Exercise 3

Paper 2 style · Graphic display calculator

3 7 marks AHL 1.10 ●●○ Typical

A committee of five people is chosen from six teachers and nine students.

(a) Find the number of committees that contain at least two teachers. [3]

(b) The committee is chosen at random. Find the probability that it contains exactly three teachers. [2]

(c) A committee of three teachers and two students sits in a row, teachers and students alternating. Find the number of possible rows. [2]

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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MARKSCHEME (a)

$\binom{15}{5} = 3003$ in total (A1)

none: $\binom{9}{5} = 126$; one: $6 \times \binom{9}{4} = 756$ (M1)

$3003 - 126 - 756 = 2121$ A1

Total 3 marks

MARKSCHEME (b)

$\dfrac{\binom{6}{3}\binom{9}{2}}{\binom{15}{5}} = \dfrac{20 \times 36}{3003}$ (M1)

$= 0.240$ A1

Total 2 marks

Note Exact value $\frac{240}{1001}$.

MARKSCHEME (c)

teacher, student, teacher, student, teacher: $3! \times 2!$ (M1)

$= 12$ A1

Total 2 marks

Note With three and two, the row must start and end with a teacher.