

Name: Key

Date: _____

Review for Probability Test 7b

Lesson 10-6 Probability of Simple Events (pp. 470-474)

Mike rolls a ten-sided solid whose identical faces are numbered with the first ten square numbers. Find each probability. Then describe the likelihood of the event as *impossible, unlikely, equally likely, likely, or certain*. $1^2, 2^2, 3^2, 4^2, 5^2, 6^2, 7^2, 8^2, 9^2, 10^2$

18. $P(\text{ones digit is 2}) = \frac{0}{10}$ impossible
19. $P(\text{two-digit number}) = \frac{6}{10}$ likely
20. $P(\text{multiple of 8}) = \frac{2}{10} = \frac{1}{5}$ unlikely
21. $P(\text{ones digit not 3}) = \frac{10}{10} = 1$ certain
22. $P(\text{odd}) = \frac{5}{10} = \frac{1}{2}$ equally likely

Example 6

Pia rolls a seven-sided solid whose identical faces are numbered 4 through 10. Find $P(\text{odd})$. Then describe the likelihood of the event as *impossible, unlikely, equally likely, likely, or certain*.

sample space: {4, 5, 6, 7, 8, 9, 10}

favorable outcomes: odd numbers, 5, 7, and 9

$$P(\text{odd}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} = \frac{3}{7}$$

The probability is about 43%. This is less than 50%, so the event is unlikely.

22.5 What is the complement of $P(\text{multiple of 8})$ from #20 above?

$$\frac{8}{10} = \frac{4}{5}$$

Lesson 10-7 Theoretical and Experimental Probability (pp. 477-481)

In a survey of randomly selected students, students chose their preference from among three meal options for a school event.

Meal	Pizza	Burgers	Vegetarian
Frequency	47	31	22

23. What was the experimental probability that a student chose burgers? $\frac{31}{100}$
24. What was the experimental probability that a student chose the vegetarian option? $\frac{22}{100}$
25. Out of a similar group of 450 students, predict how many would choose the vegetarian option.

$$\frac{22}{100} = \frac{x}{450}$$

$$\frac{100x}{100} = \frac{9900}{100}$$

$$x = 99 \text{ students}$$

* always use a proportion!

Example 7

A spinner has five equal-sized sections. Two are red, one is green, one is blue, and one is orange. Lee spins the spinner 60 times. Find the theoretical and experimental probability of red.

Result	Red	Green	Blue	Orange
Frequency	22	15	11	12

$$\text{theoretical: } P(\text{red}) = \frac{\text{favorable outcomes}}{\text{possible outcomes}} = \frac{2}{5} \text{ or } 40\%$$

$$\text{experimental: } P(\text{red}) = \frac{\text{red results}}{\text{all results}} = \frac{22}{60} = \frac{11}{30} \text{ or } 36.6\%$$

do each event separately,
then multiply them!

Lesson 10-8 Probability of Compound Events (pp. 482-486)

A penny is tossed and a number cube is rolled.

Find each probability.

26. $P(\text{heads and 4}) = \frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$

27. $P(\text{tails and 1}) = \frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$

28. $P(\text{tails and odd number}) = \frac{1}{2} \cdot \frac{3}{6} = \frac{3}{12} = \frac{1}{4}$

29. $P(\text{heads and a number greater than 2}) = \frac{1}{2} \cdot \frac{4}{6} = \frac{4}{12} = \frac{1}{3}$ $P(3, 6) = P(\text{drawing a 3}) \cdot P(\text{rolling a 6})$

30. $P(\text{tails and a number less than or equal to 5}) = \frac{1}{2} \cdot \frac{5}{6} = \frac{5}{12}$

Example 8

A card is drawn from a deck of eight cards numbered from 1 to 8 and a number cube is rolled. Find the probability of drawing a 3 and then rolling a 6.

Use the Fundamental Counting Principle to find the number of possible outcomes.

number of possible outcomes	for drawing a card	for rolling a number cube	total number of possible outcomes
8	\times	6	$=$ 48

There are 48 outcomes.

Find the probability. There is one way draw a 3 and roll a 6. So, the probability is $\frac{1}{48}$ or 2%.

**** Remember: Compound Events: find the probability of each event and multiply!**

More Practice:

1. Leanne collects data throughout the basketball season and uses these data to determine the probabilities of different teams playing in the league championship game. The probabilities for her four favorite teams playing in the championship game are shown below.

- Tigers: $P = \frac{2}{3} = 66.7\%$
- Redbirds: $P = \frac{4}{5} = 80\%$
- Bulldogs: $P = \frac{3}{8} = 37.5\%$
- Titans: $P = \frac{1}{2} = 50\%$

Which of these teams is least likely to play in the championship game?

- A Tigers
- B Redbirds
- C Bulldogs
- D Titans

2. A passenger train has tickets available for 12 window seats and 8 aisle seats. The next person to buy a ticket will be randomly assigned to one of those seats. What is the probability that the next person will be assigned to an aisle seat?

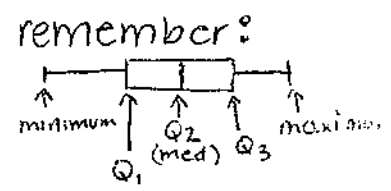
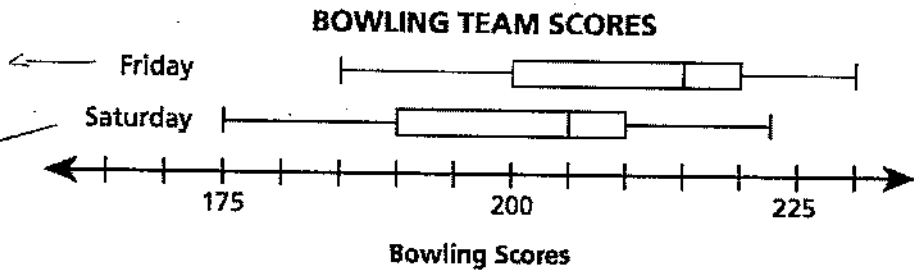
- A $\frac{1}{8}$
- B $\frac{2}{5}$
- C $\frac{1}{2}$
- D $\frac{2}{3}$

$$\frac{\text{aisle seats}}{\text{total seats}} = \frac{8}{20} = \frac{2}{5}$$

3. A bowling team participates in a two-day tournament and records the scores for each team member on both days. The scores for both days are represented by the box plots below.

IQR:
220-200
= 20

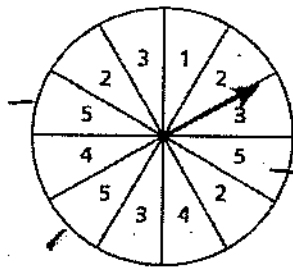
IQR:
210-190
= 20



$IQR = Q_3 - Q_1$

Which conclusion can be drawn from the box plots?

- A The scores on Friday and the scores on Saturday have the ^{NO} same median and interquartile range.
- B The scores on Friday have a greater median and a greater interquartile range than the scores on Saturday.
- C The scores on Friday have a greater interquartile range than the scores on Saturday, but both data sets have the same median.
- D The scores on Friday have a greater median than the scores on Saturday, but both data sets have the same interquartile range.
4. A seventh grade English Language Arts teacher wants to order books for all the seventh grade classes. He wants to determine the favorite type of book among the seventh grade students. Which sample would be the most appropriate for this survey?
- A 7 girls in each of his classes
- B every fifth student in the seventh grade → systematic sampling of the grade
- C 1 out of 7 students in his middle school
- D all of the boys in one of his seventh grade classes
5. A board game has a spinner divided into sections of equal size. Each section is labeled with a number between 1 and 5.



Which number is a reasonable estimate of the number of times the spinner will land on a section labeled 5 over the course of 150 spins?

- A 15
- B 25
- C 40
- D 60

(# of 5's)

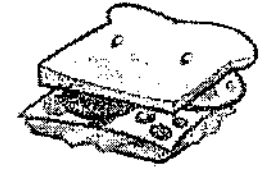
$$\frac{3}{12} = \frac{x}{150}$$

$$\frac{12}{12} x = \frac{1450}{12}$$

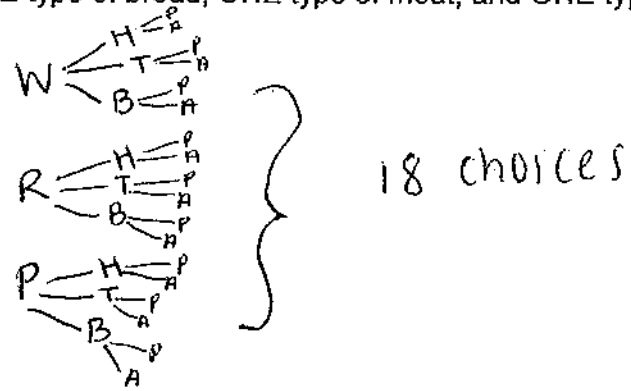
$x = 37.5$ close to 40

6. A neighborhood deli sells sandwiches that can be made with the ingredients listed on the board below.

Bread	Meat	Cheese
White	Ham	Provolone
Rye	Turkey	American
Pumpernickel	Bologna	



a. Draw a tree diagram to show all of the possible bread, meat, and cheese possibilities if a sandwich only has ONE type of bread, ONE type of meat, and ONE type of cheese.



b. $P(\text{ham, American}) = \frac{3}{18} = \frac{1}{6}$

c. Probability of ordering a sandwich with white bread, turkey and provolone cheese?
 $\frac{1}{18}$

Determine if the following events are **independent** or **dependent**. Then find the **probability**.

7. All of the letters that spell MISSISSIPPI are put into a bag.

What is the probability of selecting a vowel, and then after replacing the letter, also drawing an S?

Dependent or Independent?

Probability: $\frac{4}{11} \cdot \frac{4}{11} = \frac{16}{121}$

8. Using a standard deck of cards, what is the probability of selecting a red card, without replacement, and then selecting a heart card?

**BAD Question → assume you picked a red heart on first pick*

Dependent or Independent?

Probability: $\frac{26}{52} \cdot \frac{12}{51} = \frac{156}{2652}$

9. If you roll a die three times, what is the probability of rolling only even numbers?

Dependent or Independent?

Probability: $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$

10. There are 4 black marbles and 2 white marbles in a bag. What is the probability of choosing a black marble, not replacing it, then choosing a white marble?

Dependent or Independent?

Probability: $\frac{4}{6} \cdot \frac{2}{5} = \frac{8}{30} = \boxed{\frac{4}{15}}$

11. How many possible outcomes are there for a locker combination that has a 3 number code?

10 = # of digits to choose from

$\underline{10} \cdot \underline{10} \cdot \underline{10} = 1000$ outcomes

OR $10 P_3 = 1000$

12. How many possible outcomes are there for a combination that involves the one letter followed by two numbers?

$\underline{26} \cdot \underline{10} \cdot \underline{10} = 2600$ outcomes

13. a) How many possible outfit options are there if you are choosing between a red, blue and gray shirt, jeans or shorts, and sneakers or flip flops?

$3 \cdot 2 \cdot 2 = 12$ outfit options

b) What is the probability of picking an outfit with a red shirt?

$\frac{1}{3} \cdot \frac{2}{2} \cdot \frac{2}{2} = \frac{4}{12} = \boxed{\frac{1}{3}}$

Permutations:

14. There are five finalists in the Mr. Universe pageant. In how many ways may the judges choose a winner and a first runner-up

$\underline{5} \cdot \underline{4} = 20$ ways

$5 P_2 = 20$ ways

15. A multiple choice test consists of 15 questions, each with answers (a), (b), (c), (d), and (e). In how many ways could a student fill in the answers if they answer every question?

$\underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} \cdot \underline{5} = 5^{15}$ ways

16. In how many ways could five people line up to get on a bus?

$5 P_5 = 120$ OR $5! = 120$ OR $\underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} = 120$ ways

17. How many rearrangements are there of the letters in the word "great?"

$\underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1}$ OR $5! = 120$ ways

PrB = on calculator

18. Evaluate: 4!

$4 \cdot 3 \cdot 2 \cdot 1 = 24$

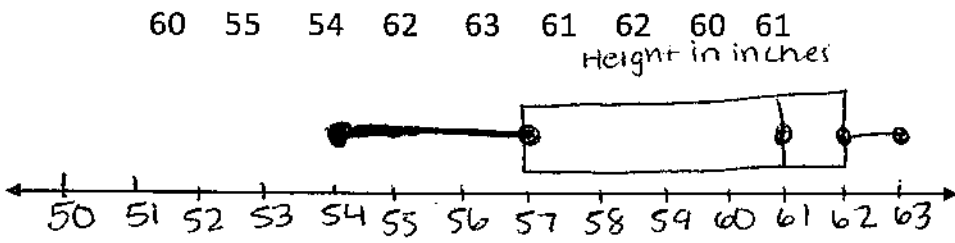
19. Evaluate: $\frac{5!}{3!}$

$\frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 2 \cdot 1} = 20$

20. Evaluate: ${}_6 P_3$

$\frac{6 \cdot 5 \cdot 4}{1} = \boxed{120}$

21. Create a box plot using the data for the heights in inches of students in middle school.



55, ⁵⁷54, ⁶²60, 60, 61, 62, 63

Five Number Summary: min Q₁ median Q₃ max
 ↓ ↓ ↓ ↓ ↓
 54 57 61 62 63

22. Harry rolled the number cube and recorded his results in the table.

# on die	1	2	3	4	5	6
Times rolled	30	45	30	28	24	23

Total: 180

experiment →

a) What is the experimental probability of rolling a 2? $\frac{45}{180} = \frac{1}{4}$

b) What is the theoretical probability of rolling a 2? $\frac{1}{6}$

c) If Harry were to roll the die 144 times, predict how many times he would land on the number 5, using his experimental probability.

$$\frac{24}{180} = \frac{x}{144}$$

$$\frac{3456}{180} = \frac{180x}{180}$$

$x = 19.2$
 about 19 times

23. Solve for x: $5(x+2) + 3x = 26$

$$5x + 10 + 3x = 26$$

$$8x + 10 = 26$$

$$8x = 16 \quad \boxed{x = 2}$$

24. Is the number $\frac{3}{4}$ rational, irrational, whole and/or counting. List all answers.

↓
 rational (it is a fraction)