COMPOUND INEQUALITIES

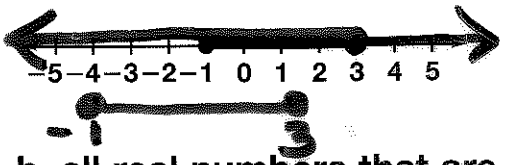
Additional Examples — Lesson 3-5

1 EXAMPLE Write two compound inequalities that represent each situation. Graph the solutions.

AND: overlap

a. all real numbers that are at least -1 and at most 3.

$b \geq -1$ and $b \leq 3$ $\quad -1 \leq b \leq 3$

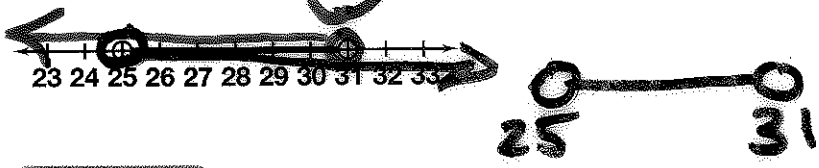


$x \geq -1$ $\quad x \leq 3$

OR: anywhere it touches

b. all real numbers that are less than 31, but greater than 25.

$31 > n$ and $n > 25$ $\quad 31 > n > 25$



$n < 31$

$n > 25$

2 EXAMPLE Solve $5 > 5 - f > 2$. Graph the solutions.

Write the compound inequality as two inequalities joined by **and**.

$5 > 5 - f$ $\quad$ and $\quad 5 - f > 2$

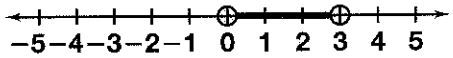
$5 - 5 > 5 - f - 5$ $\quad 5 - f - 5 > 2 - 5$

$0 > -f$ $\quad -f > -3$

$\frac{0}{-1} < \frac{-f}{-1}$ Flip sign $\quad \frac{-f}{-1} < \frac{-3}{-1}$ Flip Sign

$0 < f$ $\quad$ and $\quad f < 3$

$0 < f < 3$



3 EXAMPLE Your test grades in science so far are 83 and 87. What possible grades g can you make on your next test to have an average between 85 and 90?

Relate: 85 | is less than or equal to | the average | which is less than or equal to | 90

Write: $85 \leq \frac{83 + 87 + g}{3} \leq 90$

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$3(85) \leq 3\left(\frac{83 + 87 + g}{3}\right) \leq 3(90)$ Multiply by 3.

$255 \leq 170 + g \leq 270$ Simplify.

$255 - 170 \leq 170 + g - 170 \leq 270 - 170$ Subtract 170.

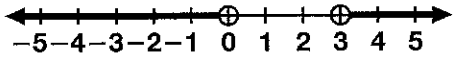
$85 \leq g \leq 100$ Simplify.

The third test grade must be between 85 and 100, inclusive.

4 EXAMPLE Write an inequality that represents each situation. Graph the solutions.

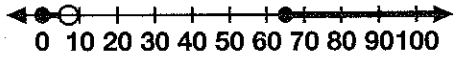
a. all real numbers that are less than 0 or greater than 3.

$n < 0$ or $n > 3$



b. Discounted tickets are available to children under 7 years old or to adults 65 and older.

$a < 7$ or $a \geq 65$; because age cannot be negative, $a > 0$.



Additional Examples — Lesson 3-5

5 EXAMPLE Solve the compound inequality $3x + 2 < -7$ or $-4x + 5 < 1$. Graph the solution.

$3x + 2 < -7$ or $-4x + 5 < 1$

$3x + 2 - 2 < -7 - 2$ $\quad -4x + 5 - 5 < 1 - 5$

$3x < -9$ $\quad -4x < -4$

$\frac{3x}{3} < \frac{-9}{3}$ $\quad \frac{-4x}{-4} > \frac{-4}{-4}$

$x < -3$ or $x > 1$