



Inequalities

- Solving linear inequalities
- Representing inequalities on a number line
- Representing the region described by several inequalities on a graph

Keywords

You should know

explanation 1a

explanation 1b

explanation 1c

explanation 1d

1 Represent these inequalities on a number line.

a $x > 2$

b $x < 4$

c $x \geq 0$

d $x \leq -2$

e $x < 3$ and $x > 1$

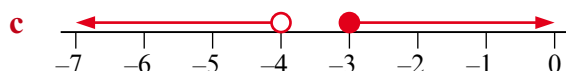
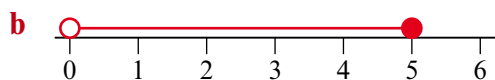
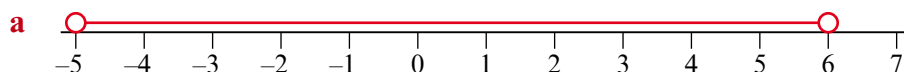
f $x \geq -3$ and $x < 1$

g $-5 < x \leq 2$

h $-1 \leq x \leq 4$

i $x > 3$ and $x \leq -2$

2 What inequalities are shown by these number lines?



3 Solve these inequalities and show your solution on a number line.

a $4n < 10$

b $5 + x > 7$

c $3y - 5 \leq 23$

d $4 + 3y \geq 1$

4 Solve these inequalities.

a $5x - 3 < 27$

b $4x - 7 \geq 13$

c $6p - 1 \leq -4$

d $\frac{m}{5} + 3 < 1$

e $5h < h + 9$

f $3(2x - 1) > 21$

g $5(3 + 2x) < 45$

h $\frac{3t}{2} > 9$

5 Solve these inequalities.

a $2 + 3x > 5 - x$

b $6(4x + 1) \geq 6$

c $7 < 2(3x - 4)$

d $2 \leq 8(x - 3)$

e $3(x + 2) > x - 5$

f $\frac{7x}{2} > 3(x + 5)$

6 Solve these inequalities.

a $4a + 3 \geq 2a - 7$

b $2t - 8 > 3t + 6$

c $\frac{1}{2}(w + 3) > 4$

d $5w + 3 < 17 - 2w$

e $\frac{3r}{4} - 5 \leq 1$

f $4(x + 3) > 2x - 2$

g $3(4s + 1) \leq 2(s - 5)$

h $\frac{5x - 6}{7} \geq x + 5$

7 Multiply both numbers in each inequality by -1 . Write the inequality for the new numbers. What do you notice?

a $4 > 3$

b $3 < 5$

c $-2 > -7$

d $-5 < 1$

8 Solve these inequalities.

a $4h \geq 28$

b $-6g < 18$

c $-3x > 30$

d $-5y \leq -30$

e $-7b \geq 56$

f $-5x > 3x + 8$

g $2f > 5f - 18$

h $2(r - 2) < 5 + 4r$

i $6 - 4k > 3(k + 5)$

explanation 2**9** Solve each of these inequalities and show your solution on a number line.

a $4 < 2x < 10$

b $-5 \leq x - 1 < 1$

c $5 < 3 + x \leq 7$

d $-2 < \frac{x}{2} < 3$

10 Write the integer values of x that satisfy each inequality.

a $-1 \leq x \leq 4$

b $-3 < x \leq 2$

c $-6 < x < -2$

d $-2 < x \leq 0$

11 Find the integer values of x that satisfy each inequality.

a $2 < 2x < 6$

b $-4 < x + 3 < -1$

c $-3 < x - 2 < 1$

d $-1 \leq 2x + 1 < 5$

e $-5 \leq 3x - 2 \leq 7$

f $1 < 4 - n \leq 5$

g $-2 < \frac{1}{2}x + 1 < 0$

h $-3 \leq 3 - 2n \leq 3$

i $-5 < 3(n + 3) < 0$

12 Solve these inequalities.

a $-15 < 2x - 5 \leq 7$

b $-8 \leq 4 - 3x \leq 7$

c $2 < \frac{(x+3)}{5} < 4$

explanation 3a

explanation 3b

explanation 3c

explanation 3d

13 For each part, draw and label axes for x and y from -4 to 4 .

Indicate the required region by shading the unwanted region.

a $y > 3$

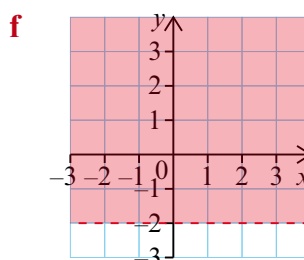
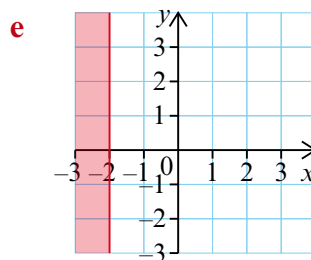
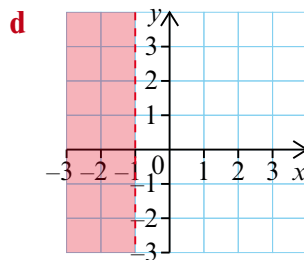
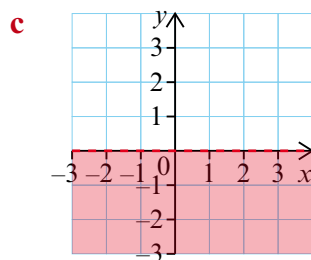
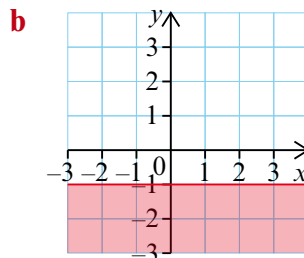
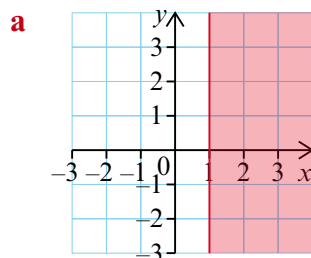
b $x \leq -1$

c $x \geq 0$

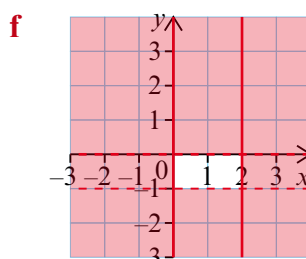
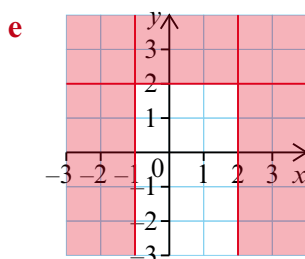
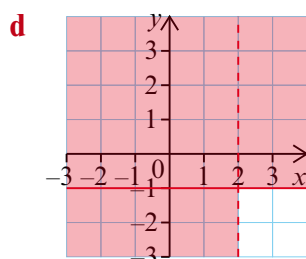
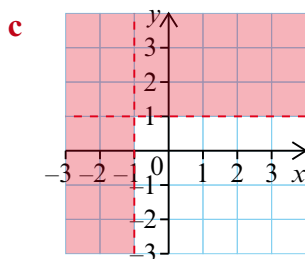
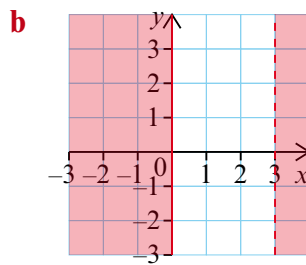
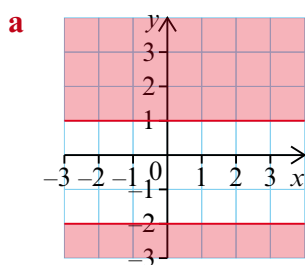
d $y > -1$

e $x < 2$

14 Use inequalities to describe the unshaded regions.



15 Use inequalities to describe the unshaded regions.



16 For each part, draw and label axes for x and y from -4 to 4 . Indicate the required region by shading the unwanted regions.

a $-2 < x < 1$

b $-1 \leq y \leq 3$

c $1 \leq x \leq 3$

d $0 \leq y < 1$

e $y > -1$ and $x < 2$

f $y \leq 3$ and $x < -1$

g $x \geq 2$ and $y > -2$

17 For each part, draw and label axes for x and y from -4 to 4 . Indicate the required region by shading the unwanted regions.

a $x > 2, x < 3, y > -1$

b $x \leq 3, y \leq 1, y > -2, x > 1$

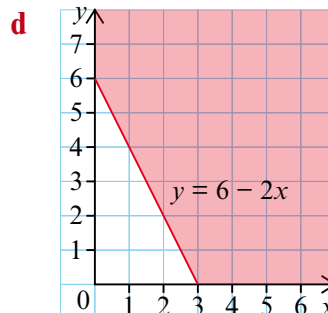
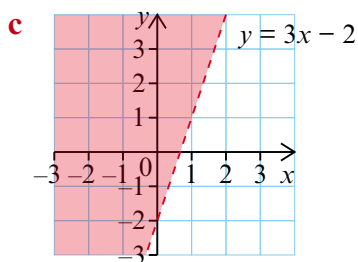
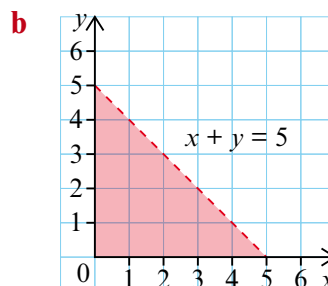
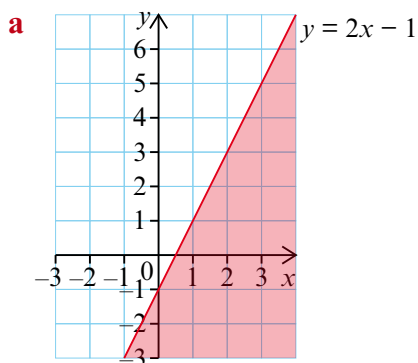
explanation 4a

explanation 4b

explanation 4c

explanation 4d

18 Describe the inequalities shown by the unshaded regions.



19 Draw graphs to show these regions.

Leave the region where the inequality is true unshaded.

a $y \geq x$

b $y > x + 1$

c $y < 2 + 2x$

d $y \leq 4x$

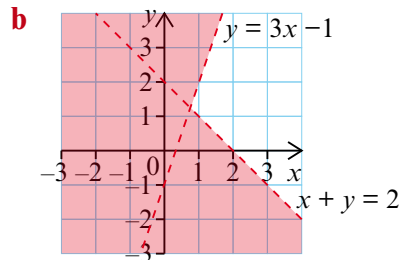
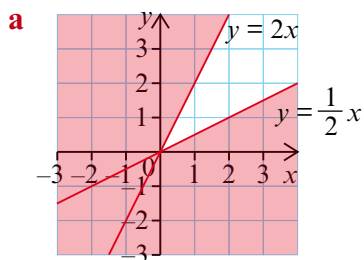
e $x + y > 4$

f $y \leq 8 - 2x$

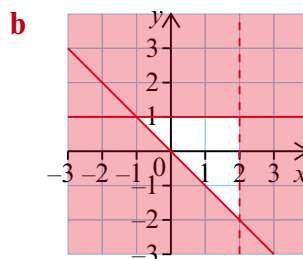
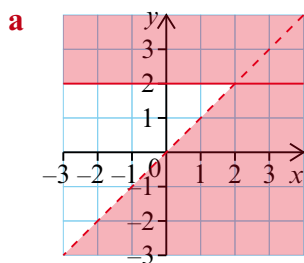
g $2x + 5y \geq 10$

h $3x + 4y < 12$

20 Describe the inequalities shown by each unshaded region.

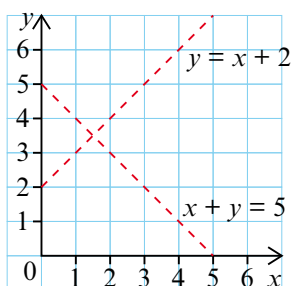


21 Describe the inequalities shown by each unshaded region.

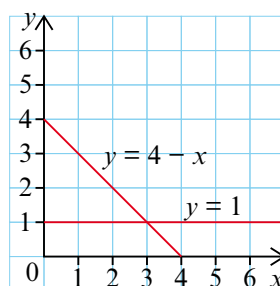


22 Copy each graph. Shade the unwanted regions to show the region that satisfies all of the inequalities.

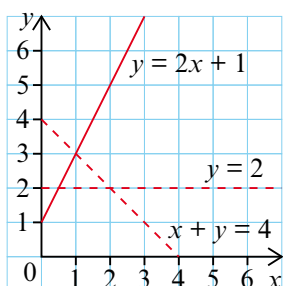
a $y < x + 2$ and $x + y > 5$



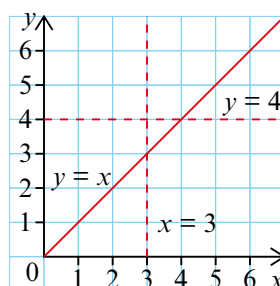
b $y \leq 1$ and $y \geq 4 - x$



c $x + y < 4$, $y > 2$ and $y \leq 2x + 1$



d $y \leq x$, $y < 4$ and $x > 3$



23 Draw graphs to show these regions. Use scales from -3 to 6 on both axes. Shade the unwanted regions.

a $y < 5$, $x > 1$ and $y > x + 2$

b $x \leq 4$, $y \leq 3$ and $x + y \geq 2$

c $2x + 3y > 9$, $x \geq 1$ and $x \leq 5$

d $y < x + 4$, $y < 7 - x$ and $y > 4$