CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Level

MARK SCHEME for the October/November 2015 series

9694 THINKING SKILLS

9694/33 Paper 3 (Problem Analysis and Solution), maximum raw mark 50

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CAMBRIDGE
International Examinations

1 (a) Which one would Jack select if he ignored other considerations? [1]

Only emmer and *kopp* have the largest capacity; *kova*, *seau* and *kopp* have the best handle, so *kopp* is only choice for best of both.

(b) (i) What stops Jill having both her priorities? [1]

None of the lowest price has the best pouring.
OR The best pourer does not have the lowest price.
OR The best pourer has highest price.
OR There's no overlap between best pourer and lowest price.

(ii) Which one would she select if her main requirement were cost, and then she would look for best pouring given minimum price, ignoring Jack's preferences? [1]

Kova and *seau* are the lowest price, but she would take the better pourer: *kova*.

(c) Which one do they select? Explain why. [2]

Emmer, *kova*, *seau* and *kopp* are all acceptable for Jack; Jill would accept *ndoo*, *seau* or *kova*. That leaves *kova* or *seau* as possible. But *kova* has both the larger capacity and the better pouring. Hence *kova*

1 mark for answer, 1 mark for explanation including use of secondary criteria (capacity and pouring).
OR
1 mark total for seau *with explanation that it is acceptable to both.*
OR
1 mark for identification of choice between kova and seau.

(d) Since a lower price is a better price, suggest what to do with the rating for price. [1]

Any decreasing function of price (over range \$11–\$15). e.g. \$20 – price, 1/price.

Accept non-technical descriptions of the transformation, e.g. 'draw it the other way around', 'take from outside'.

(e) (i) Bucket A is better than bucket B in precisely two categories and bucket B is better than bucket A in precisely two categories. Sketch, on one set of axes, two possible pentagons for buckets A and B. [1]

Any correct diagram.

(ii) If the pentagon for bucket C touches but does not go outside that of bucket D, would any customer be disadvantaged if bucket C were no longer available? Explain your answer. [1]

No. Whatever the customer's priorities, bucket D is **always** as good or better (for each consideration).

(f) Give an example of ratings for a seventh bucket, the *spand*, which doesn't have the worst rating of any of the buckets in the table for any factor, but which nobody would choose to buy based on the *Qualis?* assessment. Explain why they would not. [2]

e.g. Capacity 5 litre, Handle ★★, Pouring ★★, Base ★★, Price $14 [1 mark]

Kopp or *pail (as appropriate)* is no worse in any category and is better in some. [1 mark]

2 (a) (i) What alternative hypothesis about some suspects' heights would be consistent with these two medians? [1]

a = 168 AND d = 168
OR a = d.

(ii) Identify one of the other medians which confirms that DI Kilmartin was in fact correct. [1]

Median (Blue) OR Median (Dark)

(b) DI Kilmartin uses another median to conclude the height of suspect E. State which median he uses and the height of suspect E. [2]

Median (Brown) + B's height: [1 mark]
E's height is 172 [1 mark]

(c) Explain how the heights of the remaining two suspects can be found, stating clearly which medians are used. [2]

Median (Male) + E's height allows suspect D's height to be deduced
Median (Blue) + D's height allows suspect A's height to be deduced

OR

Median (Left) + E's height allows suspect A's height to be deduced
Median (Blue) + A's height allows suspect D's height to be deduced

OR

Median (Male) + E's height allows suspect D's height to be deduced
Median (Left) + E's height allows suspect A's height to be deduced

Award 2 marks for reference to a pair of appropriate medians and which height obtained.
Award 1 mark for E's height and appropriate median
OR Award 1 mark for a pair of appropriate median.

(d) Suspect K is the tallest of the five. Explain why it is not possible to deduce his height from the medians. [1]

For each descriptor Suspect K is one of a group of at least three.

SC1: generic observation that medians typically do not address outliers (such as tallest).

(e) Deduce the heights of the other four suspects. **[3]**

I = 181 (because she is the only female)

J = 186 (because he and suspect I are the only fair-haired suspects)

L = 168 (J & L are brown-eyed)

H = 178 (because of median dark-haired, or L&H left-handed, or by elimination as all medians of odd-sized sets (female blue right dark) must be attained.)

Award 1 mark I's height, 1 mark for J, 1 mark for both L and H.

3 (a) Buses from how many zones might pick up someone travelling from zone 6 to zone 5? [1]

4 (from 6, 7, 8 or 9)

(b) What is the maximum possible number of different fares? [2]

All single zone fares are the same (zero distance). From 9 to 8 but same in both directions so 1 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 37.

Award 1 mark for 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 ***soi*** *(36 or 45 or 73)*

(c) Explain how this helps the bus system to run more efficiently. [1]

It discourages people from getting on buses which could take others further but would likely end up with empty seats for parts of the journey.

To Zone	1	2	3	4	5	6	7	8	9
18:00	17:40	17:25	17:10	16:40	16:25	16:10	15:45	15.20	15:00
	20	15	15	30	15	15	25	25	20
	20	35	50	80	95	110	135	160	180

(d) After what time is there no chance that there will be a bus to take someone to Namatanai from the border of zones 6 and 7? [2]

It takes 25 + 25 + 20 minutes for all of zones 7–9, but they must arrive by 18:00, so 16:50.

1 mark for 70 minutes OR *110 minutes seen*
OR *a correct method with arithmetic error*.

(e) (i) What is the distance from Kavieng terminus to the far end of zone 4? [1]

80 km

(ii) Show that the distance from the middle of zone 5 to the middle of zone 7 is 35 km. [2]

15/2 + 15 + 25/2 = 35

OR

(135 + 110)/2 – (95 + 80)/2

OR

(Mid 5 to mid 6) 15 + (mid 6 to mid 7) 20

1 mark for 15/2 OR 25/2 OR (135 + 110)/2 OR (95 + 80)/2 OR associated times

(f) What is the fare from zone 8 to zone 3? [4]

Middle of zone 3 to middle of zone 2 = 15 km
35 – 15 = 20 km difference
$4.30 – $3.10 = $1.20
$1.20/20 = $0.06 per km
Award 2 marks for $0.06 ***soi****; 1 mark for substantially correct method.*
$3.10 – 15 × $0.06 = $2.20 or $4.30 – 35 × $0.06 = $2.20 is the fixed amount [1 mark]
Middle of zone 8 to middle of zone 3 = 105 km
$2.20 + 105 × $0.06 = $8.50

(g) What is the fare from zone 8 to zone 3 under this alternative proposal? [2]

Must be $1.20 per zone, which implies $0.70 as the fixed amount [1 mark]
Fare = $0.70 + 6 × $1.20 = $7.90

Award 1 mark for substantially correct method.
Condone $1.90 with use of 5 zones.

4 (a) (i) Who won this round? Justify your answer. [1]

Sally. Sally's total is 152, Doug's total is 147.

Both totals (or distances from 150) must be stated and Sally identified as the winner for the mark to be awarded.

(ii) How many points did the winner score? [2]

30

If 2 marks cannot be awarded, award 1 mark for either of the following:

- Identifying the tiles thrown away as 0, 1, 6, 6, 8 and 9.
- Recognising that the total of the 20 tiles is 90 **and** attempting to subtract the total of the 12 tiles on the cards together with the 2 tiles left in the bag (correctly or incorrectly calculated).

(b) How close to 150 can Sally get if she keeps

(i) the 0 tile? [1]

157 (e.g. 86 + 31 + 40)
OR 7 away (from 150)

(ii) the 2 tile? [1]

141 (e.g. 86 + 34 + 21)
OR 159 (e.g. 86 + 31 + 42)
OR 9 away (from 150)

(iii) the 9 tile? [1]

139 (e.g. 86 + 34 + 19)
OR 11 away (from 150)

(c) What must Sally do with these tiles in order to win this round? Explain your answer in detail. [3]

Award 1 mark for each of the following:

- She must give the 9 to Doug
- so that his best total will be 158 (e.g. 73 + 56 + 29)
  OR
  if she gives him the 0 or the 2, his best total would be 149 or 151 (respectively) (e.g. 73 + 56 + 20 or 73 + 56 + 22).
- She must keep the 0, (i.e. discard 2) to make 157 / to be closer to 150 than Doug.
  (157 may be seen in response to (b)(i) above.)

(d) What are the numbers on the two tiles that are left in the bag? [3]

0 and 7

If 3 marks cannot be awarded:

Award 1 mark for evidence of appreciation that the two numbers must add up to 90 – 27 – the sum of the other numbers in the stimulus
1 mark for recognition that the numbers that do not appear in the stimulus are 0, 1, 4, 5, 7, 8 and 9
OR 1 mark for exactly two distinct tiles from this list or from the candidate's list.

(e) Explain how it is possible for 58 points to be scored, and give an example of a completed card that could score 58 points. [3]

Award 1 mark for each of the following:

- the six tiles thrown away must be 7, 7, 8, 8, 9 and 9
- recognition that the winner's three-number total must be 150
- a completed grid that totals 150, with no digit greater than 6 and no digit appearing more than twice (e.g. 64 + 52 + 34)