**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**Cambridge Ordinary Level**

# MARK SCHEME for the October/November 2014 series

## 4040 STATISTICS

**4040/12** Paper 1, maximum raw mark 100

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| | | | |
|---|---|---|---|
| **1** | **(i)** | correct method for mean | M1 |
| | | 46.5 | A1 |
| | | correct method for SD or variance | M1 |
| | | 4.46 or better | A1 |
| | **(ii)** | mean smaller | B1 |
| | | SD larger | B1 |
| **2** | **(i)** | SD/variance = 6, 36 or 36, 6 | M1 |
| | | SD = 6 and variance = 36 | A1 |
| | | med = 48 | B1 |
| | | LQ = 43 | B1 |
| | | UQ = 53 | B1 |
| | | if zero scored allow SC1 for *their* LQ, *their* med, *their* UQ in ascending order | |
| | **(ii)** | *their* UQ | B1√ |
| **3** | **(i)** | **(a)** citizens not in the telephone directory excluded | B1 |
| | | **(b)** better response rate/questions can be clarified by interviewer | B1 |
| | | **(c)** can reach a wide range of people/efficient distribution/ responses obtained very quickly | B1 |
| | | excludes those without internet access/ responses may be from non citizens | B1 |
| | **(ii)** | **(a)** limited number of answers to questions possible/ respondent may feel none of allowed answers appropriate | B1 |
| | | **(b)** any relevant open question | B1 |
| **4** | **(i)** | **(a)** 19 in correct place | B1 |
| | | **(b)** 20 in correct place | B1 |
| | | **(c)** 17 in correct place | B1 |
| | | **(d)** 34 in correct place | B1 |
| | **(ii)** | attempt to find frequencies for variable values 1, 2 (63, 81) | M1 |
| | | 2 | A1√ |

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**5** **(i)** 15/40 or 3/8 or 0.375 B1

**(ii)** 5/40 or 1/8 or 0.125 B1

**(iii)** 6/15 or 2/5 or 0.4 B1

**(iv)** (17/40) × M1
(*their* 17 – 1)/(*their* 40 – 1) M1
272/1560 or 136/780 or 68/390 or 34/195 or 0.174 or 0.17 A1

**6** **(i)** addition of scale readings of 10 km/h wide columns (26 + 43 + 47) M1
116 A1

**(ii)** appreciation of area being proportional to frequency
(may be earned here or in **(iii)** or **(iv)**) M1
62 A1

**(iii)** 40 A1√

**(iv)** 6 A1√

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| | | | |
|---|---|---|---|
| **7** | **(i)** | 1 + 8 + 3 + 37 (=49) | M1 |
| | | 25 + 167 + 40 + 228 (=460) | M1 |
| | | (*their* 49/*their* 460) × 1000 | M1 |
| | | 106.5 | A1 |
| | **(ii)** | correct method for any job group | M1 |
| | | 40 47.9 75 162.3 | A1 |
| | **(iii)** | any one job group rate multiplied by standard population figure | M1 |
| | | sum of four such products | M1 |
| | | (40 × 0.08) + (47.9 × 0.35) + (75 × 0.12) + (162.3 × 0.45) | A1√ |
| | | 102 or 102.0 | A1 |
| | **(iv)** | because its standardised accident rate is lower | M1 |
| | | Fastbuild | A1√ |
| | **(v)** | Kwikbuild 30.7 (or Fastbuild 32.5) | B1 |
| | | Fastbuild 32.5 (or Kwikbuild 30.7) and Kwikbuild | B1 |
| | **(vi)** | crude | B1* |
| | | standardised rate is to eliminate differences in population structures so is meaningless for one category | B1dep |
| **8** | **(i)** | 280 | B1 |
| | **(ii)** | (35/100) × 120 **AG** | B1 |
| | **(iii)** | (45/100) × 160 | M1 |
| | | 72 | A1 |
| | **(iv)** | number completing = 65 + 39 + 10 + 71 + 46 + 37 (=268) | M1 |
| | | *their* **(i)** – *their* 268 | M1 |
| | | 12 | A1 |
| | **(v)** | attempted use of class mid points (75, 105, 135, 165) | M1* |
| | | correct method for mean (Σfx = 5205) | M1dep |
| | | 141 | A1 |
| | **(vi)** | finds 18 + 2 + 15 + 8 + 3 + 6 (=52) | M1* |
| | | ((3 + 6)/*their* 52) × 100 | M1dep |
| | | 17.3% or better or 17% | A1 |
| | **(vii)** | finds 30% of 160 (=48) | M1* |
| | | ((3 + 15)/*their* 48) × 100 | M1dep |
| | | 37.5% or 38% | A1 |

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| | | | | |
|---|---|---|---|---|
| 9 | (i) | **(a)** | 23.5–23.8 | B1 |
| | | **(b)** | 26.2–26.5 | B1 |
| | | **(c)** | 21.2–21.5 | B1 |
| | | **(d)** | 29.5–29.8 | B1 |
| | (ii) | **(a)** | attempt to read cf% values for BMI = 18.5 and 25 and subtract on either graph (65 – 7) (40 – 4) | M1 |
| | | | 57(%)–59(%) | A1 |
| | | **(b)** | 36(%) | A1 |
| | (iii) | | 60% overweight | B1 |
| | | | attempt to read BMI for cf% = 40% + ½ × 60% (=70%) on 2010 graph | M1 |
| | | | 28.8–29.1 | A1 |
| | (iv) | | attempt to read BMI for cf% = 93% on 1980 graph | M1 |
| | | | 30 | A1 |
| | | | Attempt to read cf% for BMI = 30 on 2010 graph | M1 |
| | | | 22(%) | A1 |
| | (v) | | population has become more unhealthy, with specific support<br>median BMI increased<br>or percentage healthy decreased<br>or percentage obese increased | B1 |
| | | | support strengthened by<br>reference to more than one of these changes<br>or citation of specific values for any change | B1 |

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**10 (i)** correctly plotted points B2
allow B1 for 6 or 7 correctly plotted

**(ii)** not in the set of four lowest x values
or any indication of need to order data by x values first B1

**(iii)** method for calculating either semi-average M1
plot of (2, 41) A1
plot of (4.5, 69) A1
method for calculating overall mean M1
plot of (3.25, 55) A1

**(iv)** straight line through at least two of *their* plotted points in **(iii)** B1
correct method for gradient, m, of *their* line M1
correct method for c M1
m = 11.0 – 11.4 and c = 18 – 19 A1

**(v)** 52 B1√

**(vi)** because its line has the greatest gradient **oe** M1
Science (or Statistics if *their* m > 13.8) A1√

**(vii)** difficult to know if pupils perform well because they like a subject,
or they like a subject because they perform well in it B1

**11 (i) (a)** $(0.9)^2$ M1
0.81 or equiv fraction A1

**(b)** 1 – *their* 0.81 or $(0.1 \times 0.9 \times 2) + (0.1)^2$ M1
0.19 or equiv fraction A1√

**(ii)** $0.1 \times 0.4$ M1
$\times (0.9)^3$ M1
$\times 4$ M1
0.11664 or 0.1166 or 0.117 or 0.12 or equiv fraction (729/6250) A1

**(iii) (a)** $(0.1 \times 0.6)^2$ M1
$\times 0.9 \times 3$ M1
0.00972 or 0.0097 or equiv fraction (243/25000) A1

**(b)** $(0.1 \times 0.4) \times (0.9)^2 \times 3$ (L, not O, not O) (0.0972) M1
$(0.1 \times 0.6) \times (0.9)^2 \times 3$ (S, not O, not O) (0.1458) M1
$(0.9)^3$ (not O, not O, not O) (0.729) M1
addition of *their* 0.00972, *their* 0.0972, *their* 0.1458, *their* 0.729 M1
0.98172 or 0.9817 or 0.982 or 0.98 or equiv fraction (24543/25000) A1

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