Finding Probability of Compound Events

<u>8.SP.B.4</u>
Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (ex: rolling double sixes), identify the outcomes in the sample space which compose the event

Vocabulary

- Compound event - event that includes 2 or more simple events

  ↳ Can include dependent or independent

Flipping Coin and

Rolling # Cube

EXPLORE ACTIVITY

A What are the possible outcomes of flipping a coin once? Heads, Tails

B What are the possible outcomes of rolling a standard number cube once? 1, 2, 3, 4, 5, 6

C Complete the list for all possible outcomes for flipping a coin *and* rolling a number cube.

H1, H2, H3 , H4 , H5 , H6 , T1, T2 , T3 , T4 , T5 , T6

There are 12 possible outcomes for this compound event.

Test 50 times

	1	2	3	.4	5	6
R						
W						

EXAMPLE 1

A food trailer serves chicken and records the order size and sides on their orders, as show in the table. What is the experimental probability that the next order is for 3-pieces with cole slaw?

	Green Salad	Macaroni & Cheese	French Fries	Cole Slaw
2 pieces	33	22	52	35
3 pieces	13	55	65	55

STEP 1 Find total # orders = 330

STEP 2 Find # outcomes wanted = 55

STEP 3 Find exp. prob. $\dfrac{outcomes}{total} = \dfrac{55}{330} = \dfrac{1}{6}$

YOUR TURN

1. Drink sales for an afternoon at the school carnival were recorded in the table. What is the experimental probability that the next drink is a small cocoa?

	Soda	Water	Cocoa
Small	77	98	60
Large	68	45	52

S1: Total = 400

S2: Outcome = 60

S3: Find prob = $\frac{60}{400} = \frac{3}{20} = 0.15 \times 100 = 15\%$

EXAMPLE 2

At a street intersection, a vehicle is classified either as a *car* or a *truck*, and it can turn *left*, *right*, or go *straight*. About an equal number of cars and trucks go through the intersection and turn in each direction. Use a simulation to find the experimental probability that the next vehicle will be a car that turns right.

$$\frac{3 \times 4}{25 \times 4} = \frac{12}{100}$$

$$\frac{6}{50} = \frac{3}{25} = 12\%$$

	Car	Truck
Left	8	9
Right	⑥	11
Straight	9	7

Find the experimental probability that a car turns right.

YOUR TURN

3. A jeweler sells necklaces made in three sizes and two different metals. Use the data from a simulation to find the experimental probability that the next necklace sold is a 20-inch gold necklace.

	Silver	Gold
12 in.	12	22
16 in.	16	8
20 in.	5	12

$$\frac{12}{75} = \frac{4}{25} = 16\%$$

1. A dentist has 400 male and female patients that range in ages from 10 years old to 50 years old and up as shown in the table. What is the experimental probability that the next patient will be female and in the age range 22–39? *(Explore Activity and Example 1)*

	Range: 10–21	Range: 22–39	Range: 40–50	Range: 50+
Male	44	66	32	53
Female	36	50	45	74

$$\frac{50}{400} = \frac{1}{8} = 12.5\%$$

2. At a car wash, customers can choose the type of wash and whether to use the interior vacuum. Customers are equally likely to choose each type of wash and whether to use the vacuum. Use a simulation to find the experimental probability that the next customer purchases a deluxe wash and no interior vacuum. Describe your simulation. (Example 2)

Spinner

Coin

CAR WASH

Standard

Deluxe

Superior

Vacuum

yes   no

The school store sells spiral notebooks in four colors and three different sizes. The table shows the sales by size and color for 400 notebooks.

	Red	Green	Blue	Yellow
100 Pages	55	37	26	12
150 Pages	60	44	57	27
200 Pages	23	19	21	19

5. What is the experimental probability that the next customer buys a red notebook with 150 pages?

$$\frac{60}{400} = \frac{3}{20} = 15\%$$

6. What is the experimental probability that the next customer buys any red notebooks?

$$\frac{55+60+23}{400} = \frac{138}{400} = \frac{69}{200} = 34.5\%$$

A middle school English teacher polled random students about how many pages of a book they read per week.

8. **Critique Reasoning** Jennie says the experimental probability that a 7th grade student reads at least 100 pages per week is $\frac{16}{125}$. What is her error and the correct experimental probability?

	6th	7th	8th
75 Pages	24	18	22
100 Pages	22	32	24
150 Pages	30	53	25

Jennie $\Rightarrow$ $\frac{32}{250} = \frac{16}{125}$ X

$\rightarrow$ did not include reading more than 100 pgs.

Correct $\Rightarrow$ $\frac{32+53}{250} = \frac{85}{250} = 34\%$