Lesson 3: Factoring Trinomials of the Form x2 + bx + c - Part Two

Friday, August 31, 2018 2:37 AM

Factoring Polynomial Expressions Lesson #3:

Factoring Trinomials of the Form $x^2 + bx + c$ - Part Two

Review of Factoring By Inspection

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.

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

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**.

+ • − = −
+ • + = + OR − • − = +

Factor the following trinomials by inspection.

a) $x^2 - x - 12$ **b)** $x^2 + 3x - 18$ **c)** $a^2 - 7a - 8$

Factor where possible.

a) $-a^2 - 6a + 27$ **b)** $2t^2 - 14t + 20$

c) $x^2 - 3x - 6$ **d)** $4x^4 - 16x^3 - 20x^2$

not possible

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) .

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

Factor.

a) $x^2+13xy+30y^2$ $(x+3y)(x+10y)$ 30 | 13 : 3·10 | 13 : 2 15

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

c) $3a^2-15ab-252b^2$ GCF: 3 $3(a^2-5ab-84b^2)$ -84 | -5 : $3(a-12b)(a+7b)$ 1 84, 2 42, 3 28, 4 21, 7-12 -5

Complete Assignment Questions #6 - #11

(1, 3,4) every 2nd letter, 5, 6a, 7a

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

3. Factor where possible.

a) $x^2 + 10x + 16$ **b)** $x^2 - 11x + 18$ **c)** $x^2 - 2x - 8$ **d)** $x^2 + 3x - 18$

e) $x^2 - 4x + 12$ **f)** $x^2 - 4x - 12$ **g)** $x^2 - 10x + 25$ **h)** $x^2 + x - 20$

i) $m^2 + 21m + 38$ **j)** $a^2 - 17a + 42$ **k)** $p^2 - 10p - 9$ **l)** $p^2 - 9p - 10$

4. Factor.

a) $-x^2 - 7x - 12$ **b)** $4x^2 - 28x - 32$ **c)** $5x^2 - 20x + 15$

d) $-2a^2 + 2a + 220$ **e)** $b^2x^2 - 4b^2x - 45b^2$ **f)** $2x^3 + 2x^2 - 40x$

5. Consider the following in which the each letter represents a whole number.

$x^2 + 4x - 5 = (x + A)(x - O)$ $x^2 - 3x - 54 = (x - E)(x + I)$

$x^3 + 2x^2 - 8x = x(x - Y)(x + P)$ $3x^2 - 48x + 192 = T(x - R)^2$

$-5x^2 + 20x + 105 = -5(x + T)(x - H)$

Determine the value of each letter and hence name the fictional character represented by the following code.

(7)	(5)	(8)	(8)	(2)	(4)	(1)	(3)	(3)	(9)	(8)
–	–	–	–	–	–	–	–	–	–	–

6. Factor.

a) $x^2 + 18xy + 45y^2$ **b)** $x^2 + 10xy - 24y^2$ **c)** $a^2 - 12ab + 36b^2$

d) $p^2 - 12pq + 11q^2$ **e)** $x^2 + xy - 72y^2$ **f)** $x^2 - 54xy - 112y^2$

7. Factor completely.

a) $4x^2 - 80xy + 144y^2$ **b)** $3b^2 - 15bv - 72v^2$ **c)** $2c^2 + 66cd - 140d^2$

Multiple Choice

8. When factored, the trinomials $x^2 - 10x + 21$ and $x^2 - 4x - 21$ have one binomial factor in common. This factor is

A. $x - 7$ **B.** $x + 7$
C. $x - 3$ **D.** $x + 3$

9. One factor of $-m^3 - m^2 + 6m$ is

A. $m - 2$ **B.** $m + 2$
C. $m - 3$ **D.** $m - 6$

10. One factor of $3x^2 - 6xy - 9y^2$ is

A. $3x$ **B.** $x + 2y$
C. $x + 3y$ **D.** $x + y$

11. The expression $x^2 - 4x + c$ **cannot** be factored if c has the value

A. –5
B. 0
C. 4
D. 5

Answer Key

1. **a)** –2, 10 **b)** –10, 2 **c)** –5, 4 **d)** –7, 10 **e)** –4, –7 **f)** –4, 4
2. **a)** $(x - 5)(x + 3)$ **b)** $(x - 6)(x + 4)$ **c)** $(x + 6)(x - 4)$ **d)** $(x + 3)(x - 1)$
e) $(x + 6)(x - 5)$ **f)** $(x - 5)(x + 2)$
3. **a)** $(x + 8)(x + 2)$ **b)** $(x - 9)(x - 2)$ **c)** $(x + 2)(x - 4)$ **d)** $(x + 6)(x - 3)$
e) not possible **f)** $(x - 6)(x + 2)$ **g)** $(x - 5)^2$ **h)** $(x + 5)(x - 4)$
i) $(m + 2)(m + 19)$ **j)** $(a - 14)(a - 3)$ **k)** not possible **l)** $(p - 10)(p + 1)$
4. **a)** $-(x + 3)(x + 4)$ **b)** $4(x - 8)(x + 1)$ **c)** $5(x - 3)(x - 1)$ **d)** $-2(a - 11)(a + 10)$
e) $b^2(x - 9)(x + 5)$ **f)** $2x(x + 5)(x - 4)$ **5.** HARRY POTTER
6. **a)** $(x + 15y)(x + 3y)$ **b)** $(x - 2y)(x + 12y)$ **c)** $(a - 6b)^2$ **d)** $(p - q)(p - 11q)$
e) $(x - 8y)(x + 9y)$ **f)** $(x + 2y)(x - 56y)$
7. **a)** $4(x - 18y)(x - 2y)$ **b)** $3(b - 8v)(b + 3v)$ **c)** $2(c + 35d)(c - 2d)$
8. A **9.** A **10.** D **11.** D