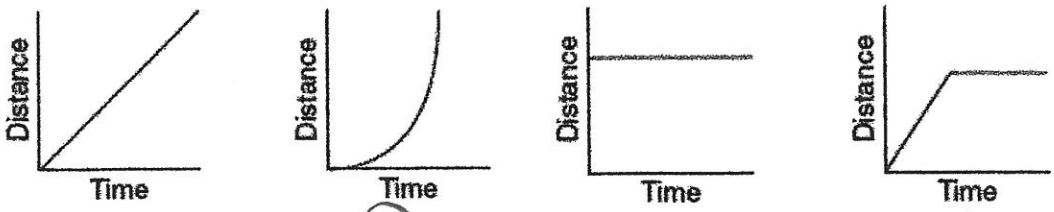
Physics Review Quiz Name_____

For each question answer to the best of your ability using the padlet and formula sheet. Each problem is worth 2 points.

1. Which of the following graphs shows constant acceleration of an object?

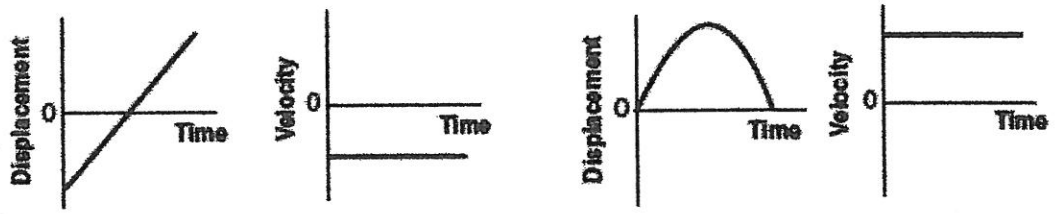



a. b. c. d.

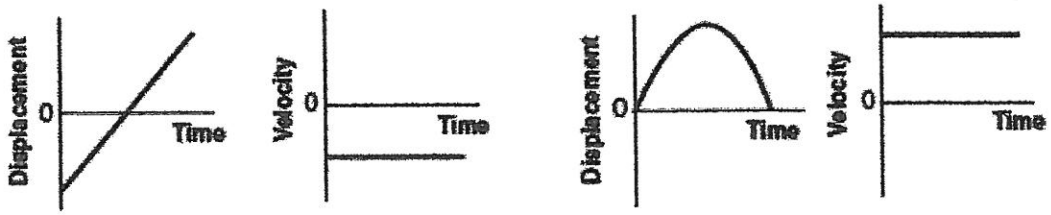
2. Which of the following measurements is *not* a vector quantity?
a. acceleration
b. displacement
c. speed
d. velocity

3. Which pair of graphs represents the same motion of an object?

none of these




a. b.




c. d.

7.6m

4. A squirrel drops and acorn from a tree branch that is ~~25 ft~~ off the ground.
How long is the acorn in the air ?

Sketch: Given: Solve:

$\Delta x = 7.6m$
$a = 10 m/s^2$
$\Delta t = ?$

$\Delta x = \frac{1}{2} a t^2$
$7.6 = \frac{1}{2} 10 (t^2)$
$1.52 = t^2$

Answer: $t = 1.23s$

5. Dealing with the same nut/squirrel in problem 1, how fast is the nut traveling when it hits the ground ?

Sketch: Given: Solve:

$a = 10 m/s^2$
$\Delta t = 1.23s$
$\Delta V = ?$

$a = \frac{\Delta V}{\Delta t}$
$10 = \frac{\Delta V}{1.23}$

$\Delta V = 10 \times 1.23$

Answer: $\Delta V = 12.3 m/s$

6. A toy rocket is shot straight up into the air with an initial speed of 45.0 m/s
What is the highest point it will reach above the ground ?

Sketch: Given: Solve:

$V_0 = 45 m/s$
$V_1 = 0 m/s$
$a = 10 m/s^2$
$\Delta x = ?$

$V_1^2 = V_0^2 + 2a\Delta x$
$0^2 = (45^2) + 2(10)\Delta x$
$-2025 = 2(10)\Delta x$
$\frac{-2025}{20} = \Delta x$

Answer: $\Delta x = 101m$

7. Referring to the toy rocket in the previous problem, how long is the rocket in the air ?

Sketch: Given: Solve:

$a = 10 m/s^2$
$\Delta x = 101m$
$t = ?$

$\Delta x = \frac{1}{2} a t^2$
$101 = \frac{1}{2}(10) t^2$
$20.3 = t^2$

Answer: $t = 4.5s$

8. What is the final velocity of the rocket as it returns Earth as described above? (1 point)

$a = 10 m/s^2$ $V_0 = 0$
$t = 4.5s$ $V_1 = ?$

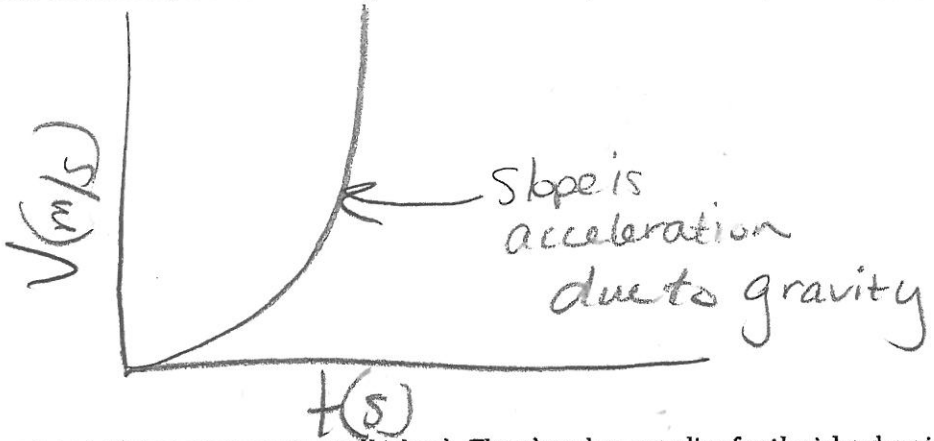
$a = \frac{V_1 - V_0}{\Delta t}$ $10 = \frac{V_1 - 0}{4.5s}$ $V_1 = 10 \times 4.5$

$V_1 = 45 m/s$

9. What is assumptions are made when considering "ideal conditions"(3 points – 3 items)

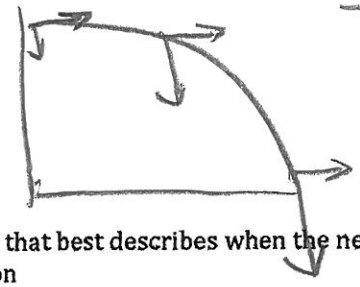
A. closed system
B. $g = 9.8 m/s^2$
C. no air resistance (frictional force)

10. Sketch the relationship between velocity and time of an object in free-fall (label axes)(2pts)




11. A cargo plane is flying over a very small island. The plane has supplies for the islanders in a crate that must be dropped into a special Materials Incoming Transport Trap (M.I.T.T). Let's suppose the plane is flying horizontally at a speed of 125 m/s. It maintains a constant altitude of 200 m. Assume there is no air resistance acting on the crate when it is dropped. How far before reaching the M.I.T.T should the cargo be launched ?

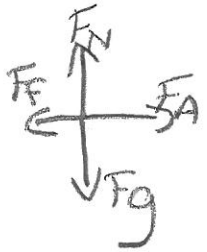
a. sketch the scenario
b. draw a vector diagram of the trajectory at start, middle, and end of flight



→ velocity is constant
↓ acceleration due to gravity

12. The term that best describes when the net forces on a object equal zero:
a. acceleration
b. equilibrium
c. apparent weight
d. periodic motion

13. A student standing on a skateboard pushes on a wall and accelerates to the right (east). Draw a force body diagram of the student.




$F_N$ = normal force (due to contact)
$F_A$ = applied force (push/pull)
$F_g$ = gravitational force
$F_f$ = frictional force (rolling friction)

14. A force of 10 N is exerted to the right on a 25 N wooden crate in an attempt to move a box across a wooden floor, which has a coefficient of friction of 0.30.
What is the force of friction between the floor and the crate as described above?
a. 3 N
b. 7.5 N
c. 75 N
d. 750 N

$F_f = \mu F_N$

$F_f = .3 \times 7.5$

$F_f = ?$
$\mu = .3$
$F_g = F_N = 7.5$

15. What is the spring constant if a spring averages a stretch if 0.001 meter when a 4 Newton force is applied?

a. $2.5 \times 10^{-4}$ N/m
b. $2.5 \times 10^{4}$ N/m
c. $4.0 \times 10^{-3}$ N/m
d. $4.0 \times 10^{3}$ N/m

$F_{el} = -k\Delta x$ $\quad -k = \frac{4}{.001}$

$4 = -k(.001)$

$\Delta x = .001\,m$ $\quad K = -4000\ N/m$

$F_{el} = 4N$ $\quad$ - indicates direction

16. A helium filled party balloon is tied to a vase full of flowers on a table. What forces act on the balloon?

$F_T$ = tensional force


$F_g$ = gravitational force

17. A person is standing on (frictionless) ice, and is holding a heavy rock. According to Newton's 3rd Law of Motion, if the rock is tossed to the right, how will the person move?

a. to the right
b. to the left
c. person will remain in place
d. more information is required

18. Consider the head-on collision between a ladybug and the windshield of a high-speed bus. Which of the following statements are *false*?

a. The magnitude of the force encountered by the bug is greater than that of the bus.
b. The magnitude of the momentum change of the bug is greater than that of the bus.
c. The magnitude of the velocity change of the bug is greater than that of the bus.
d. all of the statements are in fact true

19. An air hockey puck with a mass of 50 grams is at rest on a frictionless table. It gets struck with a paddle with a mass of 250 grams and moving at 10 m/s. The paddle comes to a complete stop after contact with the puck. Given this information, what is the velocity of the puck after the impact?

elastic collision

before = after

$\Delta P = \Delta P$

hockey stick + puck = hockey stick + puck

$m_1v_1 + m_2v_2 = m_1v_1 + m_2v_2$

$2.5 \times 10 + .05 \times 0 = 2.5 \times 0 + .05 \times v_2$

$2.5 = .05 \times v_2$

$\frac{2.5}{.05} = v_2$

$50\,m/s = v_2$