

Grade 7 · Probability of Compound Events · Worksheet Answer Key

Common Core 7.SP.C.8 · mathovore.fr

Each solution lists the full sample space first, counts the favorable outcomes, and then writes the probability as a simplified fraction. Compare the sample-space counts with yours before checking the final answers, because a missing outcome is the most common source of error.

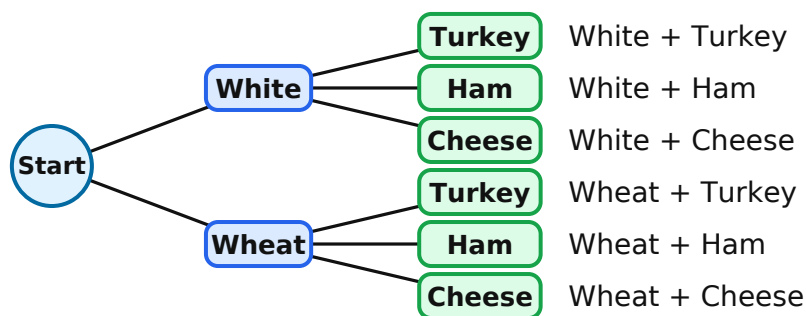
Grade 7 Common Core: 7.SP.C.8

Problem 1: Sandwich choices

Keep the bread fixed and run through the fillings: White + Turkey, White + Ham, White + Cheese, Wheat + Turkey, Wheat + Ham, Wheat + Cheese.

Check with multiplication: $2 \times 3 = 6$.

Answer: 6 sandwiches.



Each path of the tree is one sandwich: six paths in all.

Problem 2: Outfit list

Pair each shirt with each cap: red-white, red-black, blue-white, blue-black, green-white, green-black.

There are $3 \times 2 = 6$ outfits.

There are **6 outfits**.

Shirt / Cap	White	Black
Red	R + W	R + B
Blue	B + W	B + B
Green	G + W	G + B

Six outfits: 3 rows times 2 columns.

Problem 3: Two coin flips

The sample space is HH, HT, TH, TT: 4 equally likely outcomes.

- Only HH: $\frac{1}{4}$.
- HT and TH: $\frac{2}{4} = \frac{1}{2}$.
- HH, HT and TH: $\frac{3}{4}$.

Answers: $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$.

	Coin 2	
Coin 1	H	T
H	HH	HT
T	TH	TT

The highlighted cells are the two outcomes with exactly one head.

Problem 4: Number cube and coin

The sample space has $6 \times 2 = 12$ equally likely outcomes.

- Primes are 2, 3, and 5, each with tails: 3 outcomes. $\frac{3}{12} = \frac{1}{4}$.
- 5 or 6 with heads: 2 outcomes. $\frac{2}{12} = \frac{1}{6}$.
- Odd numbers (1, 3, 5) with either coin side: 6 outcomes. Even numbers with tails (2, 4, 6): 3 more outcomes. $\frac{9}{12} = \frac{3}{4}$.

Answers: $\frac{1}{4}$, $\frac{1}{6}$, $\frac{3}{4}$.

Problem 5: Spinner and coin

The outcomes are 1H, 1T, 2H, 2T, 3H, 3T, 4H, 4T.

- $4 \times 2 = 8$ outcomes.
- 2H and 4H: $\frac{2}{8} = \frac{1}{4}$.
- 1T, 2T and 3T: $\frac{3}{8}$.

Answers: 8; $\frac{1}{4}$; $\frac{3}{8}$.

Problem 6: Three-part meal

- a. $4 \times 3 \times 2 = 24$ meals.
- b. Veggie with apple can have either drink, so 2 meals. $\frac{2}{24} = \frac{1}{12}$.
- c. Sandwich: 4 choices. Side: chips or apple, 2 choices. Drink: lemonade, 1 choice.
 $4 \times 2 \times 1 = 8$ meals, so $\frac{8}{24} = \frac{1}{3}$.

Answers: 24; $\frac{1}{12}$; $\frac{1}{3}$.

Problem 7: Two number cubes

There are $6 \times 6 = 36$ equally likely outcomes.

- a. Sum 7: (1,6), (2,5), (3,4), (4,3), (5,2), (6,1) are 6 outcomes, so $\frac{6}{36} = \frac{1}{6}$.
- b. Sum 10: 3 outcomes; sum 11: 2; sum 12: 1. That is 6 outcomes, so $\frac{6}{36} = \frac{1}{6}$.
- c. Only (1,1): $\frac{1}{36}$.

Answers: $\frac{1}{6}$, $\frac{1}{6}$, $\frac{1}{36}$.

Cube 2						
Cube 1	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

Six of the 36 cells have a sum of 7.

Problem 8: Table of two spinner sums

Sums by row: 2, 3, 4; then 3, 4, 5; then 4, 5, 6. There are $3 \times 3 = 9$ outcomes.

- a. Even sums: 2, 4, 4, 4, 6, which is 5 outcomes. $\frac{5}{9}$.
- b. Sums of 5 or 6: 5, 5, 6, which is 3 outcomes. $\frac{3}{9} = \frac{1}{3}$.
- c. Sums of 4: 3 outcomes. $\frac{3}{9} = \frac{1}{3}$.

Answers: $\frac{5}{9}$, $\frac{1}{3}$, $\frac{1}{3}$.

A / B	1	2	3
1	2	3	4
2	3	4	5
3	4	5	6

The five even sums are highlighted.

Problem 9: Marbles with replacement

- $3 \times 3 = 9$ outcomes.
- RR, BB and GG: $\frac{3}{9} = \frac{1}{3}$.
- Both marbles come from {R, G}: RR, RG, GR, GG, so $\frac{4}{9}$.

Answers: 9; $\frac{1}{3}$; $\frac{4}{9}$.

2nd draw			
1st	R	B	G
R	RR	RB	RG
B	BR	BB	BG
G	GR	GB	GG

The highlighted diagonal holds the 3 same-color outcomes.

Problem 10: Two cards without replacement

- The diagonal cells are impossible, so $4 \times 3 = 12$ outcomes.
- Pairs with sum 5: (1, 4), (2, 3), (3, 2), (4, 1). $\frac{4}{12} = \frac{1}{3}$.
- Both even: (2, 4) and (4, 2). $\frac{2}{12} = \frac{1}{6}$.
- Pairs with a larger first card are the 6 cells below the diagonal. $\frac{6}{12} = \frac{1}{2}$.

Answers: 12; $\frac{1}{3}$; $\frac{1}{6}$; $\frac{1}{2}$.

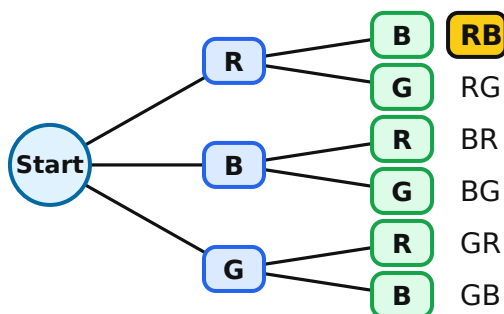
1st / 2nd	1	2	3	4
1		1,2	1,3	1,4
2	2,1		2,3	2,4
3	3,1	3,2		3,4
4	4,1	4,2	4,3	

Four pairs add to 5.

Problem 11: Marbles without replacement

- a. $3 \times 2 = 6$ outcomes: RB, RG, BR, BG, GR, GB.
- b. Only RB: $\frac{1}{6}$.
- c. Without G: RB and BR, so $\frac{2}{6} = \frac{1}{3}$.

Answers: 6; $\frac{1}{6}$; $\frac{1}{3}$.



The second draw has only two choices. The highlighted path is red then blue.

Problem 12: Two number cubes: products

There are $6 \times 6 = 36$ equally likely outcomes.

- a. Product 12: (2, 6), (6, 2), (3, 4), (4, 3). $\frac{4}{36} = \frac{1}{9}$.
- b. Doubles: (1, 1) through (6, 6), 6 outcomes. $\frac{6}{36} = \frac{1}{6}$.
- c. Sum 2: (1, 1). Sum 3: (1, 2), (2, 1). Sum 4: (1, 3), (3, 1), (2, 2). That is 6 outcomes. $\frac{6}{36} = \frac{1}{6}$.

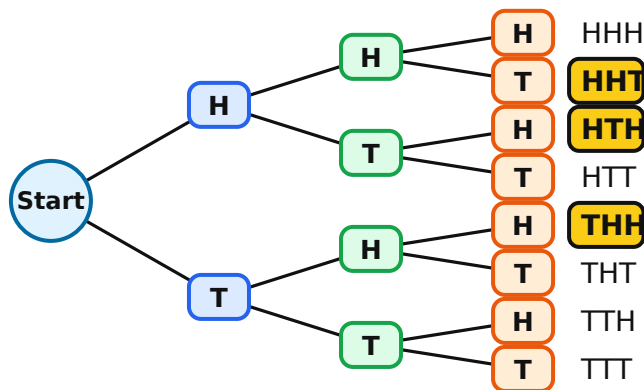
Answers: $\frac{1}{9}$, $\frac{1}{6}$, $\frac{1}{6}$.

Problem 13: Three coin flips

There are 8 outcomes.

- a. HHT, HTH, THH: $\frac{3}{8}$.
- b. Every outcome except HHH has a tail: $\frac{7}{8}$.
- c. HHH and TTT: $\frac{2}{8} = \frac{1}{4}$.

Answers: $\frac{3}{8}$, $\frac{7}{8}$, $\frac{1}{4}$.



The three highlighted paths have exactly two heads.

Problem 14: Simulate guessing

- The four digits are equally likely, so one digit out of four is $\frac{1}{4} = 25\%$.
- Only the trial 11 has two 1s. $\frac{1}{16} \approx 0.07$.
- Trials with at least one 1: 41, 11, 14, 21, 12, 31, 13. That is 7 of 15, so $\frac{7}{15} \approx 0.47$.
- There are $4 \times 4 = 16$ outcomes. Outcomes with no correct guess use only 2, 3, or 4: $3 \times 3 = 9$. So $16 - 9 = 7$ outcomes have at least one correct guess: $\frac{7}{16} = 0.4375$. The simulation estimate is close.

Answers: $\frac{1}{16}$; $\frac{7}{15}$; $\frac{7}{16}$.

Problem 15: School lunch tray

Sample space: $3 \times 3 = 9$ trays.

- Only pizza + juice: $\frac{1}{9}$.
- Salad + milk and salad + water: $\frac{2}{9}$.
- Milk or juice with any of 3 mains: $3 \times 2 = 6$ trays, so $\frac{6}{9} = \frac{2}{3}$.

Answers: $\frac{1}{9}$, $\frac{2}{9}$, $\frac{2}{3}$.

Problem 16: Class raffle

- $5 \times 4 = 20$ outcomes.
- Only (Maya, Ethan). $\frac{1}{20}$.
- Sofia first: 4 outcomes. Sofia second: 4 outcomes. $\frac{8}{20} = \frac{2}{5}$.
- (Jamal, Ethan) and (Ethan, Jamal). $\frac{2}{20} = \frac{1}{10}$.
- The two winners come from the other 4 names: $4 \times 3 = 12$ outcomes. $\frac{12}{20} = \frac{3}{5}$.

Answers: 20; $\frac{1}{20}$; $\frac{2}{5}$; $\frac{1}{10}$; $\frac{3}{5}$.

Problem 17: Two spinners

There are $3 \times 4 = 12$ outcomes.

- a. Sum 5: (1,4), (2,3), (3,2), so $\frac{3}{12} = \frac{1}{4}$.
- b. The product is odd only when both numbers are odd: A in {1, 3} and B in {1, 3} gives 4 outcomes. Even products: $12 - 4 = 8$, so $\frac{8}{12} = \frac{2}{3}$.
- c. $\frac{1}{4} \times 240 = 60$ sums of 5.

Answers: $\frac{1}{4}$; $\frac{2}{3}$; 60.

Spinner B				
A	1	2	3	4
1	2	3	4	5
2	3	4	5	6
3	4	5	6	7

Highlighted cells show the 3 sums equal to 5.

Problem 18: Board game bonus

There are 36 equally likely outcomes.

- a. Sum 8: (2, 6), (3, 5), (4, 4), (5, 3), (6, 2), which is 5 outcomes. $\frac{5}{36}$.
- b. Doubles: 6 outcomes. $\frac{6}{36} = \frac{1}{6}$.
- c. The outcome (4, 4) is in both lists, so count it once: $5 + 6 - 1 = 10$ outcomes. $\frac{10}{36} = \frac{5}{18}$.
- d. $\frac{5}{18} \times 180 = 50$ bonuses.

Answers: $\frac{5}{36}$; $\frac{1}{6}$; $\frac{5}{18}$; 50 bonuses.

Problem 19: Simulate free throws

- a. The digits 0, 1, 2, 3, 4, 5 are 6 of the 10 digits, and $\frac{6}{10} = 60\%$.
- b. Both digits are at most 5 in 51, 04, 45 and 12, so 4 trials. Estimate: $\frac{4}{10} = \frac{2}{5} = 40\%$.
- c. The first digit has 6 choices and the second has 6 choices, so $6 \times 6 = 36$ pairs. Probability: $\frac{36}{100} = \frac{9}{25} = 36\%$.

Answers: 6 of 10 digits; $\frac{2}{5}$; $\frac{9}{25}$.

1: 27	2: 83	3: 51	4: 04	5: 96
6: 38	7: 60	8: 45	9: 71	10: 12

Four of the ten trials are highlighted. The estimate 40% is close to the true 36%.

Problem 20: Carnival game

- a. $5 \times 2 = 10$ outcomes.
- b. Winning outcomes: (2, H) and (4, H). $\frac{2}{10} = \frac{1}{5}$.
- c. $\frac{1}{5} \times 150 = 30$ wins.
- d. The booth collects $150 \times \$1 = \$150$ and pays $30 \times \$4 = \$120$. Profit: $\$150 - \$120 = \$30$.

Answers: 10; $\frac{1}{5}$; 30 wins; \\$30 profit.