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# Homework SOLUTIONS

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Questions: 10, 13, 15ab, 21ce

maybe 19 and 20

10. Copy and complete.

a)  $(w + 3)(w + 2) = w^2 + \square w + 6$

$$\begin{array}{r} +3, +2 \\ \text{add} \\ +5 \end{array}$$

MultiplyAdd

b)  $(x + 5)(x + \square) = x^2 + \square x + 10$

$$\begin{array}{r} +5 \\ + \\ +5 \end{array}$$

$$+5 \times +5 = 25$$

MultiplyAdd

c)  $\begin{array}{r} a \\ \times 10 \\ \hline 10 \end{array}$  sign of largest

MultiplyAdd

$$\begin{array}{r} 0 \\ \times \square \\ \hline 20 \end{array}$$

$$0 + \square = 12$$

13. Find and correct the errors in each expansion.

a)  $(r - 13)(r + 4) = r(r + 4) - 13(r + 4)$   
 $= r^2 + 4r - 13r + 52$   
 $= r^2 + 9r + 52$



b)  $(s - 15)(s - 5) = s(s - 15) + 15(s + 5)$   
 $= s^2 - 15s + 15s + 75$   
 $= s^2 + 75$

15. Factor. Check by expanding.

a)  $12 + 13k + k^2$

$k^2 + 13k + 12$

$$\begin{array}{r} \cancel{k} \\ \cancel{+12} \\ \hline +13 \end{array}$$

$(k+1)(k+12)$

*first middle*

b)  $-16 - 6g + g^2$

$g^2 - 6g - 16$

$(g - 8)(g + 2)$  ← ✓



c)  $60 + 17y + y^2$

$y^2 + 17y + 60$

d)  $72 - z - z^2$

$z^2 - z - 72$

19. Find an integer to replace  $\square$  so that each trinomial can be factored.  
How many integers can you find each time?



a)  $x^2 + \square x + 10$

b)  $a^2 + \square a - 9$



c)  $t^2 + \square t + 8$

d)  $y^2 + \square y - 12$

e)  $h^2 + \square h + 18$

f)  $p^2 + \square p - 16$

20. Find an integer to replace  $\square$  so that each trinomial can be factored.  
How many integers can you find each time?



a)  $r^2 + r + \square$

b)  $h^2 - h + \square$

c)  $b^2 + 2b + \square$

d)  $z^2 - 2z + \square$

e)  $q^2 + 3q + \square$

f)  $g^2 - 3g + \square$

21. Factor.

c)  $4x^2 + 4x - 48$

$$4(x^2 + 1x - 12)$$

simple trinomial

$$\begin{array}{r} x \quad | \quad \text{add} \\ -12 \quad | \quad +1 \\ \hline -1x^2 \\ -2x \\ \hline -3x^2 \end{array}$$

$4(x-3)(x+4)$

e)  $-5n^2 + 40n - 35$



a)  $4y^2 - 20y - 56$

b)  $-3m^2 - 18m - 24$

d)  $10x^2 + 80x + 120$

f)  $7c^2 - 35c + 42$

# Factoring Trinomials

#1

Sign  
larger  
first

$$x^2 - 17x + 42$$

+ same  
- different

$$(x-3)(x-14)$$

Simple trinomial

last mult	middle add
+42	-17
- 1x-42	
- 2x+21	
- 3x-14	- 6x-7

#2

last mult	middle add
-38	-17
$\begin{array}{r} 11x-38 \\ +2x-19 \end{array}$	

$$x^2 - 17x - 38$$

$$(x+2)(x-19)$$

#3

$$4x^2 + 5x - 6$$

Hard trinomial  
Decomposition

## DECOMPOSITION

If there is a numerical coefficient in front of  $x^2$ , then we use a method for factoring called DECOMPOSITION.


$$4x^2 + 5x - 6$$

# Hard Trinomials

- has three terms with the form...

$$\textcolor{blue}{a}x^2 + \textcolor{brown}{b}x + c$$

- a hard trinomial has an "a" value not equal to 1.
- we use a method of decomposition to factor them.

## DECOMPOSITION METHOD

- here's how it goes... "What two numbers?"

$$\textcolor{blue}{a}x^2 + \textcolor{brown}{b}x + c$$

Multiplies to get "a" times "c"

- once you find the two numbers, use them to break the MIDDLE TERM into two pieces (decomposition).
- then, factor by grouping.

The image shows a screenshot of the cdliInteractive software interface. At the top, the logo "cdliInteractive" is displayed, with "cdli" in red and "Interactive" in blue. Below the logo, there are two main sections: "Global Actions" and "Window Actions".

**Global Actions:**

- Go to beginning
- Go back one frame
- Go forward one frame
- Go to end

**Window Actions:**

- Go to the first step
- Go back one step
- Go forward one step
- Go to the last step
- Show an object

At the bottom of the interface, there is a toolbar with four buttons: a double-left arrow, a single-left arrow, a single-right arrow, and a double-right arrow.

**Multiply**

$4x^2 + 5x - 6$

$\begin{array}{r} \text{first} \times \text{last} \\ (4)(-6) \\ \hline -24 \end{array}$

$\begin{array}{r} \text{middle} \\ -1x^2 + 4 \\ -2x^2 + 12 \\ \hline -3x^2 + 8 \end{array}$

$\begin{array}{r} \text{Sign} \\ \text{on} \\ \text{largest} \\ \text{factor} \end{array}$

$\begin{array}{r} \text{+} \\ \text{-} \end{array} = \boxed{\quad}$

$\begin{array}{r} \text{-} \\ \times \end{array} = \boxed{\quad}$

$\bullet$  Break down middle term using factors

$= 4x^2 + 8x - 3x - 6$

$= 4x(x+2) - 3(x+2)$

factor out common bracket

$= (x+2)(4x-3)$



+ same  
- different

Always check the following when you are asked to factor:

- 1) G.C.F ( # and Letters) {if not....}
- 2) Simple Trinomial
- 3) Hard Trinomial ...

Factor Completely!

large is 5  
both sum

1.  $2x^2 + 5x + 3$

first x last multiply } middle add }

+6 } +5

+1x6 + 2x3

Decompose middle term  
→ rewrite middle using factors

=  $2x^2 + 2x + 3x + 3$

factor GCF out      factor out GCF

=  $2x(x+1) + 3(x+1)$   
• factor out common bracket

=  $(x+1)(2x+3)$

Factor Completely!

$$2. \quad 10x^2 + 13x - 3$$

↓ largest  
① same  
② different

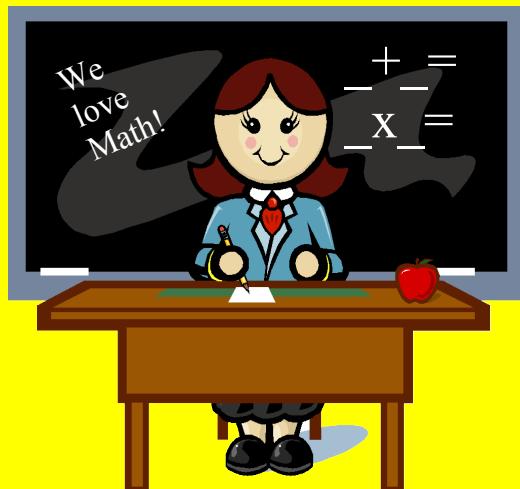
mult  
1st x 1st

$$\begin{array}{r} -30 \\ -1 \times 30 \\ -2 \times 15 \\ -3 \times 10 \\ -5 \times 6 \end{array}$$

add  
middle  
+13

$$\begin{array}{cccc} 10x^2 & -2x & +15x & -3 \\ \hline & & & \\ 2x(5x-1) & +3(5x-1) & & \\ & & & \\ (5x-1) & (2x+3) & & \end{array}$$

$$\begin{array}{c} 10x^2 + 15x - 2x - 3 \\ \hline 5x(2x+3) - 1(2x+3) \\ (2x+3)(5x-1) \end{array}$$



$$\star \quad 4. \quad 2x^2 + 6x + 4 \quad \star$$

GCF first

$$2(x^2 + 3x + 2)$$

Simple

$$2(x+2)(x+1)$$

I suppose she wants me to do two types of factoring!



## 3.6 Polynomials of the Form $ax^2 + bx + c$

# Homework

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Questions: 8, 13, 15, 19

$$13(a, b)$$