

Past-paper walk-through

Mutually Exclusive Events ■ 4.4

eXercise

Questions in this set

- 2026 Q5

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 5

2026 ■ Q5

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 ≤ Age < 30	175	1,326	620	2,121		30 ≤ Age < 35
90	287	276	653		35 ≤ Age	19	41	61	121		Total
4,193											516
											2,461
											1,216
											4,193

(a)(i) Consider the two-way table.

What is the probability a randomly selected professional athlete is a football player?

Show your work.

Question 5

(a)(ii) 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.

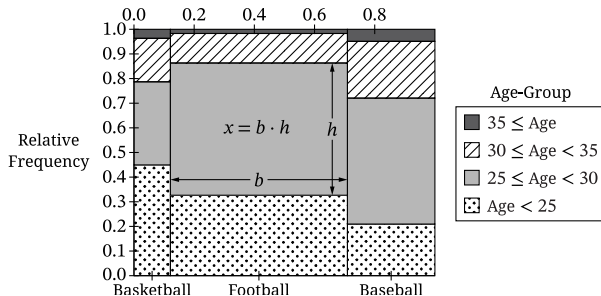
Question 5

- ii. 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



Question 5

~ ~ ~
Basketball Football Baseball
Time of Sport

Question 5

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

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

[Mosaic plot titled "Relative Frequency of Age-Group by Type of Sport Played"; horizontal axis "Type of Sport" with three columns Basketball, Football, Baseball]

Question 5

whose widths are proportional to each sport's share of the total 4,193 athletes; vertical axis "Relative Frequency" from 0.0 to 1.0. Each column is divided into four stacked segments by Age-Group, shaded by the legend: dotted = $\text{Age} < 25$, light gray = $25 \leq \text{Age} < 30$, hatched = $30 \leq \text{Age} < 35$, dark gray = $35 \leq \text{Age}$. The Football column is labeled with b as its width (horizontal extent) and h as the height of one of its segments, with the relation $x = b \cdot h$ shown inside a rectangle of that column, where x denotes the area of that rectangle.]

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)?

(b)(ii) What probability does the x displayed in the mosaic plot represent in context?

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(c)(i) Use the information to answer the following questions.

Are the events "Baseball" and " $35 \leq \text{Age}$ " mutually exclusive events? Explain.

(c)(ii) Are the events "Baseball" and " $35 \leq \text{Age}$ " independent events? Show your work.

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(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.