LESSON MAKER PRO

Sample Signal

Use random digits to test how well samples match a population.

GRADE 8 · TEKS 8.11.C

8.11.C "simulate generating random samples of the same size from a population with known characteristics to develop the notion of a random sample being representative of the population from which it was selected."

NAME _____ DATE _____

RANDOM SAMPLES

A random sample gives each population member an equal chance to be selected. You can simulate a population percentage by assigning random digits to each outcome. A sample is representative when its result is close to the known population result.

WORKED EXAMPLE

In a population, 80% of students bring a reusable water bottle. Let digits 0 through 7 mean "brings a bottle," and digits 8 and 9 mean "does not bring a bottle." Simulate a sample of 5 using these digits: 9, 1, 6, 8, 0. What percent of the sample brings a bottle?

1. Digits 1, 6, and 0 mean "brings a bottle."
2. There are 3 students who bring a bottle out of 5 students.
3. 3/5 = 60%.

Answer: 60%

PRACTICE 4 problems

1 A population is 30% left-handed. Let digits 0, 1, and 2 mean "left-handed." All other digits mean "not left-handed." A simulated sample of 4 uses 7, 2, 9, 0. What is the sample proportion that is left-handed?

ANSWER _____

2 A population is 50% likely to choose apples. Let digits 0 through 4 mean "chooses apples." Sample A uses 0, 7, 4, 9. Sample B uses 1, 2, 3, 8. Which sample is more representative? Give its proportion.

ANSWER _____

3 A population is 70% likely to walk to school. Three simulated samples, each with 10 students, have 6, 7, and 9 students who walk to school. Which sample is most representative?

ANSWER _____

4 A population is 40% likely to play an instrument. Let digits 0 through 3 mean "plays an instrument." A simulated sample of 5 uses 4, 3, 8, 1, 6. What percent of the sample plays an instrument?

ANSWER _____

APPLY IT Show your work

1 The student council knows that 40% of students use the school library after classes. Let digits 0 through 3 mean "uses the library." A simulated sample of 10 uses 6, 0, 9, 3, 4, 2, 8, 1, 7, 5. What percent of this sample uses the library? Is this sample representative of the known population percentage?

WORK SPACE

ANSWER _____

2 A gaming club knows that 60% of its members play cooperative games. Let digits 0 through 5 mean "plays cooperative games." Sample A uses 0, 9, 3, 8, 1. Sample B uses 2, 4, 5, 1, 8. Which sample gives the closer estimate of the population percentage?

WORK SPACE

ANSWER _____

3 Actually generate three random samples of 10 digits each. Your teacher supplies 10 identical folded slips labeled 0 through 9 in a bag. Draw without looking, record the digit, replace it and mix before every draw. Repeat 10 times per sample. Digits 0 through 3 mean library user: this model population is 40% users. Record each sample in the table, count users, calculate percent users and its absolute difference from 40%. Compare the three results and explain chance variation. Use separate paper for your ten-digit records if needed.

OUR RANDOM SAMPLES · SAME SIZE, KNOWN 40%

Sample	10 drawn digits	Users	Percent	Gap from 40%
1				
2				
3				

ANSWER _____

CHALLENGE One step up

A population is known to be 50%. Three simulated samples of size 4 have proportions 1/4, 3/4, and 1/2. Three simulated samples of size 8 have proportions 3/8, 5/8, and 1/2. Which sample size shows less variation and is more consistently representative? Explain using the proportions.

WORK SPACE AND ANSWER

ANSWER KEY # Sample Signal

GRADE 8 · TEKS 8.11.C

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A population is 30% left-handed. Let digits 0, 1, and 2 mean "left-handed." All other digits mean "not left-handed." A simulated sample of 4 uses 7, 2, 9, 0. What is the sample proportion that is left-handed?	**1/2**
2	A population is 50% likely to choose apples. Let digits 0 through 4 mean "chooses apples." Sample A uses 0, 7, 4, 9. Sample B uses 1, 2, 3, 8. Which sample is more representative? Give its proportion.	**Sample A, 1/2.**
3	A population is 70% likely to walk to school. Three simulated samples, each with 10 students, have 6, 7, and 9 students who walk to school. Which sample is most representative?	**The second sample, 7/10.**
4	A population is 40% likely to play an instrument. Let digits 0 through 3 mean "plays an instrument." A simulated sample of 5 uses 4, 3, 8, 1, 6. What percent of the sample plays an instrument?	**40%**

PART 2 · APPLY IT

1. **40%; yes, it exactly matches the population percentage.** Digits 0, 3, 2, and 1 represent library users, so 4 of 10 students use the library. 4/10 = 40%, which matches the population.
2. **Sample A.** Sample A has 3 of 5 members, or 60%. Sample B has 4 of 5 members, or 80%, so Sample A is closer to 60%.
3. **Results vary. For each actual sample, percent users = users/10 × 100%; gap is the absolute difference from 40%, in percentage points.** Teacher prepares identical opaque folded slips 0–9 and a bag before learners begin, demonstrates replacement and remixing, then supports the actual draws. Verify three recorded samples of ten digits, correct mapping of 0–3, counts, percentages and absolute gaps. Compare closeness only for the modeled library-use characteristic. A random sample can differ from 40%; do not require particular counts or claim that closeness proves all population characteristics are represented.

CHALLENGE

Samples of size 8. Their proportions range from 3/8 to 5/8, which are closer to 1/2 than 1/4 and 3/4 are.

Accept equivalent fractions, decimals, or percentages when they are correct. For explanation items, accept responses stating that random selection reduces bias and that results closer to the population percentage are more representative.