Bin packing

Answers

Further Maths topic practice

This topic online

Q	Answer	Marks
1	4	2
2	Bin 1: 7, 13, 4; Bin 2: 9, 15; Bin 3: 6, 11, 8; Bin 4: 2	3
3	Bin 1: 18, 12; Bin 2: 16, 14; Bin 3: 9, 7, 5, 3	3
4	**a)** 4 **b)** Bin 1: 2.4, 1.7, 0.9; Bin 2: 3.1, 1.3; Bin 3: 2.6, 2.2; Bin 4: 3.5; Bin 5: 1.8 **c)** Bin 1: 3.5, 1.3; Bin 2: 3.1, 1.8; Bin 3: 2.6, 2.4; Bin 4: 2.2, 1.7, 0.9 **d)** optimal: 4 reels = lower bound	7
5	**a)** 11 + 9, 13 + 7, 10 + 6 + 4 full; 8, 2, 5 in a fourth bin **b)** lower bound 4 = number of bins used	5
6	**a)** $x + 23 > 30$, $x + 17 \leq 30$, $x + 22 > 30$ **b)** 10, 12, 13 **c)** Bin 1: 17, 12; Bin 2: 14, 11, 5; Bin 3: 9, 8, 6; optimal (lower bound 3)	7
7	37, 38 or 39	4
8	**a)** $75 + x \geq 92 > 72$ **b)** $17 \leq x \leq 21$ **c)** Bin 1: 10, 14; Bin 2: 21, 3; Bin 3: 16, 8; Bin 4: 13, 11; 4 bins, optimal	7
9	**a)** 4 **b)** Bin 1: 1.2, 0.8, 1.5; Bin 2: 2.1, 0.6, 0.7; Bin 3: 1.9, 1.1; Bin 4: 1.4; Bin 5: 2.4 **c)** Bin 1: 2.4, 1.2; Bin 2: 2.1, 1.5; Bin 3: 1.9, 1.4; Bin 4: 1.1, 0.8, 0.7, 0.6 **d)** 4 planks = lower bound, optimal	8
10	**a)** 3 **b)** Bin 1: 410, 360, 125; Bin 2: 320, 280, 260; Bin 3: 230, 175, 150, 90 **c)** 3 vans = lower bound 3 **d)** 255 kg	8
11	**a)** 35 31 26 23 19 17 14 12 8 5 **b)** Bin 1: 35, 5; Bin 2: 31, 8; Bin 3: 26, 14; Bin 4: 23, 17; Bin 5: 19, 12 **c)** lower bound 5; optimal	9
12	**a)** Bin 1: 85, 75, 15; Bin 2: 75, 60, 40; Bin 3: 55, 50, 50; Bin 4: 35 **b)** 3 **c)** 85 + 60 + 35, 75 + 55 + 50, 75 + 50 + 40 + 15 **d)** heuristic: not guaranteed optimal	8

Full worked solutions, written out by hand, are on the solutions sheet for this topic.

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