ANSWERS

1. $\frac{11}{15}$
2. .35
3. It is possible if A and B are not independent.
4. $\frac{1}{2}$
5. Y is P(A and B)
   P(A and B) must be less than P(A or B)
6. .714
7. .196
8. .286
9. .65
10. .44
11. .286
12. $\frac{3}{8}$
13. $\frac{7}{8}$
14. $\frac{4}{8} = \frac{1}{2}$
15. $\frac{1}{2}$

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BASIC MATH

The Complete Course

Lesson Twenty Six

Probability

KA8426

Teaching Guide & Worksheet

HOW TO USE THE VIDEO AND TEACHING GUIDE

1. The "STOP TO THINK" signal means pause to think.
2. The "STOP TO WORK" signal means work the problem(s).
3. Rewind the tape and watch the lesson again if the concept is not clear.
4. Use “Learning Strategies” section of the Teachers Guide as memory aids and topics for classroom discussion.
5. Students should complete the exercises on the worksheet to confirm their understanding of this lesson.

LEARNING STRATEGIES

WHAT IS PROBABILITY?

A. It is a measure of uncertainty or chance
B. An event that is certain to happen has a probability of 1
C. An event that is certain not to happen has a probability of 0
D. An event that is uncertain has a probability between zero and one; the probability is a proper fraction
E. The probability of event A is the number of ways to get A divided by the total number of possible outcomes

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THEORETICAL VERSUS EXPERIMENTAL PROBABILITY: FLIPPING A COIN

A. If you assume the coin to be fair
   1. The probability of flipping a head is 1/2
   2. This is a theoretical probability
   3. If you actually flip the coin 1000 times and get close to 500 heads, you can say that the coin is fair; this is experimental probability
   4. The relative frequency (total heads/total flips) is an estimate of the actual probability

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USES OF PROBABILITY

A. The weather report's chance of rain is a probability
B. Probability is the basis for insurance
   1. What can a teenage male do to lower his automobile insurance cost? Why do insurance companies reward these characteristics?
   2. What factors determine the cost of life insurance?
   3. What factors determine the cost of homeowner's or renter's insurance?
C. Probability is used to measure risk
   1. Selecting an investment
   2. Concern about lightning
3. Starting a business
4. Evaluating the lottery

POLLS

A. The proportion of a sample which responds to a question in a certain manner is an estimate of the probability of that response in the population
B. Polls are used to predict election results
   1. The 1936 Literary Digest poll predicted a Landon landslide
   2. The 1948 polls indicated that Dewey would be president
   3. The 1980 election was "too close to call"
C. Television ratings are really polls
D. Polls are used to assess public attitudes
E. Companies use marketing surveys to evaluate products and services

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PROBABILITY RULES

A. P (A or B)
   1. Use a standard deck of playing cards to provide data
   2. P (face card) = 12/52
   3. P (3) = 4/52
   4. P (face card or 3) = 16/52
   5. P (heart) = 13/52
   6. Does it follow that P (face card or heart) = 25/52?
   7. We have counted the king, queen, and jack of hearts twice, and this must be corrected
   8. P (face card or heart) = 12/52 + 13/52 - 3/52 = 22/52
   9. The rule for "or" is P (A or B) = P (A) + P (B) - P (A&B)
B. Events A and B are disjoint or mutually exclusive if the P (A&B) is zero
C. P (A&B)
   1. A visual definition of independent events: the probability of one event happening is not influenced by the occurrence of the second event
   2. P (A&B) = P (A) x P (B) if A and B are independent
D. The complement of an event
   1. The complement of "it is raining" is "it is NOT raining"
   2. P (not A) = 1 - P (A)
E. The "left turn at the stop sign" problem
   1. Uses the rule for the complement
   2. Uses the rule for P (A or B)
   3. Uses the rule for P (A&B)

WORKSHEET STRATEGIES

1. A basket contains a number of pieces of candy. Five of the pieces are red, three are green, four are yellow, and three are orange. Without looking, you pick up a piece of candy. What is the probability it is not yellow?

2. P (A) = .6 P (B) =1/2
   P (A or B) = $\frac{3}{4}$

   What is P (A and B)?

3. P (A) = .5 P (B) = .32
   P (A and B) = .5

   Is this possible? Why or why not?

4. A twelve-sided die has a number, 1 through 12, one on each face. What is the probability of rolling the die and the number on the face that is facing up is a factor of twelve?

5. X = .7 Y = .48

One of these is the P (A or B), the other is P (A and B). Which one, X or Y, is the P (A and B)? Why?

P (M) = .35 P(G) = .56
M and G are independent

6. Find P (M or G)

7. Find P (M and G)

8. Find P [not (M or G)]

9. Find P (not M)

10. Find P (not G)

11. What is the product of P (not M) and P (not G)?

If I flip three coins I can have one of the following results HHH, HHT, HTH, THH, HTT, THT, TTH, TTT. If I flip three coins what is the probability of:

12. Exactly one head

13. At least one head

14. At most one head

15. An odd number of tails