Algorithms for Solving Equations and inequalities :

Mathematical algorithm

A mathematical algorithm is a set of steps used to solve a problem. Properties of real numbers can help create algorithms for working with real numbers.

Equations

An equation is a mathematical sentence that shows two expressions are equal. You can solve an equation using an algorithm. The goal is to isolate the variable, x, on one side of the equation.

Activity 1

Solve the following equations. Work down the page. As you finish a step write the justification for what you did next to the step on the page. When you are finished you should have a two-column proof. The first column is the solution the second column is the explanation.

1. $2x - 6 = 0$

```
2x  -  6  =  0
     +  6    +6
---------------
2x  -  0  =  6
2x  =  6
2 / 2 x  =  6 / 2
1x  =  3
 x  =  3
```

2. $5x - 6 = 3x + 4$

```
5x  -  6  =  3x  +  4
-3x          -3x
----------------------
2x  -  6  =  0  +  4
2x  -  6  =  4
     +  6  =  +6
----------------------
2x  +  0  =  10
2x  =  10
2 / 2x  =  10 / 2
1x  =  5
 X  =  5
```

Sometimes the solution and the explanation for solving an equation are given to you with a mistake made. It then becomes your job to find where the mistake is made.

Inequality

The only difference between solving an equation and solving an inequality is that in an inequality whenever you multiply or divide by a negative number you turn the inequality symbol around so it faces the other direction (flip the symbol).

Writing Algorithms that explain mathematical processes :

To write an algorithm, write a series of steps that can be used to solve an equation or inequality.

Activity 1

Write an algorithm you would use to solve the following equation.

$$2x - 3 = 7$$
$$2x = 10$$
$$X = 5$$

Activity 2

Which of the following algorithms can be used to solve the following equation?

$$4x^2 + 10 = 54$$

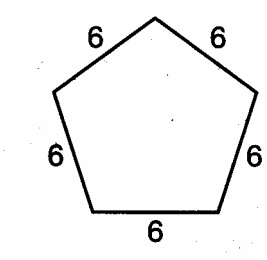
Algorithm 1	Algorithm 2	Algorithm 3
Divide both sides by 4.	Subtract 10 from both sides	Add 10 to both sides
Subtract 10 from both sides	divide both sides by 4	Divide both sides by 4
Take the square root of both sides	Take the square root of both sides	Take the square root of both sides

The answer is algorithm 2 .

Sometimes there is more than one algorithm to solve the same problem. Take, for example, finding the Perimeter of a square. One way is to find the sum of all the sides of the square. Another way is to use the formula which is $P = 4s$.

Activity 3

Write two different algorithms to find the perimeter of the polygon below.



P = 6 + 6 + 6 + 6 + 6

P = 12 + 12 + 6

P = 24 + 6

P = 30

OR

P = 5 • 6 = 30