Basic Fractions

$$\frac{2}{3} + \frac{1}{5} = \frac{10+3}{15} = \frac{13}{15}$$

$$\frac{3}{4} + \frac{1}{6} = \frac{9+2}{12} = \frac{11}{12}$$

$$\frac{7}{8} - \frac{1}{3} = \frac{21-8}{24} = \frac{13}{24}$$

$$\frac{3}{4} \times \frac{8}{9} = \frac{\cancel{3}^{1}}{\cancel{4}_{1}} \times \frac{\cancel{8}^{2}}{\cancel{9}_{3}} = \frac{1 \times 2}{1 \times 3} = \frac{2}{3}$$

$$\frac{5}{6} \div \frac{15}{2} = \frac{5}{6} \times \frac{2}{15}$$

Exercise 7A

1 a) $$\frac{4x^4 + 5x^2 - 7x}{x} = \frac{x(4x^3 + 5x - 7)}{x} = 4x^3 + 5x - 7$$

1 d) $$\frac{7x^5 - x^3 - 4}{x} = 7x^4 - x^2 - \frac{4}{x}$$

1 g) $$\frac{7x^3 - x^4 - 2}{5x} = \frac{7}{5}x^2 - \frac{1}{5}x^3 - \frac{2}{5x}$$

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2) a) $$\frac{(x+3)\cancel{(x-2)}}{\cancel{(x-2)}_{1}} = x + 3$$

2 m) $$\frac{2x^2 + 3x + 1}{x^2 - x - 2} = \frac{(2x+1)\cancel{(x+1)}}{\cancel{(x+1)}(x-2)} = \frac{2x+1}{x-2}$$

Multiplication

$$(2x^2 - 3x + 5)(x^2 + 3x - 1)$$

$$\begin{array}{rrrrrr} = & 2x^4 & -3x^3 & +5x^2 & & \\ & & +6x^3 & -9x^2 & +15x & \\ & & & -2x^2 & +3x & -5 \\ \hline = & 2x^4 & +3x^3 & -6x^2 & +18x & -5 \\ \hline \end{array}$$

Division $\quad 2x^4 + 3x^3 - 6x^2 + 18x - 5 \div x^2 + 3x - 1$

$$\begin{array}{r|rrrrr} & 2x^2 & -3x & +5 & & \\ \hline x^2+3x-1 & 2x^4 & +3x^3 & -6x^2 & +18x & -5 \\ & 2x^4 & +6x^3 & -2x^2 & & \\ \hline & & -3x^3 & -4x^2 & +18x & \\ & & -3x^3 & -9x^2 & +3x & \\ \hline & & & +5x^2 & +15x & -5 \\ & & & +5x^2 & +15x & -5 \\ \hline \end{array}$$

$$(x^2 + 3x - 1)(2x^4 - 3x + 5)$$

Exercise 7B

1f

$$\begin{array}{r|rrrr} & x^2 & +2x & +8 & \\ \hline x-7 & x^3 & -5x^2 & -6x & -56 \\ & x^3 & -7x^2 & & \\ \hline & & +2x^2 & -6x & \\ & & +2x^2 & -14x & \\ \hline \end{array}$$

$$+8x \quad -56$$
$$+8x \quad -56$$

$$x^3 - 5x^2 - 6x - 56 = (x-7)(x^2+2x+8)$$

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1 a)

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

1 b)

$$\begin{array}{r|l}
 & x^2 + 6x + 1 \\
\hline
x+4 & x^3 + 10x^2 + 25x + 4 \\
 & x^3 + 4x^2 \\
\hline
 & \quad +6x^2 + 25x \\
 & \quad +6x^2 + 24x \\
\hline
 & \qquad\quad +x + 4 \\
 & \qquad\quad +x + 4 \\
\hline
\end{array}$$

1 c)

$$\begin{array}{r|l}
 & x^2 - 3x + 7 \\
\hline
x+2 & x^3 - x^2 + x + 14 \\
 & x^3 + 2x^2 \\
\hline
 & \quad -3x^2 + x \\
 & \quad -3x^2 - 6x \\
\hline
 & \qquad\quad +7x + 14 \\
 & \qquad\quad +7x + 14 \\
\hline
\end{array}$$

1 d)

$$
\begin{array}{r|l}
 & x^2 + 4x + 5 \\
\hline
x - 3 & x^3 + x^2 - 7x - 15 \\
 & \underline{x^3 - 3x^2} \\
 & \quad +4x^2 - 7x \\
 & \quad \underline{+4x^2 - 12x} \\
 & \qquad +5x - 15 \\
 & \qquad \underline{+5x - 15}
\end{array}
$$

1 e)

$$
\begin{array}{r|l}
 & x^2 - 3x - 2 \\
\hline
x - 5 & x^3 - 8x^2 + 13x + 10 \\
 & \underline{x^3 - 5x^2} \\
 & \quad -3x^2 + 13x \\
 & \quad \underline{-3x^2 + 15x} \\
 & \qquad -2x + 10 \\
 & \qquad \underline{-2x + 10}
\end{array}
$$