

Student _____
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Time: _____

Instructor: _____

Assignment _____

Course: MAT1301-14A-2B16-S1
Book: Pirnot: Mathematics All Around,
5e

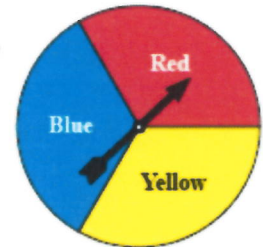
1. Write the event as a set of outcomes. If the event is large, you may describe the event without writing it out.

In an experiment, he flipped two coins and obtained less (h)eads than (t)ails.

Choose the correct answer below.

- ☐ A. tt
☐ B. hh
☐ C. hh, ht, th, tt
☐ D. ht, th

2. Write the event, "Red appears exactly once when we spin the given spinner two times" as a set of outcomes. Abbreviate "red" as "r," "blue" as "b," and "yellow" as "y."



Of the following sets, which represents the event "Red appears exactly once when we spin the given spinner two times"?

- ☐ A. {rb,ry,br,yr}
☐ B. {rr,rb,ry,br,bb,by,yr,yb,yy}
☐ C. {rr,rb,ry,br,yr}
☐ D. {bb,by,yb,yy}

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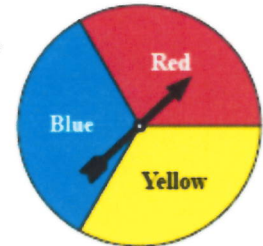
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3. Write the event, "Red appears at least once when we spin the given spinner two times" as a set of outcomes. Abbreviate "red" as "r," "blue" as "b," and "yellow" as "y."



Of the following sets, which represents the event "Red appears at least once when we spin the given spinner two times"?

- ☐ A. {bb,by,yb,yy}
- ☐ B. {rr,rb,ry,br,bb,by,yr,yb,yy}
- ☐ C. {rr,rb,ry,br,yr}
- ☐ D. {rb,ry,br,yr}

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4. A game has two four-sided dice having the numbers 9, 6, 7, and 8 on their faces. Outcomes in the sample space are pairs such as (9,6) and (8,8).

- How many elements are in the sample space?
- Express the event "the total showing is even" as a set.
- What is the probability that the total showing is even?
- What is the probability that the total showing is greater than 7?

Identify the problem solving method that should be used. Choose the correct answer below.

- ☐ A. The Analogies Principle
- ☐ B. The Be Systematic Principle
- ☐ C. The Choose Good Names for Unknown Strategies Principle
- ☐ D. The Draw Pictures Principle

- a. How many elements are in the sample space?

- b. Express the event "the total showing is even" as a set.

(Type an ordered pair. Use a comma to separate answers as needed.)

- c. What is the probability that the total showing is even?

(Type an integer or a simplified fraction).

- d. What is the probability that the total showing is greater than 7?

(Type an integer or a simplified fraction).

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5. We are flipping three coins. Outcomes in the sample space are represented by strings of Hs and Ts such as TTH and HHT.
- How many elements are in this sample space?
 - Express the event "there are more tails than heads" as a set.
 - What is the probability that there are more tails than heads?
 - What is the probability that there are an equal number of tails and heads?
-
- There are elements in this sample space.
 - Express the event "there are more tails than heads" as a set. Choose the correct answer below.
 - ☐ A. {THT, HTH, HTT, THH}
 - ☐ B. {TTH, HHT, THT, HTT}
 - ☐ C. {TTH, THT, HTT}
 - ☐ D. {TTT, TTH, THT, HTT}
 - The probability that there are more tails than heads is . (Simplify your answer.)
 - The probability that there are an equal number of tails and heads is . (Simplify your answer.)
-
6. A pair of fair dice is rolled.
- What is the probability of rolling a sum of 6?
 - What are the odds against rolling a sum of 6?
-
- The probability of rolling a sum of 6 is . (Simplify your answer.)
 - What are the odds against rolling a sum of 6?
 - ☐ A. 5 to 31
 - ☐ B. 186 to 5
 - ☐ C. 31 to 36
 - ☐ D. 31 to 5

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7. One card is selected randomly from a standard 52-card deck.

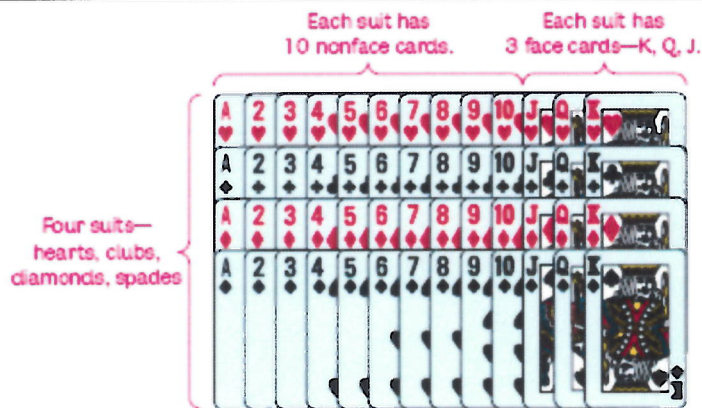
- a. What is the probability of drawing a heart?
- b. What are the odds against drawing a heart?

 Click the icon to view a diagram of a standard 52-card deck.

- a. The probability of drawing a heart is . (Simplify your answer.)
- b. What are the odds against drawing a heart?

- ☐ A. 3 to 1
- ☐ B. 1 to 4
- ☐ C. 1 to 13
- ☐ D. 1 to 3

Standard 52-card deck



8. Suppose that 4 cards are drawn from a well-shuffled deck of 52 cards. What is the probability that all 4 are red?

The probability is . (Type an integer or a fraction.)

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9. Suppose that 8 cards are drawn from a well-shuffled deck of 52 cards. What is the probability that all 8 are black?

The probability is . (Type an integer or a fraction.)

10. The following table lists some of the empirical results that were obtained in experiments in cross-breeding plants. Assume that genetically pure tall plants were cross-bred with genetically pure short plants. Use this information to assign the probability that a second-generation plant will be short. How consistent is this with the theoretical results expected from cross-breeding?

Characteristics That Were Crossbred	First-Generation Plants	Second-Generation Plants
Tall vs. short	All Tall	666 tall 216 short
Smooth seeds vs. wrinkled seeds	All smooth seeds	5,877 smooth 1,918 wrinkled

The probability that a second-generation plant will be short is .
(Round to the nearest hundredth as needed.)

How consistent is this with the theoretical results expected from cross-breeding?

The probability that a second-generation plant will be short is consistent with the

theoretical results expected because the probability is the expected

probability of one fourth.

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11. One parent who is normal and one parent who has sickle-cell anemia have a child. Construct a Punnett square and find the probability that the child is a carrier of sickle-cell anemia. A person with two sickle-cell genes will have the disease, a person with only one sickle-cell gene will be a carrier of the disease, and a person with no sickle-cell genes will be normal. Denote the sickle-cell gene by s and the normal gene by n . Use lowercase letters to indicate that neither s nor n is dominant.

Complete the Punnett square below.

		Second Parent	
		s	s
First Parent	n	ss nn ns has the disease carrier normal	ss ns nn carrier has the disease normal
	n	ns ss nn has the disease normal carrier	ns nn ss has the disease normal carrier

The probability that the child is a carrier of sickle-cell anemia is .
(Simplify your answer.)

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12.

In cross-breeding certain plants, a scientist found that flower color does not dominate as happens with peas. For example, a plant with one green gene (g) and one yellow gene (y) will have lime flowers (gy).

- Construct a Punnett square showing the results of crossing a lime plant with a purebred green plant of the same species.
- What is the probability of getting green flowers in the first-generation plants? What is the probability of getting yellow? Of getting lime?

a. Choose the correct answer below.

☐ A.

		Parent 2	
		g	y
Parent 1	g	gg	gy
	y	yg	yy

☐ B.

		Parent 2	
		g	g
Parent 1	g	gg	gg
	g	gg	gg

☐ C.

		Parent 2	
		g	g
Parent 1	g	gg	gg
	y	yg	yg

- In the first-generation plants, the probability of getting green flowers is , the probability of getting yellow flowers is , and the probability of getting lime flowers is .

(Simplify your answers.)

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13.

Cystic fibrosis is a serious inherited lung disorder that often causes death in victims during early childhood. Because the gene for this disease is recessive, two apparently healthy adults, called carriers, can have a child with the disease. We will denote the normal gene by N and the cystic fibrosis gene by c to indicate its recessive nature.

a. Construct a Punnett square to describe the genetic possibilities for a child whose two parents are carriers of cystic fibrosis.

b. What is the probability that this child will be a carrier of cystic fibrosis?

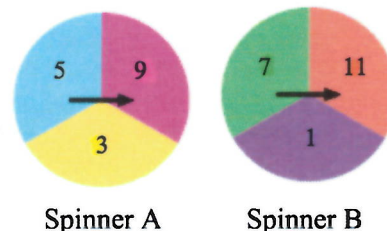
a. Complete the Punnett square below.

		Second Parent	
		c	N
First Parent	c	NN cN cc carrier normal has disease	NN cc cN carrier has disease normal
	N	Nc cc NN carrier normal has disease	cc cN NN has disease normal carrier

b. The probability that the child will be a carrier of cystic fibrosis is .
(Simplify your answer.)

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14. Suppose that player 1 and player 2 are playing a game using spinner A and spinner B, as shown to the right. Player 1 can pick either spinner A or B and player 2 uses the other spinner. Both players spin their spinner and whoever spins the higher number wins the game. (If a spinner lands on a boundary, that spinner is spun again.) Which spinner should player 1 choose and what is the probability that player 1 will win?



Select the correct choice below and fill in the answer box to complete your choice.

- ☐ A. Spinner A should be chosen with a probability of .
(Type an integer or a simplified fraction.)
- ☐ B. Spinner B should be chosen with a probability of .
(Type an integer or a simplified fraction.)

15. In horse racing, a trifecta is a race in which you must pick the first-, second-, and third-place winners in their proper order to win a payoff. If eight horses are racing, and you randomly select three as your bet in the trifecta, what is the probability that you will win? (Assume that all horses have the same chance to win.)

What is the probability that you will win?

16. If the odds against event E are 7 to 13, what is the probability of E?

The probability of event E is .
(Simplify your answer.)

17. If $P(E) = 0.28$, what are the odds against E?

The odds against E are : .
(Simplify your answers.)

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18. If the odds against a particular soccer team winning a soccer tournament are 6 to 5, what is the probability that they will win the tournament?

Identify the problem solving method that should be used. Choose the correct answer below.

- ☐ A. The Be Systematic Principle
- ☐ B. The Draw Pictures Principle
- ☐ C. The Analogies Principle
- ☐ D. The Choose Good Names for Unknown Strategies Principle

The probability that the soccer team will win the tournament is .
(Simplify your answer.)

19. Suppose the probability that a certain team will win a certain competition is 0.60.

- a. What are the odds in favor of the team winning?
- b. What are the odds against the team winning?
- a. What are the odds in favor of the team winning?

- ☐ A. 0.40
- ☐ B. 2 to 3
- ☐ C. 3 to 2
- ☐ D. 0.60

- b. What are the odds against the team winning?

- ☐ A. 3 to 2
- ☐ B. 0.40
- ☐ C. 2 to 3
- ☐ D. 0.60

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20. If the probability of surviving a head-on car accident at 55 mph is 0.004, then what is the probability of not surviving? The probability of not surviving is .
(Simplify your answer. Type an integer or a decimal.)
21. A hamburger franchise is giving away a batch of scratch-and-win tickets with the chance to win an order of french fries. There is a 1 in 8 chance that you win an order of french fries.
What is the probability that you do not win an order of french fries?
The probability you will not win an order of french fries is .
(Type an integer or simplified fraction.)
22. A pair of dice is rolled. What is the probability of getting a sum less than 11?
What is the probability of getting a sum less than 11?
(Type an integer or simplified fraction.)
23. If eleven coins are flipped, what is the probability of obtaining at least one tail?
 $P(\text{obtaining at least one tail}) =$. (Type an integer or a simplified fraction.)
24. What is the probability of getting either a diamond or a king when drawing a single card from a deck of 52 cards?
What is the probability that the card is either a diamond or a king?
(Simplify your answer. Type a fraction.)
25. Assume that A and B are events. If $P(A \cup B) = 0.6$, $P(A) = 0.4$, and $P(B) = 0.45$, find $P(A \cap B)$.
 $P(A \cap B) =$
(Simplify your answer. Type an integer or a decimal.)
26. If $P(A \cup B) = 0.7$, $P(A) = 0.5$, and $P(A \cap B) = 0.15$, find $P(B)$. Assume that A and B are events.
 $P(B) =$
(Simplify your answer. Type an integer or a decimal.)

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27. Use the table to the right, which shows the age distribution of those who earned less than minimum wage in a recent year. If a worker is randomly selected from those surveyed, what is the probability that the person is younger than 65?

Age	Working Below Minimum Wage (thousands)
16-19	333
20-24	418
25-34	314
35-44	177
45-54	138
55-64	46
65 and older	35

The probability that the person is younger than 65 is .
 (Type a decimal rounded to three decimal places as needed.)

28. The table below relates the amount of time consumers spend shopping on the Internet per month with their annual income. What is the probability that a randomly selected consumer either spends 10 + hours per month shopping on the Internet or has an annual income above \$60,000?

Annual Income	10 + Hours	3-9 Hours	0-2 Hours	Totals
Above \$60,000	197	181	134	512
\$40,000 - \$60,000	172	199	145	516
Below \$40,000	134	197	291	622
Totals	503	577	570	1,650

The probability that a consumer either has an annual income above \$60,000 or spends 10 + hours per month shopping on the Internet is .
 (Type a decimal rounded to two decimal places.)

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29. An employee at an electronics store earns both a salary and a monthly commission as a sales representative. The following table lists her estimates of the probabilities of earning various commissions next month. What is the probability that the sales representative will earn at least \$1,000?

Commission	Probability
Less than \$1,000	0.05
\$1,000–\$1,249	0.11
\$1,250–\$1,499	0.23
\$1,500–\$1,749	0.34
\$1,750–\$1,999	0.12
\$2,000–\$2,249	0.03
\$2,250–\$2,499	0.09
\$2,500 or more	0.03

$P(\text{sales representative will earn at least \$1,000 in commissions}) = \square$
(Type an integer or decimal rounded to two decimal places as needed.)

30. If a card is drawn from a standard 52-card deck, what is the probability that the card is neither a spade nor a jack? (Hint: Draw a picture of this situation before trying to calculate the probability.)

Identify the problem solving method that should be used. Choose the correct answer below.

- ☐ A. The Three-Way Principle
☐ B. The Order Principle
☐ C. The Be Systematic Principle
☐ D. The Choose Good Names for Unknown Strategies Principle

$P(\text{the card is neither a spade nor a jack}) = \square$
(Type an integer or a simplified fraction.)

31. A college administration has conducted a study of 206 randomly selected students to determine the relationship between satisfaction with academic advisement and academic success. They obtained the following information: Of the 72 students on academic probation, 42 are not satisfied with advisement; however, only 25 of the students not on academic probation are dissatisfied with advisement. What is the probability that a student selected at random is on academic probation and is not satisfied with advisement?

The probability is $\square$. (Round to two decimal places as needed.)

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32. A manufacturer has shipped 46 cameras to an electronics store, of which 2 are defective. If the electronics store sold 19 cameras before discovering that some were defective, what is the probability that at least one defective camera was sold? (Hint: $\frac{C(44,19)}{C(46,19)}$ is the probability that no defective cameras were sold.)

The probability that at least one defective camera was sold is .

(Type an integer or decimal rounded to three decimal places as needed.)

33. A sushi restaurant has prepared 34 portions of seafood, four of which had been left out too long and spoiled. If 20 of the 34 portions are served randomly to customers, what is the probability that at least one customer will receive spoiled food? (Hint: Consider the complement of this event.)

The probability that at least one customer will receive spoiled food is .

(Type a decimal rounded to three decimal places as needed.)

34. Assume that two fair dice are rolled. First compute $P(F)$ and then $P(F|E)$. Explain why one would expect the probability of F to change as it did when we added the condition that E had occurred.

F : the total is eleven

E : an odd total shows on the dice

Compute $P(F)$.

$P(F) =$ (Simplify your answer.)

Compute $P(F|E)$.

$P(F|E) =$ (Simplify your answer.)

Why does the probability of F change?

- ☐ A. The event E doubles the number of the possible outcomes, increasing the probability.
- ☐ B. The event E doubles the number of the possible outcomes, decreasing the probability.
- ☐ C. The event E halves the number of the possible outcomes, decreasing the probability.
- ☐ D. The event E halves the number of the possible outcomes, increasing the probability.

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35. We are drawing a single card from a standard 52-card deck. Find the following probability.

$P(\text{five} \mid \text{nonface card})$

The probability is . (Type an integer or a simplified fraction.)

36. We are drawing a single card from a standard 52-card deck. Find the following probability.

$P(\text{two} \mid \text{nonface card})$

The probability is . (Type an integer or a simplified fraction.)

37. Assume that 2 cards are drawn from a standard 52-card deck. Find the following probabilities.

a) Assume the cards are drawn without replacement. Find the probability of drawing 2 face cards.

b) Assume the cards are drawn with replacement. Find the probability of drawing 2 face cards.

a. The probability of drawing 2 face cards without replacement is .
(Simplify your answer.)

b. The probability of drawing 2 face cards with replacement is .
(Simplify your answer.)

38. Assume that 2 cards are drawn from a standard 52-card deck. Find the following probabilities.

a) Assume the cards are drawn without replacement. Find the probability of drawing a non-heart followed by a non-heart.

b) Assume the cards are drawn with replacement. Find the probability of drawing a non-heart followed by a non-heart.

a. The probability of drawing a non-heart followed by a non-heart without replacement is .
(Simplify your answer.)

b. The probability of drawing a non-heart followed by a non-heart with replacement is .
(Simplify your answer.)

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39. Assume that 2 cards are drawn from a standard 52-card deck. Find the following probabilities.
- a) Assume the cards are drawn without replacement. Find the probability of drawing a king and a jack.
- b) Assume the cards are drawn with replacement. Find the probability of drawing a king and a jack.

a. The probability of drawing a king and a jack, without replacement, is .
(Simplify your answer.)

b. The probability of drawing a king and a jack, with replacement, is .
(Simplify your answer.)

40. We are drawing two cards without replacement from a standard 52-card deck. Find the probability that we draw at least one king.

The probability is . (Type an integer or a simplified fraction.)

41. A container contains 40 green tokens, 5 blue tokens, and 3 red tokens. Two tokens are randomly selected without replacement. Compute $P(F|E)$.

E – you select a green token first

F – the second token is non – green

$$P(F|E) = \text{}$$

(Simplify your answer. Type an integer or a fraction.)

42. Two cards are drawn without replacement from an ordinary deck, find the probability that the second is a red card, given that the first is a red card.

What is the conditional probability?

(Type an integer or a simplified fraction.)

43. A pair of dice is rolled ten times. Find the probability of rolling an odd total exactly once.

The probability that an odd total is rolled exactly once is .
(Round to three decimal places as needed.)

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44. We roll a pair of dice four times. Find the probability that a total of seven is rolled each time.

The probability that a total of seven is rolled each time is .

(Simplify your answer. Type an integer or a fraction.)

45. Find the probability, $P(R|M)$, associated with the tree diagram.

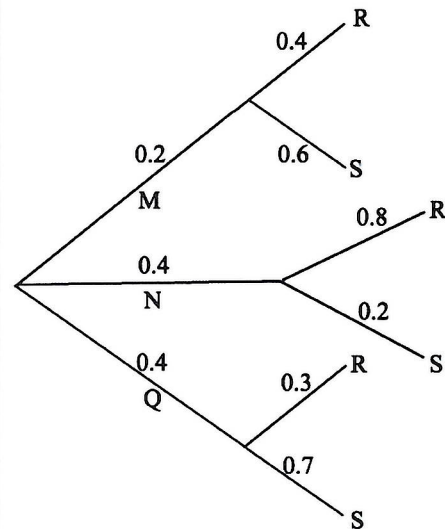
What problem solving method should be used?

- ☐ A. Relate a New Problem to an Older One
- ☐ B. The Three-Way Principle
- ☐ C. Be systematic
- ☐ D. Draw pictures

What is $P(R|M)$?

$P(R|M) =$

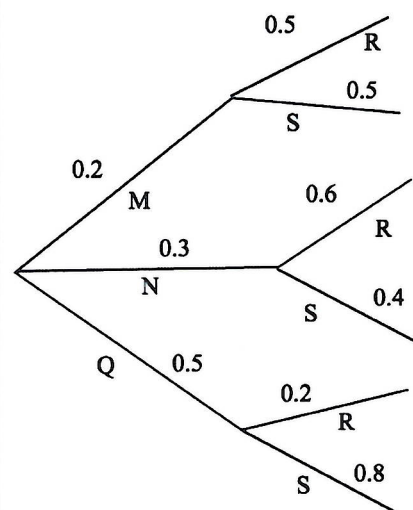
(Type an integer or decimal rounded to one decimal place as needed.)



46. Find the probability, $P(M \cap R)$, associated with the tree diagram.

What is $P(M \cap R)$?

(Round to the nearest hundredth.)



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47. An experiment and two events are given. Determine if the events are independent or dependent.

Experiment: A penny and a nickel are flipped.

Event A: Heads on the nickel.

Event B: Tails on the penny.

The two events A and B are independent.
 dependent.

48.

Major	\$20,000 & below	\$20,001-\$25,000	\$25,001-\$30,000	\$30,001-\$35,000	Above \$35,000	Totals (%)
Liberal arts	6	10	9	1	1	27
Science	2	4	10	2	2	20
Social sciences	3	6	7	1	1	18
Health fields	1	1	8	3	1	14
Technology	0	2	7	8	4	21
Totals (%)	12	23	41	15	9	100

The table shown relates starting salaries of college graduates and their majors. The numbers in the table are percentages.

Find $P(F|E)$.

E – a person majored in science

F – a person received a starting salary between \$20,001 and \$25,000

$P(F|E) =$ (Round to the nearest hundredth as needed.)

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49. The graph given below summarizes statistics regarding distracted drivers below the age of 40 who were involved in fatal crashes. Assume that we are selecting a driver at random from the 2,677 tallied. If the accident was related to cell phone use, what is the probability that the driver was over 29?



Click the icon to view the fatal crash statistics regarding distracted drivers.

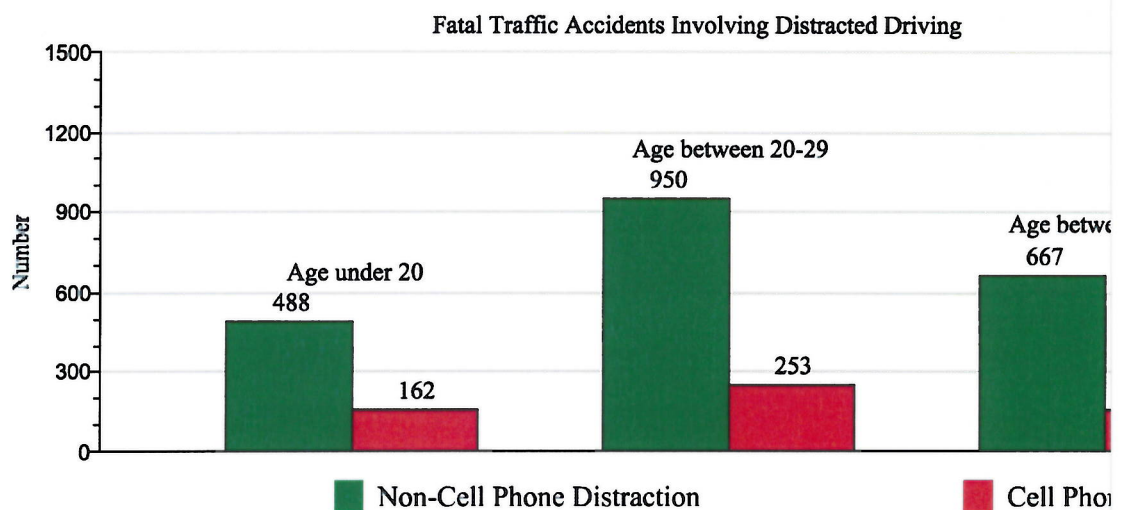
What problem solving method should be used?

- ☐ A. Relate a New Problem to an Older One
☐ B. Draw pictures
☐ C. Be systematic
☐ D. The Three-Way Principle

The probability is .

(Round to three decimal places as needed.)

Fatal Traffic Accidents Involving Distracted Driving



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50. Imagine a subject is taking part in a study to test a new cold medicine. The probability that the subject is taking drug A is 20%, that it is drug B is 40%, and that it is drug C is 40%. From past clinical trials, the probabilities that these drugs will improve his condition are A (20%), B (40%), and C (70%). What is the probability that he will improve?

The probability is .

(Type an integer or decimal)