

Grade 7 · Random Sampling and Making Inferences · Worksheet Answer Key

Common Core 7.SP.A.1, 7.SP.A.2 · mathovore.fr

Each of the twenty solutions names the population and the sample, or shows the proportion and the multiplication that give an estimate. Estimates are marked with the word about. Compare your reasoning with the explanations, especially for the random-versus-biased problems, where several valid wordings can earn full credit.

Grade 7 Common Core: 7.SP.A.1 · 7.SP.A.2

Problem 1: Population and sample

The population is everyone Mr. Lopez wants to learn about: all 720 students.

The sample is the part he actually surveys: the 45 students.

Population: the 720 students; sample: the 45 students surveyed

Problem 2: Library books

The population is every item she wants to learn about: all 4,200 books in the library.

The sample is the part she actually checks: the 60 books.

Population: the 4,200 library books; sample: the 60 books checked

Problem 3: Sample or population?

(a) Population: she wants information only about her class, and all 28 students are included.

(b) Sample: the 30 shoppers are a part of everyone in the town.

(c) Population: every book is checked.

(a) population; (b) sample; (c) population

Problem 4: Random or not random

(a) Random: every student has the same chance of being drawn.

(b) Not random: students who arrive early are favored.

(c) Not random: cooking club members may like different lunches than most students.

Only (a) is random

Problem 5: Which sample is better?

Method B gives every student the same chance of being chosen, so the sample is random and is likely to represent the whole school.

Method A uses one team. Athletes may prefer different seasons than most students, so that sample can be biased.

Method B is more likely to be representative

Problem 6: Explain the bias

People at a Little League game are more likely to like baseball than people in general. Not every town resident had an equal chance of being surveyed, so the sample is not representative.

Biased: the sample favors baseball fans

Problem 7: Bus stop survey

People waiting at a bus stop already ride the bus, so they are more likely to favor a new line than adults in general. Not every adult in town had an equal chance of being surveyed.

Improvement: choose the adults at random, for example by drawing 50 names from a list of all adult residents.

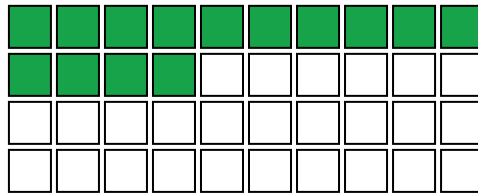
Biased: the sample favors bus riders

Problem 8: Estimate a population count

The sample proportion is $\frac{14}{40} = 0.35$.

Estimate: $0.35 \times 600 = 210$.

About 210 students



14 of 40 = 35%

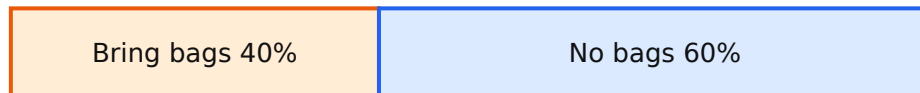
Solved: 35% of the sample walks.

Problem 9: Reusable bags

The sample proportion is $\frac{20}{50} = 0.4$.

Estimate: $0.4 \times 1500 = 600$.

About 600 shoppers



$0.4 \times 1,500 = 600$ shoppers

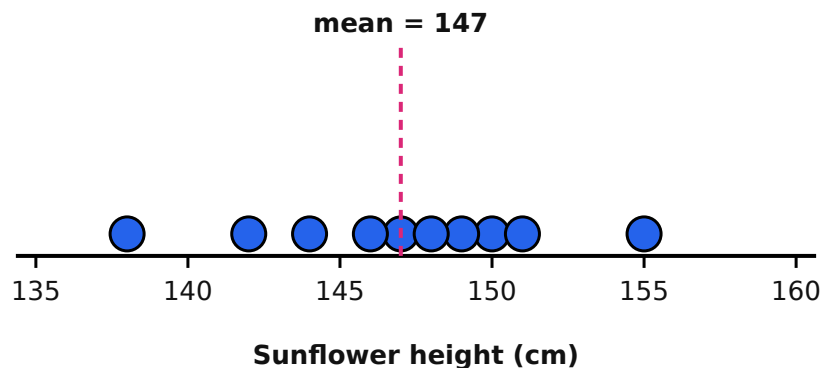
Solved: 40% of the sample brings bags.

Problem 10: Estimate a mean

Sum: $142 + 150 + 138 + 155 + 147 + 149 + 151 + 144 + 146 + 148 = 1470$.

Mean: $1470 \div 10 = 147$.

About 147 cm



Solved: the sample mean is 147 cm.

Problem 11: Voter survey

The sample proportion is $\frac{52}{80} = 0.65$, or 65%.

Estimate: $0.65 \times 2500 = 1625$.

About 65% of voters, or about 1,625 voters

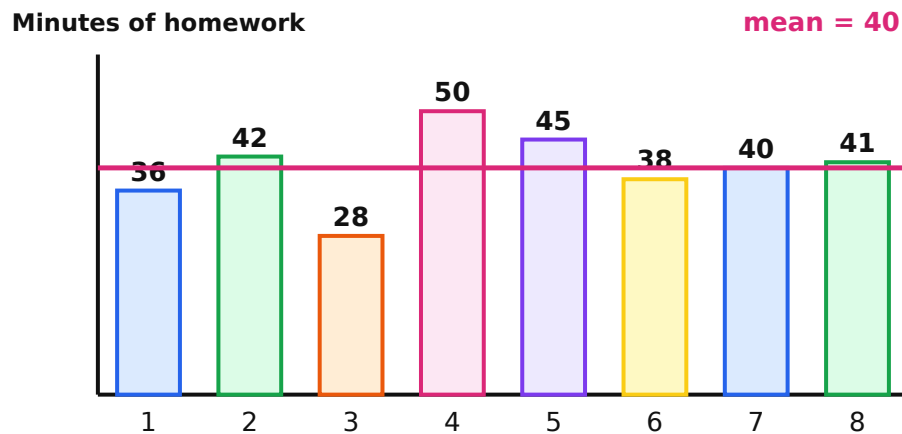
Problem 12: Homework time

Sum: $36 + 42 + 28 + 50 + 45 + 38 + 40 + 41 = 320$.

Mean: $320 \div 8 = 40$.

Total for the school: $40 \times 640 = 25,600$.

About 40 minutes per student, about 25,600 minutes in all



Solved: the sample mean is 40 minutes.

Problem 13: Two samples, two estimates

Sample A: $\frac{12}{30} = 0.4$, and $0.4 \times 900 = 360$.

Sample B: $\frac{15}{30} = 0.5$, and $0.5 \times 900 = 450$.

The estimates differ because of sampling variation: each random sample includes different students.

360 students and 450 students

Problem 14: Quality control

The sample proportion is $\frac{3}{50} = 0.06$.

Estimate: $0.06 \times 4000 = 240$.

About 240 defective bulbs

Problem 15: Sample size

Liam: $\frac{7}{10} = 0.70$, and $0.70 \times 1200 = 840$.

Aisha: $\frac{58}{100} = 0.58$, and $0.58 \times 1200 = 696$.

Aisha's estimate is likely more reliable, because a larger random sample varies less.

840 and 696; Aisha's estimate is more reliable

Problem 16: Does most mean most?

(a) Sample 1: $\frac{17}{30} \times 800 \approx 453$. Sample 2: $\frac{13}{30} \times 800 \approx 347$.

(b) No. One estimate is more than half of 800 (more than 400) and the other is less. Random samples vary, so a single small sample does not prove the claim.

(c) Combined: $\frac{17+13}{30+30} = \frac{30}{60} = 0.5$ and $0.5 \times 800 = 400$.

(a) about 453 and about 347; (b) no; (c) about 400 students, exactly half

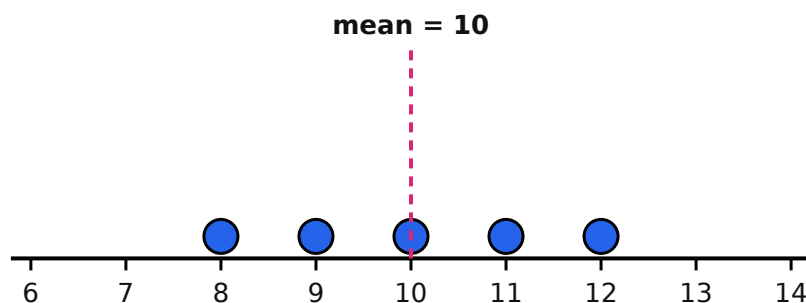
Problem 17: Five samples of lunch buyers

(a) Mean: $(9+11+8+12+10) \div 5 = 50 \div 5 = 10$.

(b) Proportion: $\frac{10}{20} = 0.5$, and $0.5 \times 1200 = 600$.

(c) Smallest: $\frac{8}{20} = 0.4$, and $0.4 \times 1200 = 480$. Largest: $\frac{12}{20} = 0.6$, and $0.6 \times 1200 = 720$.

(a) 10; (b) about 600 students; (c) between 480 and 720 students



Solved: the mean count is 10 of 20.

Problem 18: Burnt cookies

The sample proportion is $\frac{6}{80} = 0.075$.

Estimate: $0.075 \times 2400 = 180$ burnt cookies.

Loss: $180 \times 0.75 = 135$, so about \$135.

About 180 burnt cookies, a loss of about \$135

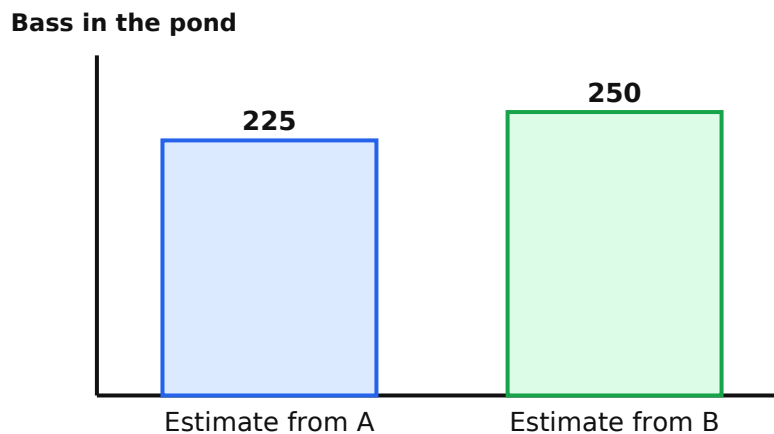
Problem 19: Bass in the pond

Sample A: $\frac{9}{50} = 0.18$, and $0.18 \times 1250 = 225$.

Sample B: $\frac{20}{100} = 0.20$, and $0.20 \times 1250 = 250$.

Sample B is likely more reliable: a larger random sample varies less from the true proportion.

About 225 bass and about 250 bass; Sample B is more reliable



Solved: the two estimates of bass.

Problem 20: New park vote

(a) $\frac{96}{150} = 0.64$, and $0.64 \times 12000 = 7680$.

(b) Mean: $(96 + 90 + 99 + 93 + 107) \div 5 = 485 \div 5 = 97$. Proportion: $\frac{97}{150}$, and $\frac{97}{150} \times 12000 = 97 \times 80 = 7760$.

(c) Smallest: $\frac{90}{150} \times 12000 = 7200$. Largest: $\frac{107}{150} \times 12000 = 8560$.

(a) about 7,680; (b) about 7,760; (c) between 7,200 and 8,560 residents