Intermediate Algebra
Skill-Builder # AE - 8
Multiplying "Long" Polynomials Using Special Products for Binomials

Examples Multiply using special products for binomials.

1. $\left[(x+1)-y\right]\left[(x+1)+y\right]$

Solution:

Letting $a = x+1$ the problem reduces to

$$(a-y)(a+y)$$

which gives the difference of squares

$$a^2 - y^2$$

and replacing a by $x+1$ we get

$$(x+1)^2 - y^2.$$

Expanding $(x+1)^2$ we get the final answer

$$x^2 + 2x + 1 - y^2.$$

2. $\left[(a+3)+b\right]\left[c+(d-1)\right]$

Solution:

Letting $x = a+3$ and $y = d-1$ the problem reduces to

$$(x+b)(c+y)$$

which gives (using FOIL)

$$xc + xy + bc + by$$

and replacing back x and y by $a+3$ and $d-1$, respectively, we get

$$(a+3)c + (a+3)(d-1) + bc + b(d-1).$$

Carrying out the multiplication

$$ac + 3c + ad - a + 3d - 3 + bc + bd - b.$$

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Multiply using special products for binomials.

1. $\left[a-(b+2)\right]^2$

2. $\left[(x+y)+4n\right]\left[(x+y)-4n\right]$

3. $\left[(n-1)+2m\right]\left[(n+1)-3m\right]$

4. $\left[(b-2)-(a-c)\right]^2$

5. $\left[x+(2y-1)\right]\left[(x+1)-5y\right]$

6. $\left[(p+q)-(r+s)\right]\left[(p+q)+(r+s)\right]$

7. $\left[4y+(x-1)\right]^2$

8. $\left[(2a-b)-(3c+4d)\right]^2$

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Answers

1. $a^2 - 2ab - 4a + b^2 + 4b + 4$
2. $x^2 + 2xy + y^2 - 16n^2$
3. $n^2 - 1 - mn + 5m - 6m^2$
4. $b^2 - 4b + 4 - 2ba + 2bc + 4a - 4c + a^2 - 2ac + c^2$
5. $x^2 - 3xy + 7y - 1 - 10y^2$
6. $p^2 + 2pq + q^2 - r^2 - 2rs - s^2$
7. $16y^2 + 4yx^2 - 8xy + 4y + x^2 - 2x + 1$
8. $4a^2 - 4ab + b^2 - 12ac - 16ad + 6bc + 8bd + 9c^2 + 24cd + 16d^2$

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