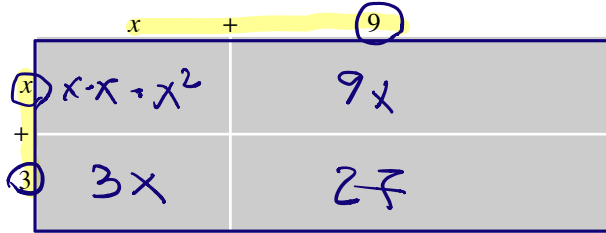


# Polynomials (Part 3): Multiplying, continued

## Section 1: Multiply binomials: area model (KA link)

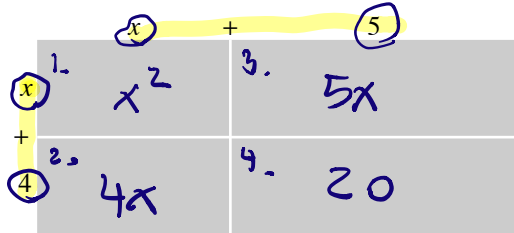
1. Express the area of the entire rectangle (your answer should be a polynomial in standard form).



$$(x+3)(x+9) = x^2 + 9x + 3x + 27 = x^2 + 12x + 27$$

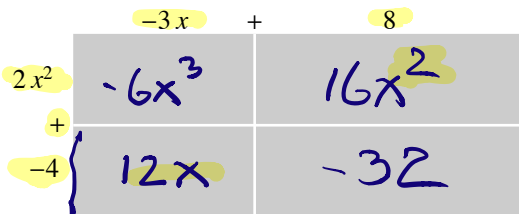
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2. Express the area of the entire rectangle (your answer should be a polynomial in standard form).



$$(x+4)(x+5) = x^2 + 5x + 4x + 20 = x^2 + 9x + 20$$

3. [Challenge] Express the area of the entire rectangle (your answer should be a polynomial in standard form).



$$\begin{aligned} &2x^2(-3x) \\ &-6x^{2+1} \\ &-6x^3 \\ &-3x \cdot (-4) \end{aligned}$$

$$(2x^2-4)(-3x+8) = -6x^3 + 16x^2 + 12x - 32$$

$2x^2 + (-4)$

## Section 2: Warmup: multiplying binomials intro (KA link)

1. Expand and simplify (your answer should be a polynomial in standard form).

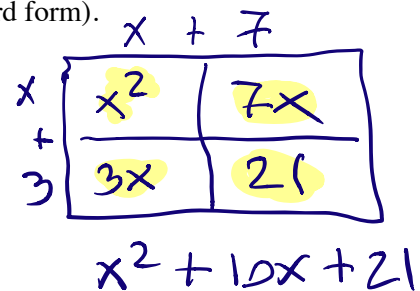
a.  $(x+3)(x+7) = x^2 + 7x + 3x + 21 = x^2 + 10x + 21$

b.  $(x-5)(x+4) = x^2 + 4x - 5x - 20 = x^2 - x - 20$

c.  $(x+6)(x-5) = x^2 - 5x + 6x - 30 = x^2 + x - 30$

d.  $(x-3)(x-1) = x^2 - x - 3x + 3 = x^2 - 4x + 3$

$(x + (-3))(x + (-1))$



### Section 3: Multiply binomials intro (KA link)

1. Expand and simplify (your answer should be a polynomial in standard form).

a.  $(x+1)(x+6) = x^2 + 6x + x + 6 = x^2 + 7x + 6$

b.  $(x+3)(x-7) = x^2 - 7x + 3x - 21 = x^2 - 4x - 21$   
*(x + (-7))*

c.  $(x-4)(x+9) = x^2 + 9x - 4x - 36 = x^2 + 5x - 36$

d.  $(x-11)(x+1) = x^2 + x - 11x - 11 = x^2 - 10x - 11$

### Section 4: Multiply binomials (KA link)

1. Expand and simplify (your answer should be a polynomial in standard form).

a.  $(5h+1)(3h-6) = 15h^2 - 30h + 3h - 6 = 15h^2 - 27h - 6$

*(5h)(3h) = 15h^2*

b.  $(9x-3)(-7x+8) = -63x^2 + 72x + 21x - 24 = -63x^2 + 93x - 24$

c.  $(-3y-6)(9y+7) = -27y^2 - 21y - 54y - 42 = -27y^2 - 75y - 42$

d. [Challenge]  $(\frac{1}{3}r - \frac{1}{2})(\frac{2}{5}r + \frac{1}{4}) = \frac{2}{15}r^2 + \frac{1}{12}r - \frac{1}{5}r - \frac{1}{8} = \frac{2}{15}r^2 - \frac{7}{60}r - \frac{1}{8}$

*$\frac{5}{60} - \frac{12}{60} = \frac{-7}{60}$*

*$\frac{1}{3} \cdot \frac{2}{5} = \frac{2}{15}$*

### Section 5: Multiply binomials by polynomials (KA link)

1. Expand and simplify (your answer should be a polynomial in standard form).

a.  $(5h+1)(3h^2-2h+6) = 15h^3 - 10h^2 + 30h + 3h^2 - 2h + 6 = 15h^3 - 7h^2 + 28h + 6$

b.  $(5b^2-3)(-3b^2+1) = -15b^4 + 5b^2 + 9b^2 - 3 = -15b^4 + 14b^2 - 3$

c.  $(\frac{1}{2}y^3 + 5y^2 - 3y + \frac{1}{3})(-y + 6) = -\frac{1}{2}y^4 + 3y^3 - 5y^3 + 30y^2 + 3y^2 - 18y - \frac{1}{3}y + 2 = -\frac{1}{2}y^4 - 2y^3 + 33y^2 - \frac{55}{3}y + 2$

*$\frac{28}{3} - \frac{1}{3} = \frac{27}{3} = 9$*

d. [Challenge]  $(\frac{1}{3}r^3 - \frac{1}{4}r^2 - \frac{1}{5}r - \frac{1}{6})(\frac{1}{7}r - \frac{1}{8}) = \frac{r^4}{21} - \frac{r^3}{24} - \frac{r^3}{28} + \frac{r^2}{32} - \frac{r^2}{35} + \frac{r}{40} - \frac{r}{42} + \frac{1}{48}$

$\frac{-1}{24} - \frac{1}{28} = \frac{-1}{4 \cdot 6} - \frac{1}{4 \cdot 7} = \frac{-7}{4 \cdot 6 \cdot 7} - \frac{6}{4 \cdot 7 \cdot 6} = \frac{-13}{168}$

$\frac{1}{32} - \frac{1}{35} = \frac{35}{32 \cdot 35} - \frac{32}{35 \cdot 32} = \frac{3}{1120}$

$\frac{1}{40} - \frac{1}{42} = \frac{1}{2 \cdot 20} - \frac{1}{2 \cdot 21} = \frac{21}{2 \cdot 20 \cdot 21} - \frac{22}{2 \cdot 21 \cdot 22} = \frac{1}{840}$

$\frac{r^4}{21} - \frac{r^3}{24} - \frac{r^3}{28} + \frac{3}{1120}r^2 + \frac{r}{840} - \frac{r}{42} + \frac{1}{48} = \frac{r^4}{21} - \frac{13}{168}r^3 + \frac{3}{1120}r^2 + \frac{r}{840} - \frac{r}{42} + \frac{1}{48}$