

Name: _____
 Period: _____

**Word Problem Primer -
 How to Solve Word Problems**

"How R U?"

You know that this means "How are you?". It is shorthand, abbreviation, "code"; it is a quicker way to write. Well, so is $F=ma$; you just don't know *the code* yet.

$F = ma$
Formulas are just shorthand.

Learn what the letters stand for.

In order to read "the code" you have to know what the letters stand for. This table will tell you many of them.

There will be other letters, too. You will have to add them as you learn them.

Variables Defined with Units		
Variable	Quantity	Standard Units
a	acceleration	m/s^2
D	distance	m (meters)
E	energy	J (joules)
F	force	N (newtons)
F_w	force of weight	N (newtons)
g	acceleration due to gravity	$g = 9.8 m/s^2$
m	mass	kg (kilograms)
p	momentum	kgm/s
S	speed	m/s
T	time	sec, min, or hr
v	velocity	m/s
MA	mechanical advantage	no units

$F = ma$
*F is force (in N)
 m is mass (in kg)
 a is acceleration (in m/s^2)*

The units are VERY important because word problems will not tell you what letters stand for, but the UNITS will..

Learn what you're supposed to do with the letters: math.

Once you know what the letter mean, you have to know what math function to perform. This table will tell you.

The Math Code		
$m + a$	is add	means m plus a
$m - a$	is sub	means m minus a
ma	is multi	means m times a
m/a	is div	means m divided by a

$F = ma$
Means Force equals the mass times the acceleration.

Learn how to move the numbers around in the formulas. (There is a formula chart on the back.)

Often you will have to solve for a different letter in the formula. You will have to know how to use math to do this.

To Move Letters in Formulas	
If $m + a$	then subtract by m or a
If $m - a$	then add by a
If ma	then divide by m or a
If m/a	then multiply by a

Make sure what ever you do to one side of an equation do to the other side, too or the equation is no longer equal!

If $F = ma$
Then to get "a", divide by "m" on both sides:

$$\frac{F}{m} = \frac{ma}{m}$$
 m's cancel on right side
 So, $a = \frac{F}{m}$

Use a five-step process to solve word problems.

5 Steps to Solve Word Problems	
Step 1	Assign letters (variables) to the numbers given
Step 2	Find a formula that uses those variables
Step 3	Solve for the letter you are trying to find
Step 4	Put the numbers in for the variables (letters)
Step 5	Calculate an answer (don't forget units)

We will do a few examples on the back of this paper.

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Δ means "change of" ("delta"). So ΔS is "delta S" and means "change of speed". ΔT is change of time.

Formula Chart

(Add other formulas here)

$S = \Delta D / \Delta T$ $A = \Delta S / \Delta T$ $\Delta T = T_2 - T_1$ $\Delta D = D_2 - D_1$ $S_{\text{average}} = D_{\text{total}} / T_{\text{total}}$	$F_{\text{net}} = ma$ $F_{\text{net}} = F_{\text{pos}} - F_{\text{neg}}$ $F_w = mg$ $p = mv$ $m_L V_L = m_R V_R$	$MA = F_{\text{out}} / F_{\text{in}}$ $MA = D_E / D_R$ $\text{Arm}_{\text{in}}(F_{\text{in}}) = \text{Arm}_{\text{out}}(F_{\text{out}})$	
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Use the units to match the variables on the left with the quantities on the right	What do these variables mean?	What is Δ and what does it mean?
1. a = _____	1. E _____	
2. S or v = _____	2. a _____	What is ΔD and what does it mean?
3. m = _____	3. S _____	
4. D = _____	4. D _____	A car starts 3 meters away and ends up 14 meters away. What is ΔD for the car?
5. F = _____	5. F _____	
6. p = _____	6. p _____	A car leaves at 2:00 p.m. and arrives at 4:30 p.m. Find ΔT .
7. T = _____	7. T _____	
8. E = _____	8. MA _____	
9. MA = _____	9. v _____	
	10. m _____	

Fill in the math functions	How do you break these up?
$ma = m$ _____ a	$S = \Delta D / \Delta T$ To move ΔT you would have to: _____
$S/T = S$ _____ T	$T = T_2 - T_1$ To move T_1 you would have to: _____
$T_2 - T_1 = T_2$ _____ T_1	$F = ma$ To move m you would have to: _____
$mv = m$ _____ v	$A = \Delta S / \Delta T$ To move ΔT you would have to: _____
$F/m = F$ _____ m	$p = mv$ To move v you would have to: _____
$T_1 + T_2 = T_1$ _____ T_2	$D = D_2 - D_1$ To move D_1 you would have to: _____
$D_{\text{total}} / T_{\text{total}} = D_{\text{total}}$ _____ T_{total}	$S_{\text{average}} = D_{\text{total}} / T_{\text{total}}$ To move T_{total} you would have to: _____

Equation: $\Delta T = T_2 - T_1$; solve for T_2 .	Equation: $F = ma$; solve for a.	Equation: $S = \Delta D / \Delta T$; solve for ΔD .	Equation: $A = \Delta S / \Delta T$; solve for ΔT .
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A car travels 40 meters in 10 seconds. Calculate the car's speed.		A car starts at rest and accelerates to 50 m/s in 5 seconds. Calculate acceleration.		A car travels at 60 mph for 10 hours. Calculate the distance it travels.	
Step 1: variables	Step 3: Solve for final variable	Step 1:	Step 3:	Step 1:	Step 3:
	Step 4: Put in numbers		Step 4:		Step 4:
Step 2: formula	Step 5: Calculate answer	Step 2:	Step 5:	Step 2:	Step 5: