

## 8-2

## Estimating Population Size

**What You'll Learn**

To estimate population size using proportions

## CONTENT STANDARDS

7.SP.2



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**A proportion is an equation stating that two \_\_\_\_\_ are equal.**

- A** factors
- B** fractions
- C** rates
- D** ratios



**Solve this proportion:**

$$\frac{2}{3} = \frac{x}{15}$$

Text in your answer for x



**Solve this proportion:**

$$\frac{n}{36} = \frac{11}{9}$$

Text in the answer for n.



Solve:

$$\frac{42}{63} = \frac{6}{k}$$

A 7

B 9

C 5

D 8

E 6

### Why Learn This?

Researchers use the *capture/recapture method* to estimate animal population size. They collect, mark, and release animals. Then they capture another group of animals. The number of marked animals in the second group indicates the population size.

The following proportion is used to estimate a deer population.



$$\frac{\text{number of marked deer counted}}{\text{total number of deer counted}} = \frac{\text{total number of marked deer}}{\text{estimate of deer population}}$$

**EXAMPLE****Using the Capture/Recapture Method**

- 1 Gridded Response** Researchers count 48 marked deer and a total of 638 deer on a flight over an area. They know there are 105 marked deer. Write a proportion to estimate the deer population in the area.

$$\frac{\text{number of marked deer counted}}{\text{total number of deer counted}} = \frac{\text{total number of marked deer}}{\text{estimate of deer population}}$$

$$\frac{48}{638} = \frac{105}{x} \quad \leftarrow \text{Write a proportion.}$$

$$48x = 105 \cdot 638 \quad \leftarrow \text{Write the cross products.}$$

$$48x = 66,990 \quad \leftarrow \text{Multiply.}$$

$$\frac{48x}{48} = \frac{66,990}{48} \quad \leftarrow \text{Divide each side by 48.}$$

$$x \approx 1,396 \quad \leftarrow \text{Round to the nearest integer.}$$

1	3	9	6
0	7	7	0
0	0	0	0
0	1	1	1
2	2	2	2
3	0	3	3
4	4	4	4
5	5	5	5
6	6	6	0
7	7	7	7
8	8	8	8
9	9	0	9

There are about 1,396 deer.

Watch a short video clip

*If you are looking at this lesson from the website, you can log into your online textbook and find the video under online resources for lesson 8-2 (homework video tutor)*

[http://www.pearsonsuccessnet.com/snapp/iText/products/1-25-698758-1/media/academy123\\_content/wl-book-demo/ph-869.html](http://www.pearsonsuccessnet.com/snapp/iText/products/1-25-698758-1/media/academy123_content/wl-book-demo/ph-869.html)

### Example

- 1 **Using the Capture/Recapture Method** Researchers know that there are 63 marked gazelles in an area. On a flight over the area, they count 19 marked gazelles and a total of 412 gazelles. Write a proportion to estimate the gazelle population.

$$\frac{\text{number of marked gazelles counted}}{\text{total number of gazelles counted}} = \frac{\text{total number of marked gazelles}}{\text{estimate of gazelle population}}$$

$$\frac{\boxed{63}}{\boxed{19}} = \frac{63}{x} \quad \leftarrow \text{Write a proportion.}$$

$$19x = 63 \cdot 412 \quad \leftarrow \text{Write cross products.}$$

$$19x = \boxed{25,956} \quad \leftarrow \text{Multiply.}$$

$$\frac{19x}{19} = \frac{25,956}{19} \quad \leftarrow \text{Divide each side by 19.}$$

$$x \approx \boxed{1,366} \quad \leftarrow \text{Round to the nearest integer.}$$

There are about  $\boxed{1,366}$  gazelles in the area.

**Check:** You can use an estimate to check your answer.

$$\frac{19}{412} \approx \frac{\boxed{19}}{400}, \text{ or } \frac{1}{20}$$

$$\frac{1}{20} = \frac{63}{x}$$

$$x = 63 \times 20 = 1,260$$

Since this is close to 1,366, the answer is reasonable.

### Quick Check

## Table talk about this one:

1. Researchers know that there are 105 marked deer in an area. On a flight over the area, they count 35 marked deer and a total of 638 deer. Estimate the total deer population in the area.

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You can power down your clickers and put them away.

Your assignment is a google form - check your email

Estimating population size - you will want your calculator.

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Practice 8-2

### Estimating Population Size

Workers at a state park caught, tagged, and set free the species shown at the right. Later that same year, the workers caught the number of animals shown in the table below and counted the tagged animals. Use a proportion to estimate the park population of each species.

Tagged Animals	
Bears	12
Squirrels	50
Raccoons	23
Rabbits	42
Trout	46
Skunks	21

	Caught	Counted Tagged	Estimated Population
1. Bears	30	9	
2. Squirrels	1,102	28	
3. Raccoons	412	10	
4. Rabbits	210	2	
5. Trout	318	25	
6. Skunks	45	6	

A park ranger tags 100 animals. Use a proportion to estimate the total population for each sample.

7. 23 out of 100 animals are tagged \_\_\_\_\_
8. 12 out of 75 animals are tagged \_\_\_\_\_

9. 8 out of 116 animals are tagged \_\_\_\_\_
10. 5 out of 63 animals are tagged \_\_\_\_\_

Use a proportion to estimate each animal population.

11. Total ducks counted: 1,100  
Marked ducks counted: 257  
Total marked ducks: 960 \_\_\_\_\_
12. Total alligators counted: 310  
Marked alligators counted: 16  
Total marked alligators: 90 \_\_\_\_\_