LESSON MAKER PRO

Patterns That Predict

Use observed counts to estimate what may happen next.

HIGH SCHOOL · MM.D3D.C.18

MM.D3D.C.18 "Construct a probability distribution based on empirical observations of a variable. a. Estimate the probability of each value for a random variable based on empirical observations or simulations, using technology. b..."

NAME _____ DATE _____

FROM COUNTS TO PREDICTIONS

To estimate the probability of a value, divide its count by the total count. To find the mean, multiply each value by its count, add the products, then divide by the total. A rare high value can pull the mean above the median.

WORKED EXAMPLE

Use the histogram to estimate P(3) and find the mean.



1. Total observations: 2 + 4 + 2 = 8.
2. P(3) = 4/8 = 1/2.
3. Mean = (1 × 2 + 3 × 4 + 5 × 2)/8 = 24/8.

Answer: P(3) = 1/2; mean = 3

PRACTICE 4 problems

1 In 10 observations, 0 occurs 3 times, 1 occurs 5 times, and 2 occurs 2 times. Estimate P(2).

ANSWER _____

2 Value 0 occurs once, 2 occurs 3 times, and 4 occurs 6 times. Find the mean.

ANSWER _____

3 Value 1 occurs 4 times, 2 occurs 4 times, and 3 occurs 2 times. Estimate P(value ≥ 2).

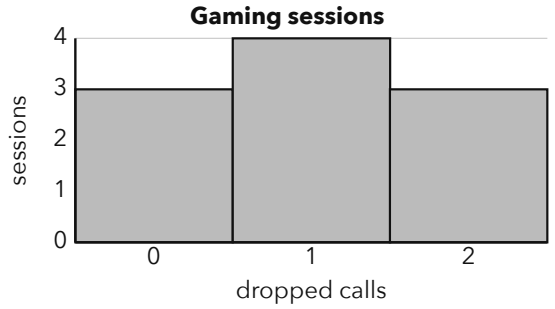
ANSWER _____

4 Each value occurs twice: 0, 2, 4, 6. Find the median and interquartile range. Find each quartile from its half of the data.

ANSWER _____

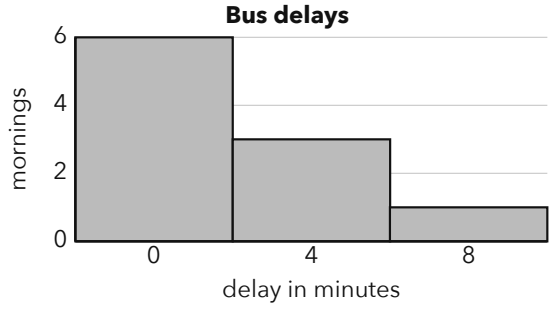
APPLY IT Show your work

1 The histogram shows dropped calls per gaming session. Predict how many of the next 100 sessions will have 2 dropped calls.



ANSWER _____

2 The histogram shows bus delays, in minutes, on school mornings. Use the mean to predict the total delay over 20 future mornings.



ANSWER _____

CHALLENGE One step up

An app loaded in 0 seconds 5 times, 1 second 3 times, 2 seconds once, and 8 seconds once. Find the mean and median load times. Which better describes a typical load time? Explain.

WORK SPACE AND ANSWER

Patterns That Predict

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	In 10 observations, 0 occurs 3 times, 1 occurs 5 times, and 2 occurs 2 times. Estimate P(2).	**1/5**
2	Value 0 occurs once, 2 occurs 3 times, and 4 occurs 6 times. Find the mean.	**3**
3	Value 1 occurs 4 times, 2 occurs 4 times, and 3 occurs 2 times. Estimate P(value ≥ 2).	**3/5**
4	Each value occurs twice: 0, 2, 4, 6. Find the median and interquartile range. Find each quartile from its half of the data.	**Median = 3; interquartile range = 4**

PART 2 · APPLY IT

1. **30 sessions** The estimated probability is 3/10. Multiply 100 by 3/10 to predict 30 sessions.
2. **40 minutes** The mean delay is (0 × 6 + 4 × 3 + 8 × 1)/10 = 2 minutes. Over 20 mornings, the predicted total is 20 × 2 = 40 minutes.

CHALLENGE

Mean = 13/10 seconds; median = 1/2 second. The median better describes a typical load time because the single 8-second time pulls the mean upward.

Accept equivalent fractions or decimals. For the challenge, accept an explanation that identifies the 8-second time as a high value that raises the mean.