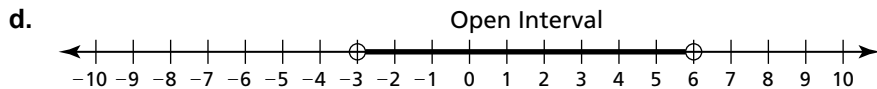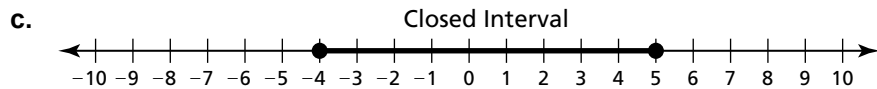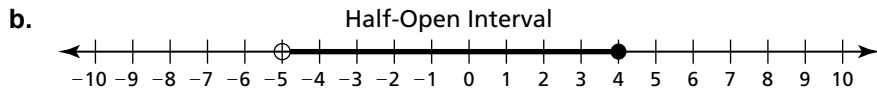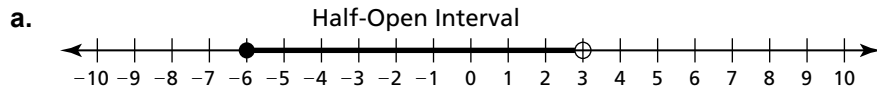Name _____ Date _____

2.5 Solving Compound Inequalities
For use with Exploration 2.5

Essential Question How can you use inequalities to describe intervals on the real number line?

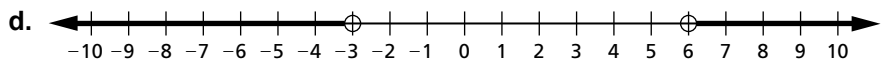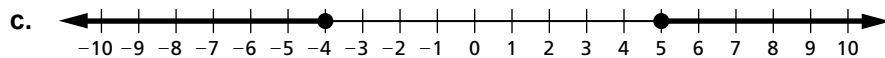**1 EXPLORATION: Describing Intervals on the Real Number Line**

Work with a partner. In parts (a)–(d), use two inequalities to describe the interval.

a.   Half-Open Interval

−10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9 10

b.   Half-Open Interval

−10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9 10

c.   Closed Interval

−10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9 10

d.   Open Interval

−10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9 10

e. Do you use "and" or "or" to connect the two inequalities in parts (a)–(d)? Explain.

2.5 Solving Compound Inequalities (continued)

2 EXPLORATION: Describing Two Infinite Intervals

Work with a partner. In parts (a)–(d), use two inequalities to describe the interval.

a.

```
◄──┼──┼──┼──┼──●──┼──┼──┼──┼──┼──┼──┼──○──┼──┼──┼──┼──┼──┼──►
  −10 −9 −8 −7 −6 −5 −4 −3 −2 −1  0  1  2  3  4  5  6  7  8  9  10
```

b.

```
◄──┼──┼──┼──┼──┼──○──┼──┼──┼──┼──┼──┼──┼──●──┼──┼──┼──┼──┼──►
  −10 −9 −8 −7 −6 −5 −4 −3 −2 −1  0  1  2  3  4  5  6  7  8  9  10
```

c.

```
◄──┼──┼──┼──┼──┼──┼──●──┼──┼──┼──┼──┼──┼──●──┼──┼──┼──┼──┼──►
  −10 −9 −8 −7 −6 −5 −4 −3 −2 −1  0  1  2  3  4  5  6  7  8  9  10
```

d.

```
◄──┼──┼──┼──┼──┼──┼──┼──○──┼──┼──┼──┼──┼──┼──┼──○──┼──┼──┼──►
  −10 −9 −8 −7 −6 −5 −4 −3 −2 −1  0  1  2  3  4  5  6  7  8  9  10
```
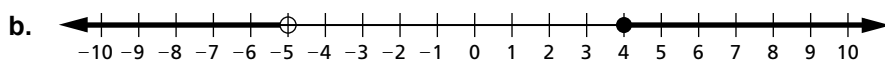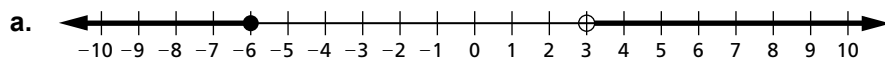
e. Do you use "and" or "or" to connect the two inequalities in parts (a)–(d)?
Explain.

Communicate Your Answer

3. How can you use inequalities to describe intervals on the real number line?

Name_____ Date _____
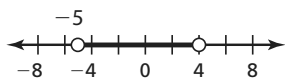

2.5 **Practice**
For use after Lesson 2.5

Notes:

Worked-Out Examples

Example #1

Solve the inequality. Graph the solution.

$$2r + 3 < \quad 7 \quad or \quad -r + 9 \leq \quad 2$$
$$\underline{-3 \quad -3} \qquad\qquad \underline{-9 \quad -9}$$
$$2r < 4 \qquad\qquad -r \leq -7$$
$$\frac{2r}{2} < \frac{4}{2} \qquad\qquad \frac{-r}{-1} \geq \frac{-7}{-1}$$
$$r < 2 \quad or \qquad r \geq 7$$

The solution is $r < 2$ or $r \geq 7$.

Example #2

Solve the inequality. Graph the solution.

$$-6 < 3n + 9 < \quad 21$$
$$\underline{-9} \qquad \underline{-9 \quad -9}$$
$$-15 < 3n \qquad < 12$$
$$\frac{-15}{3} < \frac{3n}{3} \qquad < \frac{12}{3}$$
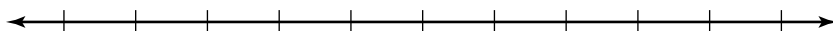$$-5 < \quad n \qquad < 4$$

The solution is $-5 < n < 4$.

Name_____ Date_____

Practice A

In Exercises 1–5, write the sentence as an inequality. Graph the inequality.

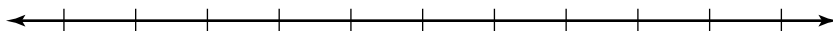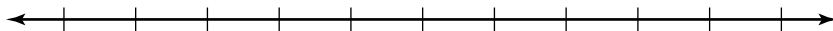**1.** A number u is less than 7 and greater than 3.

<---+---+---+---+---+---+---+---+---+---+---+---+--->
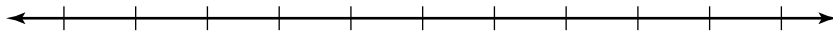
2. A number d is less than -2 or greater than or equal to 2.

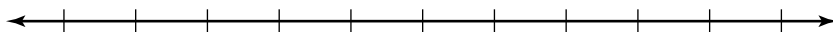<---+---+---+---+---+---+---+---+---+---+---+---+--->

3. A number s is no less than -2.4 and fewer than 4.2.
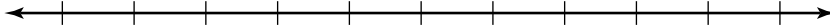
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4. A number c is more than -4 or at most $-6\frac{1}{2}$.

<---+---+---+---+---+---+---+---+---+---+---+---+--->

5. A number c is no less than -1.5 and less than 5.3.
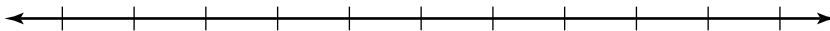
<---+---+---+---+---+---+---+---+---+---+---+---+--->

Name _____ Date _____
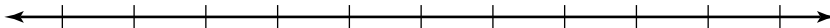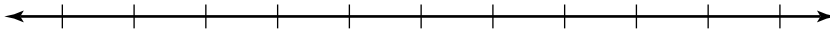
In Exercises 6–10, solve the inequality. Graph the solution.

6. $4 < x - 3 \leq 7$

7. $15 \geq -5g \geq -10$

8. $z + 4 < 2 \ or \ -3z < -27$
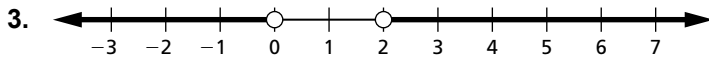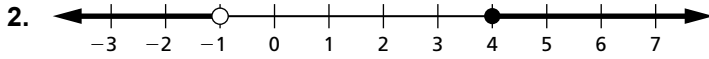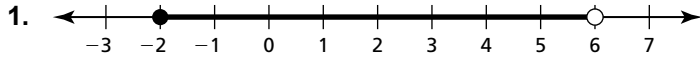

9. $2t + 6 < 10 \ or \ -t + 7 \leq 2$

10. $-8 \leq \frac{1}{3}(6x + 24) \leq 12$

11. A certain machine operates properly when the relative humidity h satisfies the inequality $-60 \leq 2(h - 50) \leq 60$. Solve for h to find the range of values for which the machine operates properly.

Name _____ Date _____

Practice B

In Exercises 1–3, write a compound inequality that is represented by the graph.

1.

2.

3.

In Exercises 4 and 5, write the sentence as an inequality. Graph the inequality.

4. A number d is less than or equal to 2 and greater than or equal to -2.

5. A number m is no less than -1 or less than or equal to $-5\frac{1}{3}$.

In Exercises 6–11, solve the inequality. Graph the solution.

6. $-2 \geq 10 - 3g \geq -8$

7. $-4 < 2p + 8 < 18$

8. $-13 > q + 2 \text{ or } 5q \geq -15$

9. $15 < -v - 8 \text{ or } 3v + 4 \geq 10$

10. $-6 < \frac{1}{3}(6y + 12) < 14$

11. $42 < 6(3 - k) \text{ or } \frac{1}{2}(14k - 8) \geq 10$

12. A tuxedo rental shop rents tuxedos with sleeve lengths from 20 inches to 40 inches. The shop says the length of the sleeves should be about 1.2 times a person's arm length. Write and solve a compound inequality that represents the arm lengths of people the shop does *not* provide tuxedos for.

In Exercises 13–16, solve the inequality. Graph the solution, if possible.

13. $8w - 5 > 12w + 3 \text{ or } 3 > -\frac{3}{4}w + 9$

14. $2t - 15 < 3t - 17 \text{ and } t - 13 < -19$

15. $3d + 17 \leq 11 \text{ or } -4d + 4 < -3d + 24$

16. $4x - 9 < 9x + 6 < 4x + 16$

17. Write a real-life story that can be modeled by the graph.