

# Notes & Steps



## Key idea

GEMA tells you the order to work in: **G**rouping symbols first, then **E**xponents, then **M**ultiplication and **D**ivision from left to right, then **A**ddition and **S**ubtraction from left to right.

## Steps

1. Do anything inside brackets first.
2. Work out powers such as  $3^2$ .
3. Multiply and divide from left to right.
4. Add and subtract from left to right.
5. If two versions look similar, brackets can completely change the value.

## Key facts

- ▶  $3 + 4 \times 2 = 11$ , not 14.
- ▶  $(3 + 4) \times 2 = 14$ .
- ▶  $18 \div 3 \times 2 = 6 \times 2 = 12$ .
- ▶  $2^3 + 5 = 8 + 5 = 13$ .
- ▶ Multiplication and division have equal priority.
- ▶ Addition and subtraction have equal priority.

## Common mistake

Doing addition before multiplication. In  $5 + 2 \times 3$ , you must do  $2 \times 3$  first, so the answer is 11, not 21.

## Try these

1. Evaluate  $6 + 3 \times 4$ .
2. Evaluate  $(6 + 3) \times 4$ .
3. Evaluate  $20 \div (2 + 3)$ .

# Notes & Steps



## Example 1: no brackets

Evaluate  $7 + 3 \times 2$ .

$$7 + 3 \times 2 = 7 + 6 = 13$$

Multiply first, then add.

## Example 2: brackets

Evaluate  $(7 + 3) \times 2$ .

$$(7 + 3) \times 2 = 10 \times 2 = 20$$

Brackets make the addition happen first.

## Example 3: left to right

Evaluate  $18 \div 3 \times 2$ .

$$18 \div 3 \times 2 = 6 \times 2 = 12$$

Do division and multiplication left to right.

## Example 4: powers

Evaluate  $2^3 + 4$ .

$$2^3 + 4 = 8 + 4 = 12$$

Work out the exponent before adding.