Lesson 11

Non-Calculator

11.1 Starter

(**i**)   Find two numbers that multiply to give 22 and subtract to give 9.

(**ii**)   Find two numbers that multiply to give 21 and subtract to give 4.

(**iii**) Find two numbers that multiply to give 27 and subtract to give 6.

(**iv**)   Find two numbers that multiply to give 60 and subtract to give 17.

(**v**)   Find two numbers that multiply to give 24 and subtract to give 23.

(**vi**)   Find two numbers that multiply to give 30 and subtract to give 7.

(**vii**) Find two numbers that multiply to give 45 and subtract to give 4.

(**viii**) Find two numbers that multiply to give 100 and subtract to give 15.

(**ix**)   Find two numbers that multiply to give 39 and subtract to give 10.

(**x**)   Find two numbers that multiply to give 24 and subtract to give 5.

11.2 Factorising Quadratics
Previously, two types of factorisation problem where considered.

$$x^2 + 8x + 15 \qquad\qquad x^2 - 8x + 15$$

$$= (x + 3)(x + 5) \qquad\qquad = (x - 3)(x - 5)$$

11.3 Example

$$x^2 + 7x - 18$$

To factorise this, we need two numbers that multiply to give 18 and subtract to give 7.
Thus;

$$x^2 + 7x - 18$$

$$= (x - 2)(x + 9)$$

The bigger number gets the plus.

11.4 Exercise
Factorise;

(i) $\quad x^2 + x - 90$

Multiply to give 90, subtract to give 1

(ii) $\quad x^2 + 5x - 66$

Multiply to give 66, subtract to give 5

(iii) $\quad x^2 + 2x - 80$

Multiply to give 80, subtract to give 2

(iv) $\quad x^2 + 2x - 48$

Multiply to give 48, subtract to give 2

(v) $\quad x^2 + 3x - 18$

Multiply to give 18, ...

(vi) $\quad x^2 + 5x - 24$

Multiply to give 24, ...

(vii) $\quad x^2 + x - 20$

(viii) $\quad x^2 + 4x - 21$

(ix) $\quad x^2 + 2x - 15$

(x) $\quad x^2 + 5x - 6$

11.5 Example

The last type of problem is a quadratic with two minus signs, such as

$$x^2 - 7x - 18$$

To factorise this, we again need two numbers that multiply to give 18 and subtract to give 7.

$$x^2 - 7x - 18$$

$$= (x + 2)(x - 9)$$

This time, however, the bigger number gets the minus.

11.6 Exercise

Factorise;

(i) $x^2 - 6x - 27$
Multiply to give 27, subtract to give 6

(ii) $x^2 - 4x - 60$
Multiply to give 60, subtract to give 4

(iii) $x^2 - 2x - 63$
Multiply to give 63, subtract to give 2

(iv) $x^2 - 5x - 36$
Multiply to give 36, subtract to give 5

(v) $x^2 - 3x - 18$
Multiply to give 18, ...

(vi) $x^2 - 2x - 99$
Multiply to give 99, ...

(vii) $x^2 - 3x - 88$

(viii) $x^2 - x - 12$

(ix) $x^2 - 4x - 45$

(x) $x^2 - x - 42$