When Totals Flip

Compare success rates within groups and after combining them.

8A.DSP.D.40 "Generate a two-way categorical table in order to find and evaluate solutions to real-world problems. a. Aggregate data from several groups to find an overall association between two categorical variables. b..."

NAME _____ DATE _____

REVERSE

The same option has a higher success rate in both groups, but the other option has a higher rate when you combine the groups. To combine groups, add successes and totals separately for each option.

Hikes finished, easy path: A 3/4, B 12/20; steep path: A 6/20, B 1/4. A has the higher rate on both paths, but B has the higher combined rate: A 9/24, B 13/24.

STAYS

The option with a higher success rate in both groups still has a higher rate when you combine the groups.

Songs recognized, pop: A 7/10, B 5/10; jazz: A 4/10, B 2/10. A has the higher rate in both groups and combined: A 11/20, B 7/20.

1 SORT

8 items

Part 1 SORT: Circle REVERSE or STAYS for each item; Part 2 PROVE IT: Pick two items and explain your choices using the rates in both groups and the combined rates.

1.	Seeds sprouted, sunny: A 9/10, B 80/100; shady: A 30/100, B 2/10.	REVERSE STAYS
2.	Free throws made, morning: A 8/10, B 6/10; afternoon: A 3/10, B 1/10.	REVERSE STAYS
3.	Packages on time, city: A 8/20, B 12/20; rural: A 10/20, B 16/20.	REVERSE STAYS
4.	Batteries still working, indoors: A 8/10, B 35/50; outdoors: A 15/50, B 2/10.	REVERSE STAYS
5.	Quiz passes, review class: A 35/50, B 8/10; no-review class: A 2/10, B 15/50.	REVERSE STAYS
6.	Tickets scanned, early: A 16/20, B 6/10; late: A 5/10, B 8/20.	REVERSE STAYS
7.	Devices connected, strong signal: A 4/5, B 14/20; weak signal: A 6/20, B 1/5.	REVERSE STAYS
8.	Orders filled, weekday: A 40/50, B 9/10; weekend: A 3/10, B 20/50.	REVERSE STAYS

2 PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Part 3 MAKE YOUR OWN: Write one REVERSE example and one STAYS example with two groups; give successes/total for A and B in each group, and show the combined fractions.

REVERSE

STAYS

CHALLENGE

CHALLENGE: Can you make a REVERSE example if A and B each have exactly 10 trials in each group? Explain why or why not.

ANSWER KEY

When Totals Flip

GRADE 8 · 8A.DSP.D.40

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	Seeds sprouted, sunny: A 9/10, B 80/100; shady: A 30/100, B 2/10.	**REVERSE**	A has the higher rate in both groups, but B has the higher combined rate: A 39/110, B 82/110.
2	Free throws made, morning: A 8/10, B 6/10; afternoon: A 3/10, B 1/10.	**STAYS**	A has the higher rate in both groups and combined: A 11/20, B 7/20.
3	Packages on time, city: A 8/20, B 12/20; rural: A 10/20, B 16/20.	**STAYS**	B has the higher rate in both groups and combined: A 18/40, B 28/40.
4	Batteries still working, indoors: A 8/10, B 35/50; outdoors: A 15/50, B 2/10.	**REVERSE**	A has the higher rate in both groups, but B has the higher combined rate: A 23/60, B 37/60.
5	Quiz passes, review class: A 35/50, B 8/10; no-review class: A 2/10, B 15/50.	**REVERSE**	B has the higher rate in both groups, but A has the higher combined rate: A 37/60, B 23/60.
6	Tickets scanned, early: A 16/20, B 6/10; late: A 5/10, B 8/20.	**STAYS**	A has the higher rate in both groups and combined: A 21/30, B 14/30.
7	Devices connected, strong signal: A 4/5, B 14/20; weak signal: A 6/20, B 1/5.	**REVERSE**	A has the higher rate in both groups, but B has the higher combined rate: A 10/25, B 15/25.
8	Orders filled, weekday: A 40/50, B 9/10; weekend: A 3/10, B 20/50.	**REVERSE**	B has the higher rate in both groups, but A has the higher combined rate: A 43/60, B 29/60.

PART 2 · PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **REVERSE**: Pet adoptions, small dogs: A 9/10, B 40/50; large dogs: A 15/50, B 2/10. A has the higher rate in both groups, but B has the higher combined rate: A 24/60, B 42/60.
- **STAYS**: Books returned, fiction: A 8/10, B 6/10; nonfiction: A 5/10, B 3/10. A has the higher rate in both groups and combined: A 13/20, B 9/20.

Challenge: No. If one option has more successes out of 10 in both groups, it will have more successes out of 20 when the groups are combined.

Each fraction shows successes/total for one option in one group. In a REVERSE item, the option with the higher rate in both groups differs from the option with the higher combined rate.