Guided Practice 5.2

Example 1

Find the product of $(2x-1)(x+18)$.

1. Distribute the first polynomial over the second.

   Ensure that any negative signs are included in the products where appropriate.

   $(2x-1)(x+18)$

   $= 2x \bullet x + 2x \bullet 18 + (-1) \bullet x + (-1) \bullet 18$

2. Use properties of exponents to simplify any expressions.

   x is x to the first power, or x^1.

   $2x \bullet x$

   $= 2x^1 \bullet x^1$

   $= 2x^{1+1}$

   $= 2x^2$

   Rewrite the expression, substituting $2x^2$ for $2x \bullet x$.

   $2x \bullet x + 2x \bullet 18 + (-1) \bullet x + (-1) \bullet 18$

   $= 2x^2 + 2x \bullet 18 + (-1) \bullet x + (-1) \bullet 18$

3. Simplify any remaining products.

   The coefficient of a term can be multiplied by a number: $ax \bullet b = abx$.

   $2x^2 + 2x \bullet 18 + (-1) \bullet x + (-1) \bullet 18$

   $= 2x^2 + 36x - x - 18$

4. Combine any like terms.

   $2x^2 + 36x - x - 18$

   $= 2x^2 + 35x - 18$

   The result of $(2x-1)(x+18)$ is $2x^2 + 35x - 18$.

Example 2

Find the product of $(x^3 + 9x)(-x^2 + 11)$.

1. Distribute the first polynomial over the second.

   Ensure that any negatives are included in the products where appropriate.

   $(x^3 + 9x)(-x^2 + 11)$

   $= x^3 \bullet (-x^2) + x^3 \bullet 11 + 9x \bullet (-x^2) + 9x \bullet 11$

2. Use properties of exponents to simplify like exponential expressions.

   To multiply terms that have the same base (in this case, x), keep this base and add the exponents: $x^m \bullet x^n = x^{(m+n)}$.

   $= x^3 \bullet (-x^2) + x^3 \bullet 11 + 9x \bullet (-x^2) + 9x \bullet 11$

   $= -x^{3+2} + x^3 \bullet 11 - 9x^{1+2} + 9x \bullet 11$

   $= -x^5 + x^3 \bullet 11 - 9x^3 + 9x \bullet 11$

3. Simplify any remaining products.

   The coefficient of a term can be multiplied by a number: $ax \bullet b = abx$.

   $-x^5 + 11 \bullet x^3 - 9x^3 + 9x \bullet 11$

   $= -x^5 + 11x^3 - 9x^3 + 99x$

4. Combine any like terms.

   $-x^5 + 11x^3 - 9x^3 + 99x$

   $= -x^5 + 2x^3 + 99x$

   The result of $(x^3 + 9x)(-x^2 + 11)$ is $-x^5 + 2x^3 + 99x$.

Example 3

Find the product of $(3x + 4)(x^2 + 6x + 10)$.

1. Distribute the first polynomial over the second.

   Multiply each term in the first polynomial by each term in the second polynomial.

   $(3x + 4)(x^2 + 6x + 10)$

   $= 3x \bullet x^2 + 3x \bullet 6x + 3x \bullet 10 + 4 \bullet x^2 + 4 \bullet 6x + 4 \bullet 10$

2. Use properties of exponents to simplify any expressions.

   $3x \bullet x^2 + 3x \bullet 6x + 3x \bullet 10 + 4 \bullet x^2 + 4 \bullet 6x + 4 \bullet 10$

   $= 3x^3 + 18x^2 + 3x \bullet 10 + 4 \bullet x^2 + 4 \bullet 6x + 4 \bullet 10$

3. Simplify any remaining products.

   $3x^3 + 18x^2 + 3x \bullet 10 + 4 \bullet x^2 + 4 \bullet 6x + 4 \bullet 10$

   $= 3x^3 + 18x^2 + 30x + 4x^2 + 24x + 40$

4. Combine any like terms.

   Only terms with the same variable raised to the same power can be combined.

   The sum can first be rewritten with the exponents in descending order.

   $3x^3 + 18x^2 + 30x + 4x^2 + 24x + 40$

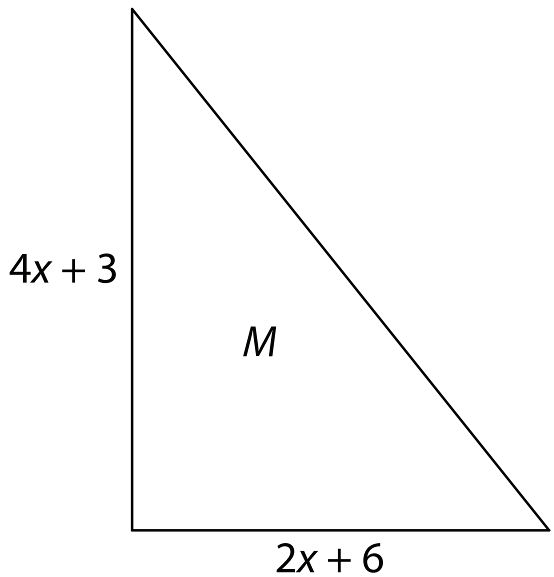
   $= 3x^3 + 18x^2 + 4x^2 + 30x + 24x + 40$

   $= 3x^3 + 22x^2 + 54x + 40$

   The result of $(3x + 4)(x^2 + 6x + 10)$ is $3x^3 + 22x^2 + 54x + 40$.

Example 4

Find the area of the right triangle.



1. Identify important quantities.

   The area of a triangle can be found using the formula $A = \frac{1}{2}bh$. In right triangle M, $b = (2x + 6)$ and $h = (4x + 3)$.

2. Substitute the expressions for b, base, and h, height.

   $A = \frac{1}{2}bh$ Formula for area of a triangle

   $A = \frac{1}{2}(2x + 6)(4x + 3)$ Substitute $(2x + 6)$ for b and $(4x + 3)$ for h.

3. Rewrite the expression using the Distributive Property.

$A=\frac{1}{2}(2x+6)(4x+3)$	Equation from the previous step
$A=\left(\frac{1}{2}\bullet 2x+\frac{1}{2}\bullet 6\right)(4x+3)$	Multiply each term in the first binomial by $\frac{1}{2}$.
$A=(x+3)(4x+3)$	Simplify.
$A=x\bullet 4x+3\bullet 4x+3\bullet x+3\bullet 3$	Multiply each term in the first binomial by each term in the second binomial.
$A=4x^2+12x+3x+9$	Simplify.

4. Add like terms.

$A=4x^2+12x+3x+9$	Equation from the previous step
$A=4x^2+15x+9$	Add $12x$ and $3x$.

The area of right triangle M is $A=4x^2+15x+9$.