

Example 1. A solved problem to start with

• **Directions:** Show that the following *algorithm*¹ produces a number that is four times the original number.

Algorithm: Pick a number. Multiply the number by 8, add 6 to the product, divide the sum by 2, and subtract 3.

• **Solution:** Let n represent the original number.

multiply the number by 8 :	$8n$
add 6 to the product :	$8n+6$
divide the sum by 2 :	$\frac{8n+6}{2}=4n+3$
subtract 3 :	$4n$

We started with n and ended with $4n$. Therefore the algorithm given in this example produces a number that is four times the original number.

Exercise 2. Check your progress

Show that the following algorithm produces a number that is three times the original number.

Algorithm: Pick a number. Multiply the number by 6, add 10 to the product, divide the sum by 2, and subtract 5.

Exercise 3. Your turn to create an algorithm!

Write an algorithm that, from the number x , produces $\sqrt{3x^2-5}$.

Exercise 4. In-class game "Guess what my function is"

1) Pick a function (it could be something like $f(x)=(2x-1)^3+5$ or $f(x)=2+\sqrt{4-x^2}$ or even $f(x)=\frac{(3x-5)^2+6}{x+2}$...etc) and write it on

a piece of paper without letting your neighbour see it. Put the paper face down.

2) Describe orally your function with an algorithm (in English of course!!!) to your neighbour and he/she will write the corresponding function down. When he/she is done, show him/her the paper with your function on it: Is it the same one? (It should be!)

3) Now it is your turn to guess your neighbour's function: Switch roles.

4) Finally, assess you team: You get one point for each function written correctly and one extra point for using English only (A single word of French, Wolof or Spanish and you lose that point!!). Allow yourselves an extra point if it was a "hard" function. What is you score?/3.

Useful words

- When you **square** x , you get x^2 (Read x *squared*).
- When you take the **inverse** of x , you get $\frac{1}{x}$ (Read "1 *over* x ").
- When you take the **square root** of x , you get \sqrt{x} .

Exercise 5. Arithmetic and algorithm

Consider the following algorithm: Pick an integer; Multiply it by 6; add 5 to the product; square the result; subtract 25.

- 1) Is it true that this algorithm will always yield a *positive* number?
- 2) Is it true that this algorithm will always yield a multiple of 5?
- 3) Is it true that this algorithm will always yield a multiple of 12?

Useful words

- " x is **positive**" means $x > 0$.
- " x is **nonnegative**" means $x \geq 0$.
- $x \geq 0$ reads " x is **greater than or equal to** zero."
- $x > 0$ reads " x is **greater than** zero"
- $x < 0$ reads " x is **less than** zero".

¹ An **algorithm** /'ælgə,rɪðəm/ is a sequence of instructions.