Proportional vs. Non-Proportional Relationships

Proportional and non-proportional relationships: Applications and decisions

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

A relationship is proportional if $y = kx$ with one constant k and $(0, 0)$ included. Rows $(2, 6), (4, 12)$ have $y/x = 3$. A fixed starting charge breaks proportionality: $y = 3x + 2$ gives $y = 2$ when $x = 0$.

Worked example

Is this relationship proportional?

1. At $x = 2$, $y/x = 8/2 = 4$.
2. At $x = 5$, $y/x = 20/5 = 4$.
3. The starting value is 0 at $x = 0$; proportional relationships require 0.
4. All nonzero ratios match and the origin condition is satisfied.
Answer: Proportional.

x	y
0	0
2	8
5	20

Practice Problems

Show your thinking.

1. Bags and cost in dollars are shown. Is cost proportional to bags?

x	y
1	4
2	8
4	16

2. A taxi starts at 3 dollars and adds 2 per km. Is total cost proportional to km?

x	y
0	3
1	5
2	7

3. Hours and liters pumped are shown. Does this represent a constant proportional flow?

x	y
1	6
2	12
3	18

4. Items and discounted total dollars are shown. Is one constant price per item used?

x	y
1	10
2	18
3	24

5. Plan A costs $4x$ dollars; plan B costs $4x + 6$. Compare costs at $x = 2$ and identify the proportional plan.

6. Paint cans and covered area are shown. Decide if the table fits a proportional coverage rule.

x	y
0	0
2	5
6	15

Answer Key

1. Proportional.
2. Not proportional.
3. Proportional.
4. Not proportional.
5. A: 8 dollars; B: 14 dollars; only A is proportional.
6. Proportional.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. At $x = 1$, $y/x = 4/1 = 4$.
2. At $x = 2$, $y/x = 8/2 = 4$.
3. At $x = 4$, $y/x = 16/4 = 4$.
4. All nonzero ratios match and the origin condition is satisfied.

Problem 2

1. At $x = 1$, $y/x = 5/1 = 5$.
2. At $x = 2$, $y/x = 7/2 = \frac{7}{2}$.
3. The starting value is 3 at $x = 0$; proportional relationships require 0.
4. The unequal ratios or nonzero starting value rule out proportionality.

Problem 3

1. At $x = 1$, $y/x = 6/1 = 6$.
2. At $x = 2$, $y/x = 12/2 = 6$.
3. At $x = 3$, $y/x = 18/3 = 6$.
4. All nonzero ratios match and the origin condition is satisfied.

Problem 4

1. At $x = 1$, $y/x = 10/1 = 10$.
2. At $x = 2$, $y/x = 18/2 = 9$.
3. At $x = 3$, $y/x = 24/3 = 8$.
4. The unequal ratios or nonzero starting value rule out proportionality.

Problem 5

1. At $x = 2$, A $= 4 \times 2 = 8$ and B $= 4 \times 2 + 6 = 14$.
2. At $x = 0$, A $= 0$ but B $= 6$, so only A passes the zero-start test.

Problem 6

1. At $x = 2$, $y/x = 5/2 = \frac{5}{2}$.
2. At $x = 6$, $y/x = 15/6 = \frac{5}{2}$.
3. The starting value is 0 at $x = 0$; proportional relationships require 0.
4. All nonzero ratios match and the origin condition is satisfied.

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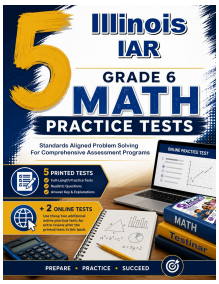

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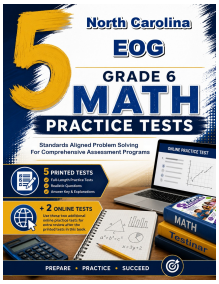

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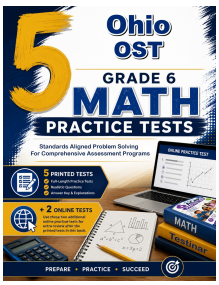

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