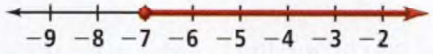
Problem 4 Dividing by a Negative Number

What are the solutions of $-9y \leq 63$? Graph the solutions.

$-9y \leq 63$

$\frac{-9y}{-9} \geq \frac{63}{-9}$ Divide each side by -9. Reverse the inequality symbol.

$y \geq -7$ Simplify each side.



Got It? 4. What are the solutions of $-5x > -10$? Graph the solutions.

Think

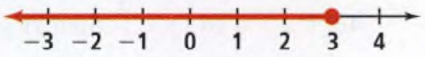
How is this inequality different from the one in Problem 3?
The coefficient is negative. You can still use the properties of inequality to solve, but pay attention to the direction of the symbol.

Lesson Check

Do you know HOW?

Match the inequality with its graph.

1. $x + 2 > -1$
2. $-\frac{x}{3} < -1$
3. $x - 4 \leq -1$
4. $-3x \geq 9$

A.


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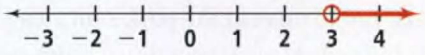

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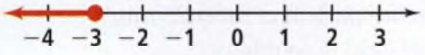

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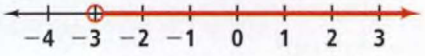
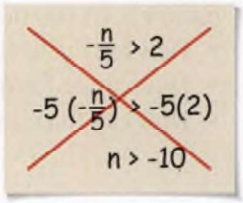


Do you UNDERSTAND? MATHEMATICAL PRACTICES

5. Which operation would you use to solve the inequality? Explain.

   a. $1 \leq -\frac{x}{2}$ b. $y - 4 > -5$ c. $-6w < -36$

6. **Error Analysis** Describe and correct the error in the solution.



Practice and Problem-Solving Exercises MATHEMATICAL PRACTICES

A Practice

Solve each inequality. Graph and check your solution. See Problems 1 and 2.

7. $\frac{x}{5} \geq -2$
8. $\frac{w}{6} < 1$
9. $4 > \frac{p}{8}$
10. $1 \leq -\frac{5}{4}y$
11. $-\frac{v}{2} \geq 1.5$
12. $-3 < \frac{x}{3}$
13. $-7 \leq \frac{7}{3}x$
14. $8 > \frac{2}{3}k$
15. $0 \leq -\frac{3}{11}m$
16. $-\frac{3}{2}b < 6$
17. $-\frac{3}{4} < -\frac{3}{8}m$
18. $-5 \geq -\frac{5}{9}y$

Solve each inequality. Graph and check your solution. See Problems 3 and 4.

19. $3m \geq 6$
20. $4t < -12$
21. $-30 > -5c$
22. $-4w \leq 20$
23. $11z > -33$
24. $56 < -7d$
25. $18b \leq -3$
26. $-7y \geq 17$
27. $-5h < 65$
28. $8t \leq 64$
29. $63 \geq 7q$
30. $-12x > 132$

31. Text Messages Text messages cost \$.15 each. You can spend no more than \$10. How many text messages can you send?

32. Aquarium Fish Tetras cost \$3.99 each. You can spend at most \$25. How many tetras can you buy for your aquarium?

B Apply

Write four solutions to each inequality.

33. $\frac{x}{2} \leq -1$ **34.** $\frac{r}{3} \geq -4$ **35.** $-1 \geq \frac{r}{3}$ **36.** $0.5 > \frac{1}{2}c$

Tell what you can do to the first inequality in order to get the second.

37. $-\frac{c}{4} > 3;\ c < -12$ **38.** $\frac{n}{5} \leq -2;\ n \leq -10$ **39.** $5z > -25;\ z > -5$ **40.** $\frac{3}{4}b \leq 3;\ b \leq 4$

Replace each ■ with the number that makes the inequalities equivalent.

41. $\blacksquare s > 14;\ s < -7$ **42.** $\blacksquare x \geq 25;\ x \leq -5$ **43.** $-8u \leq \blacksquare;\ u \geq -0.5$ **44.** $-2a > \blacksquare;\ a < -9$

Determine whether each statement is *always, sometimes,* or *never* true. Justify your answer.

45. If $x > 3$ and $y < 1$, then $xy > 0$.

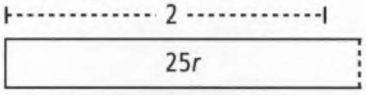
46. If $x < 0$ and $y < 0$, then $xy > 0$.

47. If $x \geq 0$ and $y > 1$, then $xy > 0$.

48. If $x > 0$ and $y \geq 0$, then $xy > 0$.

49. Think About a Plan A friend calls you and asks you to meet at the park 2 mi away in 25 min. You set off on your skateboard after the call. At what speeds (in miles per minute) can you ride your skateboard to be at the park in at most 25 min?

- How are the distance you travel, your speed, and time related?
- How can an inequality help you solve the problem?
- How can the model below help you solve the problem?



Solve each inequality. Justify each step.

50. $-4.5 > 9p$ **51.** $-1 \geq \frac{t}{3}$ **52.** $\frac{3}{4}n < 4$ **53.** $0.5 \leq \frac{1}{2}c$

54. $-8u < 4$ **55.** $\frac{n}{5} \leq -2$ **56.** $-12 > 4a$ **57.** $1 < -\frac{5}{7}s$

58. Trip A family is taking a cross-country trip by car. They drive at an average speed of 55 mi/h, and their goal is to travel at least 400 mi/day. How many hours per day do they need to drive?

59. Lunch You have \$30. You are going to buy a sandwich and a drink for yourself and two friends from the menu at the right. You will spend the remainder on snacks. What is the least number of snacks you might buy? What is the greatest number of snacks you might buy? Explain.