Name:

COLONIAL CHRISTIAN SCHOOL

Physical Science - Math Worksheet - Kinetics and Dynamics

Example: A Car moving North at **5.0 m per second** smoothly **accelerates to 20.0 m per second** in **3 seconds**. Calculate the car's **acceleration**. North is +.

$$a_{avg} = \frac{v_t - v_i}{\Delta t}$$

a_{avg} = (20m/s)-(5m/s)/3s
a_{avg} = 5 m/s^2

1. A car **moving at +20 m/s** smoothly **slows to a stop**, 0 m/s in 6.0 secs. **Calculate the acceleration** of the car. East is positive
2. Kevin dropped a 45 lb disk out of his second story window. The disk starts from rest and hits the sidewalk 1.5s later with a velocity of 14.7 m/s. Find the average acceleration of the disk.
3. Hansel's father's car accelerates from 0m/s to 45 m/s northward in 5 seconds. What is the acceleration of the car?

Example: A 2000kg dump truck is travelling East at 8.0m/s. What is its momentum? p=mv

p = (2000kg)(8.0/s)
p = 16000kgm/s

1. Ameris is driving her new 2000kg car away at 26 m/s. What is the momentum of the car?
2. Alaina is about to catch a 0.55kg kick ball travelling toward her at -25m/s. What is the momentum of the kickball?

Name:

COLONIAL CHRISTIAN SCHOOL

3. Xavier throws a 400 g football 20 m/s to his friend Santiago running directly away from him at 10m/s . What is the football's momentum from Santiago's point of view?
4. Alaina's bicycle has a momentum of 25.00 kg·m/s and a velocity of 2.5 m/s. What is the bicycle's mass?
5. Wimpy science teacher Bouwsma needs to tackle Barnett "the Powerful" in a faculty meeting. Bouwsma's mass is 55.0 kg and Barnett's is 100.0 kg. Barnett is running at a velocity of 3.0 m/s directly toward Bouwsma. What is the minimum velocity Bouwsma needs to stop Barnett's forward momentum?

Example: The Mars rover Curiosity has a mass of 899 kg. How much would it weigh on Earth? Earth has a gravity constant of 9.81 m/s^2.

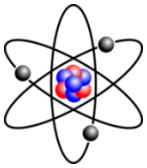
$W=mg$

$W=(899kg)(9.81\ m/s^2)$
$W=8819\ kgm/s^2$
$W=8820\ N$ Cut to sigfigs, and a kgm/s^2 is the same as a Newton

1. The Moon has a gravity constant of 1.62m/s2. How much would Peter weigh on the Moon, if he weighs 100kg on earth?
2. If Amanda weighs 105lb on Earth, and a kg is 2.2 lb, how many Newtons would she weigh?
3. The Mars rover Curiosity has a mass of 899 kg. How much would it weigh on Mars? Mars' gravity is only 38% as strong as Earth's.

Name:

COLONIAL CHRISTIAN SCHOOL



Example: How much force is required to accelerate a 2kg mass at 3 m/s^2? F=ma

F=ma
F = (2kg)(3m/s^2)
F = 6kgm/s^2 = 6N

1. During a water fight, how much force is required to accelerate a 12kg mass of ice water at 5m/s^2?
2. A Falcon 9 rocket has a thrust of 6 million Newtons and a loaded mass of 500,000 kg. What is the rocket's acceleration?
3. Two women, Euodia and Syntyche, are fighting over a 2kg steak. Euodia pulls it North with a force of 4N. Syntyche pulls it South with a force of 2N. What is the acceleration of the steak?
4. A Borris Badenoff drops a 1000 kg anvil off a cliff directly above Bullwinkle the Moose. What is the force behind the falling anvil?