

INEQUALITIES

Page	Description
1	Introduction to inequalities
2	Choose numbers that are correct for a given inequality. Write an inequality for a set of numbers
3	Find integers that fit into an inequality
4	Inequalities on a number line
5	Solving inequalities and putting their solutions on a number line
6	Solving inequalities
7	Shading regions on a graph

Inequalities

$<$ less than

\leq less than or equal to

$>$ more than

\geq more than or equal to

Put the correct inequality in between the numbers. Either $>$ or $<$.

1) $3 < 8$

2) $0.563 > 0.48$

3) $0.862 < 0.9$

4) $-3 > -7$

5) $-3 < 6$

6) $\frac{1}{4} < \frac{1}{3}$

7) $\frac{2}{3} > \frac{1}{2}$

8) $\frac{3}{5} < \frac{2}{3}$

9) $\frac{4}{5} > 0.75$

10) $0.35 < \frac{3}{8}$

n could ONLY be $-5, -2, 0, 3, 4$ or 7 .

Write down the possible value of n for each of these inequalities.

e.g. if $n > 3$ then n could be 4 or 7 .

1) $n \geq 3$ $3, 4, 7$

2) $n < 4$ $-5, -2, 0, 3$

3) $2n > 6$ $4, 7$

4) $n < 0$ $-5, -2$

5) $10 - n > 6$ $-5, -2, 0, 3$

6) $n^2 > 10$ $-5, 4, 7$

7) $n \div 2 \leq 2$ $4, 3, 0, -2, -5$

8) $2n + 1 < 7$ $0, -2, -5$

9) $n^2 + n < 20$ $3, 0, -2$

10) $10 \div n < 2$ $7, -2, -5$

n can be any whole number. Positive, negative or zero. Write all the possible values of n .

e.g. $2 < n < 8$, means 2 is less than n and n is less than 8 . n could be $3, 4, 5, 6$ or 7 .

1) $4 < n < 7$ $5, 6$

2) $3 \leq n \leq 6$ $3, 4, 5, 6$

3) $-2 \leq n < 2$ $-2, -1, 0, 1$

4) $-3 < n \leq 3$ $-2, -1, 0, 1, 2, 3$

5) $-8 < n \leq -4$ $-7, -6, -5, -4$

6) $-1 \leq n \leq 2$ $-1, 0, 1, 2$

7) $n > 2$ and $n < 5$ $3, 4$

8) $n \geq -2$ and $n < 1$ $-2, -1, 0$

9) $n \geq 0$ and $n < 1$ 0

10) $n^2 \leq 9$ $-3, -2, -1, 0, 1, 2, 3$

Inequalities

X is an integer. Shade in the possible values of x

- | | | |
|---|--------------------|---|
| 1 | $4 < x < 7$ | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 2 | $4 \leq x < 7$ | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 3 | $4 < x \leq 7$ | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 4 | $4 \leq x \leq 7$ | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 5 | $-2 < x \leq 5$ | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 6 | $0 \leq x < 3$ | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 7 | $-1 < x < 1$ | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 8 | $-1 \leq x \leq 4$ | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |

Fill in either the inequalities or the numbers corresponding to the shading.

- | | | |
|----|--|---|
| 9 | -2 $\leq x$ < 8 | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 10 | 0 $\leq x \leq$ 5 | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 11 | 3 < x < 8 | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 12 | -2 ≤ x ≤ 3 | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 13 | 6 $< x <$ 10 | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 14 | 1 $< x \leq$ 7 | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 15 | 3 ≤ x \leq 4 | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |
| 16 | -1 $\leq x <$ 9 | -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 |

1 Write down all the whole numbers (n) that fit into this inequality $-1 < n \leq 3$

0, 1, 2, 3

2 Write down all the whole numbers (n) that fit into this inequality $-3 \leq n \leq 1$

-3, -2, -1, 0, 1

3 Write down all the whole numbers (n) that fit into this inequality $6 \leq n < 10$

6, 7, 8, 9

4 Write down all the whole numbers (n) that fit into this inequality $2 < n < 9$

3, 4, 5, 6, 7, 8

5 Write down the FOUR smallest whole numbers (n) that fit into this inequality $n > 1$

2, 3, 4, 5

6 Write down the FOUR largest whole numbers (n) that fit into this inequality $n \leq 8$

5, 6, 7, 8

Using Number lines to represent inequalities

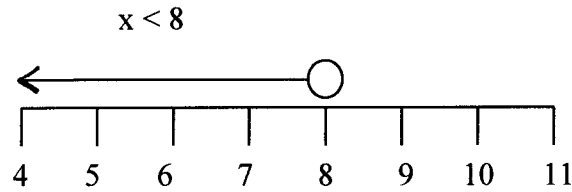
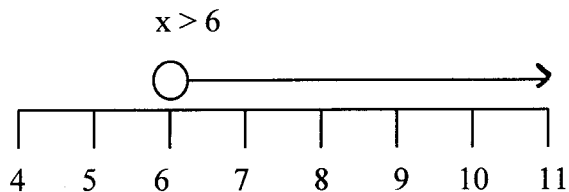
> greater than

\geq greater than or equal to

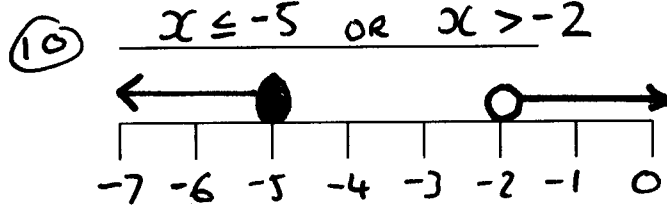
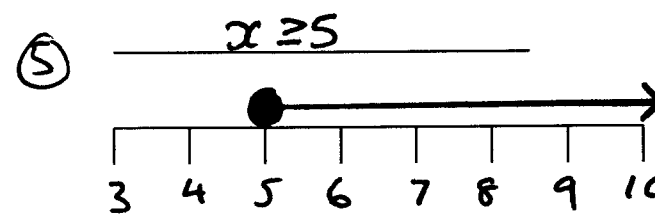
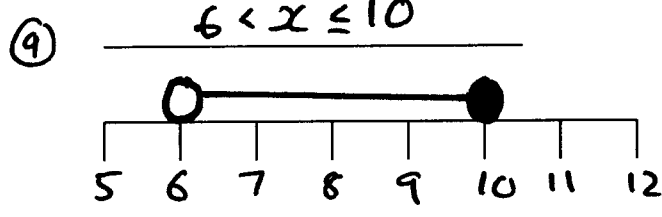
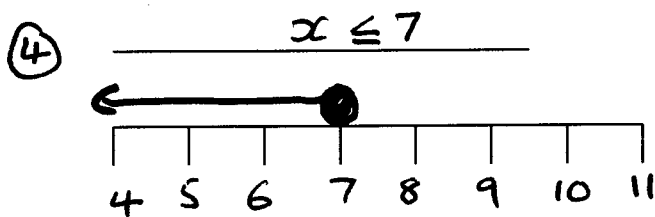
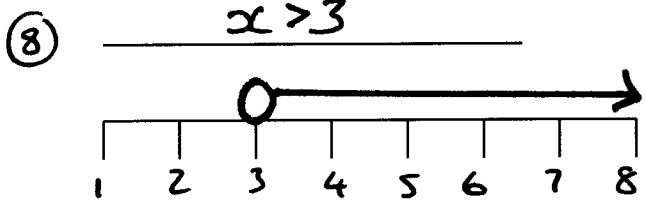
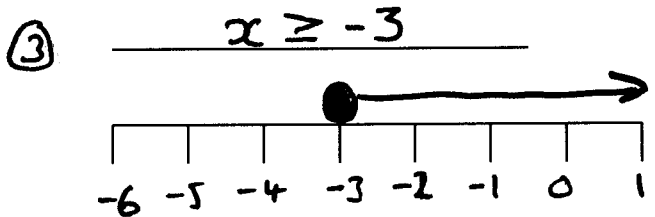
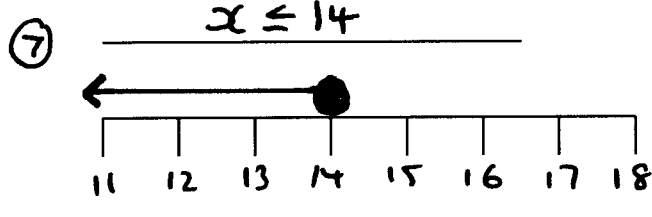
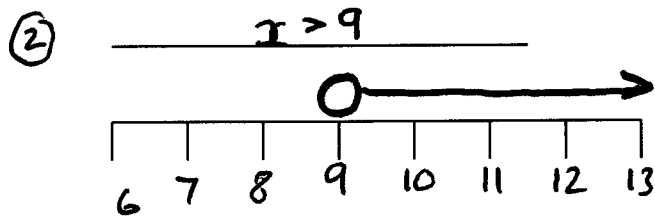
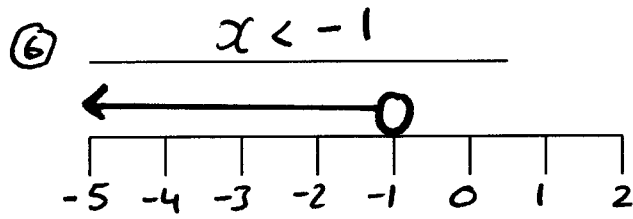
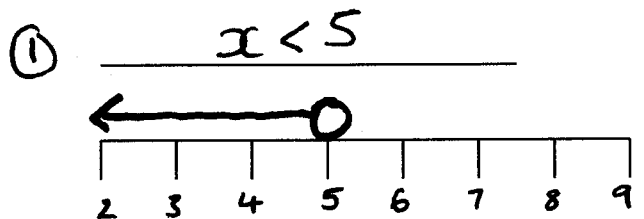
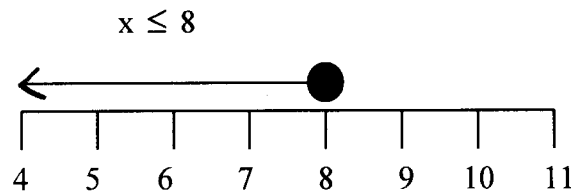
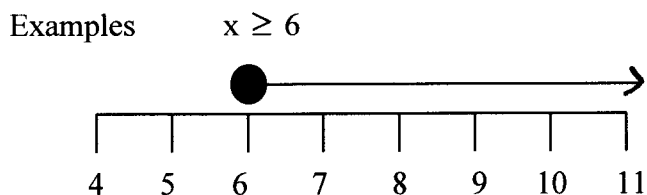
< less than

\leq less than or equal to

An **unshaded** circle for < and >



A **shaded** circle for \geq and \leq



Questions 1 to 4 Draw the inequality on the number line
5 \rightarrow 10 Write the inequality ④ from the number line.

Equations (one answer)

Solve these equations

1) $x - 3 = 13$ $x = 16$

2) $x + 4 = 11$ $x = 7$

3) $2x + 1 = 21$ $x = 10$

4) $3x - 3 = 9$ $x = 4$

5) $4x - 3 = 21$ $x = 6$

6) $\frac{x}{2} - 3 = 5$ $x = 16$

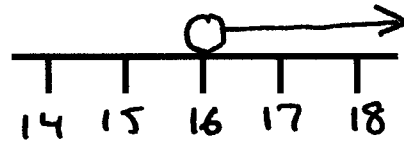
7) $14 = x + 2$ $x = 12$

8) $7 = 10 - x$ $x = 3$

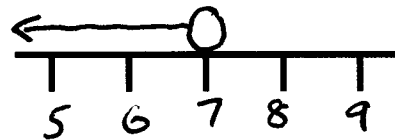
Inequalities (a range of answers)

Complete the number scale, put the solution on the number line

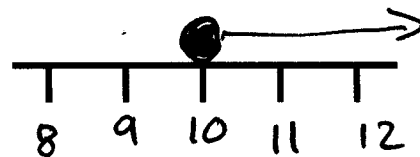
1) $x - 3 > 13$ $x > 16$



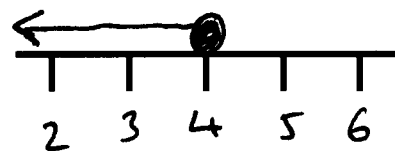
2) $x + 4 < 11$ $x < 7$



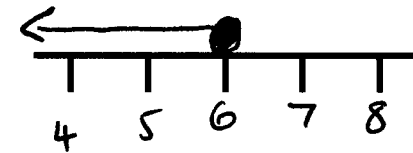
3) $2x + 1 \geq 21$ $x \geq 10$



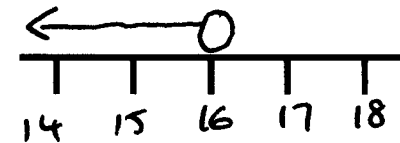
4) $3x - 3 \leq 9$ $x \leq 4$



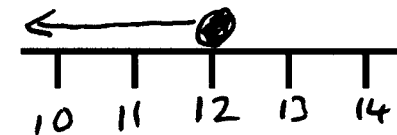
5) $4x - 3 \leq 21$ $x \leq 6$



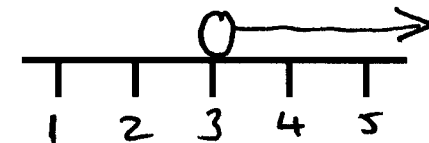
6) $\frac{x}{2} - 3 < 5$ $x < 16$



7) $14 \geq x + 2$ $14 - 2 \geq x$
 $12 \geq x$
 $x \leq 12$



8) $7 > 10 - x$



Make x positive by moving it.

$$\begin{aligned} 7 &> 10 - x \\ 7 + x &> 10 \\ x &> 3 \end{aligned}$$

⑤

Solve these Equations and Inequalities

1) Equation $x + 3 = 7$ $x = 4$
 Inequalities $x + 3 > 7$ $x > 4$
 $x + 3 < 7$ $x < 4$
 $x + 3 \leq 7$ $x \leq 4$
 $x + 3 \geq 7$ $x \geq 4$

2) Equation $2x + 1 = 11$ $x = 5$
 Inequalities $2x + 1 > 11$ $x > 5$
 $2x + 1 < 11$ $x < 5$
 $2x + 1 \leq 11$ $x \leq 5$
 $2x + 1 \geq 11$ $x \geq 5$

3) Equation $12 - x = 6$ $x = 6$
 Inequalities $12 - x > 6$ $x < 6$
 $12 - x < 6$ $x > 6$
 $12 - x \leq 6$ $x \geq 6$
 $12 - x \geq 6$ $x \leq 6$

4) Equation $3x - 1 = 8$ $x = 3$
 Inequalities $3x - 1 > 8$ $x > 3$
 $3x - 1 < 8$ $x < 3$
 $3x - 1 \leq 8$ $x \leq 3$
 $3x - 1 \geq 8$ $x \geq 3$

5) Equation $4x + 2 = 30$ $x = 7$
 Inequalities $4x + 2 > 30$ $x > 7$
 $4x + 2 < 30$ $x < 7$
 $4x + 2 \leq 30$ $x \leq 7$
 $4x + 2 \geq 30$ $x \geq 7$

6) Equation $14 = 6x + 2$ $x = 2$
 Inequalities $14 > 6x + 2$ $x < 2$
 $2 > x$
 $14 < 6x + 2$ $x > 2$
 $14 \leq 6x + 2$ $x \geq 2$
 $14 \geq 6x + 2$ $x \leq 2$

7) Equation $8x - 2 = 5x + 7$ $x = 3$
 $3x = 9$
 Inequalities $8x - 2 > 5x + 7$ $x > 3$
 $8x - 2 < 5x + 7$ $x < 3$
 $8x - 2 \leq 5x + 7$ $x \leq 3$
 $8x - 2 \geq 5x + 7$ $x \geq 3$

8) Equation $4x - 2 = 6x + 8$ $x = -5$
 $-10 = 2x$
 Inequalities $4x - 2 > 6x + 8$ $x < -5$
 $-5 > x$
 $4x - 2 < 6x + 8$ $x > -5$
 $4x - 2 \leq 6x + 8$ $x \geq -5$
 $4x - 2 \geq 6x + 8$ $x \leq -5$

Solve these inequalities

9) $4x + 1 > 2x + 9$ $x > 4$
 $2x > 8$
 10) $3x + 8 < 7x - 4$ $x > 3$
 $12 < 4x$
 $3 < x$

⑥

Inequalities and Regions

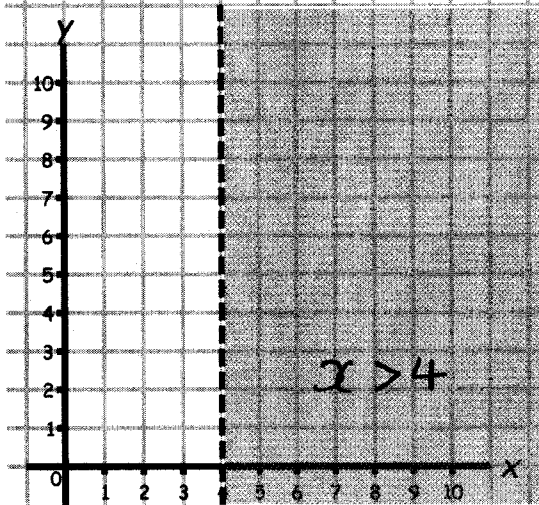
————— Solid line \leq or \geq

----- Broken line $<$ or $>$

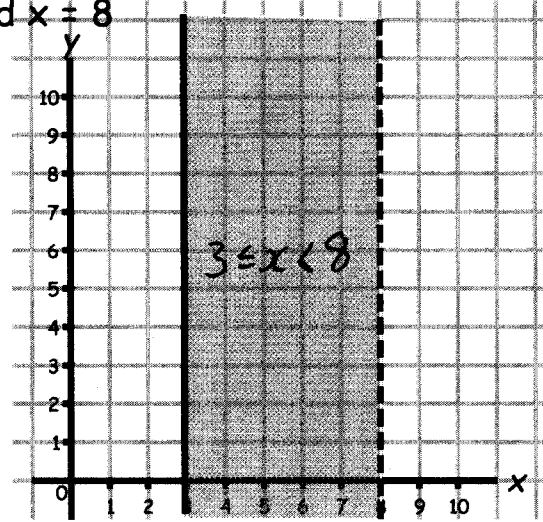
Nearly always describe the shaded region, but read the question carefully to check.

Test with a point to make sure.

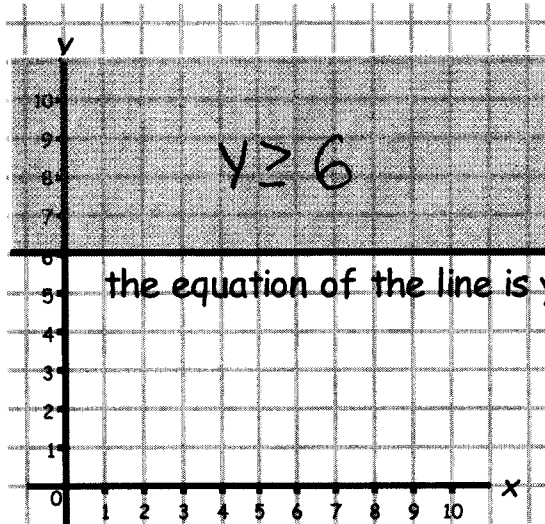
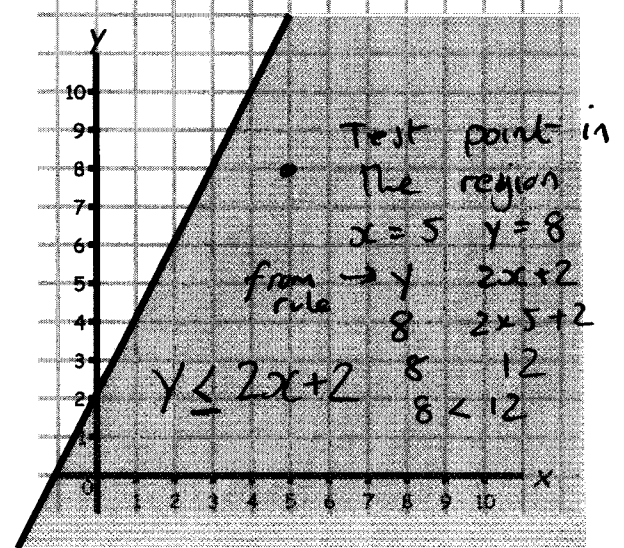
the equation of the line is $x = 4$



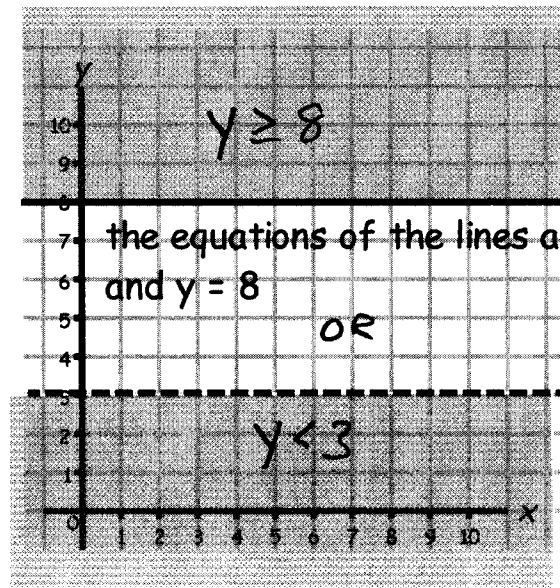
the equations of the lines are $x = 3$ and $x = 8$



the equation of the line is $y = 2x + 2$



the equation of the line is $y = 6$



the equations of the lines are $y = 3$ and $y = 8$

OR

