

Adding Polynomials

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Add like terms by adding the numerical portion of the terms, following the rules for adding signed numbers.

(The numerical portion of an expression is called the coefficient.)

Example: Add: $(2x^2 - 4) + (x^2 + 3x - 3)$

Below are several different ways to attack this example:

1. Using a horizontal method to add like terms:

Remove parentheses. Identify like terms. Group the like terms together.
Add the like terms.

$$\begin{aligned}
 &(2x^2 - 4) + (x^2 + 3x - 3) \\
 &= 2x^2 - 4 + x^2 + 3x - 3 \quad \text{.. identify like terms} \\
 &= 2x^2 + x^2 + 3x - 4 - 3 \quad \text{.. group the like terms together} \\
 &= 3x^2 + 3x - 7 \quad \text{... add the like terms}
 \end{aligned}$$

2. Using a vertical method to add like terms:

Arrange the like terms so that they are lined up under one another in vertical columns, adding 0 place holders if necessary. Add the like terms in each column following the rules for adding signed numbers.

$$\begin{array}{r}
 2x^2 + 0x - 4 \\
 + x^2 + 3x - 3 \\
 \hline
 3x^2 + 3x - 7
 \end{array}$$

Adding Polynomials

Polynomials are like numbers in many ways. If we have two polynomials we can always add them together to get another polynomial. We just have to remember only to combine like terms. Here is an example:

$$(6x - 7) + (4x + 5) = 10x - 2$$

Here are some polynomials for you to add:

1) $(3x + 5) + (4x + 1) =$

2) $(2x^2 + 3x + 7) + (8x^2 + 3x - 4) =$

3) $(x^2 + 5) + (x^2 + 4) =$

4) $(5x - 3) + (4x + 7) + (2x - 6) =$

5) $(x^2 + 6x - 5) + (x^2 - 8x - 4) =$

6) $(3a + 4b + c) + (5a - 4b + 2c) =$

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

8) $(5x^2 + 4x - 7) + (-5x^2 - 4x + 7) =$

9)
$$\begin{array}{r} 3x^2 + 5x + 2 \\ + 4x^2 + 3x + 2 \\ \hline \end{array}$$

10)
$$\begin{array}{r} 5x^2 - 4x - 8 \\ + 6x^2 - 9x + 7 \\ \hline \end{array}$$

11)
$$\begin{array}{r} x^2 + 6x + 9 \\ + x^2 + 4x + 4 \\ \hline \end{array}$$

12)
$$\begin{array}{r} 3x - 9 \\ + 2x^2 + 2x + 2 \\ \hline \end{array}$$

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Find the sum of polynomials

1. $(p^3 + 5p^2 + 9p - 6) + (-5p^3 - 8p + 1) =$ _____

2. $(-2p^4 + 3p + 9) + (4p^4 + 3p^3 + p) =$ _____

3. $(6q^5 + 2q^4 - 21q^3 + 1) + (3q^4 - q^3) =$ _____

4. $(2s^2 + 3s + 5) + (5s^3 - 7) =$ _____

5. $(s + 3) + (s^2 + 6s + 9) =$ _____

6. $(x^3 + 3x^2 + 1) + (-5x^3 + 3x + 4) =$ _____

7. $(t^2 - 6t + 3) + (-t^2 - 9) =$ _____

8. $(y^4 + 5y^2 - 3) + (y^3 - 8y^2 + 4y + 12) =$ _____

9. $(p^4 + 3p^2 - 8) + (p^3 + 9) =$ _____

10. $(4t^3 + 7t^2 + 3t) + (-2t^2 + 2t - 5) =$ _____

8-1**Reteaching****Adding and Subtracting Polynomials**

You can add and subtract polynomials by lining up like terms and then adding or subtracting each part separately.

Problem

What is the simplified form of $(3x^2 - 4x + 5) + (5x^2 + 2x - 8)$?

Write the problem vertically, lining up the like terms.

Then add each pair of like terms.

Solve Add the x^2 terms.

$$3x^2 + 5x^2 = 8x^2$$

Add the x terms.

$$-4x + 2x = -2x$$

Add the constant terms.

$$5 + (-8) = -3$$

$$\begin{array}{r} 3x^2 - 4x + 5 \\ + 5x^2 + 2x - 8 \\ \hline \end{array}$$

$$\begin{array}{r} 3x^2 - 4x + 5 \\ + 5x^2 + 2x - 8 \\ \hline \end{array}$$

$$8x^2 - 2x - 3$$

Add the sums.

Check Check your solution using subtraction.

$$8x^2 - 5x^2 = 3x^2$$

$$-2x - 2x = -4x$$

$$-3 - (-8) = 5$$

Solution: $(3x^2 - 4x + 5) + (5x^2 + 2x - 8) = 8x^2 - 2x - 3$

Exercises

Simplify.

$$1. \begin{array}{r} 5b^2 + 3b \\ + 2b^2 - 5b \\ \hline \end{array}$$

$$2. \begin{array}{r} 3c^2 + 3c \\ + 4c^2 + 2c \\ \hline \end{array}$$

$$\cancel{3. \begin{array}{r} 4d^2 - 3d + 6 \\ + 2d^3 + 5d - 3 \\ \hline \end{array}}$$

$$4. \begin{array}{r} -3e^2 - 5e + 2 \\ + e^2 + 2e - 7 \\ \hline \end{array}$$

$$5. \begin{array}{r} 4f^3 + 2f^2 + 5f \\ + 2f^3 - 4f^2 - 3f \\ \hline \end{array}$$

$$6. \begin{array}{r} 5g^3 - 2g^2 + 3g \\ + 2g^3 + 5g^2 - 2g \\ \hline \end{array}$$

$$7. (3h^2 + 5) + (-5h^2 - 3)$$

$$8. (2j^2 + 4j - 6) + (4j^2 - 3j - 3)$$

Subtracting Polynomials

Remember how we used to change subtraction problems to addition problems when we worked with integers? We always had to add the opposite of the second number. Well, polynomials work the same way - only this time we have to add the opposite of the second polynomial.

Here is an example:

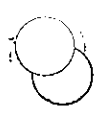
$$(5x^3 - 3x - 7) - (8x^3 + 6x - 2)$$

- | | |
|---|------------------------------|
| 1) Keep the first term the same, | $5x^3 - 3x - 7$ |
| 2) Change the subtraction sign to addition + | |
| 3) Change the signs of all the numbers in the second polynomial | $\underline{-8x^3 - 6x + 2}$ |
| 4) Then add to get the answer | $-3x^3 - 9x - 5$ |

Here is one for you to try:

$$(6x - 9) - (4x + 2)$$

- 1) Keep the first term the same,
- 2) Change the subtraction sign to addition
- 3) Change the signs of all the numbers in the second polynomial
- 4) Then add to get the answer



Be careful when the word "from" is used. It changes which polynomial to put first!

Subtract $8x + 3$ from $2x - 7$ means the first term is $2x - 7$ and you have to change the signs of $8x + 3$.

- 1) Keep the first term the same, $2x - 7$
- 2) Change the subtraction sign to addition +
- 3) Change the signs of all the numbers in the second polynomial $-8x - 3$
- 4) Then add to get the answer $-6x - 10$

Here is one for you to try:

Subtract $4x - 8$ from $10x + 15$

- 1) Keep the first term the same,
- 2) Change the subtraction sign to addition
- 3) Change the signs of all the numbers in the second polynomial
- 4) Then add to get the answer

Subtracting Polynomials

Remember how we used to change subtraction problems to addition problems when we worked with integers? We always had to add the *opposite* of the *second number*. Well, polynomials work the same way — only this time we have to add the *opposite* of the *second polynomial*. Here is an example:

$$(5x^3 - 3x - 7) - (8x^3 + 6x - 2) =$$

First we have to change this to an addition problem. There are three terms in the second polynomial, so we have to be sure to change each of them.

$$(5x^3 - 3x - 7) + (-8x^3 + 6x + 2) =$$

Now we just have to write the answer:

$$(5x^3 - 3x - 7) + (-8x^3 + 6x + 2) = -3x^3 - 9x - 5$$

You subtract these polynomials.

① $(3x^2 + 5x - 2) - (7x^2 - 5x + 4) =$

② $(6x^2 + 2x - 2) - (x^2 + 4x - 1) =$

③ $(2y^2 - y + 3) - (3y^2 - y - 4) =$

④ $(y^2 + y - 6) - (y^2 + 5y - 6) =$

⑤ $(4x^2 + 3x + 5) - (4x^2 - 3x + 5) =$

⑥
$$\begin{array}{r} 3x^2 + 5x - 2 \\ - 2x^2 - 3x + 7 \\ \hline \end{array}$$

⑦
$$\begin{array}{r} 5a^2 - 2a - 8 \\ - a^2 - 6a + 3 \\ \hline \end{array}$$

⑧
$$\begin{array}{r} 4x^2 - 3x + 2 \\ - 4x^2 + 3x + 6 \\ \hline \end{array}$$

⑨
$$\begin{array}{r} 8x^2 - 8x - 3 \\ - \quad \quad 4x + 2 \\ \hline \end{array}$$

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Subtract the polynomials

1. $(5x^3 + 3x^2 + 1) - (2x^3 - x^2 + 3)$ =

2. $(y^3 + 3y^2 + y - 13) - (3y^4 + 4y^2 - 12)$ =

3. $(3p^4 + 2p^3 + 4p) - (p^5 + 2p^4 + 1)$ =

4. $(3s^2 + 4s + 3) - (6s^3 - 8)$ =

5. $(3t^2 + 5t - 6) - (2t^2 + 3t - 3)$ =

6. $((q + 3) - (q^2 + 6q + 9))$ =

7. $(10r^4 + 3r^2 + 11) - (r^3 + 3)$ =

8. $(8z^3 + 12z + 9) - (z^2 - 5z + 1)$ =

9. $(15u^5 + 11u^2 + 5) - (2u^4 - 12)$ =

10. $(8v^2 + 5v + 3) - (5v^3 - 8v + 1)$ =

no: _____

The sum of $3x^2 + x + 8$ and $x^2 - 9$ can be expressed as

The sum of $3x^2 + 4x - 2$ and $x^2 - 5x + 3$ is

If $2x^2 - 4x + 6$ is subtracted from $5x^2 + 8x - 2$, the difference is

If $a^2 - 6a + 5$ is subtracted from $3a^2 - 2a + 3$, the result is

If $2x^2 - x + 6$ is subtracted from $x^2 + 3x - 2$, what is the result?

When $-2x^2 + 4x + 2$ is subtracted from $x^2 + 6x - 4$, what is the result?

Name: _____ Date: _____
Subtracting Polynomials - Homework Mrs. Galluzzo

Remember the rules for subtracting polynomials:

1. Keep the signs of the first term
2. Change subtraction to addition
3. Change all the signs in the second term
4. Then add


Watch the word "From",
it means put "First"

REMEMBER: CAN ONLY ADD/SUBTRACT LIKE TERMS

1. Subtract $-2x^2 + 3x + 7$ from $3x^2 + 5x - 2$

2. From $12x^2 + 5$ subtract $5x^2 - 8$

3. Subtract $2x^2 + 7x$ from $3x^2 - 1x$

Name: Homework 10/25/18


Questions 1 through 3 refer to the following:

Simplify the given expression:

1) $(-6x + 5z) - (-8x + z)$

A) $-14x + 6z$

B) $2x + 4z$

C) $-14x + 4z$

D) $2x + 6z$

2) $(7x^2 - 5x + 2) - (-3x^2 + 8x - 4)$


A) $4x^2 + 3x - 6$

C) $10x^2 - 3x + 6$

B) $10x^2 - 13x + 6$

D) $4x^2 - 3x + 6$

3) $(y^2 - 7y + 3) - (2y^2 + 3y - 4)$



4) Find the difference of the given polynomials:

$$\begin{array}{r} 13pq + 8rs \\ 11pq - 15rs \\ \hline \end{array}$$


A) $2pq + 23rs$

B) $-24pq + 23rs$

C) $-2pq - 23rs$

D) $24pq + 7rs$



Polynomials and Factoring

Skills Practice

Name

Review

Date _____

Add the polynomials.

1. $2a^2 + 4a + 3$ and $a^2 + a + 1$

2. $r^2 + r + 5$ and $4r^2 + 3r + 4$

3. $6s - 2t$ and $3s + 6t$

4. $-5z - w$ and $2z + 3w$

5. $d^2 + 5d - 3$ and $-4d^2 + 5d - 2$

6. $x^3 + 6x - 7$ and $-2x^2 + 4x + 2$

Subtract the polynomials.

7. $3m^2 + 4m + 2$ from $m^2 + m + 8$

8. $x^2 + 2x + 4$ from $4x^2 + 5x + 2$

9. $7r - 2s$ from $2r + 3s$

10. $-3y - 4z$ from $4y + z$

Simplify.

11. $2x(3x + 1)$

12. $4y(y^2 + 5y + 2)$

13. $c(5c^2 + c)$

14. $3a(a^2 - 6a + 3)$

15. $-4n(n - 2m)$

16. $t(t^2 + t + 1)$