

Quarter-Inch Detectives

Measure real lengths. Build a line plot with quarter-inch marks.

GRADE 3 • 3.MD.B.4

CCSS.Math.Content.3.MD.B.4 "Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves..."

NAME _____

DATE _____

Materials and setup

Teacher: provide an inch ruler with quarter-inch or finer marks and six straight strips labeled A-F, each between 1 and 4 inches long. Include lengths near quarter-inch and half-inch marks and at least two similar lengths. Students measure real strips; no printed diagram is a ruler.

Record to the nearest $\frac{1}{4}$ inch. If an endpoint is exactly halfway between two quarter-inch marks, use the larger value. One dot means one strip.

FROM RULER TO LINE PLOT

An inch has four equal quarters: $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, then the next whole inch. Start a ruler at 0, not at its edge. Read the other end to the nearest $\frac{1}{4}$ inch. Each dot on a line plot represents one measured strip. Stack dots for equal lengths. Decimal labels 0.25, 0.5 and 0.75 mean $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$.

WORKED EXAMPLE

Four strips measure 1, $1\frac{1}{4}$, $1\frac{1}{4}$ and $1\frac{1}{2}$ inches. Read their line plot. Why are two dots at 1.25?

1. Use equal quarter-inch intervals; 1.25 means $1\frac{1}{4}$.
2. Place one dot per strip. Stack the two dots for $1\frac{1}{4}$ inches.

Answer: Two strips measure $1\frac{1}{4}$ inches. Four dots represent four strips.

Four example strips



PRACTICE 4 problems

- 1** Measure real strips A-F with your ruler. Record each length to the nearest $\frac{1}{4}$ inch. Use fractions or equivalent decimals.

MY MEASUREMENTS

Strip	Length (inches)
A	_____
B	_____
C	_____
D	_____
E	_____
F	_____

ANSWER _____

- 3** Read your plot. Give the shortest and longest measured lengths. Explain how a stack of dots represents repeated lengths.

ANSWER _____

- 2** Make a line plot of your six measurements. Draw a scale from 0 to 4 inches with equal $\frac{1}{4}$ -inch intervals. Label each whole and half inch; mark the quarters between them. Add a title and a Length (inches) label. Place one dot for each strip, stacking equal lengths.

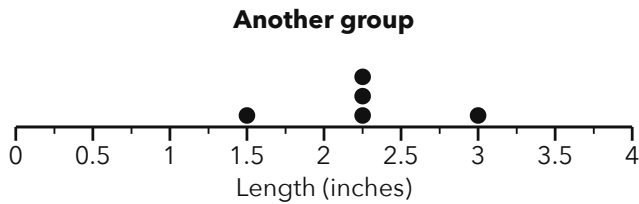
ANSWER _____

- 4** Choose one strip whose length uses a half or quarter inch. Measure it again. Record its label and length. Explain how you found the correct ruler mark.

ANSWER _____

APPLY IT Show your work

- 1** Read this new plot. How many strips are $2\frac{1}{4}$ inches? How many strips were measured in all?



ANSWER _____

- 2** Five strips measure $\frac{1}{2}$, $\frac{3}{4}$, $\frac{3}{4}$, $1\frac{1}{4}$ and $1\frac{1}{2}$ inches. Make a line plot in the box. Use a scale from 0 to 2 with equal quarter-inch intervals; label every tick, title and units.

ANSWER _____

CHALLENGE One step up

A student puts only one dot at every length used in a plot. Explain why this loses information. Then explain why quarter-inch ticks are useful when a strip measures $1\frac{3}{4}$ inches.

WORK SPACE AND ANSWER

PRACTICE 1

Measure real strips A-F with your ruler. Record each length to the nearest $\frac{1}{4}$ inch. Use fractions or equivalent decimals.

Answers vary. Six measurements must match the real strips to the nearest quarter inch.

PRACTICE 2

Make a line plot of your six measurements. Draw a scale from 0 to 4 inches with equal $\frac{1}{4}$ -inch intervals. Label each whole and half inch; mark the quarters between them. Add a title and a Length (inches) label. Place one dot for each strip, stacking equal lengths.

A quarter-inch scale and exactly six dots matching the table. Whole and half inches are labeled; all quarter-inch intervals are equal.

PRACTICE 3

Read your plot. Give the shortest and longest measured lengths. Explain how a stack of dots represents repeated lengths.

The leftmost and rightmost occupied positions give the shortest and longest lengths. Each dot in a stack is a separate strip of that length.

PRACTICE 4

Choose one strip whose length uses a half or quarter inch. Measure it again. Record its label and length. Explain how you found the correct ruler mark.

Answers vary. Check the strip label, actual quarter-inch reading and explanation of equal quarter-inch intervals from a whole-inch mark.

APPLY IT 1

Three are $2\frac{1}{4}$ inches; five in all.
Count three dots at 2.25, then all five dots.

CHALLENGE

One dot per used length hides repeats. Quarter-inch ticks provide a marked position for $1\frac{3}{4}$ inches, between $1\frac{1}{2}$ and 2.

Observe ruler use: zero at one end and length read at the other. Compare the first plot with the actual measurement table; do not substitute example data. Accept equivalent fractions/decimals and reasonable measurement error. A half-inch scale can show values between ticks; quarter-inch ticks make required measurements easier to locate at marked positions.

APPLY IT 2

Five dots: one at $\frac{1}{2}$, two at $\frac{3}{4}$, one at $1\frac{1}{4}$ and one at $1\frac{1}{2}$.

Every measurement appears once. Repeated lengths stack at the same tick.

Five practice strips

