Proportional vs. Non-Proportional Relationships

Proportional and non-proportional relationships: Models and calculations

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. Calculate every unit ratio, then decide if the table is proportional.

x	y
1	4
2	8
3	12

2. A student says adding 3 to y each time proves proportionality. Test and correct the claim.

x	y
1	5
2	8
3	11

3. Check the table even though its rate is fractional.

x	y
0	0
2	3
4	6

4. Is a constant output of 2 proportional to x?

x	y
0	2
1	2
2	2

5. Build the rows for $x = 0, 2, 3$ under $y = 5x$. Is the resulting model proportional?

6. Check the square-number table for proportionality.

x	y
1	1
2	4
3	9

Answer Key

1. Proportional.
2. Not proportional.
3. Proportional.
4. Not proportional.
5. $(0,0), (2,10), (3,15)$; yes.
6. Not 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 $x = 3$, $y/x = 12/3 = 4$.
4. All nonzero ratios match and the origin condition is satisfied.

Problem 2

1. At $x = 1$, $y/x = 5/1 = 5$.
2. At $x = 2$, $y/x = 8/2 = 4$.
3. At $x = 3$, $y/x = 11/3 = \frac{11}{3}$.
4. The unequal ratios or nonzero starting value rule out proportionality.

Problem 3

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

Problem 4

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

Problem 5

1. $y(0) = 5 \times 0 = 0$ and $y(2) = 5 \times 2 = 10$.
2. $y(3) = 5 \times 3 = 15$; the model has constant ratio 5 and starts at the origin.

Problem 6

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

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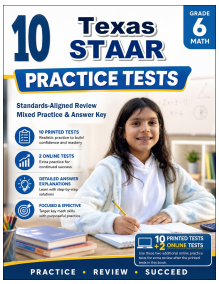

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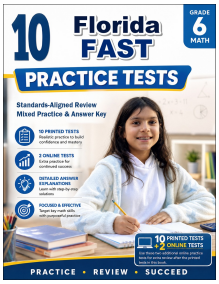

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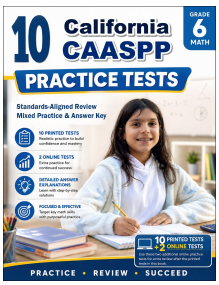

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