Practice Set 10.1

1. Divide. Write the quotient and the remainder.

(1) $21m^2 \div 7m$

Solution:

$$\begin{array}{r|l} & 3m \\ 7m & 21m^2 \\ & \underline{-\ 21m^2} \\ & 0 \end{array}$$

Thus, quotient = 3m and remainder = 0.

(2) $40a^3 \div (-10a)$

Solution:

$$\begin{array}{r|l} & -4a^2 \\ -10a & 40a^3 \\ & \underline{-\ 40a^3} \\ & 0 \end{array}$$

Thus, quotient = $-4a^2$ and remainder = 0.

(3) $(-48p^4) \div (-9p^2)$

Solution:

$$\begin{array}{r|l} & \frac{16}{3}p^2 \\ -9p^2 & -48p^4 \\ & -48p^4 \\ & \underline{+} \\ & 0 \end{array}$$

Thus, quotient = $16/3\ p^2$ and remainder = 0.

(4) $40m^5 \div 30m^3$

Solution:

$$\begin{array}{r|l} & \frac{16}{3}p^2 \\ -9p^2 & -48p^4 \\ & -48p^4 \\ & \underline{+} \\ & 0 \end{array}$$

Thus, quotient = 16/3 p^2 and remainder = 0.

(5) $(5x^3 - 3x^2) \div x^2$
Solution:

$$\begin{array}{r|l} & 5x \; - \; 3 \\ \hline x^2 & 5x^3 - 3x^2 \\ & (-)\,5x^3 \\ \hline & \qquad -3x^2 \\ & \quad (+)\,-3x^2 \\ \hline & \qquad 0 \end{array}$$

Thus, quotient = 5x – 3 and remainder = 0.

(6) $(8p^3 - 4p^2) \div 2p^2$
Solution:

$$\begin{array}{r|l} & 4p \; - \; 2 \\ \hline 2p^2 & 8p^3 - 4p^2 \\ & (-)\,8p^3 \\ \hline & \qquad -4p^2 \\ & \quad (+)\,-4p^2 \\ \hline & \qquad 0 \end{array}$$

Thus, quotient = 4p – 2 and remainder = 0.

(7) $(2y^3 + 4y^2 + 3) \div 2y^2$
Solution:

$$\begin{array}{r|l} & y \; + \; 2 \\ \hline 2y^2 & 2y^3 + 4y^2 + 0y + 3 \\ & (-)\,2y^3 \\ \hline & \qquad 4y^2 \qquad + 3 \\ & \quad (-)\,4y^2 \\ \hline & \qquad\qquad\qquad 3 \end{array}$$

Thus, quotient = y + 2 and remainder = 3.

(8) $(21x^4 - 14x^2 + 7x) \div 7x^3$

Solution:

$$\begin{array}{r|l} & 3x \\ \hline 7x^3 & 21x^4 + 0x^3 - 14x^2 + 7x \\ & (-)\ 21x^4 \\ \hline & \qquad -14x^2 + 7x \end{array}$$

Thus, quotient = 3x and remainder = $-14x^2 + 7x$.

(9) $(6x^5 - 4x^4 + 8x^3 + 2x^2) \div 2x^2$
Solution:

$$\begin{array}{r|l} & 3x^3 - 2x^2 + 4x + 1 \\ \hline 2x^2 & 6x^5 - 4x^4 + 8x^3 + 2x^2 \\ & (-)6x^5 \\ \hline & \quad -4x^4 + 8x^3 + 2x^2 \\ & (+)\ -4x^4 \\ \hline & \qquad 8x^3 + 2x^2 \\ & (-)\ 8x^3 \\ \hline & \qquad\quad 2x^2 \\ & (-)\ 2x^2 \\ \hline & \qquad\quad 0 \end{array}$$

Thus, quotient = $3x^3 - 2x^2 + 4x + 1$ and remainder = 0.

(10) $(25m^4 - 15m^3 + 10m + 8) \div 5m^3$
Solution:

$$\begin{array}{r|l} & 5m - 3 \\ \hline 5m^3 & 25m^4 - 15m^3 + 0m^2 + 10m + 8 \\ & (-)\ 25m^4 \\ \hline & \quad -15m^3 + 10m + 8 \\ & (+)\ -15m^3 \\ \hline & \qquad 10m + 8 \end{array}$$

Thus, quotient = 5m – 3 and remainder = 10m + 8.

Practice Set 10.2

1. Divide and write the quotient and the remainder.

(1) $(y^2 + 10y + 24) \div (y + 4)$

Solution:

$$
\begin{array}{r|l}
 & y + 6 \\
\hline
y + 4 & y^2 + 10y + 24 \\
 & \underline{\overset{-}{y^2} \overset{-}{+} 4y} \\
 & \quad 6y + 24 \\
 & \quad \underline{\overset{-}{}6y \overset{-}{+} 24} \\
 & \qquad 0
\end{array}
$$

Thus, quotient = y + 6 and remainder = 0

(2) $(p^2 + 7p - 5) \div (p + 3)$

Solution:

$$
\begin{array}{r|l}
 & p + 4 \\
\hline
p + 3 & p^2 + 7p - 5 \\
 & \underline{\overset{-}{p^2} \overset{-}{+} 3p} \\
 & \quad 4p - 5 \\
 & \quad \underline{\overset{-}{}4p \overset{-}{+} 12} \\
 & \qquad -17
\end{array}
$$

Thus, quotient = p + 4 and remainder = -17

(3) $(3x + 2x^2 + 4x^3) \div (x - 4)$

Solution:

Writing the dividend in descending order of their indices, we have

$3x + 2x^2 + 4x^3 = 4x^3 + 2x^2 + 3x$

$$
\begin{array}{r l}
 & 4x^2 + 18x + 75 \\
x-4 \,\big) & 4x^3 + 2x^2 + 3x \\
 & 4x^3 - 16x^2 \\
 & \underline{- \quad +} \\
 & \quad 18x^2 + 3x \\
 & \quad 18x^2 - 72x \\
 & \quad \underline{- \quad +} \\
 & \qquad 75x \\
 & \qquad 75x - 300 \\
 & \qquad \underline{- \quad +} \\
 & \qquad\quad 300
\end{array}
$$

Thus, quotient = $4x^2 + 18x + 75$ and remainder = 300

(4) $(2m^3 + m^2 + m + 9) \div (2m - 1)$
Solution:

$$
\begin{array}{r l}
 & m^2 + m + 1 \\
2m-1 \,\big) & 2m^3 + m^2 + m + 9 \\
 & 2m^3 - m^2 \\
 & \underline{- \quad +} \\
 & 0 + 2m^2 + m + 9 \\
 & \quad 2m^2 - m \\
 & \quad \underline{- \quad +} \\
 & \qquad 2m + 9 \\
 & \qquad 2m - 1 \\
 & \qquad \underline{- \quad +} \\
 & \qquad\quad 10
\end{array}
$$

Thus, quotient = $m^2 + m + 1$ and remainder = 10

(5) $(3x - 3x^2 - 12 + x^4 + x^3) \div (2 + x^2)$
Solution:

Writing the dividend in descending order of their indices, we have
$(x^4 + x^3 - 3x^2 + 3x - 12) \div (x^2 + 2)$

$$
\begin{array}{r|l}
 & x^2 + x - 5 \\
\hline
x^2+2 & x^4 + x^3 - 3x^2 + 3x - 12 \\
 & \underline{\underset{-}{x^4} \qquad \underset{-}{+2x^2}} \\
 & \quad x^3 - 5x^2 + 3x - 12 \\
 & \quad \underline{\underset{-}{x^3} \qquad \underset{-}{+2x}} \\
 & \qquad -5x^2 + x - 12 \\
 & \qquad \underline{\underset{+}{-5x^2} \qquad \underset{+}{-10}} \\
 & \qquad\qquad x - 2
\end{array}
$$

Thus, quotient = $x^2 + x - 5$ and remainder = $x - 2$.

(6) $(a^4 - a^3 + a^2 - a + 1) \div (a^3 - 2)$
Solution:

$$
\begin{array}{r|l}
 & a - 1 \\
\hline
a^3-2 & a^4 - a^3 + a^2 - a + 1 \\
 & \underline{\underset{-}{a^4} \qquad \underset{+}{-2a}} \\
 & \quad -a^3 + a^2 + a + 1 \\
 & \quad \underline{\underset{+}{-a^3} \qquad \underset{-}{+2}} \\
 & \qquad a^2 + a - 1
\end{array}
$$

Thus, quotient = $a - 1$ and remainder = $a^2 + a - 1$.

(7) $(4x^4 - 5x^3 - 7x + 1) \div (4x - 1)$
Solution:

Writing the dividend in descending order of their indices, we have
$(4x^4 - 5x^3 - 7x + 1) = (4x^4 - 5x^3 + 0x^2 - 7x + 1)$

$$\begin{array}{r|l} & x^3 \quad -x^2 \quad -\frac{x}{4} \quad -\frac{29}{16} \\ \hline 4x-1 & 4x^4 \quad -5x^3 \quad +0x^2 \quad -7x \quad +1 \end{array}$$

$$\begin{array}{rrrrr}
\text{(-) } 4x^4 & -x^3 & & & \\ \hline
 & -4x^3 & +0x^2 & -7x & +1 \\
 & \text{(+) } -4x^3 & +x^2 & & \\ \hline
 & & -x^2 & -7x & +1 \\
 & & \text{(+) } -x^2 & \text{(-)} +\frac{x}{4} & \\ \hline
 & & & -\frac{29x}{4} & +1 \\
 & & & \text{(+)} -\frac{29x}{4} & \text{(-)} +\frac{29}{16} \\ \hline
 & & & & -\frac{13}{16}
\end{array}$$

Thus, quotient = $x^3 - x^2 - x/4 - 29/16$ and remainder = $-13/16$.