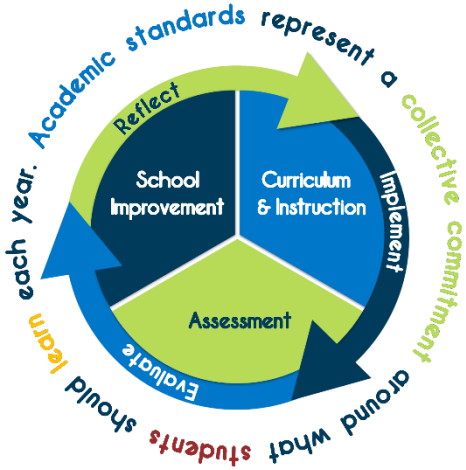
ILLINOIS STATE BOARD OF EDUCATION

MATHEMATICS HIGH SCHOOL STATISTICS & PROBABILITY

Samples to Success

Sample items provide valuable insight into how students engage with different texts, tasks, and contexts by highlighting the types of opportunities they need for success in the classroom. These items offer a shared reference point for understanding proficiency expectations, complementing the assessment's role in measuring learning. Analyzing items alongside performance data can enable educators can gain a deeper understanding of students' strengths and areas for growth. Students thrive in environments rich with diverse materials, challenges that vary in task type, and multiple avenues for demonstrating understanding. High-quality instruction, aligned with the learning goals, is the most effective way to support students' growth and prepare them for success.



The sample questions included in this rubric are a blend of those typical of the ACT and others that are suitable for classroom instruction, aimed at reinforcing and developing the skills assessed on the ACT. The statistics and probability content require students to describe center and spread of distributions; apply and analyze data collection methods; understand and model relationships in bivariate data; and calculate probabilities, including the related sample spaces. This document contains ACT items and includes excerpts from ACT alignment guides: © ACT Education Corp.

Statistics and Probability			
Below Proficient	**Approaching Proficient**	**Proficient**	**Above Proficient**
In how many different ways can 3 books be arranged on a shelf? A. 3 B. 6 C. 9 D. 12 E. 27	In how many different ways can a committee of 4 people be chosen from a group of 8? A. 32 B. 70 C. 72 D. 84 E. 196	How many different 4-digit numbers can be formed using the digits 0-9, if the digits cannot be repeated and the number cannot begin with a 0? A. 720 B. 3024 C. 4536 D. 5040 E. 10,000	In a window display at a flower shop, there are 3 spots for 1 plant each. To fill these 3 spots, Emily has 6 plants to select from, each a different type. Selecting from the 6 plants, Emily can make how many possible display arrangements with 1 plant in each spot? (Note: The position of the unselected plants does not matter.) A. 3 B. 6 C. 15 D. 120 E. 216

Statistics and Probability			
Below Proficient	**Approaching Proficient**	**Proficient**	**Above Proficient**
What is the difference between the mean and the median of the set $\{3, 8, 10, 15\}$? A. 0 B. 1 C. 4 D. 9 E. 12	Yvette has 6 pairs of leggings, 2 pairs of shoes, and 6 T-shirts, which all go together well. How many different groupings consisting of 1 of her 6 pairs of leggings, 1 of her 2 pairs of shoes, and 1 of her 6 T-shirts are available for Yvette to wear? A. 8 B. 12 C. 14 D. 24 E. 72	For a given set of data, the standard score, z, corresponding to the raw score, x, is given by $z = \frac{x-\mu}{\sigma}$, where μ is the mean of the set and σ is the standard deviation. If, for a set of score, $\mu = 78$ and $\sigma = 6$, which of the following is the raw score, x, corresponding to $z = 2$? A. 90 B. 84 C. 80 D. 76 E. 66	At the school carnival, Mike will play a game in which he will toss a penny, a nickel, and a dime at the same time. He will be awarded 3 points for each coin that lands with heads face up. Let the random variable x represent the total number of points awarded on any toss of the coins. What is the expected value of x? A. 1 B. $\frac{3}{2}$ C. $\frac{9}{2}$ D. 6 E. 9

Statistics and Probability

Below Proficient

The 35-member History Club is meeting to choose a student government representative. The members decide that the representative, who will be chosen at random, CANNOT be any of the 3 officers of the club. What is the probability that Hiroko, who is a member of the club but NOT an officer, will be chosen?

A. 0

B. $\frac{4}{35}$

C. $\frac{1}{35}$

D. $\frac{1}{3}$

E. $\frac{1}{32}$

Approaching Proficient

To make a 750-piece jigsaw puzzle more challenging, a puzzle company includes 5 extra pieces in the box along with the 750 pieces, and those 5 extra pieces do not fit anywhere in the puzzle. If you buy such a puzzle box, break the seal on the box, and immediately select 1 piece at random, what is the probability that it will be 1 of the extra pieces?

A. $\frac{1}{5}$

B. $\frac{1}{755}$

C. $\frac{1}{750}$

D. $\frac{5}{755}$

E. $\frac{5}{750}$

Proficient

As part of a probability experiment, Elliott is to answer 4 multiple-choice questions. For each question, there are 3 possible answers, only 1 of which is correct. If Elliott randomly and independently answers each question, what is the probability that he will answer the 4 questions correctly?

A. $\frac{27}{81}$

B. $\frac{12}{81}$

C. $\frac{4}{81}$

D. $\frac{3}{81}$

E. $\frac{1}{81}$

Above Proficient

A shirt will be randomly selected from a display of 23 shirts. The probability that the selected shirt will be long-sleeved is $\frac{13}{23}$. The probability that the selected shirt will be white is $\frac{8}{23}$. The probability that the selected shirt will be long-sleeved *and* white is $\frac{3}{23}$. What is the probability that the selected shirt will be long-sleeved *or* white *or* both?

A. $\frac{7}{23}$

B. $\frac{8}{23}$

C. $\frac{18}{23}$

D. $\frac{22}{23}$

E. $\frac{24}{23}$