First 5 Minutes — Review Question

GRADE 7 • TOPIC 5 • LESSON 5.5 | 5 points • Work independently

Lesson 5.5 • Solve Inequalities Using Multiplication or Division

Solve $x + 6 \geq 2$.

1. Show each step in your notebook.
2. Explain the operation or rule you used.

Real-Life Connection & Key Concepts

Essential question

How is solving inequalities with multiplication or division different from solving equations?

Solve & Discuss It!

Alex and Hope solve $-6x > 24$. Alex gets $x > -4$; Hope gets $x < -4$. Who is correct? Show your reasoning.

What we will learn

Solve inequalities with positive and negative factors; reverse the symbol only when multiplying or dividing by a negative; graph solutions.

Definitions & rules

Multiplication/Division Property of Inequality: a positive factor preserves direction.

A negative factor reverses direction.

Check by substitution and graph the solution set.

Example 1 — Multiplication & Division Inequalities

GRADE 7 • TOPIC 5 • LESSON 5.5 | Guided example • Model and explain

Problem

Gina’s pet can eat at most 18 ounces of food per day. Each scoop contains 4 oz. How many scoops, s, can she feed it?

Worked solution

$4s \leq 18$.

Divide by positive 4; keep the sign.

$s \leq 4.5$ scoops.



Included endpoint • shade left

Multiply/divide both sides; reverse the inequality only for a negative factor.

Example 2 — Multiplication & Division Inequalities

GRADE 7 • TOPIC 5 • LESSON 5.5 | Guided example • Model and explain

Problem

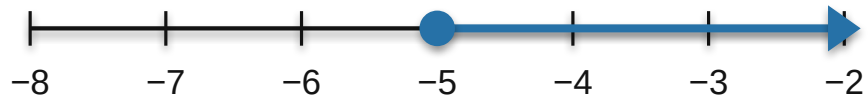
Solve and graph $-3.4m \leq 17$.

Worked solution

Divide both sides by -3.4.

Reverse the inequality sign.

$m \geq -5$.



Included endpoint • shade right

Multiply/divide both sides; reverse the inequality only for a negative factor.

Example 3 — Multiplication & Division Inequalities

GRADE 7 • TOPIC 5 • LESSON 5.5 | Guided example • Model and explain

Problem

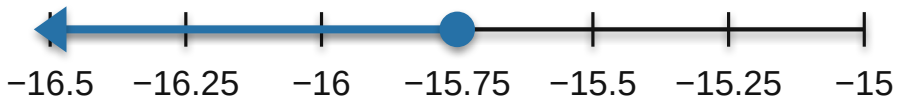
Solve and graph $\frac{r}{-2.25} \geq 7$.

Worked solution

Multiply both sides by −2.25.

Reverse the inequality sign.

$r \leq -15.75$.



Included endpoint • shade left

Multiply/divide both sides; reverse the inequality only for a negative factor.

Individual Work

GRADE 7 • TOPIC 5 • LESSON 5.5 | 10 minutes total • 10 points

Complete all five tasks. Show your reasoning.

6. (p. 293) Solve and graph $8m \leq 56$.

8. (p. 293) Solve and graph $-7x > 56$.

10. (p. 293) Fruit snacks are divided equally among 6 people; each receives at most 3. Find the possible total x.

Individual Work — continued

GRADE 7 • TOPIC 5 • LESSON 5.5 | 10 minutes total • 10 points

Finish the remaining problems. Check your work.

11. (p. 293) 17 months of e-books total more than 102 books at x per month. Solve for x.

12. (p. 293) Brittney can spend at most $15 for aquarium fish that cost $3 each. Write and solve an inequality for f, the number of fish she can buy.

Individual Work — Answer Key

Multiply/divide both sides; reverse the inequality only for a negative factor.

6. (p. 293)

Divide by positive 8: $m \leq 7$. The sign stays the same; closed at 7, shade left.

8. (p. 293)

$-7x > 56 \rightarrow x < -8$. Divide by −7 and reverse sign; open at −8, shade left.

10. (p. 293)

$x \div 6 \leq 3 \rightarrow x \leq 18$. At most 18 fruit snacks.

11. (p. 293)

$17x > 102 \rightarrow x > 6$. More than 6 e-books per month.

12. (p. 293)

$3f \leq 15 \rightarrow f \leq 5$. At most 5 fish.

Group Work

GRADE 7 • TOPIC 5 • LESSON 5.5 | 8 minutes total • 10 points

Work together. Each person must contribute a solution.

13. (p. 294) Solve and graph $18 \leq \frac{n}{6}$.

14. (p. 294) Solve $-3x < 12$. Explain why the sign changes.

Group Work — continued

Agree on a solution and be ready to explain it.

15. (p. 294) Each case contains 24 items. More than 15 × 30 items are needed. Cases cost $3.50 each. Find the minimum number and cost.

17. (p. 294) Cynthia’s tree house is one third of Andrew’s and at least 13 sq ft. Find possible areas x for Andrew’s.

Group Work — Answer Key

Multiply/divide both sides; reverse the inequality only for a negative factor.

13. (p. 294)

$18 \le \frac{n}{6} \rightarrow 108 \le n$, or $n \ge 108$. Closed at 108, shade right.

14. (p. 294)

$-3x < 12 \rightarrow x > -4$. Divide by a negative number, so reverse the inequality.

15. (p. 294)

$24c > 15(30) = 450 \rightarrow c > 18.75$. Minimum whole cases = 19; cost at least $19 \times \$3.50 = \$66.50$.

17. (p. 294)

$\frac{x}{3} \ge 13 \rightarrow x \ge 39$ sq ft. Andrew's tree house is larger because Cynthia's is one third of his.

Exit Ticket

GRADE 7 • TOPIC 5 • LESSON 5.5 | 2 minutes • Independent check

Before you leave, solve this problem.

Solve and graph $-0.8x > 4.8$.

Show your work.

Write the answer with the correct units or graph, if needed.