Cambridge International A Level

Cambridge Assessment International Education
Cambridge International Advanced Level

THINKING SKILLS **9694/31**

Paper 3 Problem and Analysis Solution **October/November 2017**

MARK SCHEME

Maximum Mark: 50

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Question	Answer	Marks
1(a)	The scenic route loses $20 \times 25 = 500$ g, whereas the direct route loses $60 \times 10 = 600$ g. *Award 1 mark for either of these masses, or for 'scenic by 100 g'.* *No marks for unsupported answer.*	**2**
1(b)	With the better-insulated box, the direct route loses $10 \times 20 = 200$ g, whereas the scenic route loses $5 \times 50 = 250$ g. So Faridah could save 500 g – 200 g = 300 g.	**1**
1(c)	It would take 2 days, each day saving 300 g of ice cream, to recoup \$1, so it would take 30 days to recoup the \$15, which corresponds to 6 weeks. *Award 1 mark for 50¢ per day or equivalent.*	**2**
1(d)	In terms of ice-cream saving, the \$0.80 bus fare corresponds to 600×0.8 g = 480 g of ice cream. Currently, Faridah is losing 500 g of ice cream a day, so the bus journey would be an improvement if she lost less than 20 g of ice cream on the journey, which means that the journey would have to take less than 20 minutes. *Award 1 mark for comparing the net cost of taking a bus journey (for an arbitrary number of minutes) and the net cost of not;* *this includes consideration of 0 minutes, which reduces to the equivalence between the bus fare and 480 g of ice cream* *OR* *for an algebraic representation: (t/600) + 0.8 = 500/600.*	**2**
1(e)	The total quantity needed is 2300 g *1 mark for any comparison of profit from n normal ice-creams on scenic route (500 g lost, \$1 for 600 g) with profit from n luxury ice creams on direct route (800 g lost, \$1 for 500 g).* *e.g.: 800 g of luxury gives no money, whereas 800 g of normal yields 50 cents.* *1 further mark for any improved comparison of quantities, or a comparison of rates (e.g. every additional 300 g of ice cream would be sold for 10¢ more if it is the better quality ice cream, so 1500 g is needed to compensate for the 50¢ loss).* *Alternatively:* *(q – 500)/600 = (q – 800)/500* [2 marks; 1 mark for either side correct]	**3**

Question	Answer	Marks
2(a)	5	**1**
2(b)	03:30 on 21st December	**1**

Question	Answer	Marks
2(c)	11:25 on 2nd July *1 mark for an otherwise correct answer which fails to deal with BST or DST correctly.* *Alternatively: 1 mark for correct time AND incorrect date or date omitted.*	**2**
2(d)(i)	28 days BST: 29 March to 25 October DST: .... to 5 April and 4 October to ... Overlap = 29 March to 5 April (7 days) + 4 October to 25 October (21 days) *Award 1 mark for 7 days or 21 days or 3 correct dates given.* *SC: 1 mark for 156 days (using complement of one DST or BST time period)*	**2**
2(d)(ii)	35 days Always 7 days in March/April. Maximum number of days overlap in October = 28 days, for example, when first Sunday is on 2nd October and last Sunday is on 30th October.	**1**
2(e)	20:12 on 18th March Total flight time = 31 h 12 min + 24 h stop-overs. Time difference NY to Sydney (DST applies) = 15 hours. Total time elapsed = 2 days 22 h 12 min. From a 22:00 start on 15th March, this gives arrival time of 20:12 on 18th March. *1 mark for travel time correct 31h 12min (+24) or final answer of 10:46 (which uses the direct time from NY to Sydney)* *OR evidence of correct local date and time for arrival/departure at London or Perth in clearly stated time system.* *OR* *2 marks for 2 days 22h 12 min (or equivalent)* *OR 19:12 OR 21:12 on 18th March (one incorrect application of DST)* *OR correct time (with working) but incorrect date/lack of date*	**3**

Question	Answer	Marks
3(a)(i)	Midnight – 22:00 cars, with one person per car: 168 – 85 = 83.	**1**
3(a)(ii)	85	**1**
3(a)(iii)	Mean number of cars in the staff car park over the three days: 10645 Discount shiftworkers cars: 10645 – 85 = 10560 Average 1.1 occupants per car *1 mark each for up to two of the above if final answer incorrect* 10560 × 1.1 = 11616	**3**

Question	Answer	Marks
3(b)	All staff travel by car. Absence rate the same. Car occupancy ratios are the same. Hours for non-shiftworkers are the same / all non-shiftworkers are in by 10:00. Shiftworker employee:position ratio is the same. Shifts follow same pattern (hours and/or uniformity). *1 mark each (max 2)*	**2**
3(c)(i)	5 positions require 27 employees. Each shift has 10 positions. So 54 shift-workers needed. [1 mark] 3233 – 54 = 3179	**2**
3(c)(ii)	There are 2730 – 10 = 2720 non-shiftworking staff cars in the car park 1.1 × 2720 = 2992 3179 – 2992 = 187 *1 mark for "1.1 × their estimate of non-shift-working staff cars"* *OR* *SC: 1 mark for 176 (forgets to subtract 10)*	**2**
3(d)	Number of shiftworkers: 27 × 85/5 = 459 [1 mark] Absence rate for non-shiftworking staff = 187/3179 [1 mark] So total non-shiftworking employees = 11616 × (3179/2992) = 12342 [1 mark] Total employees is therefore 459 + 12342 = 12801	**4**

Question	Answer	Marks
4(a)	The Last Straw (4:30)	**1**
4(b)	1983	**1**
4(c)	History could have been 11 – 8 = 3 weeks at number 2. [1 mark] Water could have spent all 12 of its weeks in the Top Ten at number 2. 15	**2**
4(d)(i)	First and Safety *Award 1 mark for each*	**2**
4(d)(ii)	2nd Night (Goose)	**1**
4(e)	Sum of 4:30, 4:10, 3:30, 3:20, 4:30, 3:30 and 3:20 is 26:50 [1 mark] 35 – 26:50 = 8 minutes 10 seconds / 8:10 / 490 seconds *Accept 8 minutes, provided it is clear that the answer has been rounded down to the nearest minute.*	**2**

Question	Answer	Marks
4(f)(i)	*Award 1 mark each of the following (maximum 2 marks):* • Cooks has not been performed for three nights / must be performed tonight. • Late has not been performed for three nights / must be performed tonight. • Straw has been performed for the last three nights / cannot be performed tonight.	**2**
4(f)(ii)	*For 4 marks to be awarded:* • *the running order must include Cooks, Stitch, Water and Late;* • *the other three songs must have a total time of no more than 11 minutes and must **not** include Hope or Straw;* • *no more than two songs can come from the same year of release;* • *the songs must be listed in order of release.* For example, {Cooks; Goose; Sky; Stitch; Water; Late; Milk} (28:10). *If 4 marks cannot be awarded, award 1 mark for each of the following (maximum 3 marks):* • Any running order that has seven songs in order of their release **and** has no more than two from the same year. • Any running order of seven songs containing Cooks, Stitch, Water **and** Late. • Evidence of recognition that these four songs have a total time of 18 minutes / the other three songs must have a total time of 11 minutes or less. • Evidence that Hope **and** Straw have been left out of the running order deliberately.	**4**