4.5 Decision: Algorithms and Graph Theory Depth: 10-minute Pack

Total Marks

EDEXCEL 9FM0 · Calculator allowed · about 10 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The lap times, in seconds, recorded for seven laps of a go-kart track, in the order the laps were driven, are:

42, 17, 56, 8, 31, 24, 63

(a) Using the first item of each sublist as the pivot, perform a quicksort on this list to sort it into ascending order. At each stage, state the pivot used and the two resulting sublists (items less than the pivot, and items greater than or equal to the pivot). Continue until every sublist contains at most one item, then state the final sorted list. **(5)**

(b) State the total number of pivots used to sort the list completely. **(1)**

(Total for Question 1 is 6 marks)

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Mark scheme · 4.5 Decision: Algorithms and Graph Theory Depth: 10-minute Pack

Question 1

(a) first pivot = 42 identified, with correct sublists {17, 8, 31, 24} (< 42) and {56, 63} (≥ 42)	**M1**
(a) correct second-stage split on {17, 8, 31, 24}: pivot 17, giving {8} and {31, 24}	**A1**
(a) correct second-stage split on {56, 63}: pivot 56, giving { } and {63}	**A1**
(a) correct third-stage split on {31, 24}: pivot 31, giving {24} and { }	**A1**
(a) correct final sorted list 8, 17, 24, 31, 42, 56, 63 cao, with all four pivots (42, 17, 56, 31) correctly identified	**B1**

(a) Answer: Final sorted list: 8, 17, 24, 31, 42, 56, 63.

(b) 4 pivots cao	**B1**

(b) Answer: 4 pivots.

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