LESSON MAKER PRO

Where Graphs Stand

Solve inequalities by tracking where a graph is above or below zero.

HIGH SCHOOL · A3.A.17

A3.A.17 "Solve polynomial and rational inequalities. Relate results to the behavior of the graphs."

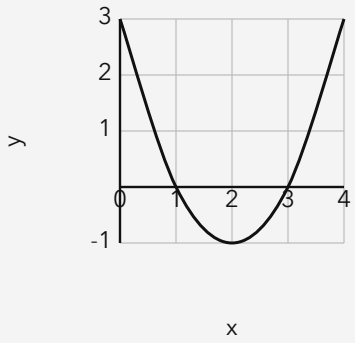
NAME _____ DATE _____

ZEROS AND SIGNS

Zeros split a graph into intervals where its sign can change. A graph is positive above the x-axis and negative below it. For a rational expression, exclude any value that makes the denominator zero.

WORKED EXAMPLE

The figure shows $y = (x - 1)(x - 3)$. Solve $(x - 1)(x - 3) \leq 0$ using the graph.



1. Find where the graph meets the x-axis: $x = 1$ and $x = 3$.
2. The graph is below the x-axis between those values.
3. Include both zeros because the inequality allows equality.

Answer: $1 \leq x \leq 3$

PRACTICE 4 problems

1 Solve $(x - 4)(x - 6) > 0$.

ANSWER _____

2 Solve $(x + 5)(x + 2) \leq 0$.

ANSWER _____

3 Solve $(x - 5)/(x - 2) < 0$.

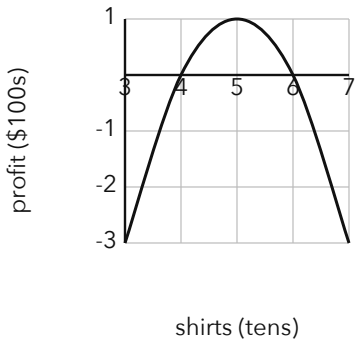
ANSWER _____

4 Solve $(x + 4)/(x + 2) \geq 0$.

ANSWER _____

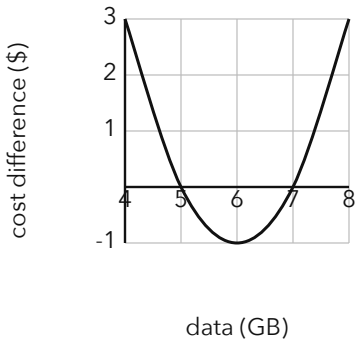
APPLY IT Show your work

1 A club's shirt-sale profit is shown. The x-axis counts shirts in tens, and the y-axis shows profit in hundreds of dollars. For which whole-number shirt counts is profit positive?



ANSWER _____

2 The graph shows Plan A's monthly cost minus Plan B's monthly cost for different amounts of data. For what data use is Plan A cheaper?



ANSWER _____

CHALLENGE One step up

Solve $(x + 5)(x - 7)/(x - 4) \geq 0$. Explain why one boundary value is excluded.

WORK SPACE AND ANSWER

Where Graphs Stand

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve (x - 4)(x - 6) > 0.	**x < 4 or x > 6**
2	Solve (x + 5)(x + 2) ≤ 0.	**-5 ≤ x ≤ -2**
3	Solve (x - 5)/(x - 2) < 0.	**2 < x < 5**
4	Solve (x + 4)/(x + 2) ≥ 0.	**x ≤ -4 or x > -2**

PART 2 · APPLY IT

1. **41 through 59 shirts** The graph is above zero between 4 and 6 tens of shirts. Exclude 40 and 60 shirts because profit is zero at those counts.
2. **More than 5 GB and less than 7 GB** Plan A is cheaper when Plan A's cost minus Plan B's cost is negative. The graph is below the x-axis for 5 < x < 7.

CHALLENGE

-5 ≤ x < 4 or x ≥ 7. Exclude x = 4 because it makes the denominator zero.

Accept interval notation or equivalent inequalities. In the challenge, the explanation must identify x = 4 as undefined.