

Origin or Not

Check whether each linear relationship starts at zero.

GRADE 8 • MA.8.AR.3.1

MA.8.AR.3.1 "Determine if a linear relationship is also a proportional relationship."

NAME _____

DATE _____

THE BIG IDEA

A linear relationship is proportional only if its graph passes through the origin, $(0,0)$. In an equation $y=mx+b$, the value of b must be 0, so the equation can be written as $y=mx$.

WORKED EXAMPLE

Determine whether $y=12x$ is a proportional relationship.

1. The equation has no added constant.
2. Write the equation as $y=12x+0$.
3. The y -intercept is 0, so the line passes through $(0,0)$.

Answer: Yes. $y=12x$ is proportional.

PRACTICE 6 problems

1 Is $y=4x-3$ a proportional relationship?

ANSWER _____

2 Is $y=-2x$ a proportional relationship?

ANSWER _____

3 A table shows x : 1, 2, 3 and y : 5, 10, 15. Is the relationship proportional?

ANSWER _____

4 A table shows x : -2, 0, 2 and y : 1, 3, 5. Is the relationship proportional?

ANSWER _____

5 A line passes through $(0,0)$ and $(6,-9)$. Is the relationship proportional?

ANSWER _____

6 A line has slope $1/2$ and y -intercept 0. Is the relationship proportional?

ANSWER _____

APPLY IT Show your work

- 1** You join a school esports club. It charges a \$9 sign-up fee and \$4 for each practice session. Let x be the number of sessions and y be the total cost. Is this linear relationship proportional? Explain using an equation.

WORK SPACE

ANSWER _____

- 2** A student sells handmade sticker packs online for \$3 per pack. Let x be the number of packs sold and y be the revenue. Is this linear relationship proportional? Write an equation.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Relationship A passes through $(-4, -10)$ and $(2, 2)$. Relationship B passes through $(-3, -6)$ and $(5, 10)$. Determine whether each relationship is proportional. Explain your reasoning.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Is $y=4x-3$ a proportional relationship?	No. The y-intercept is -3, not 0.
2	Is $y=-2x$ a proportional relationship?	Yes. It has the form $y=mx$.
3	A table shows x: 1, 2, 3 and y: 5, 10, 15. Is the relationship proportional?	Yes. The equation is $y=5x$.
4	A table shows x: -2, 0, 2 and y: 1, 3, 5. Is the relationship proportional?	No. When $x=0$, $y=3$, not 0.
5	A line passes through (0,0) and (6,-9). Is the relationship proportional?	Yes. The line passes through the origin.
6	A line has slope $1/2$ and y-intercept 0. Is the relationship proportional?	Yes. Its equation is $y=1/2x$.

PART 2 • APPLY IT

- No. $y=4x+9$, so y is 9 when $x=0$.** Write $y=4x+9$. The nonzero sign-up fee is the y-intercept, so the relationship is not proportional.
- Yes. $y=3x$, and $y=0$ when $x=0$.** Each pack adds \$3, so $y=3x$. Because the equation has a y-intercept of 0, the relationship is proportional.

CHALLENGE

A is not proportional: its equation is $y=2x-2$, so its y-intercept is -2. B is proportional: its equation is $y=2x$, so it passes through (0,0).

Accept equivalent equations and explanations that correctly use a zero or nonzero y-intercept. For table and point problems, accept a correct statement about whether the relationship includes (0,0).