Sample Size Switch

How does a new sample change the precision of an estimate?

S.DC.1.4 "Explain how sample size impacts the precision with which generalizations can be made."

NAME _____ DATE _____

MORE PRECISE

The new random sample is larger than the old one. Its estimate of a population percentage will usually be more precise, meaning estimates from repeated samples would vary less.

To estimate the percentage of bicycles in a town with working lights, a researcher changes from a random sample of 90 bicycles to a random sample of 900.

LESS PRECISE

The new random sample is smaller than the old one. Its estimate of a population percentage will usually be less precise, meaning estimates from repeated samples would vary more.

To estimate the percentage of library books with torn covers, a researcher changes from a random sample of 300 books to a random sample of 30.

1 SORT

8 items

Circle MORE or LESS for each new sample's usual precision compared with the old sample, then choose two items and explain how you knew.

1.	Birds with leg bands at a wildlife refuge: old random sample 60, new random sample 240.	MORE LESS
2.	City buses with working air conditioning: old random sample 180, new random sample 45.	MORE LESS
3.	Sheep with ear tags on a farm: old random sample 35, new random sample 140.	MORE LESS
4.	Dented boxes in a warehouse: old random sample 50, new random sample 200.	MORE LESS
5.	Gym members who attend weekly: old random sample 85, new random sample 255.	MORE LESS
6.	Cracked shells on a beach: old random sample 120, new random sample 30.	MORE LESS
7.	Hospital beds with clean sheets: old random sample 160, new random sample 40.	MORE LESS
8.	Hotel rooms with a desk: old random sample 25, new random sample 175.	MORE LESS

2 PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new MORE example and one new LESS example. For each, name what percentage is being estimated and give the old and new random sample sizes.

MORE

LESS

CHALLENGE

A school changes from a random sample of 400 students to a random sample of 40 students. Someone says the estimate of the percentage who ride the bus is more precise because both samples are random. Explain whether that claim is correct in two sentences.

ANSWER KEY

Sample Size Switch

HIGH SCHOOL · S.DC.1.4

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	Birds with leg bands at a wildlife refuge: old random sample 60, new random sample 240.	**MORE**	The new random sample is larger, so the percentage estimate will usually be more precise.
2	City buses with working air conditioning: old random sample 180, new random sample 45.	**LESS**	The new random sample is smaller, so the percentage estimate will usually be less precise.
3	Sheep with ear tags on a farm: old random sample 35, new random sample 140.	**MORE**	The new random sample is larger, so the percentage estimate will usually be more precise.
4	Dented boxes in a warehouse: old random sample 50, new random sample 200.	**MORE**	The new random sample is larger, so the percentage estimate will usually be more precise.
5	Gym members who attend weekly: old random sample 85, new random sample 255.	**MORE**	The new random sample is larger, so the percentage estimate will usually be more precise.
6	Cracked shells on a beach: old random sample 120, new random sample 30.	**LESS**	The new random sample is smaller, so the percentage estimate will usually be less precise.
7	Hospital beds with clean sheets: old random sample 160, new random sample 40.	**LESS**	The new random sample is smaller, so the percentage estimate will usually be less precise.
8	Hotel rooms with a desk: old random sample 25, new random sample 175.	**MORE**	The new random sample is larger, so the percentage estimate will usually be more precise.

PART 2 · PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **MORE**: To estimate the percentage of airport flights that leave late, change from a random sample of 70 flights to a random sample of 280.
- **LESS**: To estimate the percentage of restaurant plates with chips, change from a random sample of 150 plates to a random sample of 50.

Challenge: The claim is incorrect because the new random sample of 40 students will usually give a less precise estimate than the old sample of 400. Both samples are random, but estimates from smaller random samples tend to vary more.

For Part 2, accept explanations that compare the two sample sizes and connect a larger sample with less variation in percentage estimates. The comparison assumes the population and random sampling method stay the same.