Marked example 1

Paper 1 style · No calculator

1 7 marks AHL 1.10 ●●○ Typical

A gardener plants nine different shrubs in a straight row: four flowering shrubs and five evergreen shrubs. Find the number of possible rows in which

(a) the four flowering shrubs are next to each other; [2]

(b) the row starts and ends with an evergreen shrub; [2]

(c) no two flowering shrubs are next to each other. [3]

MARKSCHEME (a)

$6! \times 4!$ (M1)

$= 17\,280$ A1

Total 2 marks

Note The block of four and the five evergreens make six objects.

MARKSCHEME (b)

$5 \times 4 \times 7!$ (M1)

$= 100\,800$ A1

Total 2 marks

Note An evergreen at each end, then the seven other shrubs in any order.

MARKSCHEME (c)

5! rows of evergreens (M1)

six gaps: ${}^6P_4 = 360$ (M1)

$120 \times 360 = 43\,200$ A1

Total 3 marks

Note Accept $\binom{6}{4} \times 4!$ for ${}^6P_4$.

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