

AP Statistics - z-Scores and the Normal Distribution - Worksheet

Common Core AP STAT 1.10, AP STAT 1.11, HSS-ID.A.4 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

These 20 problems practice AP Statistics topics 1.10 and 1.11. You will compute z-scores and percentiles, apply the empirical rule, find normal probabilities, and work backward from a percentile to a value.

AP Statistics · Common Core State Standards: **AP STAT 1.10, AP STAT 1.11, HSS-ID.A.4**

Exercise 1 - Compute a z-score

Heights of adult women are approximately normal with mean 64 inches and standard deviation 2.5 inches. Find the z-score of a woman who is 69 inches tall.

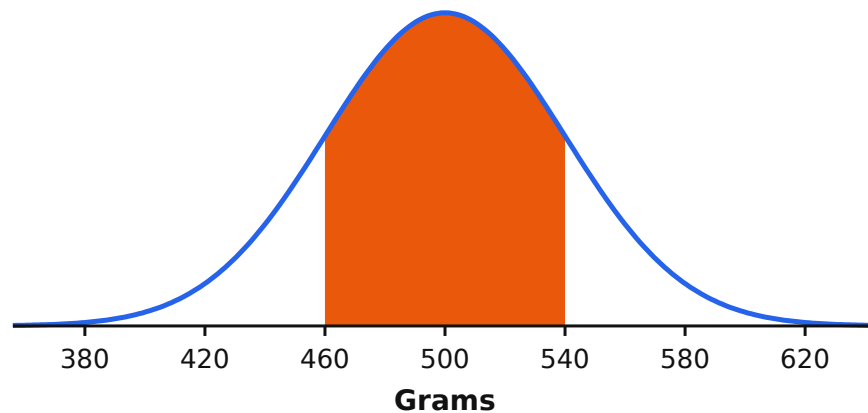
Exercise 2 - Value from a z-score

Scores on a driving test have mean 78 and standard deviation 6. Find the score that has $z = -1.5$.

Exercise 3 - Compare two scores

Jamal scored 84 on a math test (mean 75, sd 6). Sofia scored 640 on a science test (mean 600, sd 50). Who did relatively better?

Exercise 4 - Empirical rule



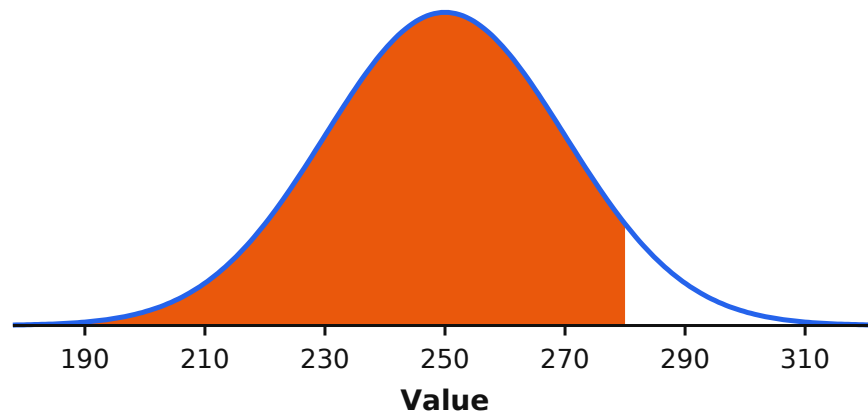
Weights of a bag of rice in grams.

The weights of rice bags are approximately normal with mean 500 g and standard deviation 40 g. What percent of bags weigh between 420 g and 580 g? Between 460 g and 540 g?

Exercise 5 - Empirical rule counts

Battery life is approximately normal with mean 12 hours and standard deviation 1.5 hours. Of 400 batteries, about how many last more than 15 hours?

Exercise 6 - Area to the left



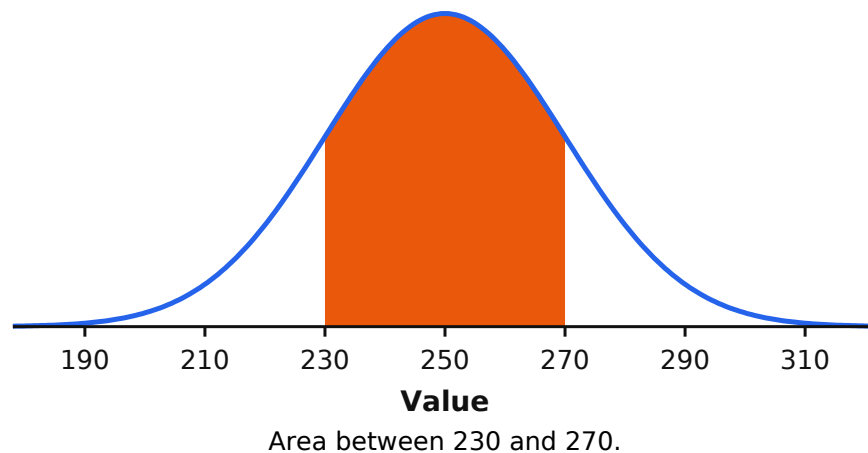
Area left of 280.

A variable is normal with mean 250 and standard deviation 20. Find the proportion of values below 280.

Exercise 7 - Area to the right

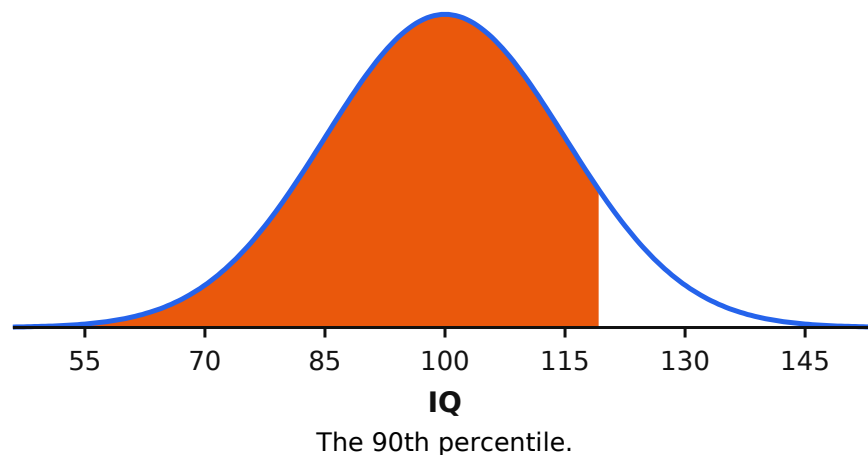
For the same distribution (mean 250, sd 20), find the proportion of values above 215.

Exercise 8 - Area between



Find the proportion of values between 230 and 270 for the same distribution.

Exercise 9 - Value from a percentile



IQ scores are normal with mean 100 and standard deviation 15. Find the IQ at the 90th percentile.

Exercise 10 - Percentile of a value

A runner finishes a 5K in 22 minutes. Times are normal with mean 27 minutes and standard deviation 4 minutes. Find her percentile and interpret it.

Exercise 11 - Quartiles of a normal

Find Q1 and Q3 for the IQ distribution (mean 100, sd 15) and the IQR.

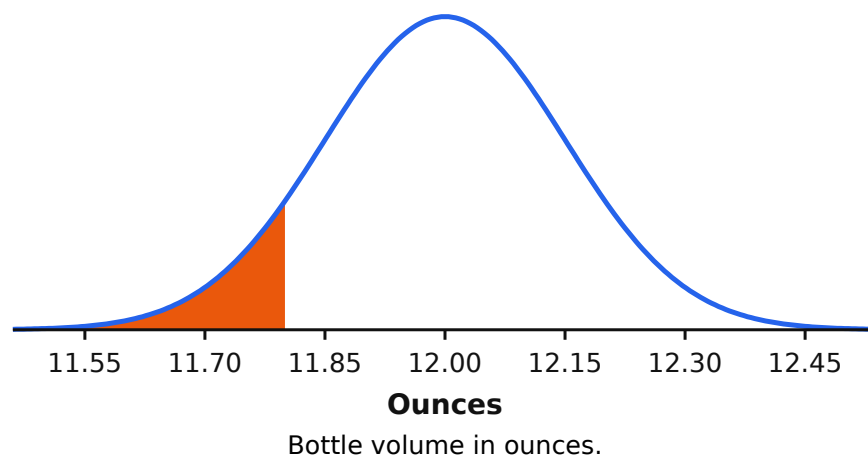
Exercise 12 - Change of units

Heights have mean 64 inches and sd 2.5 inches. A woman is 69 inches tall. If the heights are converted to centimeters (1 inch = 2.54 cm), what is her z-score? Why?

Exercise 13 - Is it approximately normal?

A data set of 200 values has mean 50 and sd 8. There are 138 values between 42 and 58 and 192 values between 34 and 66. Does the empirical rule suggest approximate normality?

Exercise 14 - Bottle filling



A machine fills bottles with mean 12.0 oz and standard deviation 0.15 oz (normal). A bottle with less than 11.8 oz is rejected. What proportion is rejected? How many of 5,000 bottles?

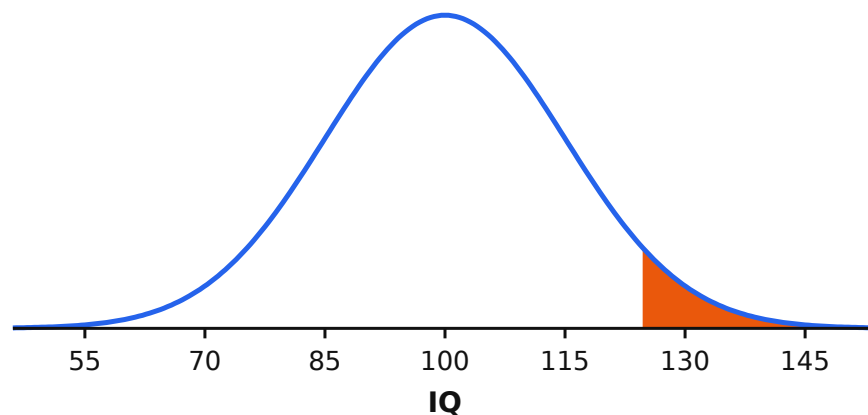
Exercise 15 - Tall women

Using mean 64 inches and sd 2.5 inches, what proportion of women are taller than 70 inches? Is a height of 70 inches unusual?

Exercise 16 - Commute times

Commute times in a city are normal with mean 60 minutes and sd 4 minutes. Find the percent of commutes between 55 and 65 minutes.

Exercise 17 - Top 5 percent



Top 5 percent of IQ scores.

A gifted program admits students scoring in the top 5% (IQ mean 100, sd 15). Find the minimum IQ for admission.

Exercise 18 - Find the standard deviation

The weights of apples are normal with mean 3.2 oz. About 2.5% of apples weigh more than 4.0 oz. Use the empirical rule to estimate the standard deviation.

Exercise 19 - Two-step

The rainfall in a region in one month is normal with mean 3.5 in. and sd 0.8 in. Find the proportion of months with rainfall within 0.5 in. of the mean, and the proportion more than 1 in. above the mean.

Exercise 20 - Scores above a cutoff

Scores on a placement exam are normal with mean 72 and sd 9. A student needs at least 90 to place out of the course. What proportion of students do so?