

3.6 Adding and Subtracting Polynomials

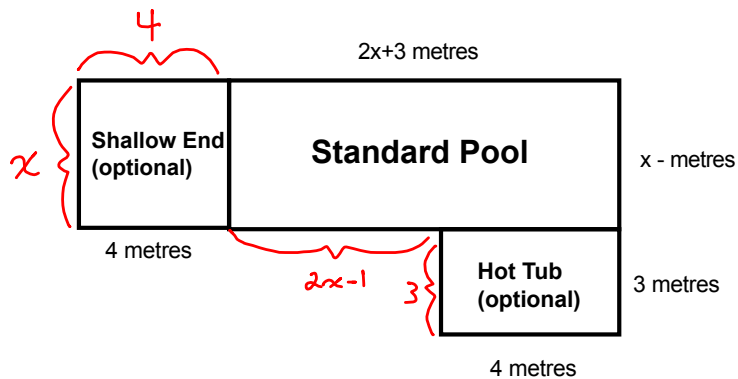
Part 1: DO IT NOW

The Cool Pool Company makes pools and uses the following diagram to calculate the perimeter of pool with different options:

Option 1 – Bronze package (standard pool only)

Option 2 – Silver package (standard pool and shallow pool)

Option 3 – Gold package (all sections of the pool are included)



a) In your group choose either the Bronze, Silver, or Gold package and create a simplified expression for the perimeter of your pool.

$$\begin{aligned}\text{BRONZE: } P &= (2x+3) + (2x+3) + x + x \\ &= 6x+6\end{aligned}$$

$$\begin{aligned}\text{SILVER: } P &= (2x+3) + (2x+3) + x + x + 4 + 4 \\ &= 6x+14\end{aligned}$$

$$\begin{aligned}\text{GOLD: } P &= (2x+3) + x + 3 + 4 + 3 + (2x-1) + 4 + x + 4 \\ &= 6x+20\end{aligned}$$

b) What is the perimeter of your pool if $x=4$

$$\text{BRONZE: } P = 6(4) + 6 = 30\text{m}$$

$$\text{SILVER: } P = 6(4) + 14 = 38\text{m}$$

$$\text{GOLD: } P = 6(4) + 20 = 44\text{m}$$

Part 2: Adding Polynomials

Polynomial: an algebraic expression consisting of one or more terms connected by addition or subtraction operators

When **adding** polynomials you can simply **remove** the brackets and collect the like terms

Example:

$$(4x+3) + (7x+2)$$

$$= 4x + 3 + 7x + 2$$

Step 1: Remove the Brackets

$$= 4x + 7x + 3 + 2$$

Step 2: Rearrange like terms into groups

$$= 11x + 5$$

Step 3: Collect the like terms

Practice Adding Polynomials

1) $(3y + 5) + (7y - 4)$

$$= 3y + 5 + 7y - 4$$

$$= 3y + 7y + 5 - 4$$

$$= 10y + 1$$

2) $(2p - 2) + (4p - 7)$

$$= 2p - 2 + 4p - 7$$

$$= 2p + 4p - 2 - 7$$

$$= 6p - 9$$

3) $(6x - 12) + (-9x - 4) + (x + 14)$

$$= 6x - 12 - 9x - 4 + x + 14$$

$$= 6x - 9x + x - 12 - 4 + 14$$

$$= -2x - 2$$

4) $(5x - 4y - 1) + (-2x + 5y + 13)$

$$= 5x - 4y - 1 - 2x + 5y + 13$$

$$= 5x - 2x - 4y + 5y - 1 + 13$$

$$= 3x + y + 12$$

Part 3: Subtracting Polynomials

To **subtract** polynomials, add the **opposite polynomial** (switch the signs of the terms of the polynomial being subtracted)

Example:

$$(3y + 5) - (7y - 4) \quad \text{To subtract the polynomial we must add the opposite}$$

The opposite of $(7y-4)$ is: $-7y+4$

$$\begin{aligned} \therefore (3y+5) - (7y-4) &= (3y+5) + (-7y+4) \\ &= 3y+5-7y+4 \\ &= 3y-7y+5+4 \\ &= -4y+9 \end{aligned}$$

OR

Subtracting Polynomials

To subtract polynomials, subtract each of the terms in the second polynomial.

$$(3y + 5) - (7y - 4)$$

$$\begin{aligned}\therefore (3y+5) - (7y-4) &= 3y+5-7y-(-4) \\ &= 3y+5-7y+4 \\ &= 3y-7y+5+4 \\ &= -4y+9\end{aligned}$$

$$5) (4x + 3) - (7x + 2)$$

$$\begin{aligned}&= 4x+3-7x-(+2) \\ &= 4x+3-7x-2 \\ &= 4x-7x+3-2 \\ &= -3x+1\end{aligned}$$

$$6) (a^2 - 2a + 1) - (-a^2 - 2a - 5)$$

$$\begin{aligned}&= a^2-2a+1-(-a^2)-(-2a)-(-5) \\ &= a^2-2a+1+a^2+2a+5 \\ &= a^2+a^2-2a+2a+1+5 \\ &= 2a^2+6\end{aligned}$$

$$7) (3x + y - 4z) - (7x + 3y - 2z)$$

$$= 3x + y - 4z - 7x - (+3y) - (-2z)$$

$$= 3x + y - 4z - 7x - 3y + 2z$$

$$= 3x - 7x + y - 3y - 4z + 2z$$

$$= -4x - 2y - 2z$$

$$8) (6x - 12) - (-9x - 4) - (x + 14)$$

$$= 6x - 12 - (-9x) - (-4) - x - (+14)$$

$$= 6x - 12 + 9x + 4 - x - 14$$

$$= 6x + 9x - x - 12 + 4 - 14$$

$$= 14x - 22$$

Part 4: Apply Our Knowledge!

The Burgh Birds players get a \$ x bonus added to their base salary for every goal that they score during the playoffs. Here are the salaries and goals scored for the 3 highest scoring players on the Burg Birds during the playoffs last season.

Player	Base salary	Goals in playoffs last season
Bardown Jensen	\$1200	18
Wayne Goal	\$1300	22
Timmy Toe Drag	\$900	5

a) Write and simplify an expression for each player's year end salary.

Bardown Jensen: $1200 + 18x$

Wayne-G: $1300 + 22x$

Timmy: $900 + 5x$

b) Write and simplify an expression for the total amount of money that the owner of the team will need to pay the three players at the end of the season.

$$\begin{aligned} \text{Total Paid} &= (1200 + 18x) + (1300 + 22x) + (900 + 5x) \\ &= 45x + 3400 \end{aligned}$$

c) If $x = 25$, what is the total amount of money that the owner will need to pay the three players at the end of the season?

$$\begin{aligned} \text{Total Paid} &= 45(25) + 3400 \\ &= \$4525 \end{aligned}$$

Review of Key Concepts

- To add polynomials, remove brackets and collect like terms
- To subtract a polynomial, add the opposite polynomial

Homework: Complete Worksheet