Exercise 7

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

$$(6x^2 - 25x - 25) \div (6x + 5)$$

Solution

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

$$6x + 5 \overline{)\, 6x^2 - 25x - 25}$$

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.

$$\begin{array}{r} x \\ 6x + 5 \overline{)\, 6x^2 - 25x - 25} \end{array}$$

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

$$\begin{array}{r} x \\ 6x + 5 \overline{)\, 6x^2 - 25x - 25} \\ -\left(6x^2 + 5x\right) \\ \hline -30x \end{array}$$

Bring the next term in the dividend down.

$$\begin{array}{r} x \\ 6x+5\overline{)\,6x^2-25x-25} \\ -\left(6x^2+5x\right)\quad\downarrow \\ \hline -30x-25 \end{array}$$

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.

$$\begin{array}{r} x-5 \\ 6x+5\overline{)\,6x^2-25x-25} \\ -\left(6x^2+5x\right) \\ \hline -30x-25 \end{array}$$

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

$$\begin{array}{r} x-5 \\ 6x+5\overline{)\,6x^2-25x-25} \\ -\left(6x^2+5x\right) \\ \hline -30x-25 \\ -(-30x-25) \\ \hline 0 \end{array}$$

There are no further terms in the dividend to drop down, so the division is complete. The quotient is $x-5$, and the remainder is 0.

$$(6x^2-25x-25)\div(6x+5)=x-5$$