9.5 Factor $x^2 + bx + c$

Goal • Factor trinomials of the form $x^2 + bx + c$.

Your Notes

FACTORING $x^2 + bx + c$

Algebra

$x^2 + bx + c = (x + p)(x + q)$ provided _____ $= b$ and _____ $= c$.

Example

$x^2 + 6x + 5 =$ (_____)(_____) because _____ $= 6$ and _____ $= 5$.

Example 1 ***Factor when b and c are positive***

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

Solution

Find two _____ factors of _____ whose sum is _____. Make an organized list.

Factors of _____	Sum of factors
16, ____	16 + ____ = ____
8, ____	8 + ____ = ____
4, ____	4 + ____ = ____

The factors 8 and ____ have a sum of _____, so they are the correct values of p and q.

$x^2 + 10x + 16 = (x + 8)$(_____)

CHECK

$(x + 8)$(_____) = _____ **Multiply.**

= _____ **Simplify.**

Your Notes

Example 2 ***Factor when b is negative and c is positive***

Factor $a^2 - 5a + 6$.

Solution

Because b is negative and c is positive, p and q must _____.

Factors of ___	Sum of factors
_____	_____ + (_____) = _____
_____	_____ + (_____) = _____

$a^2 - 5a + 6 =$ (_____)(_____)

Example 3 ***Factor when b is positive and c is negative***

Factor $y^2 + 3y - 10$.

Solution

Because c is negative, p and q must _____ _____.

Factors of _____	Sum of factors
−10, ___	−10 + ___ = _____
10, _____	10 + _____ = ___
−5, ___	−5 + ___ = _____
5, _____	5 + _____ = ___

$y^2 + 3y - 10 =$ (_____)(_____)

✔ ***Checkpoint*** **Factor the trinomial.**

1. $x + 7x + 12$	**2.** $x + 9x + 8$

Your Notes

✔ ***Checkpoint*** **Factor the trinomial.**

3. $x + 12x + 27$	**4.** $x^2 - 9x + 20$
5. $y^2 + 4y - 21$	**6.** $z^2 + 2z - 24$

Example 4 ***Solve a polynomial equation***

Solve the equation $x^2 + 7x = 18$.

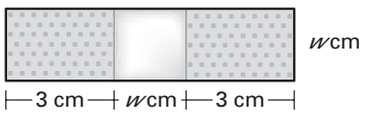
$x^2 + 7x = 18$	**Write original equation.**
$x^2 + 7x -$ ____ $= 0$	**Subtract** ____ **from each side.**
_____ $= 0$	**Factor left side.**
_____ *or* _____	**Zero-product property**
_____ *or* _____	**Solve for x.**

The solutions of the equation are _____.

Your Notes

Example 5 ***Solve a multi-step problem***

Dimensions The bandage shown has an area of 16 square centimeters. Find the width of the bandage.



Solution

Step 1 **Write** an equation using the fact that the area of the bandage is 16 square centimeters.

$A = \ell \cdot w$	**Formula for area**
$\_\_\_\_ = \_\_\_\_\_ \cdot w$	**Substitute values.**
$0 = \_\_\_\_\_$	**Simplify.**

Step 2 **Solve** the equation for w.

$0 = \_\_\_\_\_$	**Write equation.**
$0 = \_\_\_\_\_$	**Factor right side.**
$\_\_\_\_\_$ *or* $\_\_\_\_\_$	**Zero-product property**
$\_\_\_\_\_$ *or* $\_\_\_\_\_$	**Solve for w.**

The bandage cannot have a negative width, so the width is _____.

✔ ***Checkpoint*** **Complete the following exercises.**

7. Solve the equation $s^2 - 12s = 13$.

8. What If? In Example 5, suppose the area of the bandage is 27 square centimeters. What is the width?

Homework