

5. A researcher is investigating whether there is an association among professional athletes between age-group (in years) and type of sport played (basketball, football, baseball). The age-group and type of sport played for all 4,193 professional athletes in these sports for a recent year are given in the two-way table.

Age-Group by Type of Sport Played

Age (years)	Basketball	Football	Baseball	Total
Age < 25	232	807	259	1,298
$25 \leq \text{Age} < 30$	175	1,326	620	2,121
$30 \leq \text{Age} < 35$	90	287	276	653
$35 \leq \text{Age}$	19	41	61	121
Total	516	2,461	1,216	4,193

Part A

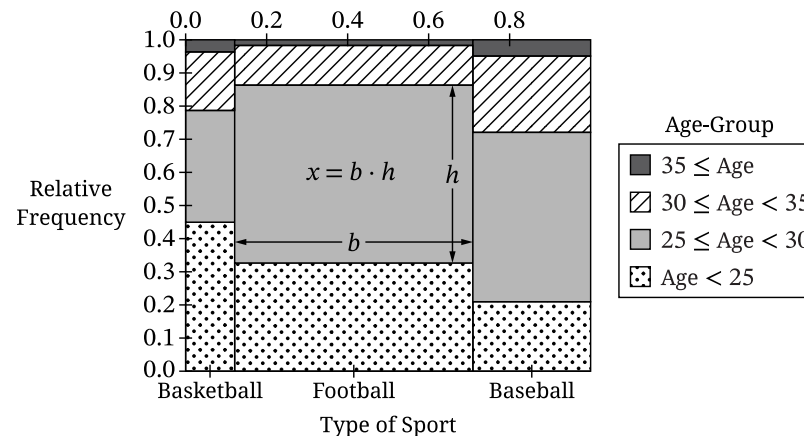
Consider the two-way table.

- What is the probability a randomly selected professional athlete is a football player? Show your work.
- What is the probability a randomly selected professional athlete is in the age-group of " $25 \leq \text{Age} < 30$ " given they are a football player? Show your work.

Part B

A mosaic plot was constructed using the information in the two-way table. Use the mosaic plot to answer the following questions.

Relative Frequency of Age-Group by Type of Sport Played



- The b and h displayed in the mosaic plot each represent a probability calculated in part A. Which probability does b correspond to: the probability calculated in part A (i) or the probability calculated in part A (ii)?
- What probability does the x displayed in the mosaic plot represent in context?

Part C

Use the information to answer the following questions.

- Are the events "Baseball" and " $35 \leq \text{Age}$ " mutually exclusive events? Explain.
- Are the events "Baseball" and " $35 \leq \text{Age}$ " independent events? Show your work.

Part D

Consider the data of all professional athletes from the two-way table. Determine if it is appropriate to carry out a chi-square test for independence to investigate whether there is an association between age-group and sport played using these data. Explain your answer.