

Section 5.4

COMPOUND INEQUALITIES

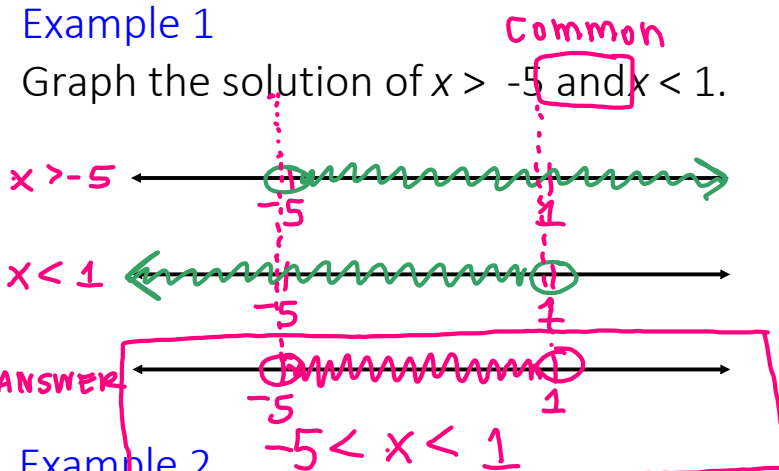
A compound inequality consists of two inequalities connected by "*and*" or "*or*".

and: what they have in common (overlap)

or: combining/merging together

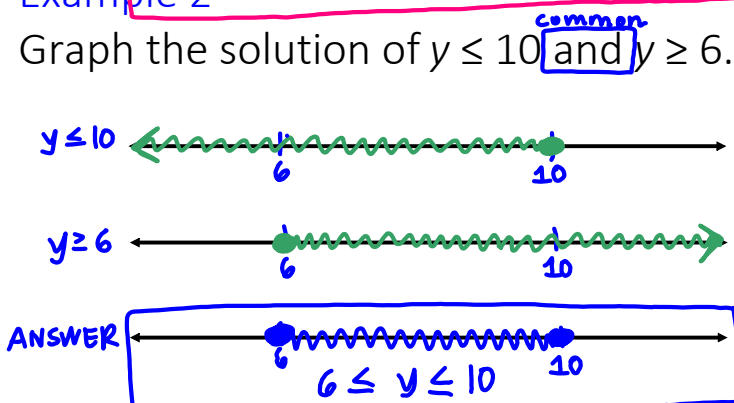
Example 1

Graph the solution of $x > -5$ and $x < 1$.



Example 2

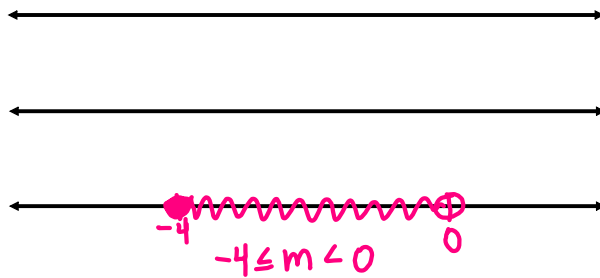
Graph the solution of $y \leq 10$ and $y \geq 6$.



Example 3

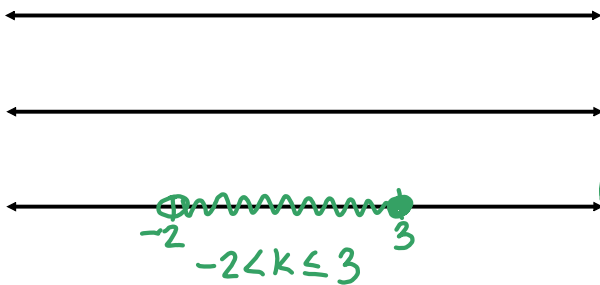
Graph the solution of $-4 \leq m < 0$.

shading in middle



Example 4

Graph the solution of $-2 < k \leq 3$.



Example 5

Write an inequality that represents the statement and graph.

- a. x is greater than 0 and less than or equal to 4



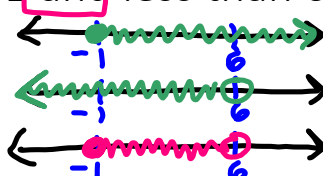
$0 < x \leq 4$

- b. x is less than 9 and greater than -2



$-2 < x < 9$

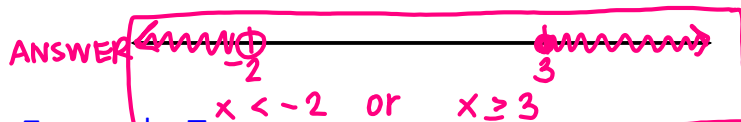
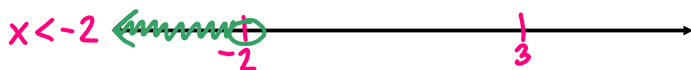
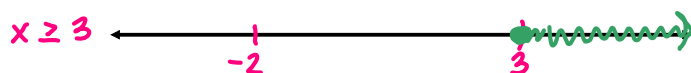
- c. x is at least -1 and less than 6



$-1 \leq x < 6$

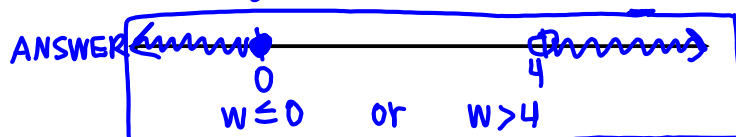
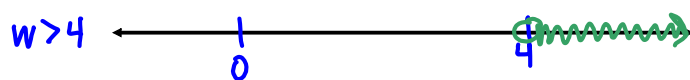
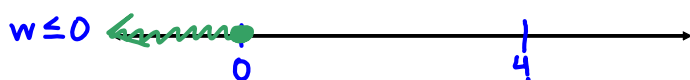
Example 6

Graph the solution of $x \geq 3$ or $x < -2$.
combine/merge



Example 7

Graph the solution of $w \leq 0$ or $w > 4$.



Example 8

Write an inequality that represents the statement and graph.

- a. x is less than -1 or greater than 2

$$x < -1 \quad \text{or} \quad x > 2$$

- b. x is greater than or equal to 5 or less than 0

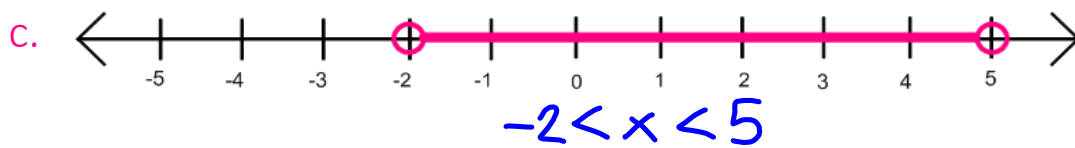
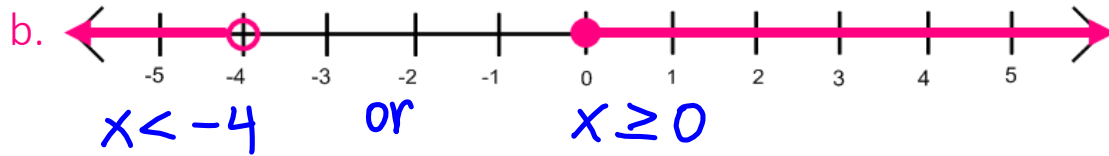
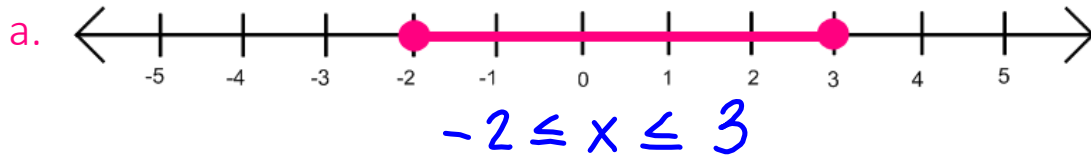
$$x \geq 5 \quad \text{or} \quad x < 0$$

- c. x is less than 7 or at least 12

$$x < 7 \quad \text{or} \quad x \geq 12$$

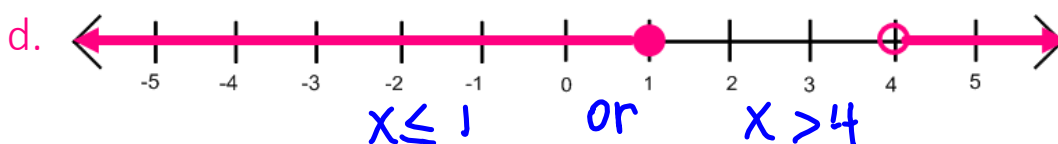
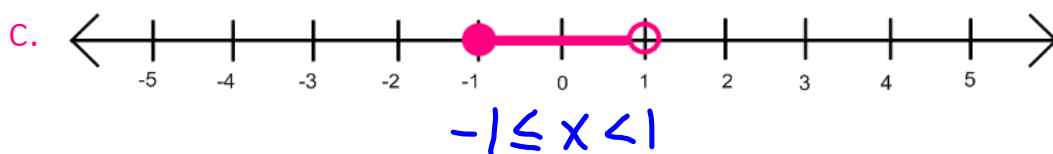
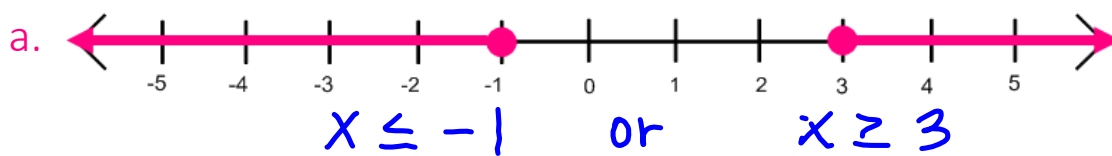
Example 9

Write an inequality that describes the graph.



Example 10

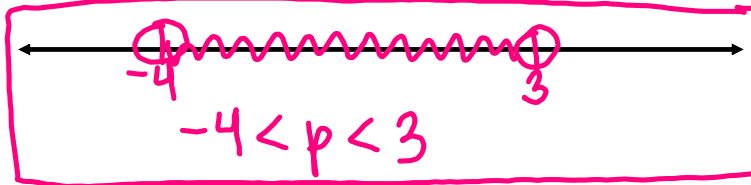
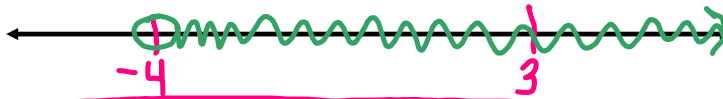
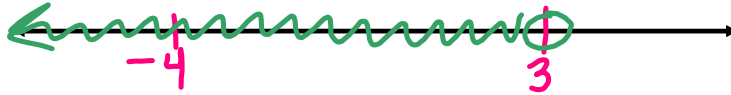
Write an inequality that describes the graph.



Example 11

Solve $p - 4 < -1$ and $p + 5 > 1$. Graph.

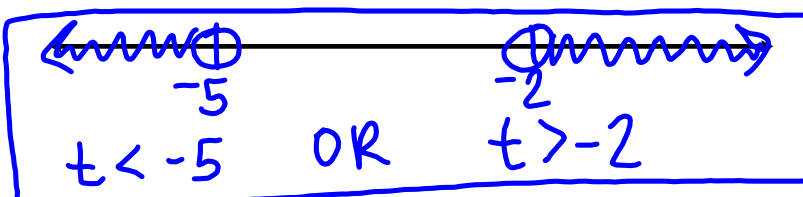
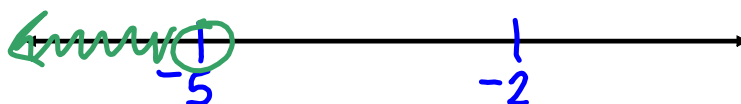
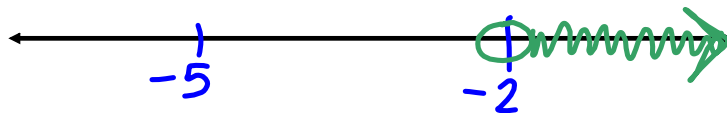
$$\begin{array}{r} +4 \quad +4 \quad \downarrow \quad -5 \quad -5 \\ \hline p < 3 \quad \text{and} \quad p > -4 \\ \downarrow \\ \text{common} \end{array}$$



Example 12

Solve $t - 2 > -4$ or $-t > 15$. Graph.

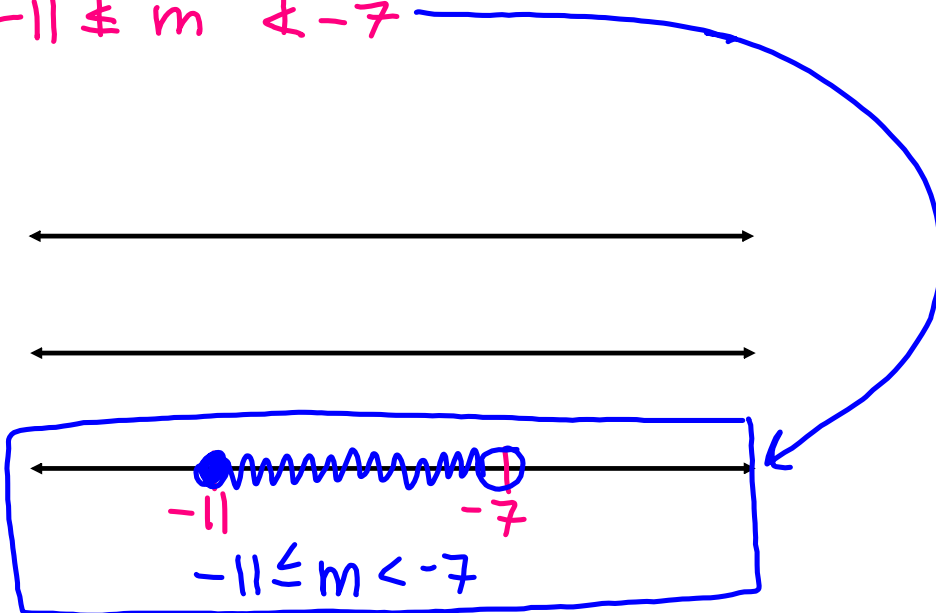
$$\begin{array}{r} +2 \quad +2 \quad \downarrow \quad -3 \quad -3 \\ \hline t > -2 \quad \text{or} \quad t < -5 \\ \downarrow \\ \text{combine/merge} \end{array}$$



Example 13

Solve $-3 \leq m + 8 < 1$. Graph.

$$\begin{array}{r} -8 \quad -8 \quad -8 \\ \hline -11 \leq m < -7 \end{array}$$

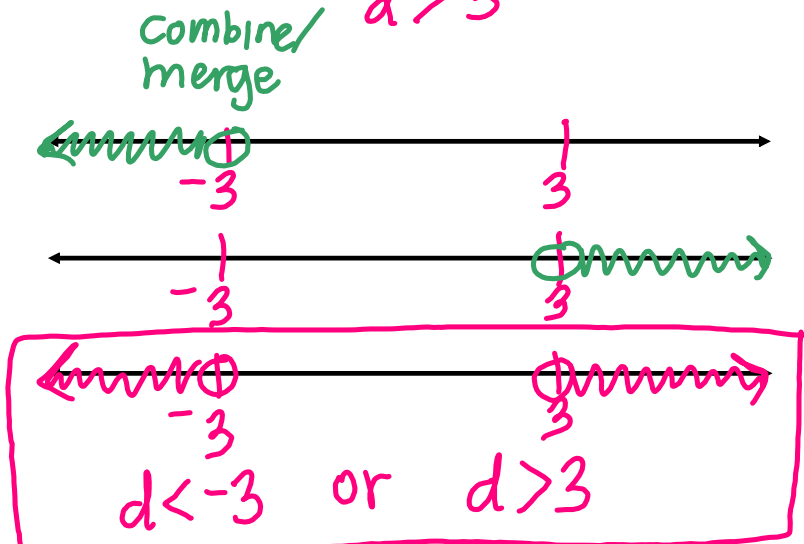


Example 14

Solve $2d < d - 3$ or $3d > d + 6$. Graph.

$$\begin{array}{r} -d \quad -d \\ \hline d < -3 \end{array} \quad \begin{array}{r} -d \quad -d \\ \hline 2d > 6 \\ \hline 2 \quad 2 \\ d > 3 \end{array}$$

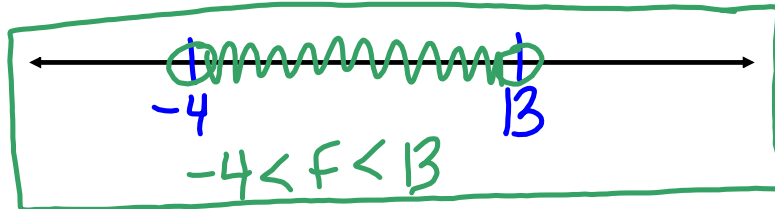
or
Combine/merge



Example 15

Solve $-16 < 2f - 8 < 18$. Graph.

$$\begin{array}{r|l|l} +8 & +8 & +8 \\ \hline -8 < 2f < 26 \\ \hline 2 & 2 & 2 \\ \hline -4 < f < 13 \end{array}$$



Example 16

Solve $2x + 3 < 9$ or $3x - 6 > 12$. Graph.

$$\begin{array}{r|l} -3 & 3 \\ \hline 2x < 6 \\ \hline 2 & 2 \\ \hline x < 3 \end{array} \quad \text{or} \quad \begin{array}{r|l} +6 & +6 \\ \hline 3x > 18 \\ \hline 3 & 3 \\ \hline x > 6 \end{array}$$

