Exercise 1B

In Questions **1** to **3** simplify each of the given inequalities.

1 a) $3x + 5 > x + 13$ b) $2x - 3 \leqslant 5x + 9$ c) $4x - 7 \geqslant 2x + 4$
d) $5x - 8 > x + 7$ e) $2x - 1 < x + 4$ f) $7x - 3 \geqslant 2x - 1$
g) $6 - 5x < 2 - 3x$ h) $3 - x \geqslant 9 + 6x$ i) $7x - 2 \geqslant 4x + 3$
j) $9 - 8x > 4$ k) $2 - 3x < 6x + 20$ l) $3x - 2 \geqslant 5x - 9$

2 a) $2(x + 3) - 3(x - 2) > 8$ b) $6(2x - 1) + 5(x + 1) < 33$
c) $5(x - 3) < 6(x - 4)$ d) $3(x + 4) \geqslant 6(x + 2)$
e) $3(x - 2) - 2(4 - 3x) > 5$ f) $7(1 - x) + 3(4 - 5x) \leqslant 41$
g) $3(2 - x) > 5(3 + 2x)$ h) $5(2 - x) - 2(3 - 6x) + 2(x - 1) > 0$
i) $2(3x - 1) - 2(x - 1) - x + 4 > 0$ j) $3(6x - 5) - 10(x - 4) \geqslant 3(x - 1)$
k) $5x - 2 + 3(2x - 7) < 2(5x - 3)$ l) $2(x - 3) - 3(5x - 2) \leqslant 6(3 - 2x)$

3 a) $\frac{1}{2}x + 2 < 7$ b) $\frac{1}{6}(x - 1) \geqslant \frac{1}{3}(x - 4)$
c) $\frac{1}{2}(x + 3) \leqslant \frac{1}{3}(x - 5)$ d) $\frac{1}{7}(2x + 5) > \frac{1}{8}(x + 3)$
e) $\dfrac{x - 2}{4} < \dfrac{2x - 3}{3}$ f) $\dfrac{4 - x}{2} \geqslant \dfrac{2 - x}{3}$
g) $\frac{1}{3}(6 - x) \leqslant \frac{1}{5}(2 - 3x)$ h) $\frac{1}{9}(2x - 1) > \frac{1}{3}(3 - x)$
i) $\frac{1}{3}(x - 2) + \frac{1}{2}(3x - 1) > 2$ j) $\frac{1}{2}(3x + 5) - \frac{1}{4}(2 - x) < 1$
k) $\frac{3}{4}(2 - x) + \frac{5}{6}(3 - 2x) \geqslant \frac{1}{2}$ l) $\frac{1}{2}(x - 1) + \frac{1}{3}(x - 2) \leqslant \frac{1}{4}(x - 3)$

4 Find the integers which simultaneously satisfy each of the following pairs of inequalities.

a) $4x + 3 \geqslant 2x + 5$ and $x + 4 \leqslant 7$
b) $5x + 3 > 3 - x$ and $3x + 5 < 2x + 7$
c) $5 - 2x \leqslant 3 - x$ and $1 - 2x \leqslant 11 - 4x$
d) $3x + 2 \geqslant 2x - 1$ and $7x + 3 < 5x + 2$
e) $5x - 4 \geqslant 4x - 3$ and $\frac{1}{3}x < 1$
f) $\frac{1}{2}(x + 1) > 1$ and $5x + 1 < 4(x + 2)$

5 Show that there are no real numbers which simultaneously satisfy the two inequalities $2x + 1 \geqslant x + 1$ and $\frac{1}{2}(x + 5) \leqslant 2$.

6 Prove that the pair of inequalities $\frac{1}{3}(4x + 1) > x + 2$ and $3 - x \leqslant 2(4 - x)$ cannot be solved simultaneously.

7 Show that there is just one number which simultaneously satisfies these three inequalities and find it.

$\frac{1}{2}(x - 1) \geqslant 1$ $\quad 2 - 3x \leqslant 7 - 4x$ $\quad \frac{1}{3}x \leqslant 1$