84. A travel agency offers a group rate of $600 per person for a weekend in Lake Tahoe if 20 people sign up. For each additional person who signs up, the price per person is reduced by $10.
   a. Write expressions for the size of the group and the price per person if \( x \) additional people sign up.
   b. Write a polynomial for the travel agency’s total income if \( x \) additional people sign up for the trip.
   c. If 25 members of a ski club sign up for the weekend, what is the travel agency’s income? If 30 members sign up?

B

- Simplify each expression. Assume that all exponents denote natural numbers. See Examples 7 and 8.

85. \( a^2b^3a^{-3} \)  \hspace{1cm} 86. \( b^3b^{2n+1} \) 
87. \( y^{2n+6}y^{4n} \)  \hspace{1cm} 88. \( a^{2n-5}a^{n+3} \)
89. \( (x^m)^3 \)  \hspace{1cm} 90. \( (xy)^{3n} \)  \hspace{1cm} 91. \( (x^{2n+1}y^{n-1})^3 \)  \hspace{1cm} 92. \( (x^{n-2}y^{2n+1})^2 \)
93. \( x^n(2x^n - 1) \)  \hspace{1cm} 94. \( 3t^n(2t^n + 3) \)  \hspace{1cm} 95. \( a^{2n+1}(a^n + a) \)  \hspace{1cm} 96. \( b^{2n+2}(b^{n-1}+ b^n) \)
97. \( (1 + a^n)(2 - a^n) \)  \hspace{1cm} 98. \( (a^n - 3)(a^n + 2) \)  \hspace{1cm} 99. \( (2a^n - b^n)(a^n + 2b^n) \)  \hspace{1cm} 100. \( (a^{2n} - 2b^n)(a^{3n} + b^{2n}) \)

- Verify each product.

101. \( (x + a)(x - a) = x^2 - a^2 \)  \hspace{1cm} 102. \( (x - a)^2 = x^2 - 2ax + a^2 \)
103. \( (x + a)^2 = x^2 + 2ax + a^2 \)  \hspace{1cm} 104. \( (x + a)(x + b) = x^2 + (a + b)x + ab \)
105. \( (x + a)(x^2 - ax + a^2) = x^3 + a^3 \)  \hspace{1cm} 106. \( (x - a)(x^2 + ax + a^2) = x^3 - a^3 \)

1.4 FACTORING

It is sometimes useful to write a polynomial as a single term composed of two or more factors. This process is the reverse of multiplication and is called factoring. For example, observe that

\[ 3x^2 + 6x = 3x(x + 2). \]

Of course, we can also write

\[ 3x^2 + 6x = 6\left(\frac{1}{2}x^2 + x\right), \]