Name:_____

Group:_____

GERC

Step 1: Given

Write down what you have been given from the problem.

Problem: A spring pulls with 30N on a 6kg cart. Find the acceleration that occurs.

F = ← Make sure that you always write in the units!!!
m =
a =

You will be using this format in order to solve your physics story problems.

Step 2: Equation

Use your equation chart to determine which equation you need in order to solve the problem.

F = 30N
m = 6kg
a = ?

$F=m*a$
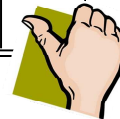
Force	Variable	Unit
F=m*a	Force	N
△ (F / m a)	mass	kg
	a	m/s²

Step 3: Rearrange

Rearrange the formula so that the variable you are trying to solve for is by itself on one side of the equation.

F = 30N
m = 6kg
a = ?

Cover up the variable that is not known in order to find the rearranged equation.

Force	Variable	Unit
F=m*a	Force	N
△ (F / m)	mass	kg
	a	m/s²

Step 4: Calculate

Substitute all the known variables into the rearranged equation and solve the problem

F = 30N
m = 6kg
a = ?

$$a = \frac{\ }{\ } =$$

Make sure that you write in the units when you substitute the knowns in to the variables.

Circle your final answer!

CAUTION "If you don't bother to use the GERC format, I won't bother to grade your homework!"

-Neddo

How to do the Algebra

Notation — Addition and subtraction are notated the same in physics equations as in basic mathematics, but not so for multiplication or division.

Two letters or numbers next to each other show multiplication.
$F = ma = m \times a$

A letter below another letter means division.
$v = \frac{d}{t} = d \div t$

Equations are Equal — The equal sign means that both sides are equal. Therefore, anything done to one side must be done to the other or the equation is no longer equal.

Equal → $35 = v_f - 10$
Not Equal → $35 = v_f - 10 + 10$

Equal → $35 = v_f - 10$
Still Equal → $35 + 10 = v_f - 10 + 10$

The Algebra — The following shows only the four most common algebraic operations. There are many more. They will be presented to you as necessary.

Division Moves Multiplication

Variables	Numbers
$F = ma$	$35 = 7a$
$\frac{F}{m} = \frac{\cancel{m}a}{\cancel{m}}$	$\frac{35}{7} = \frac{\cancel{7}a}{\cancel{7}}$
$\frac{F}{m} = a$	$5m/s^2 = a$

Subtraction Moves Addition

Variables	Numbers
$F_{net} = F_1 + F_2$	$15 = F_1 + 6$
$-F_2 = F_1 + \cancel{F_2} - \cancel{F_2}$	$15 - 6 = F_1 + \cancel{6} - \cancel{6}$
$F_{net} - F_2 = F_1$	$9N = F_1$

Multiplication Moves Division

Variables	Numbers
$P = \frac{W}{t}$	$12 = \frac{W}{3}$
$Pt = \frac{W}{\cancel{t}}\cancel{t}$	$12(3) = \frac{W}{\cancel{3}}\cancel{3}$
$Pt = W$	$36 \text{ J} = W$

Addition Moves Subtraction

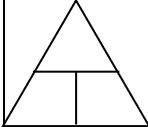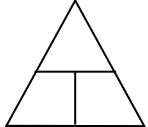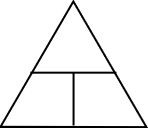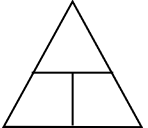| Variables	Numbers
$\Delta V = V_f - V_i$	$24 = V_f - 8$
$\Delta V + V_i = V_f - \cancel{V_i} + \cancel{V_i}$	$24 + 8 = V_f - \cancel{8} + \cancel{8}$
$\Delta V + V_i = V_f$	$32 m/s = V_f$

Order Matters! — "Please Excuse My Dear Aunt Sally" will help you remember you order of operations: Parenthesis; Exponents; Multiply; Divide; Add; Subtract.

Correct
$2(4-2) + 3 = 2(2) + 3 = 4 + 3 = 7$

Incorrect
$2(4-2) + 3 = 2(2) + 3 = 2(5) = 10$

Force	Variable	Unit	Speed	Variable	Unit

Acceleration	Variable	Unit	Work	Variable	Unit

A bike moves 30 meters in 5 seconds. *Calculate the speed of the bike.*		*A car starts at rest. After 4 seconds it is going 24m/s.* *What was the car's acceleration?*	
Given:	Rearrange:	Given:	Rearrange:
Equation:	Calculate	Equation:	Calculate
A 12 N force pushes on a 3 kg object. *Find the object's acceleration.*		*A 10 N force pushes for 3 m.* *How much work was done on the object?*	
Given:	Rearrange:	Given:	Rearrange:
Equation:	Calculate	Equation:	Calculate

Using the same format as above,
solve the following problems.

A bike goes 10m/s for 20 seconds. Calculate how far the bike traveled.

A 2kg object is accelerating at 12m/s^2. How much force was applied to move the object?

If a person pushes with 3 N and does 18 J of work, how far did they push the object?

Challenge Problems

A person walks 240 meters at 3 m/s. How long did it take?

Grandma lives 120 miles away. Dinner is at 5 p.m. The speed limit is 60 mph. What time do you need to leave to be on time? (Hint, do not convert the units.)