

Exercise 9

For the following exercises, use long division to divide. Specify the quotient and the remainder.

$$(2x^2 - 3x + 2) \div (x + 2)$$

Solution

Set up the division problem, writing out every term in the dividend.

$$x + 2 \overline{) 2x^2 - 3x + 2}$$

Divide the leading term of the dividend by the leading term of the divisor and place the result above the term with the same power of x .

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

Multiply this result by the divisor and subtract it from the dividend.

$$x + 2 \overline{) 2x^2 - 3x + 2} \quad \begin{array}{r} 2x \\ \hline -(2x^2 + 4x) \\ \hline -7x \end{array}$$

Bring the next term in the dividend down.

$$\begin{array}{r} 2x \\ x+2 \overline{) 2x^2 - 3x + 2} \\ \underline{-(2x^2 + 4x)} \quad \downarrow \\ -7x + 2 \end{array}$$

Divide the leading term of this modified dividend by the leading term of the divisor and place the result above the term with the same power of x .

$$\begin{array}{r} 2x - 7 \\ x+2 \overline{) 2x^2 - 3x + 2} \\ \underline{-(2x^2 + 4x)} \\ -7x + 2 \end{array}$$

Multiply this result by the divisor and subtract it from the modified dividend.

$$\begin{array}{r} 2x - 7 \\ x+2 \overline{) 2x^2 - 3x + 2} \\ \underline{-(2x^2 + 4x)} \\ -7x + 2 \\ \underline{-(-7x - 14)} \\ 16 \end{array}$$

There are no further terms in the dividend to drop down, so the division is complete. The quotient is $2x - 7$, and the remainder is 16.

$$(2x^2 - 3x + 2) \div (x + 2) = 2x - 7 + \frac{16}{x + 2}$$