LESSON MAKER PRO

Chance Check

Model random outcomes and judge what results mean.

HIGH SCHOOL · HSS-IC.A

CCSS.Math.Content.HSS-IC.A "Understand and evaluate random processes underlying statistical experiments"

NAME _____ DATE _____

PROBABILITY MODELS

A random process has outcomes that cannot be predicted one trial at a time, but its probabilities describe what to expect over many trials. When outcomes are equally likely, P(event) = favorable outcomes / total outcomes. An expected count equals probability x number of trials, but an actual count may differ because of chance.

WORKED EXAMPLE

A bag holds 13 identical chips. 4 are silver. One chip is chosen at random. What is P(silver)?

1. Count all equally likely chips: 13.
2. Count silver chips: 4.
3. Divide favorable outcomes by total outcomes: 4/13.

Answer: 4/13

PRACTICE 6 problems

1 A fair coin is flipped twice. What is P(exactly one head)?

ANSWER _____

2 A spinner has 8 equal sections. 3 are labeled A and 5 are labeled B. What is P(A)?

ANSWER _____

3 A random whole number is chosen from 1 through 12. What is P(the number is a multiple of 3)?

ANSWER _____

4 A bag contains 7 black marbles and 5 white marbles. One marble is chosen at random. What is P(not black)?

ANSWER _____

5 A game has three mutually exclusive outcomes. P(win) = 1/8 and P(draw) = 3/8. What must P(lose) be?

ANSWER _____

6 A random process has P(success) = 1/3. In 15 independent trials, what number of successes is expected?

ANSWER _____

APPLY IT Show your work

1 A music app has 21 songs in a study playlist, and 7 are from an artist you follow. The app chooses one song at random each time you press play, and each choice is independent. If you press play 18 times, how many songs by that artist should you expect?

WORK SPACE

ANSWER _____

2 A school esports club uses a randomizer that claims each of 5 map choices is equally likely. In 25 rounds, the Desert map appears 8 times. How many Desert maps does the model predict, and does getting 8 appearances by itself prove the randomizer is unfair?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A game's fair randomizer gives an even result with probability 1/2 on each use. It is used 16 times. What is the probability of getting exactly 10 even results? Based on that probability, is getting 10 even results enough to prove the randomizer is unfair? Explain.

WORK SPACE AND ANSWER

ANSWER KEY

Chance Check

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A fair coin is flipped twice. What is P(exactly one head)?	**1/2**
2	A spinner has 8 equal sections. 3 are labeled A and 5 are labeled B. What is P(A)?	**3/8**
3	A random whole number is chosen from 1 through 12. What is P(the number is a multiple of 3)?	**1/3**
4	A bag contains 7 black marbles and 5 white marbles. One marble is chosen at random. What is P(not black)?	**5/12**
5	A game has three mutually exclusive outcomes. P(win) = 1/8 and P(draw) = 3/8. What must P(lose) be?	**1/2**
6	A random process has P(success) = 1/3. In 15 independent trials, what number of successes is expected?	**5**

PART 2 · APPLY IT

1. **6 songs** The probability of a song by that artist is 7/21 = 1/3. Multiply 18 by 1/3 to get an expected 6 songs.
2. **The model predicts 5 Desert maps. No, 8 appearances alone does not prove the randomizer is unfair.** The expected number is 25 x 1/5 = 5. An actual result can differ from the expected count because of random variation.

CHALLENGE

1001/8192. No. There are C(16,10) = 8008 possible even-odd sequences with exactly 10 even results, so P(exactly 10 evens) = 8008/2^{16} = 1001/8192. This result can occur with a fair randomizer.

Accept equivalent fractions. For expected-count questions, accept correct calculations paired with language that the actual result may vary by chance; challenge explanations should state that one result cannot prove unfairness.