

Probability and Compound Events: practice solutions, Grade 7 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Likely or unlikely?



- a. Every face is less than 7, so the event is certain: **1**.
- b. A die has no 7, so it is impossible: **0**.
- c. Heads and tails are equally likely: **0.5**.
- d. $\frac{1}{20} = 0.05$.
- e. $1 - \frac{1}{20} = \frac{19}{20} = 0.95$.

2 Marbles in a bag



There are $4 + 6 + 5 = 15$ marbles.

- a. $P(\text{green}) = \frac{6}{15} = \frac{2}{5}$.
- b. $P(\text{yellow}) = \frac{5}{15} = \frac{1}{3}$.
- c. $P(\text{not red}) = \frac{11}{15}$, or $1 - \frac{4}{15} = \frac{11}{15}$.

3 The eight-section spinner



a. Even: 2, 4, 6, 8. $\frac{4}{8} = \frac{1}{2}$.

b. Greater than 5: 6, 7, 8. $\frac{3}{8}$.

c. Prime: 2, 3, 5, 7 (1 is not prime). $\frac{4}{8} = \frac{1}{2}$.

d. Multiples of 3: 3 and 6. $\frac{2}{8} = \frac{1}{4}$.

4 Using the complement



a. $1 - 0.35 = 0.65$.

b. $1 - \frac{3}{8} = \frac{8}{8} - \frac{3}{8} = \frac{5}{8}$.

5 Paper cup experiment



$\frac{9}{50} = 0.18 = 18\%$. Since the cup is not a symmetric object, we could not have found this number by counting equally likely outcomes.

6 True or false?



a. False. Probabilities are never greater than 1.

b. True. $\frac{7}{7} = 1$.

c. True. $P(\text{not } A) = 1 - 0.5 = 0.5$.

d. False. The smallest probability is 0 (impossible), never negative.

7 Two coins



a. HH, HT, TH, TT: 4 equally likely outcomes.

b. HT and TH: $\frac{2}{4} = \frac{1}{2}$.

c. HH, HT, TH: $\frac{3}{4}$.

8 Lunch model



a. The total must be 1: $0.4 + 0.25 + 0.1 = 0.75$, so the salad has $1 - 0.75 = 0.25$.

b. $0.4 + 0.1 = 0.5$.

c. No. The outcomes do not all have the same probability (pizza has 0.4, soup has 0.1).

9 Rolling a 4



a. $\frac{25}{120} = \frac{5}{24} \approx 0.208$.

b. $\frac{1}{6} \approx 0.167$.

c. $\frac{1}{6} \times 600 = 100$.

d. $\frac{5}{24} \times 600 = 125$.

The two predictions differ because 120 rolls is a small sample.

10 Defective light bulbs



Defective: $0.04 \times 2,500 = 100$ bulbs.

Working: $2,500 - 100 = 2,400$ bulbs (also $0.96 \times 2,500$).

About 100 bulbs are defective.

11 Two dice and a table



- a. The highlighted cells: (3,6), (4,5), (5,4), (6,3). $\frac{4}{36} = \frac{1}{9}$.
- b. Sums of 2 or 3: (1,1), (1,2), (2,1). $\frac{3}{36} = \frac{1}{12}$.
- c. Half of the cells have an even sum (18 of 36). $\frac{18}{36} = \frac{1}{2}$.

12 Outfits



- a. $3 \times 4 \times 2 = 24$ outfits.
- b. Each shirt is equally likely: $\frac{1}{3}$. (Check: 8 of the 24 outfits have the red shirt, and $\frac{8}{24} = \frac{1}{3}$.)
- c. $\frac{1}{24}$.

13 Unequal sections



- a. Red $\frac{180}{360} = \frac{1}{2}$; blue $\frac{90}{360} = \frac{1}{4}$; green $\frac{60}{360} = \frac{1}{6}$; yellow $\frac{30}{360} = \frac{1}{12}$.
- b. $\frac{6}{12} + \frac{3}{12} + \frac{2}{12} + \frac{1}{12} = \frac{12}{12} = 1$.
- c. $\frac{3}{12} + \frac{2}{12} = \frac{5}{12}$.

14 Find the mistakes



- a. Each flip is independent. The coin has no memory, so $P(\text{tails})$ is still $\frac{1}{2}$.
- b. The colors are not equally likely. The correct value is $\frac{2}{10} = \frac{1}{5}$.

15 Coin and spinner



- a. H1, H2, H3, H4, T1, T2, T3, T4: $2 \times 4 = 8$ outcomes.
- b. H3, H4: $\frac{2}{8} = \frac{1}{4}$.
- c. T1, T3: $\frac{2}{8} = \frac{1}{4}$.
- d. All 4 heads outcomes plus T4: $\frac{5}{8}$. (Do not count H4 twice.)

16 Three coin flips



- a. HHH, HHT, HTH, HTT, THH, THT, TTH, TTT: 8 outcomes.
- b. HHT, HTH, THH: $\frac{3}{8}$.
- c. Only HHH has no tail: $1 - \frac{1}{8} = \frac{7}{8}$.
- d. HHH and TTT: $\frac{2}{8} = \frac{1}{4}$.

17 Letter and digit



- a. $3 \times 5 = 15$.
- b. B1, B3, B5: $\frac{3}{15} = \frac{1}{5}$.
- c. A4, A5: $\frac{2}{15}$.
- d. A with any digit gives 5 outcomes; B5 and C5 add 2 more. $\frac{7}{15}$.

18 Cereal box simulation



- a. 4, 3, 6, 1, 3, 7, 2, 4, 1, 5.
- b. Total: $4 + 3 + 6 + 1 + 3 + 7 + 2 + 4 + 1 + 5 = 36$. Average: $36 \div 10 = 3.6$ boxes.
This is close to the 4 boxes we might guess from “1 out of 4”.
- c. Trials 2, 4, 5, 7 and 9: 5 trials out of 10, so $\frac{5}{10} = 0.5$.

19 Is the game fair?



- a. The product is odd only when both dice are odd: $3 \times 3 = 9$ of 36 outcomes.
 $P(\text{odd}) = \frac{9}{36} = \frac{1}{4}$ and $P(\text{even}) = \frac{27}{36} = \frac{3}{4}$.
- b. No. Ava is three times as likely to win.
- c. Ava: $27 \times 1 = 27$ points. Ben: $9 \times 3 = 27$ points. With 3 points the game is fair.

20 Bike to school



- a. $\frac{28}{80} = 0.35$.
- b. $0.35 \times 1,200 = 420$ students.
- c. A random sample represents the whole school. If you only asked the track team, the result would be biased.

21 Changing the bag



- a. Bag A: $\frac{3}{8} = 0.375$. Bag B: $\frac{4}{12} = \frac{1}{3} \approx 0.333$. Bag A is better.
- b. Test adding 4 red marbles: Bag B then has 8 red out of 16, and $\frac{8}{16} = \frac{1}{2}$. So 4 red marbles must be added. (With 3 added: $\frac{7}{15}$, too small; with 5: $\frac{9}{17}$, too big.)

22

At least one six

a. Each die has 5 faces that are not 6: $5 \times 5 = 25$ outcomes.

b. $\frac{25}{36}$.

c. $1 - \frac{25}{36} = \frac{11}{36}$. (Check by listing: six outcomes with a 6 on the first die plus five more with a 6 on the second, which is 11.)

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