

WS 3-3

9. The area of a \$10 bill can be represented by the expression $x^2 - 25$.

(a) Find the expressions for the length and width of the \$10 bill.

$$\begin{aligned} & x^2 - 25 \\ & = (x+5)(x-5) \end{aligned}$$

(b) Find the dimensions of the \$10 bill when $x=12$ cm.

$$x+5 = 12+5 = 17 \text{ cm}$$

$$x-5 = 12-5 = 7 \text{ cm}$$

(c) If the area of the \$10 bill is 75 cm^2 , find the length and width of the \$10 bill.

$$A = x^2 - 25 = 75 \quad x = ? \quad \begin{aligned} x+5 &= l \\ x-5 &= w \end{aligned}$$

$$\begin{array}{r} x^2 - 25 = 75 \\ +25 \quad +25 \\ \hline \sqrt{x^2} = \sqrt{100} \end{array}$$

$$x = 10 \text{ or } -10 \text{ (rejected)}$$

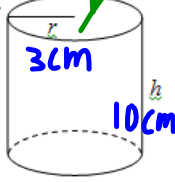
$$x=10 \rightarrow \begin{aligned} l &= 10+5 = 15 \text{ cm} \\ w &= 10-5 = 5 \text{ cm} \end{aligned}$$

WS 3-4

6. The surface area of a cylinder is given by the formula $S.A. = 2\pi r^2 + 2\pi rh$ $r^2 = \cancel{r} \times r$

(a) Factor the expression for the surface area.

$$= 2\pi r \left(\frac{2\pi r \cancel{r}}{2\pi} + \frac{2\pi \cancel{r} h}{2\pi} \right) \quad \text{GCF} = 2\pi r$$

$$= 2\pi r(r+h)$$


(b) A cylinder has radius 3 cm and height 10 cm. Use both the original expression and the factored expression in (a) to find the surface area of this cylinder to the nearest square centimetre.

$2\pi r^2 + 2\pi rh$ $= 2\pi(3)^2 + 2\pi(3)(10)$ $= 245.04 \text{ cm}^2$ $= 245 \text{ cm}^2$	$2\pi r(r+h)$ $= 2\pi(3)(3+10)$ $= 2\pi(3)(13)$ $= 245.04 \text{ cm}^2$ $= 245 \text{ cm}^2$
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Worksheet 3-5: Factoring Trinomials of the Form $ax^2 + bx + c$ (Part 2)

Steps for Factoring Trinomials of the form $ax^2 + bx + c$:

- 1. Factor out any greatest common factor (GCF can divide each term "evenly")**
- 2. Factor as product of two binomials (by "Trial and Error" using product and sum)**
- 3. Check each binomial for any other common factor**
- 4. Check your answer by expanding**

There are two ways to factor trinomial of the form $ax^2 + bx + c$ where a is not a common factor. Both ways require "trial and error" to find the right binomial factors.

Factor each trinomial.

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

$ac = -6$

$(-1) \times (6) = 5$

$(1) \times (-6) = -6$

$(-2) \times (3) = -6$

$(2) \times (-3) = -6$

Grouping

Decomposition

$3x^2$	-2
$3x$	1
x	-2

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

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

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

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

Factor each trinomial.

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

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

X-Box

Decomposition	
$x - 2$	
$3x^2$	$-6x$
x	-2

a
 c
 -6
 -6
 -5
 b

2. $2y^2 + 11y + 12$

$\begin{matrix} 1 \times 24 \\ 2 \times 12 \\ \textcircled{3 \times 8} \\ 4 \times 6 \end{matrix}$

$\begin{matrix} a & c \\ 24 & 8 \\ 3 & 8 \\ \hline 11 & \\ b \end{matrix}$

$\begin{matrix} & & & \textcircled{4} \\ & & \text{gcf} \rightarrow & \\ 2y & 2y^2 & 8y & \\ \textcircled{3} & 3y & 12 & \end{matrix}$

$= (2y+3)(y+4)$

3. $6m^2 + 13m - 5$

$$a=6, b=13, c=-5$$

$$= (3m-1)(2m+5)$$

$\begin{array}{c} ac \\ -30 \\ -2 \quad 15 \\ 13 \\ b \end{array}$	$\begin{array}{c} 2m \quad 5 \\ 3m \left[\begin{array}{c c} 6m^2 & 15m \\ \hline -2m & -5 \end{array} \right. \\ -1 \end{array}$
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$$-3 \times 10$$

$$-10 \times 3$$

-2×15	$-2 + 15 = 13$
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$$\boxed{-60} \quad \begin{array}{l} -10 \times 6 \\ -6 \times 10 \end{array}$$

$$60 \div 1 \Rightarrow 1 \times 60$$

$$60 \div 2 = 2 \times 30$$

$$60 \div 3 = 3 \times 20$$

$$60 \div 4 = \boxed{15 \times 4}$$

$$60 \div 5 = 12 \times 5$$

$$60 \div 10 = 10 \times 6$$

Difference

$$-15 \times 4$$

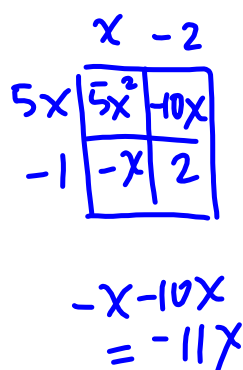
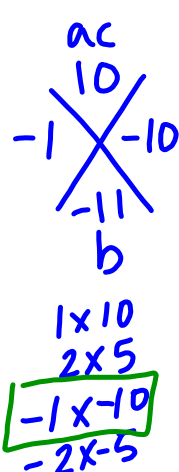
$$\boxed{15 \times -4}$$

4. $10t^2 + 11t - 6$

5. $10x^2 - 22x + 4$ GCF = 2

$= 2(5x^2 - 11x + 2)$
 $\boxed{a=5, b=-11, c=2}$

$= 2(5x-1)(x-2)$



6. $12r^2 + 27r + 15$

7. $-4x^2 - 22x - 28$ GCF = -2 You must factor out any -ve number next to x^2

$$= -2(2x^2 + 11x + 14)$$

$$= -2(x+2)(2x+7)$$

a	c	
4	28	7
b		

	$2x$	7
x	$2x^2$	$7x$
2	$4x$	14