Complex Numbers

All real numbers squared produce a positive answer.

A real numbers are all the positive/negative whole numbers, fractions and decimals, including those that can not be written as fractions

The equation $x^2 = -1$ has no real solution.
So a new imaginary number is defined:

$$i = \sqrt{-1}$$

Therefore $x^2 = -1$ has two solutions i and $-i$.

A complex number is made up of two parts, a real and an imaginary part.
For example: $2+3i,\ 3-i,\ 4i$ (which is also $0+4i$)

So if $i=\sqrt{-1}$, then $i^2 = (\sqrt{-1})^2 = -1$.
Then $i^3 = i^2.i = -i$,
and $i^4 = (i^2)^2 = (-1)^2 = 1$.
Find i^5, i^6, i^7 and i^8.

Complex numbers may be added, subtracted and multiplied.
So if $z_1 = 3+2i$ and $z_2 = 1-i$, then:

$$z_1 + z_2 = (3+2i)+(1-i)$$
$$=(3+1)+(2i+(-i))$$
$$=4+i$$

Add the real parts, then add the imaginary parts.

$$z_1 - z_2 = (3+2i)-(1-i)$$
$$=(3-1)+(2i-(-i))$$
$$=2+3i$$

Subtract the real parts, then subtract the imaginary parts.

$$z_1 z_2 = (3+2i)(1-i)$$
$$=3+2i-3i+(2i)(-i)$$
$$=5-i$$

Expand the brackets, then collect the real and imaginary parts.

Given that $z_1 = 3-2i$, $z_2 = 1+i$ and $z_3 = -1-i$, work out: $z_1 + z_2 + z_3$, $z_1 - z_2$, $z_1 z_2$, $z_2 - z_3$, $z_1^* z_1$.

We can a solve quadratic equation by completing the square (or use the formula if you prefer).

$$z^2 + 2z + 5 = 0$$
$$(z+1)^2 - 1 + 5 = 0$$
$$(z+1)^2 = -4$$
$$z+1 = \pm\sqrt{-4}$$
$$z = -1 \pm 2\sqrt{-1}$$
$$z = -1+2i \text{ and } -1-2i$$

Completing the square.

Remember that $i=\sqrt{-1}$.

Notice one solution is of the form $a+bi$, the other is of the form $a-bi$.
If $z = a+bi$, then $z^* = a-bi$ is called the conjugate of z.

Try to solve the equation:

$$z^2 - 2z + 10 = 0$$