Exercise 1

Paper 1 style · No calculator

1 7 marks AHL 1.10 ●●○ Typical

Ten different paintings are hung in a straight row on a wall: four portraits and six landscapes. Find the number of possible rows in which

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

(b) the row starts and ends with a landscape; [2]

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

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)

$7! \times 4!$ (M1)

$= 120\,960$ A1

Total 2 marks

Note The block of four and the six landscapes make seven objects.

MARKSCHEME (b)

$6 \times 5 \times 8!$ (M1)

$= 1\,209\,600$ A1

Total 2 marks

MARKSCHEME (c)

6! rows of landscapes (M1)

seven gaps: ${}^{7}P_{4} = 840$ (M1)

$720 \times 840 = 604\,800$ A1

Total 3 marks