

Division of a Polynomial by a Binomial with no Remainder



• Example 1

Dividing by Binomials

Divide $x^2 + 7x + 10$ by $x + 2$.

The first term in the dividend, x^2 , is divided by the first term in the divisor, x .

Step 1 $x + 2 \overline{)x^2 + 7x + 10}$ Divide x^2 by x to get x .

Step 2 $x + 2 \overline{)x^2 + 7x + 10}$
 $\quad \underline{x^2 + 2x}$
 Multiply the divisor, $x + 2$, by x .

Remember: To subtract $x^2 + 2x$, mentally change each sign to $-x^2 - 2x$, and add. Take your time and be careful here. It's where most errors are made.

Step 3 $x + 2 \overline{)x^2 + 7x + 10}$
 $\quad \underline{x^2 + 2x}$
 $\quad \quad \underline{5x + 10}$
 Subtract and bring down 10.

Step 4 $x + 2 \overline{)x^2 + 7x + 10}$
 $\quad \underline{x^2 + 2x}$
 $\quad \quad \underline{5x + 10}$ Divide $5x$ by x to get 5.

Note that we repeat the process until the degree of the remainder is less than that of the divisor or until there is no remainder.

Step 5 $x + 2 \overline{)x^2 + 7x + 10}$
 $\quad \underline{x^2 + 2x}$
 $\quad \quad \underline{5x + 10}$
 $\quad \quad \quad \underline{5x + 10}$
 $\quad \quad \quad \quad \underline{0}$
 Multiply $x + 2$ by 5 and then subtract.

The quotient is $x + 5$.

● ● ● CHECK YOURSELF 1

Divide $x^2 + 9x + 20$ by $x + 4$.

• Example 2

Dividing by Binomials

Divide $x^2 + x - 12$ by $x - 3$.

You might want to write out a problem like $408 \div 17$, to compare the steps.

$$\begin{array}{r} x + 4 \\ x - 3 \overline{) x^2 + x - 12} \\ \underline{x^2 - 3x} \\ 4x - 12 \\ \underline{4x - 12} \\ 0 \end{array}$$

The Steps

1. Divide x^2 by x to get x , the first term of the quotient.
2. Multiply $x - 3$ by x .
3. Subtract and bring down -12 . Remember to mentally change the signs to $-x^2 + 3x$ and add.
4. Divide $4x$ by x to get 4 , the second term of the quotient.
5. Multiply $x - 3$ by 4 and subtract.

The quotient is $x + 4$.

● ● ● CHECK YOURSELF 2

Divide.

$$(x^2 + 2x - 24) \div (x - 4)$$

● ● ● CHECK YOURSELF ANSWERS

1. $x + 5$. 2. $x + 6$.
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5.7 Exercises

Name _____

Section _____

Date _____

Perform the indicated divisions.

1. $\frac{x^2 + 5x + 6}{x + 2}$

2. $\frac{x^2 + 8x + 15}{x + 3}$

3. $\frac{x^2 - x - 20}{x + 4}$

4. $\frac{x^2 - 2x - 35}{x + 5}$

5. $\frac{x^2 - x - 6}{x + 2}$

6. $\frac{x^2 + 7x + 12}{x + 3}$

7. $\frac{x^2 - 9x + 18}{x - 3}$

8. $\frac{x^2 - 9x + 14}{x - 2}$

9. $\frac{2x^2 + 5x - 3}{2x - 1}$

10. $\frac{3x^2 + 20x - 32}{3x - 4}$

A N S W E R S

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____