

SAMPLE PAGES
from
The Competitive Edge

Passing the
EOG 5 in MATH

❖ *SECOND EDITION* ❖

by
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*Chapter 10 is enclosed
to illustrate the quantity
and quality of problems in
this workbook.*

CPC

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CHAPTER

RATIOS AND PROPORTIONS

A ratio is a way to compare numbers.

EXAMPLES

4 cantelopes, 12 limes

Make a ratio of cantelopes to limes.

$$4 \text{ to } 12 \quad 4:12 \quad \frac{4}{12}$$

$$\text{Lowest terms:} \quad 1 \text{ to } 3 \quad 1:3 \quad \frac{1}{3}$$

These are the 3 ways to show ratio!

Two ratios that are equal are called a proportion.

$$\frac{4}{12} \stackrel{\times}{=} \frac{1}{3}$$

Are they equal?

Multiply diagonals (\times) to see.

$$4 \times 3 = 12$$

$$12 \times 1 = 12$$

Yes, they are equal! This is a proportion.

In comparing ratios, the top numbers of each ratio (fraction) must compare the same items (cantelopes), and the bottom numbers must compare the same items (limes).

EXAMPLE

Write the ratio of 30 potatoes to 60 turnips in one box. Write the ratio of 1 potato and 2 turnips in another box.

$$\frac{30 \text{ potatoes}}{60 \text{ turnips}}$$

$$\frac{1 \text{ potato}}{2 \text{ turnips}}$$

(potatoes on top)
(turnips on bottom)

Are they a proportion (equal)?

$$\frac{30}{60} \stackrel{\times}{=} \frac{1}{2}$$

$$\frac{30 \times 2 = 60}{60 \times 1 = 60}$$

Yes!

PRACTICE

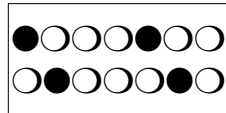
Write a ratio (in fraction form) for each. Reduce to lowest terms if necessary.

1. 2, 16 _____
2. 30, 40 _____
3. 2, 4 _____
4. 8, 10 _____
5. 5, 9 _____
6. 16, 20 _____
7. 10, 100 _____
8. 5, 6 _____
9. 25, 35 _____
10. 6, 15 _____

11. Write the ratio of triangles to circles.



12. Write the ratio of shaded circles to non-shaded circles.



13.

	Cherries	Sugar
Cherry Pie #1	8 small	2 cups
Cherry Pie #2	4 small	6 cups

	Cherries	Sugar
Cherry Pie #1	8 small	2 cups
Cherry Pie #2	4 small	6 cups

What is the ratio of the amounts of ingredients in cherry pie #1 to cherry pie #2?

14.

Team	Won	Lost	Tied
Razors	5	2	1

What is the ratio of games tied to games won? _____

PRACTICE

Multiply diagonals to see if these are proportions (equal). Write yes or no.

1. $\frac{8}{18}$ $\frac{24}{52}$ _____

5. $\frac{12}{21}$ $\frac{10}{15}$ _____

2. $\frac{65}{13}$ $\frac{5}{1}$ _____

6. $\frac{18}{14}$ $\frac{54}{42}$ _____

3. $\frac{8}{30}$ $\frac{12}{45}$ _____

7. $\frac{9}{15}$ $\frac{81}{130}$ _____

4. $\frac{3}{6}$ $\frac{2}{5}$ _____

8. $\frac{9}{12}$ $\frac{12}{16}$ _____

(continued on next page)

$9. \frac{8}{9} \quad \frac{24}{27} \quad \underline{\hspace{2cm}}$

$17. \frac{4}{8} \quad \frac{1}{2} \quad \underline{\hspace{2cm}}$

$10. \frac{1}{4} \quad \frac{3}{8} \quad \underline{\hspace{2cm}}$

$18. \frac{2}{3} \quad \frac{3}{8} \quad \underline{\hspace{2cm}}$

$11. \frac{6}{15} \quad \frac{3}{7} \quad \underline{\hspace{2cm}}$

$19. \frac{15}{10} \quad \frac{20}{16} \quad \underline{\hspace{2cm}}$

$12. \frac{4}{10} \quad \frac{14}{35} \quad \underline{\hspace{2cm}}$

$20. \frac{2}{3} \quad \frac{7}{16} \quad \underline{\hspace{2cm}}$

$13. \frac{4}{5} \quad \frac{32}{40} \quad \underline{\hspace{2cm}}$

$21. \frac{3}{8} \quad \frac{30}{80} \quad \underline{\hspace{2cm}}$

$14. \frac{3}{10} \quad \frac{12}{15} \quad \underline{\hspace{2cm}}$

$22. \frac{9}{8} \quad \frac{17}{16} \quad \underline{\hspace{2cm}}$

$15. \frac{3}{9} \quad \frac{21}{63} \quad \underline{\hspace{2cm}}$

$23. \frac{12}{28} \quad \frac{18}{42} \quad \underline{\hspace{2cm}}$

$16. \frac{7}{8} \quad \frac{2}{17} \quad \underline{\hspace{2cm}}$

$24. \frac{42}{9} \quad \frac{252}{50} \quad \underline{\hspace{2cm}}$

Let's solve for a missing part of a proportion.

EXAMPLES

$$\frac{4}{10} = \frac{m}{70}$$

$$\frac{4}{10} \swarrow \nearrow \frac{m}{70}$$

$$10m = 280$$

$$m = 28$$

Multiply diagonals first.

To solve for m, divide each side by 10.

$$\frac{4}{6} = \frac{16}{x}$$

$$\frac{4}{6} \swarrow \nearrow \frac{16}{x}$$

$$4x = 96$$

$$x = 24$$

Multiply diagonals.

To solve for x, divide each side by 4.

PRACTICE

Solve each proportion.

1. $\frac{s}{24} = \frac{12}{16}$

6. $\frac{6}{78} = \frac{b}{26}$

2. $\frac{16}{12} = \frac{x}{54}$

7. $\frac{32}{48} = \frac{68}{c}$

3. $\frac{4}{10} = \frac{y}{70}$

8. $\frac{16}{x} = \frac{56}{84}$

4. $\frac{t}{28} = \frac{24}{16}$

9. $\frac{30}{h} = \frac{14}{28}$

5. $\frac{a}{56} = \frac{48}{4}$

10. $\frac{12}{8} = \frac{w}{28}$

(continued on next page)

11. $\frac{2}{18} = \frac{32}{t}$

16. $\frac{6}{a} = \frac{36}{48}$

12. $\frac{8}{10} = \frac{24}{y}$

17. $\frac{14}{28} = \frac{x}{84}$

13. $\frac{24}{16} = \frac{x}{56}$

18. $\frac{86}{172} = \frac{1}{x}$

14. $\frac{y}{2} = \frac{3,055}{47}$

19. $\frac{7}{16} = \frac{w}{48}$

15. $\frac{6}{w} = \frac{18}{24}$

20. $\frac{6}{16} = \frac{t}{98}$

RATE OF CHANGE

A rate of change is a rate that compares how one amount changes in relation to another.

EXAMPLE

Jason weighed 125 pounds in the 3rd grade. He weighed 155 pounds in the 5th grade. Find the rate of change in his weight from the 3rd to the 5th grade.

$$\frac{\text{change in weight}}{\text{change in grades}} = \frac{155 - 125}{5\text{th} - 3\text{rd}} = \frac{30}{2} = \frac{15}{1}$$

Jason has gained 15 pounds per year.

PRACTICE

Find the rate of change.

1. Martha measured 50 inches in height in 2001. She measured 62 inches in 2004. Find the rate of change.
2. At 10 a.m., the temperature was 46° . At noon, the temperature was 68° . Find the rate of change.
3. In 1993, there were 16,000 visitors to the state park. In 2003, there were 34,000 visitors to the state park. Find the rate of change.
4. July 1st, a bicycle sells for \$250. On September 1st, the same bicycle sells for \$300. Find the rate of change.
5. In 2000, there were 500 students in the 5th grade. In 2004, there were 700 students in the 5th grade. Find the rate of change.
6. Mary had 324 dolls in her collection in 1994. In 2002, she had 560 dolls in her collection. Find the rate of change.
7. In 1982, cars traveled 12 miles on a gallon of gas. In 2002, a car traveled 32 miles per gallon. Find the rate of change.
8. A large company increased its sales from 2 million to 23 million from 1990 to 1997. Find the rate of change.
9. A cat weighed 5 pounds at 3 months of age. At 5 months of age, the cat weighed 7 pounds. Find the rate of change.

REVIEW

1. Which is a ratio for 5 red buttons compared to 6 blue buttons?
- $\frac{6}{5}$
 - $1\frac{1}{5}$
 - $\frac{5}{6}$
 - .30
2. What is the ratio $\frac{20}{30}$ in lowest terms (reduced)?
- $\frac{4}{6}$
 - $\frac{2}{3}$
 - $\frac{1}{10}$
 - $\frac{1}{5}$
3. Which ratio is the same as $\frac{3}{4}$?
- $\frac{9}{8}$
 - $\frac{1}{12}$
 - .75
 - $\frac{75}{100}$
4. Which ratio is $\frac{1}{4}$?
- $\frac{5}{10}$
 - $\frac{3}{12}$
 - $\frac{4}{8}$
 - $\frac{7}{14}$
5. What is the ratio of squares to circles?
- ○□□○○□○
- $\frac{7}{6}$
 - $\frac{6}{12}$
 - $\frac{7}{12}$
 - $\frac{6}{7}$
6. Which statement is false?
- $\frac{2}{3} = \frac{22}{30}$
 - $\frac{3}{8} = \frac{12}{24}$
 - $\frac{1}{2} = \frac{25}{50}$
 - $\frac{5}{6} = \frac{15}{18}$
7. If $\frac{2}{30} = \frac{10}{x}$, then $x =$ _____.
- 15
 - 300
 - $\frac{2}{3}$
 - 150
8. If $\frac{16}{24} = \frac{14}{x}$, then $x =$ _____.
- 21
 - 9.3
 - 224
 - 336

9. If 3 photo albums sells for \$15, how many photo albums sell for \$45?

- a. 135
- b. 225
- c. 9
- d. 45

10. What proportion did you use to solve number 9?

- a. $\frac{3}{15} = \frac{45}{x}$
- b. $\frac{x}{15} = \frac{3}{45}$
- c. $\frac{15}{x} = \frac{45}{3}$
- d. $\frac{3}{15} = \frac{x}{45}$

11. If 2 containers of soda cost \$4, how much would 5 containers cost?

- a. \$10
- b. \$20
- c. 10¢
- d. \$ 2

12. What proportion did you use to solve number 11?

- a. $\frac{4}{5} = \frac{x}{2}$
- b. $\frac{x}{2} = \frac{5}{4}$
- c. $\frac{2}{4} = \frac{5}{x}$
- d. $\frac{2}{x} = \frac{4}{5}$

13. What is the ratio of raisins in #1 cinnamon loaf to raisins in #2 cinnamon loaf?

Loaves	Flour	Raisins
#1	1 cup	2 oz.
#2	2 cups	4 oz.

- a. $\frac{2}{2} = 1$
- b. $\frac{2}{4} = \frac{1}{2}$
- c. $\frac{1}{4}$
- d. $\frac{4}{1} = 4$

14. What proportion would you use to solve this problem? How many tulips are in 7 bunches if 364 are in 12 bunches?

- a. $\frac{x}{7} = \frac{364}{12}$
- b. $\frac{7}{364} = \frac{x}{12}$
- c. $\frac{7}{x} = \frac{364}{12}$
- d. $\frac{7}{364} = \frac{12}{x}$

15. What proportion would you use to solve this problem? If 96 inches are in 8 feet, how many inches are in 15 feet?

- a. $\frac{8}{x} = \frac{15}{96}$
- b. $\frac{96}{x} = \frac{15}{8}$
- c. $\frac{96}{8} = \frac{15}{x}$
- d. $\frac{96}{8} = \frac{x}{15}$

16. If $\frac{a}{5} = \frac{12}{3}$, then $a =$ _____.

- a. 20
- b. 60
- c. 4
- d. $\frac{12}{15}$

17. A recipe uses 3 cups of sugar to make 48 pieces of taffy. How much sugar would you use to make 80 pieces of taffy?

- a. 216
- b. 144
- c. $\frac{1}{16}$
- d. 5

18. Write the ratio 72 to 96 in simplest form.

- a. $\frac{3}{4}$
- b. $\frac{72}{96}$
- c. $\frac{6}{8}$
- d. $\frac{1}{3}$

19. If $\frac{w}{21} = \frac{2}{3}$, then $w =$ _____.

- a. 42
- b. 126
- c. 14
- d. $1\frac{1}{2}$

20. If $\frac{15}{20} = \frac{z}{16}$ then, $z =$ _____.

- a. 20
- b. $\frac{1}{20}$
- c. 240
- d. 12

21. A pole has a shadow that is 5 feet long. Jackie's shadow is 3 feet long, and she is 6 feet tall. How tall is the pole?

- a. 2.5
- b. 30
- c. 15
- d. 10

22. An architect is drawing a scale model of a new mall. The real mall will be 1,800 feet long. The scale the architect is using is 1 inch is equal to 100 feet. How long will the model be?

- a. .018 inches
- b. 18 inches
- c. 1.8 inches
- d. 180,000 inches

23. A fire tower has a shadow 40 yards long. A tree, 3 yards long, has a shadow 10 yards. How tall is the fire tower?

- a. 5 yards
- b. 144 yards
- c. 460 yards
- d. 288 yards

24. There are 250 boys and 511 men in the arena. What is the ratio of boys to total people in the arena?
- 250 to 511
 - 511 to 761
 - 511 to 250
 - 250 to 761
25. What is the value of x ?
- $$\frac{x}{60} = \frac{2}{6}$$
- 12
 - 20
 - 30
 - 180
26. The garage is 12 feet by 20 feet with an area of 240 square feet. The living room is 18 feet by 20 feet with an area of 360 square feet. What is the ratio of the area of the garage to the area of the living room?
- 3 to 5
 - 2 to 3
 - 4 to 9
 - 1 to 2
27. A house has a shadow 34 feet long. Eddie is 6 feet tall and has a shadow that is 12 feet long. How tall is the building?
- 408 feet
 - 72 feet
 - 204 feet
 - 17 feet
28. In 2000, there were 3,000 applicants for the space program. In 2004, there were 5,000 applicants. Find the rate of change.
- 8,000 applicants per year
 - 400 applicants per year
 - 2,000 applicants per year
 - 1,000 applicants per year
29. A puppy weighed 4 pounds at 4-months-old, and he weighed 12 pounds at 8-months-old. What is the rate of change?
- 2 pounds per month
 - 4 pounds per month
 - 16 pounds per month
 - 8 pounds per month