

# Message in a bracelet

## Learn to encipher and decipher using the genetic code

### Materials

- 20-30cm of elastic cord (enough to go around your wrist plus an extra 5-7cm to tie knots)
- Approximately 20-30 beads in 4 different colours (depends on the length of your message)

### How to encipher

- Tie a double knot in one end of your elastic cord
- Decide on your word or message to appear in the bracelet
- The different coloured beads represent the genetic code i.e. A = Green, U = Red, C = Blue, G = Yellow
- Using the genetic code table below find the sequence that corresponds to the first letter in your code word

**For example:** E for 'Emily' is GAA

**Note:** For some letters there are more than one correct coding combination, such as E which can also be GAG. In this instance simply chose which you would prefer to use

- Select the coloured beads to match the coding combination **For example:** GAA for E would be Yellow, Green, Green
- Thread the three beads onto your elastic cord in their coding order
- Continue to add to your bracelet using further sets of three beads until your word is complete

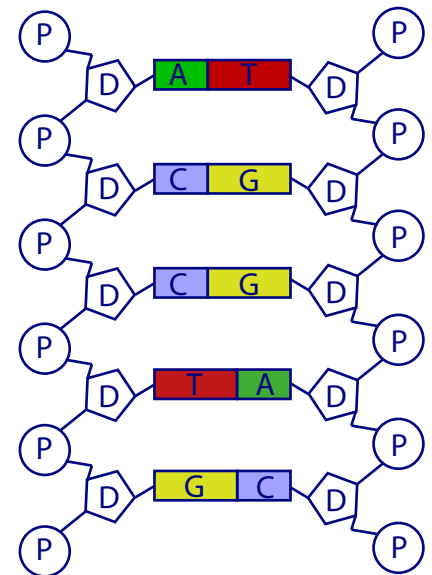
**For example:** 'Emily' could be GAA, AUG, AUC, CUG, UAC

- For longer messages of more than one word, separate the words using one of the 'stop' code triplets
- Tie a knot in the other end of the elastic cord, then tie the two ends together to make the finished bracelet
- See if you can decipher the message of a friend or family member using the code below.

### The Genetic Code

A A A	K	A G A	R	A C A	T	A U A	I
A A G	K	A G G	R	A C G	T	A U G	M
A A C	N	A G C	S	A C C	T	A U C	I
A A U	N	A G U	S	A C U	T	A U U	I
G A A	E	G G A	G	G C A	A	G U A	V
G A G	E	G G G	G	G C G	A	G U G	V
G A C	D	G G C	G	G C C	A	G U C	V
G A U	D	G G U	G	G C U	A	G U U	V
C A A	Q	C G A	R	C C A	P	C U A	L
C A G	Q	C G G	R	C C G	P	C U G	L
C A C	H	C G C	R	C C C	P	C U C	L
C A U	H	C G U	R	C C U	P	C U U	L
U A A	stop	U G A	stop	U C A	S	U U A	L
U A G	stop	U G G	W	U C G	S	U U G	L
U A C	Y	U G C	C	U C C	S	U U C	F
U A U	Y	U G U	C	U C U	S	U U U	F

Amino acids are the building blocks which make up proteins and are represented by the letters in black



Untwisted DNA ladder shows the 'backbone' of alternating Phosphate groups ('P') and Deoxyribose ('D') molecules to which the 'nucleotides' (A, T, C, G) attach

### The biology behind it

DNA is comprised of a long string of the four different 'bases' or 'nucleotides' (A, T, C, G), attached to the sugar and phosphate backbone. If all the DNA in an individual - its 'genome' - was a book, then a section of the DNA, referred to as a 'gene' would be a chapter. When a gene is copied it makes a molecule known as 'messenger RNA'. This RNA is written in the genetic code above (A, U, C, G). Each of the beads in your bracelet represent a nucleotide in the messenger RNA and the groups of three beads in your bracelet represent an amino acid. The cell is able to decipher the message to make a protein.

Amino acids have different properties which give proteins with different characteristics. For example, proteins high in C amino acids can form cross-links, such as those between the two chains of insulin.