9 - 1 Factoring Polynomials

Multiply binomials by finding the sum and product of the last two terms of the binomials.

Ex.❶ $(x + 2)(x + 3)$
$= x^2 + (2 + 3)x + 2 \cdot 3$
$= x^2 + (\ 5\ )x + 6$
(5: Sum of two last terms; 6: Product of two last terms)

1. $(x + 1)(x + 1)$
$= x^2 + (\quad)x + (\quad)$

2. $(x + 2)(x + 3)$
$= x^2 + (\quad)x + (\quad)$

3. $(x + 1)(x + 2)$
$= x^2 + (\quad)x + (\quad)$

4. $(x + 1)(x + 3)$
$= x^2 + (\quad)x + (\quad)$

5. $(x + 2)(x + 4)$
$= x^2 + (\quad)x + (\quad)$

6. $(x + 6)(x + 5)$

7. $(x + 16)(x + 2)$

8. $(x + 6)(x + 8)$

Factor out by finding a pair of factors of the last term whose sum is equal to the coefficient of the middle term.

Ex.❷ $x^2 + 5x + 6$
$= x^2 + (2 + 3)x + 2 \cdot 3$
$= (x + 2)(x + 3)$

Step1: Find the pairs of factors of the last term.
Factors of 6 : 1 & 6 or 2 & 3
Step2: Find the sum of each pair.
1 + 6 = 7 , 2 + 3 = 5
Choose the pair whose sum is equal to 5 which is the coefficient of the middle term.
Step3: Put 2 and 3 in factored form.

9. $x^2 + 3x + 2$ *factors of 2 = 1 & 2*
$= x^2 + 3x + (\ 1\ \cdot\ 2\ )$
$= (x + 1)(x + \quad)$

10. $x^2 + 4x + 3$ *factors of 3 = 1 & 3*
$= x^2 + 4x + (\ 1\ \cdot\ \quad)$
$= (x + \quad)(x + 3)$

11. $x^2 + 5x + 4$ *factors of 4 = 1 & 4*
$= x^2 + 5x + (\quad \cdot \quad)$
$= (x + \quad)(x + 4)$

12. $x^2 + 7x + 6$

13. $x^2 + 6x + 9$

14. $x^2 + 8x + 7$

15. $x^2 + 2x + 1$

16. $x^2 + 11x + 10$

17. $x^2 + 6x + 5$

Fill in the blanks and find the two numbers of each problem.

1.

The larger of two numbers is 20 more than the smaller. Six times the larger is 80 more than 5 times the smaller.

A. **Determine a variable for the smaller number.**

Let the smaller number = ☐

B. **Find the expression for the larger number.**

the larger number = ☐ +

C. **6 times the larger is 80 more than 5 times the smaller.**

6 (*larger #*) = 5(*smaller #*) + 80

↓ ↓ *Substitute.*

6 ( ) = 5( ) + 80

Simplify and solve for x.

x = ☐

Two numbers : ☐ ☐

2.

The larger of two numbers is 9 less than twice the smaller and their sum is 81.

A. **Determine a variable for the smaller number.**

Let the smaller number = ☐

B. **Find the expression for the larger number.**

the larger number = ☐

C. **Their sum is 81.**

81 = (*larger #*) + (smaller #)

↓ ↓ *Substitute.*

81 = ( ) + ( )

Simplify and solve for x.

x = ☐

Two numbers : ☐ ☐