

Random Sampling and Comparing Populations: math practice, Grade 7 – download the PDF

21 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Population or sample?



For each situation, say whether the group described is a **population** or a **sample**.

- a. All 1,200 residents of a small town.
- b. 60 residents of that town, phoned using a random list.
- c. The 24 cars checked on Monday out of the 300 cars a garage repaired this year.

2 Which method is random?



The student council wants to survey 25 of the 500 students at school. Which methods give a **random** sample?

- a. Write all 500 names on slips of paper, mix them in a bin, and draw 25.
- b. Survey the first 25 students who arrive at school.
- c. Number the roster 1 to 500 and use a random number generator to pick 25 numbers.
- d. Survey the 25 students sitting in the library.

3 True or false?



Say whether each statement is true or false, and justify your answer.

- a. A sample can have more members than its population.
- b. In a random sample, every member of the population has an equal chance of being chosen.
- c. If you survey every single member of a group, you have a sample.

4 Mean, median, and range

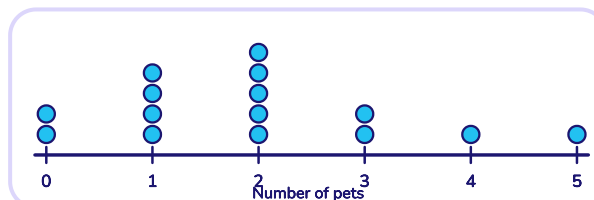


Seven students scored 8, 9, 6, 10, 7, 9, and 7 on a quiz. Find the mean, the median, and the range.

5 Reading a dot plot



The dot plot shows the number of pets owned by 15 students.



- a. How many students own exactly 2 pets?
- b. What is the most common number of pets?
- c. How many students own 3 or more pets?
- d. What is the range of the data?

6 Estimating a count



A random sample of 120 students from a school of 800 shows that 30 of them play soccer. Estimate how many students at the school play soccer.

7 Which set is more spread out?



Set P: 10, 12, 14, 16, 18. Set Q: 13, 14, 15, 16, 17. Find the range of each set and tell which one is more spread out.

8 MAD of daily temperatures



Five afternoon temperatures (in °F) were 62, 65, 66, 68, and 69. Find the mean and the mean absolute deviation.

9 Five-number summary



A coach recorded the number of laps 12 swimmers finished: 3, 5, 5, 6, 8, 9, 10, 12, 12, 13, 15, 16. Find the minimum, Q_1 , median, Q_3 , maximum, and the IQR.

10 Spot the bias



A reporter wants to know which sport is the favorite of the students at a school. She surveys only the students who attend the Saturday basketball clinic.

- Why is this sample likely biased?
- Describe a better way to choose the sample.

11 Defective light bulbs



A factory will make 4,000 light bulbs this week. A random sample of 50 bulbs contains 6 defective ones.

- Estimate the number of defective bulbs this week.
- A second random sample of 50 bulbs contains 9 defective ones. What does this second sample estimate?
- Give a range of reasonable values for the number of defective bulbs.

12 Fish in two lakes



Lengths (in inches) of 5 fish caught in Lake A: 8, 9, 10, 10, 11. Lengths of 5 fish caught in Lake B: 12, 13, 13, 14, 15. Compare the medians and the ranges. What can you say about the fish in each lake?

13 An unusual value



Seven students timed how long they took to read the same article, in minutes: 10, 12, 12, 13, 13, 14, 45. Find the mean and the median. Which one describes the typical reading time better? Explain.

14 Gap in MADs



Over a season, Team A's number of points per game has a mean of 21 and a MAD of 2. Team B has a mean of 27 and a MAD of 2. Express the difference between the means as a multiple of the MAD, and tell whether the distributions overlap a lot.

15 Three samples, one claim



A club has 1,200 members. Three random samples of 40 members were asked whether they support a new schedule. In the three samples, 14, 17, and 11 members said yes.

- Use each sample to estimate the number of supporters in the club.
- A student claims that more than half of the club (more than 600 members) supports the new schedule. Do the samples support this claim?

16 Design a sampling plan



The principal wants to know how many hours per week the 600 students of the school spend on homework. Describe a complete plan to choose a random sample of 30 students, and explain why your plan avoids bias.

17 Two box plots



Two classes took the same test. Class X: minimum 55, $Q_1 = 65$, median 72, $Q_3 = 80$, maximum 92. Class Y: minimum 60, $Q_1 = 70$, median 75, $Q_3 = 78$, maximum 85.

- Find the range and the IQR of each class.
- Which class has the higher typical score? Which one is more consistent? Explain.

18 Two sprinters



The times (in seconds) of two sprinters over five races are Anna: 14.2, 14.6, 14.4, 14.8, 14.0 and Ben: 14.9, 14.1, 14.3, 14.1, 14.6.

- Find the mean time of each sprinter.
- Find the MAD of each sprinter.
- Who is more consistent? Explain.

19 Does fertilizer help?



A student grew 8 bean plants with fertilizer and 8 without. Heights after four weeks, in centimeters. With fertilizer: 21, 23, 24, 24, 25, 26, 26, 27. Without fertilizer: 17, 18, 19, 20, 20, 21, 22, 23.

- Find the mean and the MAD of each group.
- Express the difference between the means as a multiple of the MAD.
- What do you conclude about the overlap and about the fertilizer?

20 Find the two mistakes



Maya picks the 10 players on her own basketball team and asks them which sport they like best. Eight say basketball. She writes: "80% of the 500 students in my school like basketball best, so about 400 students." Describe two mistakes in her reasoning.

21**Sleep and age**

Two random samples of 10 students recorded their hours of sleep on a school night.

Seventh graders: 7, 8, 8, 9, 9, 9, 9, 10, 10, 11. Older students: 5, 6, 7, 7, 7, 8, 8, 8, 9, 10.

- Find the mean and the MAD of each group.
- Divide the difference between the means by the larger MAD. Does it seem that the groups overlap a lot?

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