Craigieburn Secondary College

Best Practice #1

AusVELS 10.0 Students will be able to factorise monic quadratic expressions using a variety of strategies.

Factorising by Common Factor		
Step 1	Write the question	Factorise $15bc - 9cd + 3ce$
Step 2	Find the highest common factor for all terms	Highest common factor is 3c
Step 3	Write the highest common factor on the left hand side of a bracket and then write the multiples inside the bracket. The terms in the brackets should have no common factor.	3c (5b – 3d + e)

Factorising in pairs		
Step 1	Write the question	Factorise 5x + 3y + xy + 15
Step 2	Notice that 5x and 15 have a common factor of 5. Notice that 3y and xy have a common factor of y. Rewrite the expression in this order: 5x + 15 + xy + 3y	5x + 15 + xy + 3y
Step 3	Now factorise the first pair and the second pair of terms separately. Write the highest common factor on the left hand side of a bracket and then write the multiples inside the bracket. The terms in the brackets should have no common factor.	5(x + 3) + y(x + 3)
Step 4	(x + 3) is now a common factor, so write it on the left hand side of a bracket and then write the5 and y in another bracket.	(x + 3)(5 + y)

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Factorising Difference of Two Squares		
Step 1	Write the question	Factorise $w^2 - 16$
Step 2	Indicate ➢ Sometimes an algebraic expression doesn't have any common factors. ➢ We can look for perfect squares ➢ If an algebraic expression consists of 2 perfect squares, one subtracted from the other, then we say this is a difference of two squares. ➢ We can factorise by finding the square root of each of the terms.	w^2 and 16 are perfect squares w is the square root of w^2 4 is the square root of 16
Step 3	Take the square root of each term and write them in 2 brackets. Have one bracket with a subtraction sign, the other with an addition sign. This is the rule for factorising a difference of two squares. NB. This also works for expressions where one of the two terms are not perfect squares. We leave the term with a square root sign. Example: $x^2 - 5 = (x - \sqrt{5})(x + \sqrt{5})$	$w^2 - 16 = (w - 4)(w + 4)$

Factorising Perfect Squares		
Step 1	Write the question	Factorise $y^2 + 10y + 25$
Step 2	Indicate: ➢ The first term is a perfect square ➢ The last term is a perfect square ➢ The middle term is twice the product of the square root of the first term and the square root of the last term Take the square root of each term and write them in 2 brackets. Have both brackets with the same sign, in this case	$y^2 + 10y + 25 = (y + 5)(y + 5)$

	positive as the middle term is positive. This is the rule for factorising perfect two squares.	
Step 3	Since the two brackets are identical, rewrite the answer with one bracket to the power of 2	$(y + 5)(y + 5)= (y + 5)^2$

Factorising a Quadratic Trinomial		
Step 1	Write the question	Factorise y^2+3y-4
Step 2	Indicate: ➢ A quadratic trinomial is an algebraic expression that has 3 terms and the highest power is a squared term. To factorise a quadratic trinomial, we need to find the two values that when multiplied, equal the last term and when added, equal the middle term.	-1 multiplied by 4 equals -4 -1 added to 4 equals 3
Step 3	Take the two values of -1 and 4 and place into each bracket NB. Sometimes you need to take out a common factor beforehand. For example: $2y^2 + 14y + 24$ has a common factor of 2. So $2(y^2 + 7y + 12) = 2(y +3)(y + 4)$	$y^2+3y-4 = (y -1)(y + 4)$

Best Practice #1

Factorising by Completing the Square		
Step 1	Write the question	Factorise $x^2 + 6x + 2$
Step 2a	Add a third term to the first two terms to make a perfect square. For $x^2 + 6x + 2$, take the middle term (middle term has coefficient 6), halve and square it.	$x^2 + 6x + 2$ $\left(\frac{6}{2}\right)^2 = 3^2$ $= 9$
Step 2b	We add a 9 to obtain the perfect square $(x^2 + 6x + 9)$ Keep the 2 to add to the end	$(x^2 + 6x + 9) + 2$
Step 3	Subtract a 9 to keep the expression equivalent.	$(x^2 + 6x + 9) + 2 - 9$
Step 4	Simplify	$(x^2 + 6x + 9) + 2 - 9 = (x^2 + 6x + 9) - 7$
Step 5	Now use the perfect square and difference of two squares rules to factorise. $(x^2 + 6x + 9)$ is the perfect square $(x + 3)^2$ $(x^2 + 6x + 9) - 7$ is the difference between two squares written as $(x + 3)^2 - (\sqrt{7})^2$	$(x^2 + 6x + 9) - 7 = (x + 3)^2 - (\sqrt{7})^2$ $= (x + 3 - \sqrt{7})(x + 3 + \sqrt{7})$