____ 9. If some measurements agree closely with each other but differ widely from the actual value, these measurements are
a. neither precise nor accurate.
b. accurate but not precise.
c. acceptable as a new standard of accuracy.
d. precise but not accurate.

____ 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. 57.573
b. 57.57
c. 57.6
d. 58

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. What is the symbol for mass?
a. m
b. *m*
c. M
d. Δm

____ 14. What are the basic SI units?
a. meters, kilograms, hours
b. feet, pounds, seconds
c. meters, kilograms, seconds
d. feet, kilograms, seconds

____ 15. What is the speed of an object at rest?
a. 0.0 m/s
b. 1.0 m/s
c. 9.8 m/s
d. 9.81 m/s

____ 16. A dolphin swims 1.85 km/h. How far has the dolphin traveled after 0.60 h?
a. 1.1 km
b. 2.5 km
c. 0.63 km
d. 3.7 km

____ 17. A hiker travels south along a straight path for 1.5 h with an average velocity of 0.75 km/h, then travels south for 2.5 h with an average velocity of 0.90 km/h. What is the hiker's displacement for the total trip?
a. 1.1 km to the south
b. 2.2 km to the south
c. 3.4 km to the south
d. 6.7 km to the south

____ 18. Acceleration is
a. displacement.
b. the rate of change of displacement.
c. velocity.
d. the rate of change of velocity.

____ 19. Which of the following is the expression for acceleration?
a. $a = \dfrac{\Delta t}{\Delta v}$
b. $a = \dfrac{\Delta v}{\Delta t}$
c. $a = \Delta t \bullet \Delta v$
d. $a = \dfrac{v_i - v_f}{t_i - t_f}$

____ 20. A marble accelerates from rest at a constant rate and travels for a total displacement of 44 m in 20.0 s. What is the average velocity of the marble?
a. 1.1 m/s
b. 2.2 m/s
c. 4.4 m/s
d. 0.0 m/s

____ 21. A curious kitten pushes a ball of yarn at rest with its nose, displacing the ball of yarn 17.5 cm in 2.00 s. What is the acceleration of the ball of yarn?
a. 11.0 cm/s^2
b. 8.75 cm/s^2
c. 14.4 cm/s^2
d. 4.38 cm/s^2

____ 22. A sports car accelerates at a constant rate from rest to a speed of 27.8 m/s in 8.00 s. What is the displacement of the sports car in this time interval?
a. 55.0 m
b. 77.0 m
c. 111 m
d. 222 m

____ 23. Which of the following is a value for the acceleration of objects in free fall?
a. 9.81 m/s^2
b. –9.81 m/s^2
c. 9.80 m/s^2
d. –9.80 m/s^2

____ 24. A rock is thrown straight upward with an initial velocity of 24.5 m/s where the downward acceleration due to gravity is 9.81 m/s^2. What is the rock's displacement after 1.00 s?
a. 9.81 m
b. 19.6 m
c. 24.5 m
d. 29.4 m

____ 25. A rock is thrown straight upward with an initial velocity of 19.6 m/s where the downward acceleration due to gravity is 9.81 m/s^2. What time interval elapses between the rock's being thrown and its return to the original launch point?
a. 4.00 s
b. 5.00 s
c. 8.00 s
d. 10.0 s

____ 26. A baseball is released at rest from the top of the Washington Monument. It hits the ground after falling for 6.00 s. What was the height from which the ball was dropped? (Disregard air resistance. g = 9.81 m/s^2.)
a. 150.0 m
b. 177 m
c. 115 m
d. 210.0 m

____ 27. A rock is thrown from the top of a cliff with an initial speed of 12 m/s. If the rock hits the ground after 2.0 s, what is the height of the cliff? (Disregard air resistance. g = 9.81 m/s^2.)
a. 22 m
b. 24 m
c. 44 m
d. 63 m

____ 28. A tourist accidentally drops a camera from a 40.0 m high bridge. If $g = 9.81$ m/s^2 and air resistance is disregarded, what is the speed of the camera as it hits the water?
a. 28.0 m/s
b. 31.0 m/s
c. 56.0 m/s
d. 784 m/s

____ 29. Which would fall with greater acceleration in a vacuum, a leaf or a stone?
a. the leaf
b. the stone
c. They would accelerate at the same rate.
d. It is difficult to determine without more information.

____ 30. Which of the following is a physical quantity that has both magnitude and direction?
a. vector
b. scalar
c. resultant
d. frame of reference

____ 31. 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

____ 32. Identify the following quantities as scalar or vector: the speed of a snail, the time it takes to run a mile, the free-fall acceleration.
a. vector, scalar, scalar
b. scalar, scalar, vector
c. vector, scalar, vector
d. scalar, vector, vector

____ 33. Which of the following is an example of a vector quantity?
a. velocity
b. temperature
c. volume
d. mass

____ 34. An ant on a picnic table travels 3.0×10^1 cm eastward, then 25 cm northward, and finally 15 cm westward. What is the ant's directional displacement relative to its original position?
a. 29 cm at 59° north of east
b. 52 cm at 29° north of east
c. 57 cm at 29° north of west
d. 29 cm at 77° north of east

____ 35. While following directions on a treasure map, a person walks 45.0 m south, then turns and walks 7.50 m east. Which single straight-line displacement could the treasure hunter have walked to reach the same spot?
a. 45.6 m at 9.5° south of east
b. 52.5 m at 21° east of south
c. 45.6 m at 9.5° east of south
d. 45.6 m at 21° south of east

____ 36. A string attached to an airborne kite was maintained at an angle of 40.0° with the ground. If 120 m of string was reeled in to return the kite back to the ground, what was the horizontal displacement of the kite? (Assume the kite string did not sag.)
a. 110 m
b. 84 m
c. 77 m
d. 92 m

____ 37. A skateboarder rolls 25.0 m down a hill that descends at an angle of 20.0° with the horizontal. Find the horizontal and vertical components of the skateboarder's displacement.
a. 8.55 m; 23.5 m
b. 23.5 m; 8.55 m
c. 23.5 m; 73.1 m
d. 73.1 m; 26.6 m

____ 38. Find the resultant of these two vectors: 2.00×10^2 units due east and 4.00×10^2 units 30.0° north of west.
a. 300 units 29.8° north of west
b. 581 units 20.1° north of east
c. 546 units 59.3° north of west
d. 248 units 53.9° north of west

____ 39. What is the path of a projectile?
a. a wavy line
b. a parabola
c. a hyperbola
d. Projectiles do not follow a predictable path.

____ 40. Which of the following exhibits parabolic motion?
a. a person diving into a pool from a diving board
b. a space shuttle orbiting Earth
c. a leaf falling from a tree
d. a train moving along a flat track

____ 41. A track star in the long jump goes into the jump at 12 m/s and launches herself at 20.0° above the horizontal. How long is she in the air before returning to Earth? (g = 9.81 m/s^2)
a. 0.42 s
b. 0.83 s
c. 1.5 s
d. 1.2 s

____ 42. A model rocket flies horizontally off the edge of the cliff at a velocity of 50.0 m/s. If the canyon below is 100.0 m deep, how far from the edge of the cliff does the model rocket land?
a. 112 m
b. 225 m
c. 337 m
d. 400 m

____ 43. A passenger on a bus moving east sees a man standing on a curb. From the passenger's perspective, the man appears to
a. stand still.
b. move west at a speed that is less than the bus's speed.
c. move west at a speed that is equal to the bus's speed.
d. move east at a speed that is equal to the bus's speed.

____ 44. A piece of chalk is dropped by a teacher walking at a speed of 1.5 m/s. From the teacher's perspective, the chalk appears to fall
a. straight down.
b. straight down and backward.
c. straight down and forward.
d. straight backward.

____ 45. A jet moving at 500.0 km/h due east moves into a region where the wind is blowing at 120.0 km/h in a direction 30.0° north of east. What is the new velocity and direction of the aircraft relative to the ground?
a. 607 km/h, 5.67° north of east
b. 620.0 km/h, 7.10° north of east
c. 550.0 km/h, 6.22° north of east
d. 588 km/h, 4.87° north of east

____ 46. Which of the following forces arises from direct physical contact between two objects?
a. gravitational force
b. fundamental force
c. contact force
d. field force

____ 47. Which of the following forces exists between objects even in the absence of direct physical contact?
a. frictional force
b. fundamental force
c. contact force
d. field force

____ 48. Which of the following forces is an example of a field force?
a. gravitational force
b. frictional force
c. normal force
d. tension

____ 49. A late traveler rushes to catch a plane, pulling a suitcase with a force directed 30.0° above the horizontal. If the horizontal component of the force on the suitcase is 60.6 N, what is the force exerted on the handle?
a. 53.0 N
b. 70.0 N
c. 65.2 N
d. 95.6 N

____ 50. 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.

____ 51. A sled is pulled at a constant velocity across a horizontal snow surface. If a force of 8.0×10^1 N is being applied to the sled rope at an angle of 53° to the ground, what is the force of friction between the sled and the snow?
a. 83 N
b. 64 N
c. 48 N
d. 42 N

____ 52. If a nonzero net force is acting on an object, then the object is definitely
a. at rest.
b. moving with a constant velocity.
c. being accelerated.
d. losing mass.

____ 53. A small force acting on a human-sized object causes
a. a small acceleration.
b. no acceleration.
c. a large acceleration.
d. equilibrium.

____ 54. An airplane with a mass of 1.2×10^4 kg tows a glider with a mass of 0.60×10^4 kg. If the airplane propellers provide a net forward thrust of 3.6×10^4 N, what is the acceleration of the glider?
a. 2.0 m/s^2
b. 3.0 m/s^2
c. 6.0 m/s^2
d. 9.8 m/s^2

____ 55. A hammer drives a nail into a piece of wood. Identify an action-reaction pair, and compare the forces exerted by each object.
a. The nail exerts a force on the hammer; the hammer exerts a force on the wood.
b. The hammer exerts a force on the nail; the wood exerts a force on the nail.
c. The hammer exerts a force on the nail; the nail exerts a force on the hammer.
d. The hammer exerts a force on the nail; the hammer exerts a force on the wood.

____ 56. A hockey stick hits a puck on the ice. Identify an action-reaction pair, and compare the forces exerted by each object.
a. The stick exerts a force on the puck; the puck exerts a force on the stick.
b. The stick exerts a force on the puck; the puck exerts a force on the ice.
c. The puck exerts a force on the stick; the stick exerts a force on the ice.
d. The stick exerts a force on the ice; the ice exerts a force on the puck.

____ 57. A leaf falls from a tree and lands on the sidewalk. Identify an action-reaction pair, and compare the forces exerted by each object.
a. The tree exerts a force on the leaf; the sidewalk exerts a force on the leaf.
b. The leaf exerts a force on the sidewalk; the sidewalk exerts a force on the leaf.
c. The leaf exerts a force on the tree; the sidewalk exerts a force on the leaf.
d. The leaf exerts a force on the sidewalk; the tree exerts a force on the leaf.

____ 58. A ball is dropped from a person's hand and falls to Earth. Identify an action-reaction pair, and compare the forces exerted by each object.
a. The hand exerts a force on the ball; Earth exerts a force on the hand.
b. Earth exerts a force on the ball; the hand exerts a force on Earth.
c. Earth exerts a force on the hand; the hand exerts a force on the ball.
d. Earth exerts a gravitational force on the ball; the ball exerts a gravitational force on Earth.

____ 59. The statement by Newton that for every action there is an equal but opposite reaction is which of his laws of motion?
a. first
b. second
c. third
d. fourth

____ 60. The magnitude of the force of gravity acting on an object is
a. frictional force.
b. weight.
c. inertia.
d. mass.

____ 61. A change in the force of gravity acting on an object will affect the object's
a. mass.
b. frictional force.
c. weight.
d. inertia.

____ 62. A force does work on an object if a component of the force
a. is perpendicular to the displacement of the object.
b. is parallel to the displacement of the object.
c. perpendicular to the displacement of the object moves the object along a path that returns the object to its starting position.
d. parallel to the displacement of the object moves the object along a path that returns the object to its starting position.

____ 63. Work is done when
a. the displacement is not zero.
b. the displacement is zero.
c. the force is zero.
d. the force and displacement are perpendicular.

____ 64. The magnitude of the component of the force that does the work is 43.0 N. How much work is done on a bookshelf being pulled 5.00 m at an angle of 37.0° from the horizontal?
a. 172 J
b. 215 J
c. 129 J
d. 792 J

____ 65. A child moving at constant velocity carries a 2 N ice-cream cone 1 m across a level surface. What is the net work done on the ice-cream cone?
a. 0 J
b. 0.5 J
c. 2 J
d. 20 J

____ 66. A construction worker pushes a wheelbarrow 5.0 m with a horizontal force of 50.0 N. How much work is done by the worker on the wheelbarrow?
a. 10 J
b. 1250 J
c. 250 J
d. 55 J

____ 67. Which of the following energy forms is involved in a pencil falling from a desk?
a. kinetic energy
b. nonmechanical energy
c. gravitational potential energy
d. elastic potential energy and kinetic energy

____ 68. Which of the following energy forms is associated with an object in motion?
a. potential energy
b. elastic potential energy
c. nonmechanical energy
d. kinetic energy

____ 69. Which of the following energy forms is stored in any compressed or stretched object?
a. nonmechanical energy
b. elastic potential energy
c. gravitational potential energy
d. kinetic energy

____ 70. Which of the following energy forms is associated with an object's interaction with the environment?
a. potential energy
b. kinetic energy
c. mechanical energy
d. nonmechanical energy

____ 71. A pole vaulter clears 6.00 m. With what velocity does the vaulter strike the mat in the landing area? (Disregard air resistance. $g = 9.81$ m/s^2.)
a. 2.70 m/s
b. 5.40 m/s
c. 10.8 m/s
d. 21.6 m/s

____ 72. A parachutist with a mass of 50.0 kg jumps out of an airplane at an altitude of 1.00×10^3 m. After the parachute deploys, the parachutist lands with a velocity of 5.00 m/s. Using the work–kinetic energy theorem, find the energy that was lost to air resistance during this jump. ($g = 9.81$ m/s^2.)
a. 49 300 J
b. 98 800 J
c. 198 000 J
d. 489 000 J

____ 73. A horizontal force of 2.00×10^2 N is applied to a 55.0 kg cart across a 10.0 m level surface, accelerating it 2.00 m/s^2. Using the work–kinetic energy theorem, find the force of friction that slows the motion of the cart? (Disregard air resistance. $g = 9.81$ m/s^2.)
a. 110 N
b. 90.0 N
c. 80.0 N
d. 70.0 N

____ 74. Which of the following equations is NOT an equation for power?
a. $P = F\dfrac{d}{\Delta t}$
b. $P = \dfrac{W}{\Delta t}$
c. $P = Fv$
d. $P = \dfrac{Fv}{\Delta t}$

____ 75. A jet engine develops 1.0×10^5 N of thrust to move an airplane forward at a speed of 9.0×10^2 km/h. What is the power output of the engine?
a. 550 kW
b. 1.0 MW
c. 25 MW
d. 5.0 MW