

# Graphing Ratios

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 24

## Q Quick Review

Equivalent ratios can be **graphed as points** on a coordinate grid. If the ratio of  $x$  to  $y$  is  $1 : 3$ , then the pairs  $(1, 3)$ ,  $(2, 6)$ , and  $(3, 9)$  all belong to it. When you plot these points, they always line up in a **straight line that passes through the origin**  $(0, 0)$ . The point  $(1, k)$  on that line shows the **unit rate** — the  $y$ -value when  $x = 1$ . Reading a graph backward works too: a point  $(4, 12)$  tells you the ratio  $4 : 12$ , which simplifies to  $1 : 3$ .

◇ **Example:** The ratio of bags to marbles is  $1 : 4$ . List three coordinate pairs (bags, marbles) that belong on its graph.  
 ⇒ For each pair, the marbles value is 4 times the bags value. Start with 1 bag:  $1 \times 4 = 4$  marbles, giving the point  $(1, 4)$ . Next, 2 bags:  $2 \times 4 = 8$  marbles, giving  $(2, 8)$ . Then 3 bags:  $3 \times 4 = 12$  marbles, giving  $(3, 12)$ . If you plotted these, they would form a straight line through the origin, and the point  $(1, 4)$  shows the unit rate of 4 marbles per bag.

**Answer:**  $(1, 4)$ ,  $(2, 8)$ ,  $(3, 12)$

## PRACTICE

Use the given ratio or points to answer each question.

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|---|--|
| 1. Ratio $1 : 2$ : find $y$ when $x = 5$ _____                  | 11. Point $(3, 21)$ : write the unit rate as $1 : \square$ _____ |
| 2. Ratio $1 : 3$ : find $y$ when $x = 4$ _____                  | 12. Ratio $1 : 5$ : find $y$ when $x = 6$ _____                  |
| 3. Ratio $2 : 5$ : find $y$ when $x = 6$ _____                  | 13. Ratio $4 : 5$ : find $y$ when $x = 12$ _____                 |
| 4. Ratio $1 : 4$ : find $y$ when $x = 7$ _____                  | 14. Point $(6, 18)$ : write the unit rate as $1 : \square$ _____ |
| 5. Ratio $3 : 4$ : find $y$ when $x = 9$ _____                  | 15. Ratio $3 : 7$ : find $y$ when $x = 6$ _____                  |
| 6. Point $(2, 6)$ : write the unit rate as $1 : \square$ _____  | 16. Ratio $1 : 8$ : find $y$ when $x = 4$ _____                  |
| 7. Point $(4, 8)$ : write the unit rate as $1 : \square$ _____  | 17. Point $(8, 24)$ : write the unit rate as $1 : \square$ _____ |
| 8. Point $(5, 20)$ : write the unit rate as $1 : \square$ _____ | 18. Ratio $5 : 2$ : find $y$ when $x = 15$ _____                 |
| 9. Ratio $1 : 6$ : find $y$ when $x = 3$ _____                  | 19. Point $(2, 14)$ : write the unit rate as $1 : \square$ _____ |
| 10. Ratio $2 : 3$ : find $y$ when $x = 8$ _____                 | 20. Ratio $1 : 1$ : find $y$ when $x = 9$ _____                  |

## ◆ Word Problems

21. A bakery makes 3 muffins for every 1 minute. List the coordinate pairs (minutes, muffins) for 1, 2, and 3 minutes. \_\_\_\_\_
22. On a graph of cups of lemonade sold, the point  $(5, 15)$  is plotted. What is the unit rate in dollars per cup if the  $y$ -axis shows dollars? \_\_\_\_\_
23. A car uses gas at the ratio 1 gallon to 30 miles. What coordinate pair shows the distance for 4 gallons? \_\_\_\_\_
24. A graph of a walking trip passes through  $(2, 8)$ , where  $x$  is hours and  $y$  is miles. How many miles are walked in 5 hours? \_\_\_\_\_



## Answer Keys

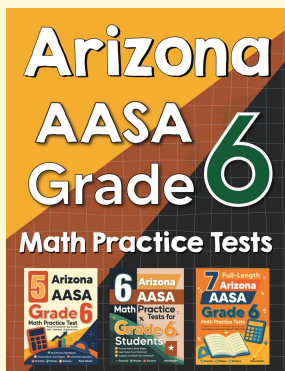
- |  |   |
|--|---|
| <p>1. <input type="text" value="10"/></p> <p>2. <input type="text" value="12"/></p> <p>3. <input type="text" value="15"/></p> <p>4. <input type="text" value="28"/></p> <p>5. <input type="text" value="12"/></p> <p>6. <input type="text" value="3"/></p> <p>7. <input type="text" value="2"/></p> <p>8. <input type="text" value="4"/></p> <p>9. <input type="text" value="18"/></p> <p>10. <input type="text" value="12"/></p> <p>11. <input type="text" value="7"/></p> <p>12. <input type="text" value="30"/></p> | <p>13. <input type="text" value="15"/></p> <p>14. <input type="text" value="3"/></p> <p>15. <input type="text" value="14"/></p> <p>16. <input type="text" value="32"/></p> <p>17. <input type="text" value="3"/></p> <p>18. <input type="text" value="6"/></p> <p>19. <input type="text" value="7"/></p> <p>20. <input type="text" value="9"/></p> <p>21. <input type="text" value="(1, 3), (2, 6), (3, 9)"/></p> <p>22. <input type="text" value="\$3 per cup"/></p> <p>23. <input type="text" value="(4, 120)"/></p> <p>24. <input type="text" value="20 miles"/></p> |
|--|---|

### Step-by-Step Explanations

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| <p>1. Multiply: <math>5 \times 2 = 10</math>, so the point is <math>(5, 10)</math>.</p> <p>2. Multiply: <math>4 \times 3 = 12</math>, so the point is <math>(4, 12)</math>.</p> <p>3. 6 is 3 times 2, so <math>y = 3 \times 5 = 15</math>.</p> <p>4. Multiply: <math>7 \times 4 = 28</math>, so the point is <math>(7, 28)</math>.</p> <p>5. 9 is 3 times 3, so <math>y = 3 \times 4 = 12</math>.</p> <p>6. The ratio <math>2 : 6</math> simplifies to <math>1 : 3</math> by dividing both by 2.</p> <p>7. The ratio <math>4 : 8</math> simplifies to <math>1 : 2</math> by dividing both by 4.</p> <p>8. The ratio <math>5 : 20</math> simplifies to <math>1 : 4</math> by dividing both by 5.</p> <p>9. Multiply: <math>3 \times 6 = 18</math>, so the point is <math>(3, 18)</math>.</p> <p>10. 8 is 4 times 2, so <math>y = 4 \times 3 = 12</math>.</p> <p>11. The ratio <math>3 : 21</math> simplifies to <math>1 : 7</math> by dividing both by 3.</p> <p>12. Multiply: <math>6 \times 5 = 30</math>, so the point is <math>(6, 30)</math>.</p> <p>13. 12 is 3 times 4, so <math>y = 3 \times 5 = 15</math>.</p> | <p>14. The ratio <math>6 : 18</math> simplifies to <math>1 : 3</math> by dividing both by 6.</p> <p>15. 6 is 2 times 3, so <math>y = 2 \times 7 = 14</math>.</p> <p>16. Multiply: <math>4 \times 8 = 32</math>, so the point is <math>(4, 32)</math>.</p> <p>17. The ratio <math>8 : 24</math> simplifies to <math>1 : 3</math> by dividing both by 8.</p> <p>18. 15 is 3 times 5, so <math>y = 3 \times 2 = 6</math>.</p> <p>19. The ratio <math>2 : 14</math> simplifies to <math>1 : 7</math> by dividing both by 2.</p> <p>20. With ratio <math>1 : 1</math>, <math>y</math> always equals <math>x</math>, so <math>y = 9</math>.</p> <p>21. Muffins are 3 times the minutes: <math>1 \rightarrow 3, 2 \rightarrow 6, 3 \rightarrow 9</math>. These points line up through the origin.</p> <p>22. The point <math>(5, 15)</math> means 5 cups earn \$15. The unit rate is <math>15 \div 5 = \\$3</math> per cup.</p> <p>23. Multiply the gallons by 30: <math>4 \times 30 = 120</math> miles, so the point is <math>(4, 120)</math>.</p> <p>24. From <math>(2, 8)</math>, the unit rate is <math>8 \div 2 = 4</math> miles per hour. In 5 hours: <math>5 \times 4 = 20</math> miles.</p> |
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