

Name: _____ Date: _____

At the Track

Permutations

Betting on the horses at the racetrack is based on whether 'your' horse crosses the finish line 1st, 2nd or 3rd. Coming in 1st, 2nd, or 3rd is called winning, placing or showing respectively.

An **exacta** is when you choose 2 horses in the same race that cross the finish line in order of 1st and 2nd.

A **trifecta** is when you choose 3 horses in the same race that cross the finish line in order of 1st, 2nd, and 3rd.

Suppose there are 5 horses in the first race. How many different exactas could there be in the first race?

Use your calculator to calculate the number of possibilities

$${}_5P_2 \quad \left[\frac{n!}{(n-r)!} \right] \quad \mathbf{5} \quad \text{SHIFT} \quad \mathbf{1} \quad \mathbf{2} \quad \mathbf{=}$$

1. Use today's racing form and find out how many possible **exactas** there would be for each of the first 5 races of the day. (Remember - this is a permutation -meaning order matters ! AB is different than BA.)
2. In races 6-10, determine how many possible **trifectas** there would be in each race.

For example: The number of trifectas for a 5 horse race is ${}_5P_3$

Thinking Cap

Suppose order doesn't matter, i.e. you can pick two horses for 1st and 2nd and they can finish in any order in those places. How does this change the odds?

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Using this Activity:

Several newspapers with racetrack results are necessary for this activity. Otherwise, the teacher can create their own race form to use with the activity.

Answers :

Example: 20 possibilities

1. Answers will vary based on the racing form
2. Answers will vary based on the racing form

Example: 60 possibilities

Thinking Cap: Without consideration of order, this becomes a combination problem.

Objective: Use the calculator to investigate the relationships between patterns and combinations of elements.

NCTM Standards: Probability; Mathematics as Problem Solving; Number and number relationships.