

Factoring Polynomial Expressions Lesson #3: Factoring Trinomials of the Form $x^2 + bx + c$ - Part Two

Review of Factoring By Inspection

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In order to factor $x^2 + bx + c$ by inspection, we need to find two integers which have a product equal to c and a sum equal to b . If no two such integers exist, then the polynomial cannot be factored.

In order to factor $x^2 + 6x + 9$, we need to find two numbers whose product is 9 and whose sum is 6. $\rightarrow (x+3)(x+3)$ or $(x+3)^2$

1 9
3 3
-1 -9
-3 -3

In order to factor $x^2 + x - 12$, we need to find two numbers whose product is -12 and whose sum is 1. $\rightarrow (x-3)(x+4)$

-1 12 1 -12
-2 6 2 -6
-3 4 3 -4

Recall the following points from the previous lesson.

- If the product is **positive**, then the two integers must be either **both positive** or **both negative**.
- If the product is **negative**, then one integer is **positive** and the other is **negative**.



Factor the following trinomials by inspection.

- a) $x^2 - x - 12$ *mult -12 add -1* $(x+3)(x-4)$ b) $x^2 + 3x - 18$ $(x+6)(x-3)$ c) $a^2 - 7a - 8$ $(a-8)(a+1)$



Factor where possible.

- a) $\frac{a^2}{1} - \frac{6a}{1} + \frac{27}{1}$ *GCF = -1*
 $-(a^2 + 6a - 27)$
 $-(a+9)(a-3)$
- b) $2t^2 - 14t + 20$ *GCF = 2*
 $2(t^2 - 7t + 10)$
 $2(t-5)(t-2)$
- c) $x^2 - 3x - 6$
Will not factor
- d) $4x^4 - 16x^3 - 20x^2$ *GCF = $4x^2$*
 $4x^2(x^2 - 4x - 5)$
 $4x^2(x+1)(x-5)$

-1 6
-2 3
1 -6
2 -3

Complete Assignment Questions #1 - #5

Factoring Trinomials of the form $x^2 + bxy + cy^2$

Complete the following statements:

- i) $(x+2)(x+4)$ can be expanded to $x^2 + 6x + 8$,
so $x^2 + 6x + 8$ can be factored to $(x+2)(x+4)$.

$$\begin{aligned}(x+2)(x+4) &= x^2 + 4xy + 2xy + 8y^2 \\ &= x^2 + 6xy + 8y^2\end{aligned}$$

- ii) $(x+2y)(x+4y)$ can be expanded to $x^2 + 6xy + 8y^2$,
so $x^2 + 6xy + 8y^2$ can be factored to $(x+2y)(x+4y)$.



Factor.

a) $x^2 + 13xy + 30y^2$ *mult. 30 add 13*

$$(x+3y)(x+10y)$$

b) $x^2 + 71xy - 72y^2$

$$(x+72y)(x-y)$$

c) $3a^2 - 15ab - 252b^2$ *GCF = 3*

$$3(a^2 - 5ab - 84b^2)$$

$$3(a+7b)(a-12b)$$

Complete Assignment Questions #6 - #11**Assignment**

1. Complete the table to find two numbers with the given sum and the given product.

	Sum	Product	Integers
a)	8	-20	
b)	-8	-20	
c)	-1	-20	

	Sum	Product	Integers
d)	3	-70	
e)	-11	28	
f)	0	-16	

2. Factor the following trinomials.

a) $x^2 - 2x - 15$

b) $x^2 - 2x - 24$

c) $x^2 + 2x - 24$

d) $x^2 + 2x - 3$

e) $x^2 + x - 30$

f) $x^2 - 3x - 10$

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