Background Knowledge: Algebraic Simplification

To answer the following questions, you will need to remember:

- the distributive law \[ a(b + c) = ab + ac \]
- power notation \[ a^2 = a \times a, \quad a^3 = a \times a \times a, \quad a^4 = a \times a \times a \times a, \quad \text{and so on.} \]

Please copy each of the following onto a separate sheet of paper and SHOW ALL WORK.

1 Simplify if possible:
   - a \[ 3x + 7x - 10 \]
   - b \[ 3x + 7x - x \]
   - c \[ 2x + 3x + 5y \]
   - d \[ 8 - 6x - 2x \]
   - e \[ 7ab + 5ba \]
   - f \[ 3x^2 + 7x^3 \]

2 Remove the brackets and then simplify:
   - a \[ 3(2x + 5) + 4(5 + 4x) \]
   - b \[ 6 - 2(3x - 5) \]
   - c \[ 5(2a - 3b) - 6(a - 2b) \]
   - d \[ 3x(x^2 - 7x + 3) - (1 - 2x - 5x^2) \]

3 Simplify:
   - a \[ 2x(3x)^2 \]
   - b \[ \frac{3a^2b^3}{9ab^4} \]
   - c \[ \sqrt{16x^4} \]
   - d \[ (2a^2)^3 \times 3a^4 \]

Background Knowledge: Linear Equations and Inequalities

When dealing with inequalities:

- multiplying or dividing both sides by a negative reverses the inequality sign.
- do not multiply or divide both sides by the unknown or a term involving the unknown.

Please copy each of the following onto a separate sheet of paper and SHOW ALL WORK.

1 Solve for \( x \):
   - a \[ 2x + 5 = 25 \]
   - b \[ 3x - 7 > 11 \]
   - c \[ 5x + 16 = 20 \]
   - d \[ \frac{x}{3} - 7 = 10 \]
   - e \[ 6x + 11 < 4x - 9 \]
   - f \[ \frac{3x - 2}{5} = 8 \]
   - g \[ 1 - 2x \geq 19 \]
   - h \[ \frac{1}{2}x + 1 = \frac{2}{3}x - 2 \]
   - i \[ \frac{2}{3} - \frac{3x}{4} = \frac{1}{2}(2x - 1) \]

2 Solve simultaneously for \( x \) and \( y \):
   - a \[ \begin{align*}
   x + 2y &= 9 \\
   x - y &= 3 
   \end{align*} \]
   - b \[ \begin{align*}
   2x + 5y &= 28 \\
   x - 2y &= 2 
   \end{align*} \]
   - c \[ \begin{align*}
   7x + 2y &= -4 \\
   3x + 4y &= 14 
   \end{align*} \]
   - d \[ \begin{align*}
   5x - 4y &= 27 \\
   3x + 2y &= 9 
   \end{align*} \]
   - e \[ \begin{align*}
   x + 2y &= 5 \\
   2x + 4y &= 1 
   \end{align*} \]
   - f \[ \begin{align*}
   \frac{x}{2} + \frac{y}{3} &= 5 \\
   \frac{x}{3} + \frac{y}{4} &= 1 
   \end{align*} \]