Fundamental Quizzes

Name: Key Period: 2nd Date: _____

1. What is the mass of a block with weight 100N?

$\frac{100N}{10} = 10kg$

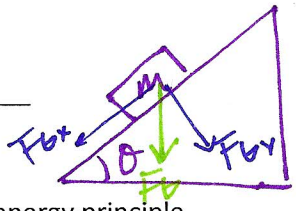
2. Give the equations for two types of potential energy, identifying each.

$U_G = mgh$ gravitational | $\frac{1}{2}kx^2$ springs | $\frac{kq_1q_2}{r}$ Electric | $\frac{1}{2}QV$ capacitors

3. When an object of mass *m* is on an incline of angle Θ, one must break the weight of an object into components parallel and perpendicular to the incline.

i. What is the components of the weight parallel to the incline? $mg\sin\theta$

i. What is the component of the weight perpendicular to the incline? $mg\cos\theta$



4. Write two expressions for work, including the definition of the work and the work- energy principle.

$W = F \cdot d$ $W = \Delta U = \Delta K$

5. Quickly identify as a vector of a scalar:

V Acceleration	V force	V momentum
V Velocity	S speed	V displacement
S Work	S mass	S kinetic energy

vector → magnitude + direction

scalar → magnitude only

6. Name at least four things that can NEVER go on a free-body diagram. [only for forces]

- acceleration
- velocity
- mass
- time
- distance
- displacement

7. Write two expressions for impulse. What are the units of impulse?

$J = m \cdot \Delta V = F \cdot t$

8. In what kind of collision is momentum conserved? In what kind of collision is kinetic energy conserved?

Elastic (Bounce) $m_1v_1 + m_2v_2 = m_1v_1' + m_2v_2'$

Inelastic (stick together) $m_1v_1 + m_2v_2 = (m_1+m_2)V_f$

- Momentum is conserved on both type of collisions
- Kinetic energy is ONLY conserved on elastic collisions

9. What is the mass of a block with weight *W*?

$\frac{W}{10} = \frac{mg}{10}$

10. A ball is thrown straight up. At the peak of its flight, what is the ball's acceleration?

$a = 10 m/s^2 \downarrow$

Be sure to give both magnitude and direction.

11. A mass experiences a force vector with components 30 N to the right, 40 N down. Explain how to determine the magnitude and direction (angle) of the force vector.

The magnitude of the resultant force is found by using Pythagorean theorem, getting 50N. The angle of the resultant force is calculated by taking the inverse tangent of the vertical over the horizonal. $\tan^{-1}(40/30)=$

12. Write the definition of the coefficient of friction, μ. What are the units of μ?

$\mu = \frac{F_f}{F_N}$ μ has no units

13. How do you find acceleration from a velocity-time graph? slope

14. How do you find displacement from a velocity-time graph? Area under the curve

15. How do you find velocity from a position-time graph? slope

16. An object has a positive acceleration. Explain *briefly* how to determine whether the object is speeding up, slowing down, or moving with constant speed?

Acceleration is not zero → object cannot be moving @ constant speed.
positive acceleration → object is speeding up!

17. Given the velocity of an object, how do you tell which direction that object is moving?

An object always moves in the direction indicated by the velocity.

18. When is the gravitational force on an object *mg*? When is the gravitational force Gm_1m_2/r^2 ?

Near the surface of a planet, mg gives the gravitational force. Newton's Law of gravitation, Gm_1m_2/r^2 is valid everywhere in the universe.

19. What is the direction of the net force on an object that moves in a circle at constant speed?

An object in uniform circular motion experiences a centripetal, meaning "center seek-ing" force.

20? Under what conditions is the equation $x-x_0 = v_0t + 1/2at^2$ valid? When can you use the kinematics equations?

All 3 kinematics equations are valid only when acceleration is constant.