Recognizing Proportional Relationships

Apply the skill to decisions and designs

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QUICK REVIEW

A proportional relationship has $y = kx$: every nonzero row has the same y/x, and the graph includes $(0, 0)$. For $(2, 6), (4, 12)$ both ratios are 3; $(2, 7), (4, 13)$ have different ratios even though increases are steady.

Worked example

Practice table: does the table show a proportional relationship? Give two ratios as evidence.

1. First row: $y/x = 2/1 = 2$.
2. Second row: $y/x = 6/3 = 2$.
3. Third row gives 2; all ratios agree.
Answer: Yes; $k = 2$.

x	y
1	2
3	6
5	10

Practice Problems

Show your thinking.

1. Notebook order: decide whether a single per-unit price can explain every row. State the price or explain the conflict.

x	y
1	4
2	8
4	16

2. Joining fees: decide whether a single per-unit price can explain every row. State the price or explain the conflict.

x	y
2	10
3	14
5	22

3. A rental costs \$0.00 initially plus \$3.00 per hour. Find costs for 1 and 4 hours; decide whether cost is proportional to time. Write the total-cost equation.

4. A rental costs \$5.00 initially plus \$2.00 per hour. Find costs for 1 and 3 hours; decide whether cost is proportional to time. Find how much the one-hour and longer-rental unit costs differ.

5. A rental costs \$0.00 initially plus \$4.00 per hour. Find costs for 1 and 2 hours; decide whether cost is proportional to time. Recover the hours that give cost \$24.00.

6. A rental costs \$6.00 initially plus \$3.00 per hour. Find costs for 1 and 5 hours; decide whether cost is proportional to time.

7. Refill station: decide whether a single per-unit price can explain every row. State the price or explain the conflict.

x	y
2	7
4	14
6	21

8. Delivery membership: decide whether a single per-unit price can explain every row. State the price or explain the conflict.

x	y
1	4
3	10
5	16

Answer Key

1. Yes; $k = 4$.
2. No; the ratios are different.
3. \$3.00 and \$12.00; proportional. $C = 3h$.
4. \$7.00 and \$11.00; not proportional. Unit-cost gap $\frac{10}{3}$ dollars per hour.
5. \$4.00 and \$8.00; proportional. 6 hours.
6. \$9.00 and \$21.00; not proportional.
7. Yes; $k = \frac{7}{2}$.
8. No; the ratios are different.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. First row: $y/x = 4/1 = 4$.
2. Second row: $y/x = 8/2 = 4$.
3. Third row gives 4; all ratios agree.

Problem 2

1. First row: $y/x = 10/2 = 5$.
2. Second row: $y/x = 14/3 = \frac{14}{3}$.
3. Third row gives $\frac{22}{5}$; one constant does not fit all rows.

Problem 3

1. One hour costs $0 + 3 = 3$ dollars.
2. 4 hours cost $0 + 3(4) = 12$ dollars.
3. At 0 hours the cost is 0 dollars; the rule is $C = 3h$.
4. No joining cost: $C = 3h + 0 = 3h$.

Problem 4

1. One hour costs $5 + 2 = 7$ dollars.
2. 3 hours cost $5 + 2(3) = 11$ dollars.
3. At 0 hours the cost is 5 dollars; the initial fee prevents a constant ratio.
4. Gap $= (7) - (11/3) = \frac{10}{3}$ dollars per hour.

Problem 5

1. One hour costs $0 + 4 = 4$ dollars.
2. 2 hours cost $0 + 4(2) = 8$ dollars.
3. At 0 hours the cost is 0 dollars; the rule is $C = 4h$.
4. $24/4 = 6$ hours.

Problem 6

1. One hour costs $6 + 3 = 9$ dollars.
2. 5 hours cost $6 + 3(5) = 21$ dollars.
3. At 0 hours the cost is 6 dollars; the initial fee prevents a constant ratio.

Problem 7

1. First row: $y/x = 7/2 = \frac{7}{2}$.
2. Second row: $y/x = 14/4 = \frac{7}{2}$.
3. Third row gives $\frac{7}{2}$; all ratios agree.

Problem 8

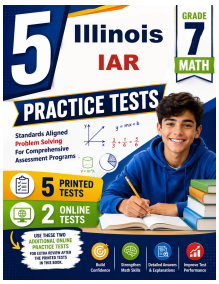
1. First row: $y/x = 4/1 = 4$.
2. Second row: $y/x = 10/3 = \frac{10}{3}$.
3. Third row gives $\frac{16}{5}$; one constant does not fit all rows.

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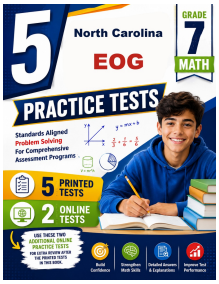
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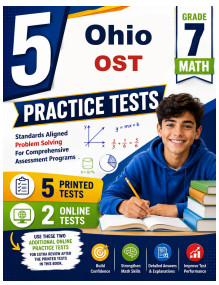
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