Exercise 4

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

$$(2x^2 - 9x - 5) \div (x - 5)$$

Solution

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

$$x - 5 \overline{)2x^2 - 9x - 5}$$

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.

$$\begin{array}{r} 2x \\ x - 5 \overline{)2x^2 - 9x - 5} \end{array}$$

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

$$\begin{array}{r} 2x \\ x - 5 \overline{)2x^2 - 9x - 5} \\ -\left(2x^2 - 10x\right) \\ \hline x \end{array}$$

Bring the next term in the dividend down.

$$\begin{array}{r} 2x \\ x-5\overline{)\,2x^2-9x-5} \\ \underline{-\left(2x^2-10x\right)\downarrow} \\ x-5 \end{array}$$

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.

$$\begin{array}{r} 2x+1 \\ x-5\overline{)\,2x^2-9x-5} \\ \underline{-\left(2x^2-10x\right)} \\ x-5 \end{array}$$

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

$$\begin{array}{r} 2x+1 \\ x-5\overline{)\,2x^2-9x-5} \\ \underline{-\left(2x^2-10x\right)} \\ x-5 \\ \underline{-(x-5)} \\ 0 \end{array}$$

There are no further terms in the dividend to drop down, so the division is complete. The quotient is $2x+1$, and the remainder is 0.

$$(2x^2-9x-5)\div(x-5)=2x+1$$