

Factoring requires the use of algebra to find the "root(s)", ie, the values of "x", that satisfies the quadratic equation

- We will be seeing four different methods to factoring quadratic equations in order to find the "root(s)"/solution(s).
- Before using any one of these four methods, always try and simplify the equation by checking to see if there are any GCF that can be factored out of the equation first

Example 1: Factor the following

a) $6q^2 + 48q^3 - 24q^4$	b) $-8f^2g^4h^3 - 12f^3g^3h^2 + 16f^5g^2h^4$	c) $4m(m+2) - 7n(m+2)$
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Method 1: Punnet Square Method for solving roots

Factor $3a^2 + 8a + 4 = 0$

<table border="1"> <tr> <td style="padding: 5px;">×</td> <td style="width: 40px;"></td> <td style="width: 40px;"></td> </tr> <tr> <td style="border-top: 1px solid black;"></td> <td style="text-align: center; padding: 5px;">$3a^2$</td> <td style="border-right: 1px solid black;"></td> </tr> <tr> <td style="border-top: 1px solid black;"></td> <td style="border-right: 1px solid black;"></td> <td style="text-align: right; padding: 5px;">$+4$</td> </tr> </table>	×				$3a^2$				$+4$	<ol style="list-style-type: none"> 1. Find 2 #'s that if multiplied will give $3a^2$ 2. Find 2 #'s that if multiplied will give $+4$ 3. Use Punnet square like a times table. Make sure blanks, when combined, gives answer equal to middle term of quadratic equation 4. Once factored, equate each binomial to zero and find the roots, ie, solve for the variable
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	$3a^2$									
		$+4$								

Method 2: B.U.M. Method for solving roots

Factor $3a^2 + 8a + 4 = 0$

	<ol style="list-style-type: none"> 1. Eliminate 1st term coeff. by multiplying it with last term, then replace last term with this # 2. Factor by finding 2 #'s that multiply to last term and add to coeff. of 2nd term 3. Put 1st term coeff. to 1st terms of each binomial 4. "BUM"/factor out the GCF in each binomial 5. Equate each binomial to zero and find the roots
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Method 3: Decomposition Method for solving roots

Factor $3a^2 + 8a + 4 = 0$

	<ol style="list-style-type: none">1. Find 2 #'s that gives the product of 1st & 3rd term coeff. & the sum of 2nd term coeff.2. Use the 2 #'s to "split the middle term" into two terms3. Factor GCF from 1st two terms & GCF from last 2 terms4. Factor out the common binomial5. Equate each binomial to zero and find the roots
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Method 4: Criss-Criss Method for solving roots

Factor $3a^2 + 8a + 4 = 0$

	<ol style="list-style-type: none">1. Find two possible factors of 1st term coeff.2. Find two possible factors of last term coeff.3. Multiply the factors sideways, then add their products to see if it equals 2nd term coeff.4. "Criss-cross" 'x' values with 'constant' values to get binomials5. Equate each binomial to zero and find the roots
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Example 2: Find the roots for the following

a) $4g^2 + 4g - 15 = 0$	b) $15x^2 - 65x + 20 = 0$
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Example 3: The Sydney Harbor Bridge in Australia is one of the widest long-span bridges in the world. It carries two rail lines, eight road lanes, a bike lane, and a pedestrian walkway. If $10x^2 - 7x - 3 = 0$ represents the binomial dimensions of the length and width of the bridge, how long and wide is the bridge if $x = 50$ m?

Example 4: A 10 cm x 5 cm picture is to be surrounded by a mat before being framed. The width of the mat is to be the same on all sides of the picture and the area of the mat is to be three times the area of the picture. What are the dimensions of the mat?

Homework: