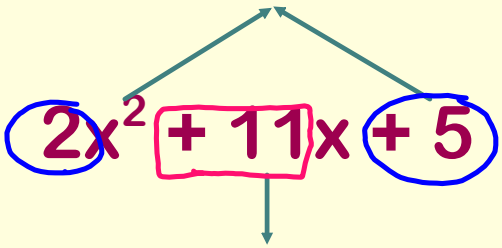
8.5 - 8.6 FACTORING $ax^2 + bx + c$

1. Factor $2x^2 + 11x + 5$. ← descending

STEP 1: Make a sum and product chart.

Multiply the coefficient and the constant to find the PRODUCT.



The coefficient for the middle term is the SUM.

Start ↓ 2 · 5

addition

SUM 11	PRODUCT 10
1 + 10	1 · 10
	~~1 · −10~~
	~~2 · 5~~
	~~−2 · −5~~

STEP 2: Divide each number by the coefficient of the first term.

~~If possible, reduce.~~

$\frac{1}{2}$ $\frac{10 \div 2}{2 \div 2} = \frac{5}{1}$

STEP 3: To put in factored form as two binomials, the denominator becomes the coefficient of the first term and the numerator becomes the coefficient of the last term.

denom → front num. → back

$(2x + 1)(1x + 5)$

2. Factor $3 + 10p + 3p^2$.

SUM 10	PRODUCT 9 (3·3)
1+9	1·9
	~~-9·-1~~
	~~3·3~~
	~~-3·-3~~

$\frac{1}{3}$ $\frac{9\div3}{3\div3}=\frac{3}{1}$

$(3+1p)(1+3p)$

3. Factor $5m^2 - 7mn + 2n^2$.

SUM −7	PRODUCT 10 (5·2)
	~~1·10~~
	~~-1·-10~~
	~~2·5~~
−2+−5	−2·−5

$\frac{-2}{5}$ $\frac{-5\div5}{5\div5}=\frac{-1}{1}$

$(5m-2n)(1m-1n)$

4. Solve $8k^2 - 16k + 6 = 0$.

GCF = 2

SUM −8	PRODUCT 12 (4·3)
	~~1·12~~ ~~−1·−12~~
−2 + −6	~~2·6~~ −2·−6
	~~3·4~~ ~~−3·−4~~

$2(4k^2 - 8k + 3) = 0$

$\frac{-2 \div 2}{4 \div 2} \rightarrow \frac{-1}{2}$ $\quad \frac{-6 \div 2}{4 \div 2} \rightarrow \frac{-3}{2}$

$2(2k - 1)(2k - 3) = 0$

$2 \neq 0$

$2k - 1 = 0$
$+1 \quad +1$
$\frac{2k}{2} = \frac{1}{2}$
$k = \frac{1}{2}$

$2k - 3 = 0$
$+3 \quad +3$
$\frac{2k}{2} = \frac{3}{2}$
$k = \frac{3}{2}$

5. Solve $8h^3 - 6h^2 - 9h = 0$.

GCF = h

SUM −6	PRODUCT −72
	−1·72 1·−72
6 + −12	−2·36 2·−36
	−3·24 3·−24
	−4·18 4·−18
	6·−12
	−8·9 8·−9

$h(8h^2 - 6h - 9) = 0$

$\frac{6}{8} \rightarrow \frac{3}{4}$ $\quad \frac{-12}{8} \rightarrow \frac{-3}{2}$

$h(4h + 3)(2h - 3) = 0$

$h = 0$

$4h + 3 = 0$
$-3 \quad -3$
$\frac{4h}{4} = \frac{-3}{4}$
$h = -\frac{3}{4}$

$2h - 3 = 0$
$+3 \quad +3$
$\frac{2h}{2} = \frac{3}{2}$
$h = \frac{3}{2}$