# Mark scheme

Calculator Crossover Paper 2

40 marks · 45 minutes · Calculator

M = method mark  A = accuracy mark (depends on M marks)  B = independent mark  C = communication
ft = follow through  cao = correct answer only  oe = or equivalent  isw = ignore subsequent working

| Q | Answer | Mark | Guidance |
|---|---|---|---|
| **1(a)** N3 | 6.167573141... | **M1** | for $\sqrt{48.6} = 6.971...$ or $3.7^2 = 13.69$ or $5.2 - 1.85 = 3.35$ or 20.661... seen |
| | | **A1** | for 6.167573... (at least the first 6 figures) |
| **1(b)** | 6.17 | **B1** | for 6.17 (ft their answer to (a) if it has more than 3 significant figures) |
| | | | **Total for Question 1: 3 marks** |
| **2(a)** A5 | $t = \frac{v-u}{a}$ | **M1** | for a correct first step, e.g. $v - u = at$ |
| | | **A1** | for $t = \frac{v-u}{a}$ oe<br>$t = \frac{v}{a} - \frac{u}{a}$ is acceptable. $t = v - \frac{u}{a}$ scores M0 A0. |
| **2(b)** | $r = \sqrt{\frac{A}{\pi}}$ | **M1** | for $r^2 = \frac{A}{\pi}$ |
| | | **A1** | for $r = \sqrt{\frac{A}{\pi}}$ oe<br>Accept $\pm$ in front of the square root. |
| | | | **Total for Question 2: 4 marks** |
| **3** N4 | 10:27 am | **M1** | for listing multiples of 18 and 24 (at least 3 of each), or $18 = 2 \times 3^2$ and $24 = 2^3 \times 3$, or listing times for both buses |
| | | **A1** | for 72 (minutes) identified as the LCM |
| | | **A1** | for 10:27 (am) oe<br>An answer of 10:27 with no working scores all 3 marks. |
| | | | **Total for Question 3: 3 marks** |

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|---|---|---|---|
| **4**<br>S1 | Two different reasons, e.g. the sample is too small; students in the library are likely to use it more than other students | **C1**<br>**C1** | for one correct reason<br>for a second, different correct reason<br>Acceptable reasons: sample too small (15 out of 1200); biased because only students already in the library are asked; only one lunchtime / one day; not random. |
| | | | **Total for Question 4: 2 marks** |
| **5**<br>R5 | 7.7 litres | **M1**<br>**M1**<br>**A1** | for 2.4 ÷ 3 × 8 (= 6.4) or 5.6 ÷ 8 × 3 (= 2.1) or 5.6 ÷ 8 (= 0.7)<br>for recognising yellow paint is the limiting amount, e.g. 2.1 litres of blue with 5.6 litres of yellow<br>for 7.7<br>8 litres (using all the paint) scores 0. 8.8 (from 2.4 + 6.4) scores M1 M0 A0. |
| | | | **Total for Question 5: 3 marks** |
| **6(a)**<br>S4 | median 69.95 s, range 4.5 s | **B1**<br>**B1** | for median = 69.95<br>for range = 4.5 |
| **6(b)** | e.g. On average the Rockets were faster; the Harriers' times were more consistent | **C1**<br>**C1** | for a correct comparison of medians in context, e.g. the Rockets have a lower median so on average they were faster<br>for a correct comparison of ranges in context, e.g. the Harriers have a smaller range so their times were more consistent<br>ft their values from (a). Comparisons must be in context (time/speed/consistency); just stating the numbers scores 0. |
| | | | **Total for Question 6: 4 marks** |
| **7**<br>R16 | £15 583 (15 583.372) | **M1**<br>**M1**<br>**A1** | for 0.86 seen, or 24 500 × 0.86 (= 21 070) as the value after 1 year<br>for $24\,500 \times 0.86^3$, or a complete year-by-year method for 3 years<br>for 15 583 (accept 15 583.37)<br>Simple depreciation 24 500 – 3 × 3430 = £14 210 scores M0 A0. |
| | | | **Total for Question 7: 3 marks** |

| Q | Answer | Mark | Guidance |
|---|---|---|---|
| **8**<br>R1<br>R11 | 3.14 m/s (3.1398...) | **M1**<br><br>**M1**<br>**A1** | for converting one unit correctly, e.g. 21 100 m or 112 minutes or 6720 seconds<br>for 21 100 ÷ 6720 oe, or 11.30... km/h ÷ 3.6<br>for 3.14 (accept 3.139 to 3.140)<br>21.1 ÷ 1.52 (= 13.9) scores M0 M0 A0. |
| | | | **Total for Question 8: 3 marks** |
| **9(a)**<br>G17 | 6361.7 $cm^3$ (6361.725...) | **M1**<br>**A1** | for $\pi \times 9^2 \times 25$<br>for 6361.7 (accept 6361.7 to 6362)<br>Using diameter 9 (radius 4.5) gives 1590.4: M0 A0. |
| **9(b)** | 25 | **M1**<br>**A1** | for their volume ÷ 250 (= 25.4...)<br>for 25 (ft their volume, rounded down)<br>An answer of 25.4 or 26 scores M1 A0. |
| | | | **Total for Question 9: 4 marks** |
| **10(a)**<br>P8 | Monday: 0.85 for not late; Tuesday: 0.15, 0.85, 0.15, 0.85 | **B1**<br>**B1** | for 0.85 on the Monday 'Not late' branch<br>for all four Tuesday branches correct (0.15 Late, 0.85 Not late on each pair) |
| **10(b)** | 0.255 | **M1**<br>**A1** | for 0.15 × 0.85 (= 0.1275) seen (ft their tree)<br>for 0.255 oe<br>0.1275 on its own scores M1 A0. |
| | | | **Total for Question 10: 4 marks** |
| **11**<br>G20 | Yes, angle $x = 6.9°$ (6.947...°) which is less than 7° | **M1**<br><br>**A1**<br>**C1** | for $\sin x = \frac{0.75}{6.2}$ oe<br>for 6.9 (accept 6.94 to 6.95)<br>for Yes with a correct angle (rounded to more than 1 s.f.) compared with 7°<br>Using tan: $\tan x = \frac{0.75}{6.2}$ gives 6.89...°: M0 A0 C0. Accept the method sin 7° × 6.2 = 0.755... m > 0.75 m, so Yes (M1 A1 C1). |
| | | | **Total for Question 11: 3 marks** |

| Q | Answer | Mark | Guidance |
|---|---|---|---|
| **12**<br>A19 | coffee £2.15, muffin £2.45 | **M1**<br><br>**M1**<br><br><br><br>**A1**<br>**A1** | for setting up two equations, e.g. $3c + 2m = 11.35$ and $2c + 5m = 16.55$<br>for a correct method to eliminate one variable, e.g. $6c + 4m = 22.70$ and $6c + 15m = 49.65$ then subtracting ($11m = 26.95$)<br>for one correct value<br>for both correct values<br>Trial and improvement leading to both correct values scores full marks. Answers in pence (215 and 245) are acceptable. |
| | | | **Total for Question 12: 4 marks** |