Sample Spaces for Compound Events

Explore ideas and representations

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

A table, tree, or systematic list can show outcomes. Keep the stage order unless the task says otherwise. If branches differ in size, add their counts: three branches with 2, 4, and 5 leaves give 11 outcomes.

Worked example

Choose an online O or in-person P class, then a day D or evening E time. List the ordered outcomes.

1. Format O gives 2 outcomes: (O, D) and (O, E).
2. Format P gives 2 outcomes: (P, D) and (P, E).
3. The format is first in each pair; $2 + 2 = 4$ outcomes.
Answer: $(O, D), (O, E), (P, D), (P, E)$.

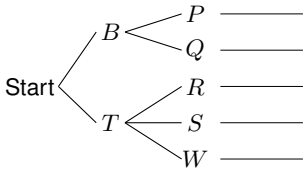
Practice Problems

Show your thinking.

1. Choose snack M or Y, then topping B, N, or C. Complete the table with ordered pairs and count the outcomes.

1st / 2nd	B	N	C
M			
Y			

2. Choose bus B or train T. The bus serves P or Q; the train serves R, S, or W. Write the ordered pair at each tree tip and count all routes.



3. Draw two cards in order from A, B, C without replacement. List all possible ordered pairs and give the count.

4. Three switches can each be U or D. List all ordered triples in groups by the first switch and count them.

5. One spinner shows 1 or 3 and the second shows 1, 2, or 3. Fill the grid with sums. List the distinct totals and the one reached in two ways.

1st / 2nd	1	2	3
1			
3			

6. The full space is $(R, 1), (R, 2), (G, 1), (G, 2), (B, 1), (B, 2)$. Recover the stage label sets. If second-stage label 3 is added, list the new pairs and give the new total.

Answer Key

1. 6 outcomes; see completed table.
2. 5 routes; see labeled tree.
3. (A,B), (A,C), (B,A), (B,C), (C,A), (C,B); 6 outcomes.
4. 8 triples, listed by first switch below.
5. Totals $2,3,4,5,6$; 4 occurs twice.
6. First R, G, B; second $1,2$. Add $(R,3)$, $(G,3)$, $(B,3)$; total 9.

Step-by-Step Solutions

Follow each calculation, then check your own work.

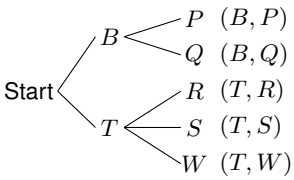
Problem 1

1. M has 3 outcomes: (M,B), (M,N), (M,C).
2. Y has 3 outcomes: (Y,B), (Y,N), (Y,C).
3. Both rows together give $2(3)=6$ outcomes.

1st / 2nd	B	N	C
M	(M,B)	(M,N)	(M,C)
Y	(Y,B)	(Y,N)	(Y,C)

Problem 2

1. Bus B gives 2 leaves: (B,P), (B,Q).
2. Train T gives 3 leaves: (T,R), (T,S), (T,W).
3. Add the unequal branch sizes: $2+3=5$ routes.



Problem 3

1. After A, the 2 possible pairs are (A,B) and (A,C).
2. After B use (B,A), (B,C); after C use (C,A), (C,B). Each branch has 2 outcomes.
3. There are $3(2)=6$ outcomes. Repeats such as (A,A) are impossible.

Problem 4

1. First U: (U,U,U), (U,U,D), (U,D,U), (U,D,D). Count 4.
2. First D: (D,U,U), (D,U,D), (D,D,U), (D,D,D). Count 4.
3. The groups are disjoint; total $4+4=2^3=8$.

Problem 5

1. First spin 1 gives $1+1=2$, $1+2=3$, and $1+3=4$.
2. First spin 3 gives $3+1=4$, $3+2=5$, and $3+3=6$.
3. The grid has 6 cells but 5 different sums; 4 appears twice.

1st / 2nd	1	2	3
1	2	3	4
3	4	5	6

Problem 6

1. The first coordinates give 3 distinct labels: R, G, B.
2. The second coordinates give 2 labels: $1,2$. Pair the new label 3 with each first label.
3. Add $(R,3)$, $(G,3)$, $(B,3)$: the count is now $6+3=9$.

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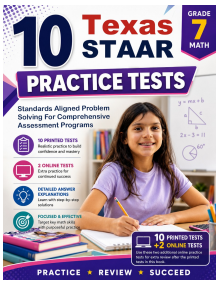

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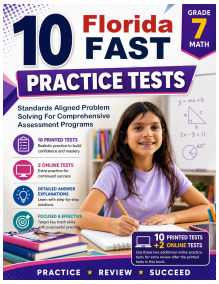

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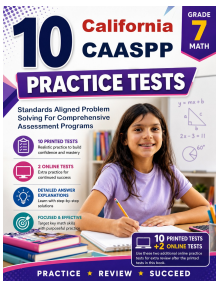

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