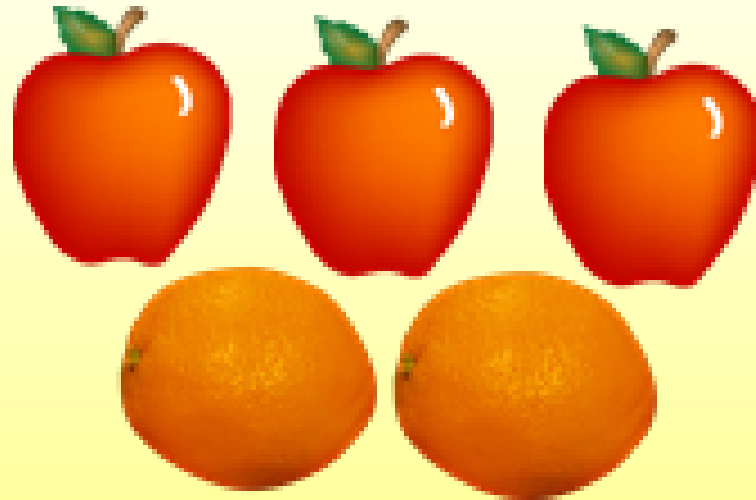


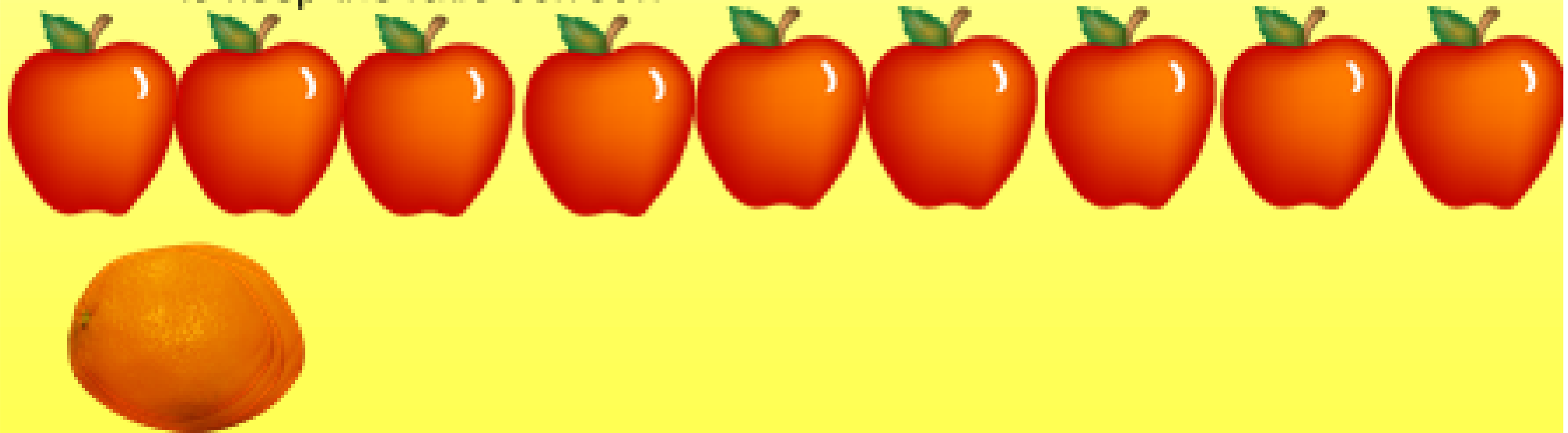
# PROPORTIONS

the ratio of apples to oranges  
in a fruit basket is 3:2



---

Using the same ratio as above  
if there are 9 apples, how many oranges should there be  
to keep the ratio correct?



grab the orange and make as many as you need

# PROPORTIONS

On the previous page we had  
3 apples to 2 oranges is equal to 9 apples to 6 oranges

Can you show why these ratios are equal?

$$\frac{3}{2} = \frac{9}{6}$$

**Test Option #1: Write both ratios in simplest form to see if they are equal.**



$$\frac{9 \div 3}{6 \div 3} = \frac{3}{2}$$

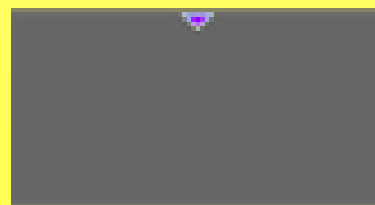
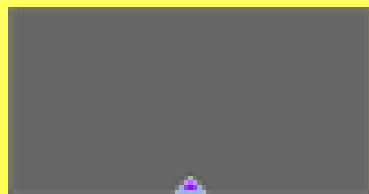
**Test Option #2: Find a common multiplier for the numerator and denominator.**



$$\frac{3}{2} \cdot \frac{3}{3} = \frac{9}{6} \text{ or } \frac{3}{2} \cdot \frac{7}{7} = \frac{21}{14}$$

all are equivalent

**Test Option #3: Check to see if their cross products are equal.**



$$\frac{3}{2} = \frac{9}{6} \quad 18 = 18$$
$$3 \cdot 6 = 2 \cdot 9$$

# PROPORTIONS

## FIND UNIT RATE TO SOLVE

Step 1: Find the unit price.

Step 2: Multiply to find the cost of the given amount of the item.

### Example 1:

Post cards cost \$2.45 for 5 cards. How much will 13 cards cost?

Step 1: What do I want to find?

Pull out  
Answer

cost per card

How do I do it?

Pull out  
Answer

divide  $2.45 \div 5 = .49$  each

Step 2: What do I do now?

Pull out  
Answer

multiply  $.49 \times 13$  cards = \$6.37

# PROPORTIONS

Solve proportions involving variables.

Touch star to reveal answers

$$\frac{3 \cdot 3 = 9}{8 \cdot 3 = 24} = \frac{b}{24}$$

Use mental math to find b

$$b = 9$$



$$\frac{m \cdot 8 = 16}{5 \cdot 8 = 40} = \frac{m}{40}$$

Use mental math to find m

$$m = 2$$



$$\frac{1 \cdot 15 = 5}{2 \cdot 30 = 60} = \frac{5}{p}$$

Use mental math to find p

$$p = 10$$



# PROPORTIONS

A. Sometimes if you have a proportion you can use cross products to find the missing value.

Remember the cross products of proportions are equal.

$$\frac{4}{5} \cdot \frac{12}{15} = \frac{b}{20}$$

Handwritten work shows the cross products:  $4 \cdot 12 = 48$  and  $5 \cdot 15 = 75$ . A blue arrow points from the 48 to the 12, and another blue arrow points from the 75 to the 15, illustrating the cross-multiplication process.

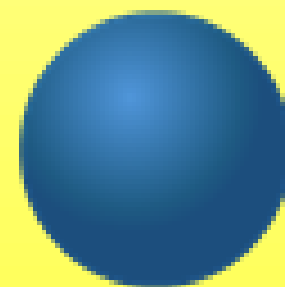
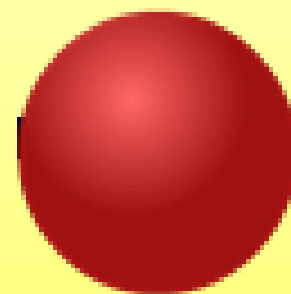
$$b = 16$$

$$\frac{8}{17} \cdot \frac{46}{34} = \frac{b}{51}$$

Handwritten work shows the cross products:  $8 \cdot 46 = 368$  and  $17 \cdot 34 = 578$ . A blue arrow points from the 368 to the 46, and another blue arrow points from the 578 to the 34, illustrating the cross-multiplication process.

$$b = 24$$

May this  
math be  
to you  
helpful



# PROPORTION WORD PROBLEMS

IT DOESN'T MATTER HOW YOU SET UP THE FIRST RATIO  
JUST MAKE SURE THE SECOND ONE MATCHES

TOUCH THE CORRECT ANSWER TO SEE IF YOU ARE RIGHT

$$\frac{\text{GIRLS}}{\text{BOYS}} =$$

$$\frac{\text{BOYS}}{\text{GIRLS}} \times$$

$$\frac{\text{GIRLS}}{\text{BOYS}}$$

Which of these proportions are set up correctly

$$\frac{\text{winners}}{\text{losers}} = \frac{\text{losers}}{\text{winners}}$$

$$\frac{\text{losers}}{\text{winners}} = \frac{\text{losers}}{\text{winners}}$$

note

$$\frac{\text{winners}}{\text{losers}} = \frac{\text{winners}}{\text{losers}}$$

$$\frac{\text{winners}}{\text{losers}} = \frac{\text{losers}}{\text{winners}}$$

## PROPORTION WORD PROBLEMS

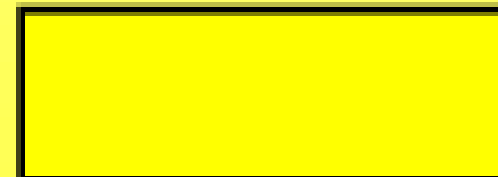
B. The ratio of sparrows to bluejays in the yard was 5 to 3. If there were 15 bluejays in the yard, how many sparrows were in the yard?

$$\frac{5s}{3bj} = \frac{x}{15bj}$$

$$x = 25 \text{ sparrows}$$

touch box to see answer

ANSWER



some extra problems

# PROPORTIONS

C. FIND THE MISSING NUMBER IN EACH PROPORTION

$$\frac{4}{6} = \frac{\quad}{12} \quad \text{★}$$

*Handwritten solution:  $4 \cdot 2 = 8$*

$$\frac{2}{3} = \frac{\quad}{9} \quad \text{★}$$

*Handwritten solution:  $2 \cdot 3 = 6$*

$$\frac{6}{18} = \frac{\quad}{9} \quad \text{★}$$

*Handwritten solution:  $6 \div 2 = 3$*

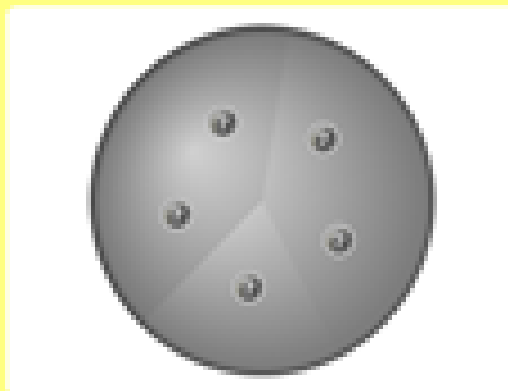
$$\frac{4}{1} = \frac{\quad}{2} \quad \text{★}$$

*Handwritten solution:  $4 \cdot 2 = 8$*



Hector has a floor plan showing his new house. On the floor plan, his bedroom is 3 inches wide and 3 1/2 inches long. The scale of the floor plan is 1/4 inch = 1 foot. What is the actual length of Hector's room?

- A 13 feet
- B 14 feet
- C 15 feet
- D 16 feet



$$\frac{2.5 \text{ in}}{1 \text{ ft}} = \frac{3.5 \text{ in}}{x \text{ ft}}$$
$$\frac{3.5}{2.5} = 14 \text{ ft}$$

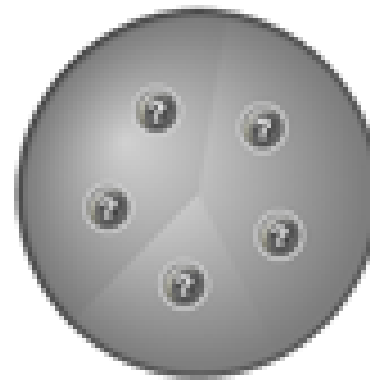


Jonah built a model train car. The length of the model train car is 6 inches. The scale Jonah used to build the model train car is 1:36. What is the actual length of the train car in FEET?

- A 6 feet
- B 12 feet
- C 18 feet
- D 24 feet



$$\begin{aligned} \frac{36}{1} &= \frac{1}{36} \\ 6 \cdot \frac{36}{1} &= 216 \text{ inches} \\ \frac{216}{12} &= 18 \text{ ft} \end{aligned}$$



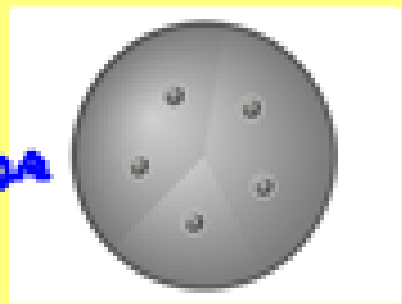
A jar contains 144 pennies. The pennies are taken out and divided into 2 piles. If the larger pile contains twice as many pennies as the smaller one, how many pennies are in the larger pile?

- A** 24 pennies
- B** 36 pennies
- C** 48 pennies
- D** 72 pennies
- E** 96 pennies



$$\frac{144}{x} = \frac{3}{2} \quad \frac{144}{3} = 48$$

$48 \cdot 2 = 96$  pennies



Tate is on a 2100 mile trip across the country. Over the last 12 hours of driving Tate has traveled 720 miles. If he continues traveling at the same rate, how many more hours will it take him to complete his trip?

- A** 18 hours
- B** 47 hours
- C** 15 hours
- D** 23 hours
- E** 35 hours



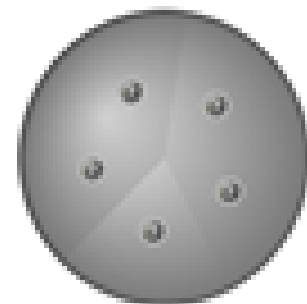
$$\frac{2100 \text{ mi}}{x \text{ hrs}} = \frac{720 \text{ mi}}{12 \text{ hrs}}$$

x hrs

$$\frac{720 \text{ mi}}{12 \text{ hrs}} = 60 \text{ mph}$$

$$\frac{2100 \text{ mi}}{60 \text{ mph}} = 35 \text{ hrs}$$

$$35 - 12 = 23 \text{ hrs}$$

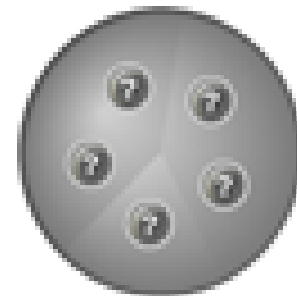


Jim found out that after working for 9 months at his new job, that he had earned 6 days of vacation time. How many days will he have earned after working for two years?

- A 12 days
- B 18 days
- C 24 days
- D 16 days
- E 2 days

$$\frac{9 \text{ mo}}{6 \text{ d}} = \frac{24 \text{ mo}}{x \text{ d}}$$

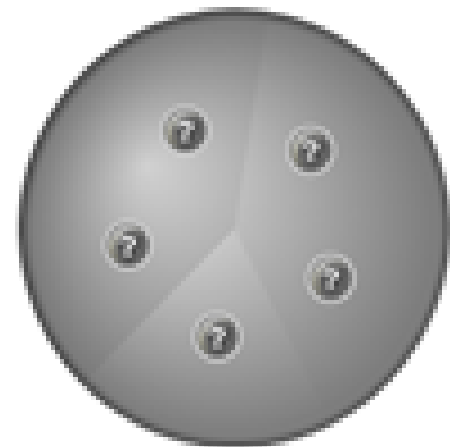
$$16 \text{ days} \quad \frac{9}{6} = \frac{3}{2} \quad \frac{3}{2} \cdot 8 = 12$$
$$2 \cdot 8 = 16$$



Sam works as a dental hygienist. Last week Sam made \$500 for 20 hours of work. How many hours must Sam work in order to make \$700?

- A 24 hours
- B 40 hours
- C 28 hours

$$\frac{\$500}{20\text{h}} = \$25/\text{hr}$$
$$\frac{\$700}{\$25/\text{hr}} = 28\text{hrs}$$



In a shipment of 400 parts, 14 are found to be defective. How many defective parts should be expected in a shipment of 1000?

- A 28 parts
- B 42 parts
- C 35 parts

$$\frac{400 \text{ parts}}{14 \text{ defective}} =$$

$$\frac{1000 \text{ parts}}{x \text{ defective}}$$

$$\frac{1000}{400} = 2.5$$

$$14 \cdot 2.5 = 35 \text{ parts}$$

