LESSON MAKER PRO

Line Shift Lab

See how a constant moves a proportional line.

GRADE 8 · 8.PFA.3.a

8.PFA.3.a "Determine how adding a constant (b) to the equation of a proportional relationship y = mx will translate the line on a graph."

NAME _____ DATE _____

THE BIG IDEA

When you change y=mx to y=mx+b, every y-value changes by b. A positive b moves the line up, and a negative b moves the line down. The slope m stays the same, so the new line is parallel to the original line.

WORKED EXAMPLE

Start with y=11x. Add b=12. Write the new equation and describe the translation.

1. Start with y=11x.
2. Add 12: y=11x+12.
3. Since 12 is positive, move the line up 12 units.

Answer: y=11x+12, translated up 12 units.

PRACTICE 6 problems

1 The line y=2x changes to y=2x+6. How does the line move?

ANSWER _____

2 The line y=-x changes to y=-x-3. How does the line move?

ANSWER _____

3 What equation results when y=4x is translated down 2 units?

ANSWER _____

4 What equation results when y=-3x is translated up 1 unit?

ANSWER _____

5 The line y=1/2x changes to y=1/2x+4. What is the translation?

ANSWER _____

6 A line begins as y=6x. It is translated down 10 units. Write the new equation.

ANSWER _____

APPLY IT Show your work

1 At a gaming club, snacks cost $2 each. The relationship y=2x gives the total cost y for x snacks. The club adds a $6 entry fee to every order. Write the new equation and state how the graph moves.

WORK SPACE

ANSWER _____

2 An online store charges $6 for each custom phone case, modeled by y=6x. A $3 coupon is taken off the entire order. Write the new equation and state how the graph moves.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Compare y=-2x+4 and y=-2x-5. How is the first line translated to make the second line? Explain your reasoning.

_____

_____

ANSWER KEY

Line Shift Lab

GRADE 8 · 8.PFA.3.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The line y=2x changes to y=2x+6. How does the line move?	**Up 6 units.**
2	The line y=-x changes to y=-x-3. How does the line move?	**Down 3 units.**
3	What equation results when y=4x is translated down 2 units?	**y=4x-2**
4	What equation results when y=-3x is translated up 1 unit?	**y=-3x+1**
5	The line y=1/2x changes to y=1/2x+4. What is the translation?	**Up 4 units.**
6	A line begins as y=6x. It is translated down 10 units. Write the new equation.	**y=6x-10**

PART 2 · APPLY IT

1. **y=2x+6; the line moves up 6 units.** Add the entry fee as a constant: y=2x+6. Because the constant is positive 6, the graph shifts up 6 units.
2. **y=6x-3; the line moves down 3 units.** Subtract the coupon amount from the total: y=6x-3. Because the constant is negative 3, the graph shifts down 3 units.

CHALLENGE

The line y=-2x+4 is translated down 9 units to make y=-2x-5. The slope stays -2, and the constant changes from 4 to -5, which is a decrease of 9.

Accept equivalent wording such as “shifted” instead of “translated.” Equations should keep the original slope and change only the constant term.