

Rate or Start?

Spot proportional rules and starting amounts.

GRADE 8 • TEKS 8.5.H

8.5.H "identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems; and"

NAME _____

DATE _____

THE BIG IDEA

A proportional relationship has a constant output/x ratio and can be written output = kx . It has no starting amount, so when x is 0, the output is 0.

WORKED EXAMPLE

Is the rule output = $9x$ proportional?

1. Compare the rule to output = kx .
2. The constant k is 9.
3. There is no added starting amount.

Answer: Yes, it is proportional.

PRACTICE 5 problems

- 1** For the rule output = $4x$, is the relationship proportional? Give k .

ANSWER _____

- 2** For the rule output = $5x + 6$, is the relationship proportional? Explain.

ANSWER _____

- 3** Use the table. Is the relationship proportional? Give k .

INPUT AND OUTPUT

x	output
0	0
2	10
4	20

ANSWER _____

- 4** A candle is 12 cm tall at the start and loses 2 cm each hour. Is its height proportional to the number of hours? Explain.

ANSWER _____

- 5** When x is 2, 5, and 7, the outputs are 8, 20, and 28. Is the relationship proportional? Write the rule.

ANSWER _____

APPLY IT Show your work

- 1** A video-editing app charges a \$3 account fee and \$2 for each filter pack. For x filter packs, is total cost proportional to x ? Write a rule.

WORK SPACE

ANSWER _____

- 2** An esports club earns \$6 for each ticket it sells for a tournament, with no starting money. For x tickets, are total earnings proportional to x ? Write a rule.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Poster Shop A charges \$4 per poster. Poster Shop B charges \$3 per poster plus a \$5 design fee. For x posters, identify the proportional plan and write both cost rules. Explain why the other plan is non-proportional.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	For the rule $\text{output} = 4x$, is the relationship proportional? Give k .	Proportional; $k = 4$.
2	For the rule $\text{output} = 5x + 6$, is the relationship proportional? Explain.	Non-proportional; it has an added starting amount of 6.
3	Use the table. Is the relationship proportional? Give k .	Proportional; $k = 5$.
4	A candle is 12 cm tall at the start and loses 2 cm each hour. Is its height proportional to the number of hours? Explain.	Non-proportional; at 0 hours, the height is 12 cm, not 0.
5	When x is 2, 5, and 7, the outputs are 8, 20, and 28. Is the relationship proportional? Write the rule.	Proportional; $\text{output} = 4x$.

PART 2 • APPLY IT

- Non-proportional; total cost = $2x + 3$.** The \$3 account fee is a starting amount. Add it to the \$2 per filter pack charge.
- Proportional; total earnings = $6x$.** Each ticket adds the same \$6, and 0 tickets earns \$0.

CHALLENGE

Shop A is proportional: total cost = $4x$. Shop B is non-proportional: total cost = $3x + 5$ because it has a \$5 starting fee.

Accept equivalent wording for proportional and non-proportional. Accept rules with a named output, such as $y = 4x$, when the rate and starting amount are correct.