

EXERCISES

For more practice, see *Extra Practice*.

Practice and Problem Solving

A Practice by Example

Example 1 (page 40)

1. A class tossed coins and recorded 161 heads and 179 tails. What is the experimental probability of heads? Of tails?
2. Another class rolled number cubes. Their results are shown in the table. What is the experimental probability of rolling each number?

Number	1	2	3	4	5	6
Occurrences	42	44	45	44	47	46

Example 2 (page 40)

For Exercises 3–5, define a simulation by telling how you represent correct answers, incorrect answers, and the quiz. Use your simulation to find each experimental probability.

3. If you guess the answers at random, what is the probability of getting at least two correct answers on a five-question true-or-false quiz?
4. If you guess the answers at random, what is the probability of getting at least three correct answers on a five-question true-or-false quiz?
5. A five-question multiple-choice quiz has five choices for each answer. What is the probability of correctly guessing at random exactly one correct answer? Exactly two correct answers? Exactly three correct answers? (*Hint:* You could let any two digits represent correct answers, and the other digits represent wrong answers.)



Graphing Calculator Hint

To generate random numbers, press

MATH **◀** 1 **ENTER**

Example 3 (page 41)

A jar contains 30 red marbles, 50 blue marbles, and 20 white marbles. You pick one marble from the jar at random. Find each theoretical probability.

6. $P(\text{red})$
7. $P(\text{blue})$
8. $P(\text{not white})$
9. $P(\text{red or blue})$

A bag contains 36 red, 48 green, 22 yellow, and 19 purple blocks. You pick one block from the bag at random. Find each theoretical probability.

10. $P(\text{green})$
11. $P(\text{purple})$
12. $P(\text{not yellow})$
13. $P(\text{green or yellow})$
14. $P(\text{yellow or not green})$

Example 4 (page 41)

For each situation, find the sample space and the theoretical probability that a child will naturally place the left thumb on top.

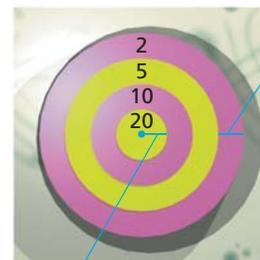
15. The father has gene pair gg and the mother has Gg .
16. The father has gene pair gg and the mother has GG .

Example 5 (page 42)



Geometry Suppose that a dart lands at random on the dartboard shown at the right. Find each theoretical probability.

17. The dart lands in the bull's-eye.
18. The dart lands in a green region.
19. The dart scores at least 10 points.
20. The dart scores less than 10 points.



Width of each ring = 1.5 in.

$r = 1.5$ in.

B Apply Your Skills

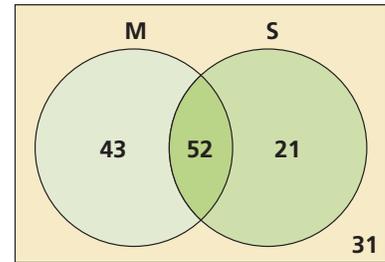
21. The common interpretation of Murphy's Law is, If something can go wrong, it will. Assume that Murphy's Law applies to the following situations, and estimate each probability as either 0 or 1.
- $P(\text{your dog chews up your homework after you've finished it})$
 - $P(\text{your teacher accepts your excuse for not having your homework})$

22. **Quality Control** Suppose the experimental probability is $\frac{1}{3}$ that a carton of eggs contains at least one broken egg. Use a simulation of 20 trials to find the experimental probability that three cartons selected at random contain only unbroken eggs. (*Hint:* Use any three digits to represent cartons with broken eggs and six other digits to represent cartons with unbroken eggs. Discard the tenth digit.)

23. Use the random number table at the left to simulate tossing a coin 50 times. Find the experimental probability that the outcome of a coin toss is heads.

Random Number Table		
31504	51648	40613
79321	80927	42404
15594	84675	68591
34178	00460	31754
49676	58733	00884
85400	72294	22551
22547	86066	93114
85211	07790	20890
21339	09414	51549
13843	18407	87043
34990	16214	46849
11390	01322	82656
45950	37521	77417

In a class of 147 students, 95 are taking math (M), 73 are taking science (S), and 52 are taking both math and science. One student is picked at random. Find each probability.



- $P(\text{taking math or science or both})$
- $P(\text{not taking math})$
- $P(\text{taking math but not science})$
- $P(\text{taking neither math nor science})$

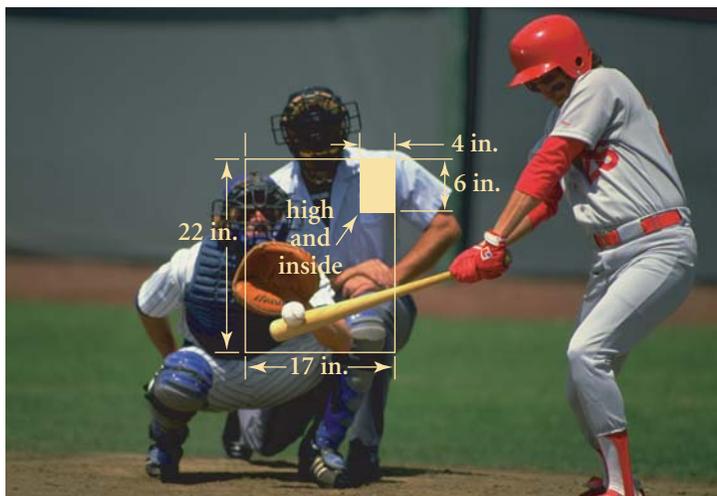
Suppose you roll a number cube. Find each theoretical probability.

- $P(5)$
- $P(\text{a number less than } 5)$
- $P(\text{a number greater than } 5)$
- $P(\text{an even number})$
- $P(8)$
- $P(\text{a number less than } 8)$

Suppose you select a number at random from the sample space $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$. Find each theoretical probability.

- $P(\text{the number is a multiple of } 3)$
- $P(\text{the number is prime})$
- Suppose you roll two number cubes.
 - What is the sample space?
 - How many outcomes are there?
 - What is the theoretical probability of getting a sum of 12?
 - What is the theoretical probability of getting a sum of 7?
- $P(\text{the number is less than } 5)$
- $P(\text{the number is even})$

39. **Sports** The batter's strike zone depends on the height and stance of the batter. Find the geometric probability that a baseball thrown at random within the batter's strike zone as shown in the figure below will be "high and inside." This is one of the harder pitches to hit!



40. **a. Sports** Team A has won one game and team B has won three games in a World Series. What is the experimental probability that team A wins the next game? That team B wins the next game?
b. Critical Thinking Do you think that experimental probability is a good predictor of the winner of the next game? Explain.
41. **Writing** Explain what you would need to know to determine the theoretical probability that a five-digit postal ZIP code ends in 1.
42. Suppose you choose a two-digit number at random. What is the theoretical probability that its square root is an integer?
43. The odds in favor of an event are the ratio of the number of favorable outcomes to the number of unfavorable outcomes.
a. If the odds in favor of an event are a to b or $\frac{a}{b}$, what is the probability of the event?
b. If the probability of an event is $\frac{a}{b}$, what are the odds in favor of the event?
c. Would you rather play a game where your odds of winning are $\frac{1}{2}$, or a game where your probability of winning is $\frac{1}{2}$? Explain.
44. **Open-Ended** Use a telephone book. Select 50 telephone numbers at random and record the first three digits (the "exchange") of each number. Summarize your results using probability statements.
45. On a TV game show, you want to win a prize that is hidden behind one of three doors. You choose one door, but before it is opened the host opens another door and shows that the prize is not there. Now you can switch to the other unopened door or stick with your original choice.
a. Find the experimental probability of winning the prize if you stick with your original choice. (*Hint:* Simulate the doors with index cards and the prize with a mark on one side of one card. One person can act as the host and another as the contestant.)
b. Find the experimental probability of winning if you switch to the other door.

C Challenge



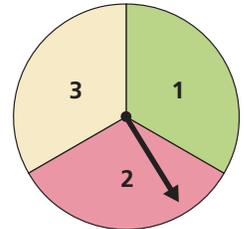
Standardized Test Prep

Multiple Choice

46. What is the theoretical probability of getting a 2 or a 3 when rolling a number cube?
 A. $\frac{1}{2}$ B. $\frac{1}{3}$ C. $\frac{1}{4}$ D. $\frac{1}{6}$
47. How many outcomes are in the sample space for rolling a number cube and tossing a coin?
 F. 2 G. 6 H. 12 I. 24

Short Response

48. What is the sample space for spinning the spinner at the right twice? Are all the outcomes equally likely?
49. What is the probability of spinning a 1 on both of two spins? Explain.



Extended Response

50. Which is more likely on two spins, an even sum or a sum that is not prime? Include all the steps of your solution.

Reading Comprehension

51. Read the passage below. Do you agree with the statement in the last sentence? Explain.

The chances of the chromosomes being defective are 1 in 250, which sounds like reasonable odds. Except that all odds are, in reality, 50-50: it may happen and it may not.



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Web Code: aga-0106

Mixed Review

Lesson 1-5

Solve each absolute value equation. Check your answers.

52. $|x + 3| = 9$

53. $|3x - 5| = 10$

54. $|2x + 7| + 3 = 22$

55. $|3x - 6| - 7 = 14$

56. $|2x + 3| - 9 = 14$

57. $|6 - 5x| = 18$

Lesson 1-5

Solve each absolute value inequality.

58. $2|x| - 3 \geq 5$

59. $|2x - 4| + 16 \leq 24$

60. $|3x - 5| - 2 > 0$

61. $|2x + 4| - 6 < 0$

62. $2|x + 3| \geq 10$

63. $6|x + 9| \leq 36$