

Factoring

Name: _____

Trinomials: $ax^2 + bx + c$

Worked Out Solutions

Factoring $ax^2 + bx + c$ using the $a \cdot c$ methodFind two numbers where $\underline{\quad} \cdot \underline{\quad} = a \cdot c$ and $\underline{\quad} + \underline{\quad} = b$

Then rewrite the polynomial as

 $ax^2 + \underline{\quad}x + \underline{\quad}x + c$ and factor by grouping.

Factor the following. Don't forget to factor out the GCF if necessary.

<p>1. $2x^2 + 15x + 18$</p> $a \cdot c = 2 \cdot 18 = 36$ $b = 15$ <p>and</p> $3 \cdot 12 = 36$ $3 + 12 = 15$ $2x^2 + 15x + 18$ $= 2x^2 + 3x + 12x + 18$ $= x(2x + 3) + 6(2x + 3)$ $= (2x + 3)(x + 6)$	<p>2. $3x^2 - 11x - 20$</p> $a \cdot c = 3 \cdot (-20) = -60$ $b = -11$ <p>and</p> $4 \cdot (-15) = -60$ $4 + (-15) = -11$ $3x^2 - 11x - 20$ $= 3x^2 + 4x - 15x - 20$ $= x(3x + 4) - 5(3x + 4)$ $= (3x + 4)(x - 5)$	<p>3. $5y^2 + 4y - 12$</p> $a \cdot c = 5 \cdot (-12) = -60$ $b = 4$ <p>and</p> $-6 \cdot 10 = -60$ $(-6) + 10 = 4$ $5y^2 + 4y - 12$ $= 5y^2 - 6y + 10y - 12$ $= y(5y - 6) + 2(5y - 6)$ $= (5y - 6)(y + 2)$
<p>4. $2a^2 - 17y + 8$</p> $a \cdot c = 2 \cdot 8 = 16$ $b = -17$ <p>and</p> $(-1) \cdot (-16) = 16$ $(-1) + (-16) = -17$ $2a^2 - 17y + 8$ $= 2a^2 - a - 16a + 8$ $= a(2a - 1) - 8(2a - 1)$ $= (2a - 1)(a - 8)$	<p>5. $4x^2 + 13x - 12$</p> $a \cdot c = 4 \cdot (-12) = -48$ $b = 13$ <p>and</p> $(-3) \cdot 16 = -48$ $(-3) + 16 = 13$ $4x^2 + 13x - 12$ $= 4x^2 - 3x + 16x - 12$ $= x(4x - 3) + 4(4x - 3)$ $= (4x - 3)(x + 4)$	<p>6. $6x^2 - 13x + 6$</p> $a \cdot c = 6 \cdot 6 = 36$ $b = -13$ <p>and</p> $(-4) \cdot (-9) = 36$ $(-4) + (-9) = -13$ $6x^2 - 13x + 6$ $= 6x^2 - 4x - 9x + 6$ $= 2x(3x - 2) - 3(3x - 2)$ $= (3x - 2)(2x - 3)$
<p>7. $5p^2 - 7p + 8$</p> $a \cdot c = 5 \cdot 8 = 40$ $b = -7$ <p>There are no to numbers that multiply to 40 and add to -7.</p> <p>The only possible options are: $-1, -40$; $-2, -20$; $-4, -10$; $-5, -8$</p> <p>does not factor (prime)</p>	<p>8. $4x^2 - 4x - 15$</p> $a \cdot c = 4 \cdot (-15) = -60$ $b = -4$ <p>and</p> $6 \cdot (-10) = -60$ $6 + (-10) = -4$ $4x^2 - 4x - 15$ $= 4x^2 + 6x - 10x - 15$ $= 2x(2x + 3) - 5(2x + 3)$ $= (2x + 3)(2x - 5)$	<p>9. $3x^2 + 11xy - 4y^2$</p> $a \cdot c = 3 \cdot (-4) = -12$ $b = 11$ <p>and</p> $(-1) \cdot 12 = -12$ $(-1) + 12 = 11$ $3x^2 + 11xy - 4y^2$ $= 3x^2 - xy + 12xy - 4y^2$ $= x(3x - y) + 4y(3x - y)$ $= (3x - y)(x + 4y)$

<p>10. $7u^2 - 19uv - 6v^2$ $a \cdot c = 7 \cdot (-6) = -42$ $b = -19$</p> <p>and</p> $2 \cdot (-21) = -42$ $2 + (-21) = -19$ <p>$7u^2 - 19uv - 6v^2$ $= 7u^2 + 2uv - 21uv - 6v^2$ $= u(7u + 2v) - 3v(7u + 2v)$ $= (7u + 2v)(u - 3v)$</p>	<p>11. $2x^2 - 10x + 8$ $= 2(x^2 - 5x + 4)$ $= 2(x - 4)(x - 1)$</p> <p>since $(-4) \cdot (-1) = 4$ and $(-4) + (-1) = -5$</p>	<p>12. $6m^2 - 20m - 16$ $= 2(3m^2 - 10m - 8)$</p> $a \cdot c = 3 \cdot (-8) = -24$ $b = -10$ <p>and</p> $2 \cdot (-12) = -24$ $2 + (-12) = -10$ <p>$2(3m^2 - 10m - 8)$ $= 2(3m^2 + 2m - 12m - 8)$ $= 2[m(3m + 2) - 4(3m + 2)]$ $= 2(3m + 2)(m - 4)$</p>
<p>13. $6x^3 - x^2 - 2x$ $= x(6x^2 - x - 2)$</p> $a \cdot c = 6 \cdot (-2) = -12$ $b = -1$ <p>and</p> $3 \cdot (-4) = -12$ $3 + (-4) = -1$ <p>$x(6x^2 - x - 2)$ $= x(6x^2 + 3x - 4x - 2)$ $= x[3x(2x + 1) - 2(2x + 1)]$ $= x(2x + 1)(3x - 2)$</p>	<p>14. $-10x^2 + 25x + 125$ $= -5(2x^2 - 5x - 25)$</p> $a \cdot c = 2 \cdot (-25) = -50$ $b = -5$ <p>and</p> $5 \cdot (-10) = -50$ $5 + (-10) = -5$ <p>$-5(2x^2 - 5x - 25)$ $= -5(2x^2 + 5x - 10x - 25)$ $= -5[(x(2x + 5) - 5(2x + 5))]$ $= -5(2x + 5)(x - 5)$</p>	<p>15. $6ab^2 + 9ab - 42a$ $= 3a(2b^2 + 3b - 14)$</p> $a \cdot c = 2 \cdot (-14) = -28$ $b = 3$ <p>and</p> $(-4) \cdot 7 = -28$ $(-4) + 7 = 3$ <p>$3a(2b^2 + 3b - 14)$ $= 3a(2b^2 - 4b + 7b - 14)$ $= 3a[2b(b - 2) + 7(b - 2)]$ $= 3a(b - 2)(2b + 7)$</p>