Rules for expanding expressions

- **BEDMAS** (Brackets, Exponents, Division, Multiplication, Addition, Subtraction)

Rules for isolating variables in an expression

- **SAMDEB** (it's just BEDMAS in reverse)

1. Identify the terms in the expression (separated by addition and subtraction. If multiplication is involved the whole thing is a term made up of **factors**

$$\boxed{a^2} = \boxed{15bc} + \boxed{14} + \boxed{3ac(\sin(x^2-2))}$$

2. Start the isolation process by moving **terms to the other side**. In this example we'll isolate for **"x"**. The two terms "15bc" and "14" were ***"attached"*** through addition; therefore to bring them to the other side we use **subtraction.**

$$a^2 - 15bc - 14 = 3ac(\sin(x^2-2))$$

3. Now we only have one term left on the right-hand side (the **subtraction** you see in the brackets is buried deep within the **term**, we have to **"peel" the layers of algebra** away before we can deal with that buried term.). The next step is to take care of any **multiplication and/or division**.

   To bring the factors to the other side we do the ***opposite operation*** of the one that **"attaches"** them. "3ac" is **attached** to our bracket through **multiplication,** therefore to bring it over we use **division.**

$$\frac{a^2-15bc-14}{3ac} = (\sin(x^2-2))$$

   and now we can lose the extra brackets so we get

$$\frac{a^2-15bc-14}{3ac} = \sin(x^2-2)$$

4. Now on to the **sine function**. Trig functions behave like **multiplication** so to get ride of "**sin"** we have to do the **opposite operation** which is the **inverse of sin** or **arcsine** $(\sin^{-1})$

$$\sin^{-1}\left(\frac{a^2-15bc-14}{3ac}\right) = (x^2-2)$$

   and again we can lose the extra brackets. We've now "freed" two buried terms and must start **SAMDEB** over again

$$\sin^{-1}\left(\frac{a^2-15bc-14}{3ac}\right) = x^2-2$$

5. Now we have two terms on the right side again. The "2" is attached through subtraction, therefore to bring it to the other side we use **addition**.

$$2+\sin^{-1}\left(\frac{a^2-15bc-14}{3ac}\right) = x^2$$

6. And finally we are left with one **exponent**. The opposite to the **square** is **square root** therefore we take the **square root of both sides**

$$\sqrt{2+\sin^{-1}\left(\frac{a^2-15bc-14}{3ac}\right)} = x$$

and then we flip the equation around

$$x = \sqrt{2 + \sin^{-1}\left(\frac{a^2 - 15bc - 14}{3ac}\right)}$$

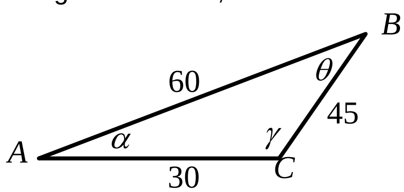
and that's it!

Examples:

1. Using SAMDEB, isolate for "x".

$$a^3 - 4\left(\frac{b - 4c}{\tan\left(x^3\right)}\right) = \frac{42}{d}$$

2. Using in SAMDEB, cosine and / or sine law, find all the unknown angles.



Sine Law

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c} \quad \textbf{or} \quad \frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Cosine Law

$$a^2 = b^2 + c^2 - 2bc\cos(A)$$

$$b^2 = a^2 + c^2 - 2ac\cos(B)$$

$$c^2 = a^2 + b^2 - 2ab\cos(C)$$