1) You can read the problem and try to solve it by yourself then check the answer.
OR
2) You can cover up the answers and uncover each step as the page progresses.

Problem 1:
A 25 kg box is pulled by a 125 newton force.
What acceleration will it have?

Step 1: assign letters (variables) to the numbers given and to what you are looking for:

m = 25 kg F = 125 N a = ?

Step 2: Find an equation that fits these variables:

F = ma (Newton's second law) - means m multiplied by a

Step 3: Solve for the variable you are looking for:

(Note: If the equation is already solved for what you are looking for [like the F in F = ma] you can skip this step.)

Since ma is multiplication, then to get a by itself, divide by a on both sides:

$\frac{F}{m} = \frac{ma}{m}$ and the m's cancel on the right side

So: $a = \frac{F}{m}$ which means a = F ÷ m

Steps 4 and 5: Put the numbers in and calculate an answer:

$a = \frac{F}{m} = \frac{125\ N}{25\ kg} = 5\ m/s^2$ - remember that acceleration is in m/s^2 (look on the letter chart).

Problem 2:
A plane stops from 250 m/sec in 10 seconds. What was its acceleration?

Step 1: assign variables to the numbers given and to what you are looking for:

$S_1 = 250$ m/s $S_2 = 0$ m/s
ΔT (change of time) = 10 secs.
a = ?

Step 2: Find an equation that fits these variables:
Here we have 2 equations: $\Delta S = S_2 - S_1$ and $a = \frac{\Delta S}{\Delta T}$

Step 3: Solve for the variable you are looking for:
(For this problem we don't have to do this step.)

Steps 4 and 5: Put the numbers in and calculate an answer:
To calculate the acceleration, first we must get ΔS.

So, $\Delta S = 0$ m/s – 250 m/s = -250 m/s
(the ΔS is negative because it stops from 250 m/s)

So, $a = \frac{\Delta S}{\Delta T} = \frac{-250\ m/s}{10\ s} = -25$ m/s2

Problem 3:
A lever has an input arm of 25 m and an output arm of 5 m.
How much force would it take to lift a 100N with this lever?

Step 1: $Arm_{in} = 25$ m $Arm_{out} = 5$ m $F_{out} = 100$ N $F_{in} = ?$

Step 2: $Arm_{in}(F_{in}) = Arm_{out}(F_{out})$

Step 3: since $Arm_{in}(F_{in})$ means multiplication, divide both sides by Arm_{in}: $Arm_{in}(F_{in})/Arm_{in} = Arm_{out}(F_{out})/Arm_{in}$

Arm_{in} cancels on the left giving: $F_{in} = Arm_{out}(F_{out})/Arm_{in}$

Step 4 and 5: $F_{in} = 5$ m(100 N)/25 m or 5m X 100N ÷ 25m (use a calculator!)

$F_{in} = 20$ m

Problem 4:
A 40 kg boy throws a 2 kg ball to the left. The boy ends up going to the right a 2 m/s. How fast is the ball going?

Step 1: $m_{ball} = 2$ kg $v_{ball} = ?$ $m_{boy} = 40$ kg $v_{boy} = 2$ m/s

Step 2: $m_L v_L = m_R v_R$ (boy is m_R and v_R, ball is m_L and v_L)

Step 3: solve for v_L (ball) $m_L v_L = m_R v_R$

divide both sides by m_L $m_L v_L / m_L = m_R v_R / m_L$

m_L's cancel on the left giving: $v_L = m_R v_R / m_L$

Step 4 and 5: $v_L = 40$kg (2m/s)/ 2kg = (80kgm/s) / 2 kg

kgs cancel out giving us: $v_L = 40$ m/s

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

Formula Chart

(Add other formulas here)

$S = \Delta D/\Delta T$ $A = \Delta S/\Delta T$ $\Delta T = T_2 - T_1$ $\Delta D = D_2 - D_1$ $S_{average} = D_{total}/T_{total}$	$F_{net} = ma$ $F_{net} = F_{pos} - F_{neg}$ $F_w = mg$ $p = mv$ $m_L v_L = m_R v_R$	$MA = F_{out}/F_{in}$ $MA = D_E/D_R$ $Arm_{in}(F_{in}) = Arm_{out}(F_{out})$		

"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.