

# Compound Events, Sample Spaces and Simulations

Grade 7 math · Worksheet Answer Key · Standards: 7.SP.C.8

Each solution lists or counts the sample space first and then divides the number of matching outcomes by the total. When a problem involves replacement or a simulation, the steps also state what a trial is and how a success is counted.

**Standards:** 7.SP.C.8 · **Level:** Grade 7

## Problem 1 Two coin flips

Sample space: HH, HT, TH, TT. Exactly one head: HT and TH.

$$P = 2/4 = 1/2.$$

$$\mathbf{1/2}$$

## Problem 2 Outfit choices

Outfits: red-jeans, red-khaki, blue-jeans, blue-khaki, green-jeans, green-khaki ( $3 \times 2 = 6$ ).

Blue shirt: 2 outcomes out of 6, so  $P = 2/6 = 1/3$ .

**6 outfits; P(blue shirt) = 1/3**

## Problem 3 Two spinners

There are  $3 \times 2 = 6$  outcomes. A sum of 4 happens for (2, 2) and (3, 1).

$$P = 2/6 = 1/3.$$

$$\mathbf{1/3}$$

## Problem 4 Sum of eight

The 36 outcomes are shown. A sum of 8 appears in 5 cells: (2, 6), (3, 5), (4, 4), (5, 3), (6, 2).

$$P = 5/36.$$

$$\mathbf{5/36}$$

| Cube 1 | Cube 2 |   |   |    |    |    |
|--------|--------|---|---|----|----|----|
|        | 1      | 2 | 3 | 4  | 5  | 6  |
| 1      | 2      | 3 | 4 | 5  | 6  | 7  |
| 2      | 3      | 4 | 5 | 6  | 7  | 8  |
| 3      | 4      | 5 | 6 | 7  | 8  | 9  |
| 4      | 5      | 6 | 7 | 8  | 9  | 10 |
| 5      | 6      | 7 | 8 | 9  | 10 | 11 |
| 6      | 7      | 8 | 9 | 10 | 11 | 12 |

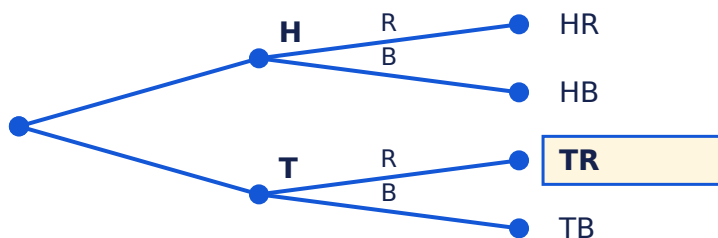
The 5 shaded cells have a sum of 8.

### Problem 5 Coin and spinner tree

The four outcomes are HR, HB, TR, TB, and TR is one of them.

$$P = 1/4.$$

**1/4**



The shaded path is TR.

### Problem 6 Counting a menu

Outcomes:  $4 \times 3 \times 2 = 24$ .

One particular meal is 1 outcome out of 24.

**24 meals;  $P = 1/24$**

### Problem 7 At least one head

Sample space: HH, HT, TH, TT. Outcomes with at least one head: HH, HT, TH.

$$P = 3/4.$$

**3/4**

### Problem 8 Small sums

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Sums less than 5: 2 (1 way), 3 (2 ways), 4 (3 ways), which is  $1 + 2 + 3 = 6$  outcomes.

$$P = 6/36 = 1/6.$$

**1/6**

### Problem 9 Coin and four-section spinner

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The sample space has  $2 \times 4 = 8$  outcomes. Heads with 3 or 4: H3 and H4.

$$P = 2/8 = 1/4.$$

**1/4**

### Problem 10 Three coin flips

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Sample space: HHH, HHT, HTH, HTT, THH, THT, TTH, TTT (8 outcomes).

Exactly two heads: HHT, HTH, THH.

$$P = 3/8.$$

**3/8**

### Problem 11 Draw with replacement

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With replacement, each draw has 5 choices, so there are  $5 \times 5 = 25$  equally likely ordered pairs.

Both red:  $3 \times 3 = 9$  pairs.

$$P = 9/25.$$

**9/25**

### Problem 12 Draw without replacement

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First draw: 5 choices. Second draw: 4 choices. There are  $5 \times 4 = 20$  ordered pairs.

Both red:  $3 \times 2 = 6$  pairs.

$$P = 6/20 = 3/10.$$

**3/10**

### **Problem 13 Family of three**

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The trials with no girl are TTT, which appears 3 times. So  $10 - 3 = 7$  trials have at least one head.

Experimental:  $7/10 = 0.7$ . Theoretical:  $7/8 = 0.875$ .

The experimental value is lower, which is reasonable with only 10 trials.

**0.7 compared with 0.875**

### **Problem 14 Sums of four-section spinners**

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There are  $4 \times 4 = 16$  outcomes. Sums of at least 7 appear for (3, 4), (4, 3) and (4, 4).

$P = 3/16$ .

**3/16**

### **Problem 15 Pizza options**

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Pizzas:  $2 \times 3 \times 2 = 12$ .

Thick and large: 2 pizzas (cheese or pepperoni), so  $2/12 = 1/6$ .

Cheese:  $2 \times 3 = 6$  pizzas, so  $6/12 = 1/2$ .

**12 pizzas; P(thick and large) = 1/6; P(cheese) = 1/2**

### **Problem 16 Two-digit codes**

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There are  $5 \times 5 = 25$  codes.

Same digits: 22, 44, 55, 77, 99, so  $5/25 = 1/5$ .

First greater:  $4 + 3 + 2 + 1 = 10$  codes (42, 52, 54, 72, 74, 75, 92, 94, 95, 97), so  $10/25 = 2/5$ .

**1/5 and 2/5**

### **Problem 17 Product game**

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There are 36 outcomes. List the winning pairs by the first number: (2, 6); (3, 4), (3, 5), (3, 6); (4,

3), (4, 4), (4, 5), (4, 6); (5, 3), (5, 5), (5, 6), (5, 4); (6, 2), (6, 3), (6, 4), (6, 5), (6, 6).

That is  $1 + 3 + 4 + 4 + 5 = 17$  pairs.

$P = 17/36$ .

**17/36**

### Problem 18 Guessing on a quiz

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Trials with exactly two heads: HTH, HHT, THH, HTH, HHT, HHT, which is 6 trials. Experimental:  $6/10 = 0.6$ .

Theoretical: 3 outcomes (HHT, HTH, THH) out of 8, so  $3/8 = 0.375$ .

The difference is 0.225. Ten trials is a small number, so the simulation result can vary from the theoretical value.

**0.6 experimental; 3/8 theoretical; the difference comes from chance in a small number of trials**

### Problem 19 Prime sums

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There are  $3 \times 4 = 12$  outcomes. The prime sums are 2, 3, 5 and 7.

Row 1: 2, 3, 4, 5 has 3 primes. Row 2: 3, 4, 5, 6 has 2 primes. Row 3: 4, 5, 6, 7 has 2 primes. Total: 7.

$P = 7/12$ .

**7/12**

### Problem 20 Restaurant combos

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Combinations:  $3 \times 5 \times 2 = 30$ .

Tuna:  $3 \times 1 \times 2 = 6$  combinations, so  $6/30 = 1/5$ .

Rye with swiss:  $1 \times 5 \times 1 = 5$  combinations, so  $5/30 = 1/6$ .

**30 combinations;  $P(\text{tuna}) = 1/5$ ;  $P(\text{rye and swiss}) = 1/6$**