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# Topical Worksheets for Cambridge IGCSE™

# Mathematics (0580)

## Probability (I)

## Mark Scheme

1st edition, for examination until 2025

| Question | Answer | Marks | AO Element | Notes | Guidance |
|---|---|---|---|---|---|
| 1(a) | 20 [< $t \leqslant$] 25 | **1** | | | |
| 1(b) | 25 [< $t \leqslant$] 30 | **1** | | | |
| 1(c) | 28.3 or 28.33.. | **4** | | **M1** for 22.5, 27.5, 32.5, 37.5, 42.5 soi<br>**M1** for $\Sigma fx$ where $x$ is in the correct interval including boundaries<br>**M1**dep for $\Sigma fx \div 120$ or $\Sigma fx \div (44 + 32 + 28 + 12 + 4)$ | |
| 1(d) | $\frac{4}{120}$ oe isw | **1** | | | |
| 2(a) | $\frac{9}{20}$ oe | **1** | | | |
| 2(b)(i) | **M1** for $\frac{6}{20} \times \frac{5}{19}$<br>**A1** for $\frac{30}{380}$ oe | **2** | | | |

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|---|---|---|---|---|---|
| 2(b)(ii) | $\frac{258}{380}$ oe | **4** | | **M3** for $1-\frac{3}{38}-\frac{5}{20}\times\frac{4}{19}-\frac{9}{20}\times\frac{8}{19}$ oe<br>or **M2** for $\frac{3}{38}+\frac{5}{20}\times\frac{4}{19}+\frac{9}{20}\times\frac{8}{19}$ or $\frac{5}{20}\times\frac{9}{19}+\frac{6}{20}\times\frac{9}{19}+\frac{6}{20}\times\frac{5}{19}$ oe<br>or **M1** for for one correct product other than $\frac{6}{20}\times\frac{5}{19}$ | |
| 3(a)(i) | $1.5 < h \leqslant 1.6$ | **1** | | | |
| 3(a)(ii) | 1.62 or 1.623… nfww | **4** | | **M1** for 1.35, 1.45, 1.55, 1.65, 1.75 1.85 soi<br>**M1** for $\Sigma fx$<br>**M1 dep** for *their* $\Sigma fx \div 120$ | |
| 3(b)(i) | $\frac{14}{120}$ oe | **1** | | | |

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|---|---|---|---|---|---|
| 3(b)(ii) | $\frac{21}{20060}$ oe | **4** | | **M3** for $3\left(\frac{14}{120}\times\frac{7}{119}\times\frac{6}{118}\right)$<br>or **M2** for $\frac{14}{120}\times\frac{7}{119}\times\frac{6}{118}$ isw<br>or **M1** for $\frac{14}{120}, \frac{7}{119}, \frac{6}{118}$<br>After 0 scored, **SC1** for answer $\frac{343}{864000}$ or $\frac{343}{288000}$ oe | |
| 3(c)(i) | 55, 79, 106, 120 | **2** | | **B1** for 2 or 3 correct | |
| 3(c)(ii) | Correct diagram | **3** | | **B1** for correct horizontal plots<br>**B1FT** for correct vertical plots<br>**B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 6 points<br>If 0 scored **SC1** for 5 out of 6 points correctly plotted | |

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|---|---|---|---|---|---|
| 3(d)(i) | 1.62 to 1.63 | **1** | | | |
| 3(d)(ii) | 1.57 to 1.58 | **2** | | **B1** for 48 soi | |
| 4(a) | $\frac{11}{30}$ oe | **1** | | | |
| 4(b) | $\frac{25}{30}$ oe | **1** | | | |
| 4(c) | 0 | **1** | | | |
| 5 | 0 | **1** | | | |
| 6 | $\frac{147}{160}$ oe | **3** | | **M2** for $\frac{1}{10} \times \frac{3}{4} + \frac{9}{10} \times \frac{15}{16}$ or **M1** for $\frac{1}{10} \times \frac{3}{4}$ or $\frac{9}{10} \times \frac{15}{16}$ | |
| 7 | $\frac{2}{20}$ oe | **2** | | **M1** for $\frac{2}{5} \times \frac{1}{4}$ oe | |
| 8(a) | $\frac{9}{16}$ oe | **2** | | **B1** for $\frac{9}{k}$ or $\frac{k}{16}$ provided fraction is less than 1 | |

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|---|---|---|---|---|---|
| 8(b) | 46 | **1** | | | |
| 9(a) | $1 - r$ | **1** | | | |
| 9(b)(i) | $(1 - r)(1.3 - r)$ [$= 0.4$] | **1** | | **FT** *their* **(a)** dep on **(a)** being an expression in $r$ | |
| 9(b)(ii) | **M1** for $1.3 - 1.3r - r + r^2$ or better nfww<br><br>**M1** for $0.9 - 2.3r + r^2$ [$= 0$]<br><br>OR<br>$13 - 13r - 10r + 10r^2 = 4$ oe<br><br>**A1** for $10r^2 - 23r + 9 = 0$ | **3** | | **FT** *their* **(b)(i)**<br><br>**Strict FT** *their* expansion to a quadratic then equating to 0.4 and then collecting to 3 terms on 'one side'<br><br>OR<br><br>**Strict FT** *their* expansion to a quadratic = 0.4 all multiplied by 10<br><br>no errors or omissions seen | |

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| 9(b)(iii) | **B2** for $(5r - 9)(2r - 1)$ [= 0]<br><br>**B1** for $[r =] \frac{9}{5}$ oe $\quad [r =] \frac{1}{2}$ oe | **3** | | or **B2** for e.g. $5r(2r-1) - 9(2r-1)$ **and then** $5r - 9 = 0$ **and** $2r - 1 = 0$<br><br>or **B1** for $5r(2r-1) - 9(2r-1)[= 0]$ or $2r(5r-9) - 1(5r-9)[= 0]$ or $(5r + a)(2r + b)$ [= 0] where $a$, $b$ are integers and $ab = +9$ or $2a + 5b = -23$<br><br>If 0 scored, **SC1** for $5r - 9$ **and** $2r - 1$ seen but not in factorised form | |
| 9(b)(iv) | 0.8 or $\frac{4}{5}$ oe | **1** | | | |

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| 10 | $\frac{1}{6}$ oe | **4** | | **M3** for $\frac{5}{9} \times \frac{4}{8} \times \frac{3}{7} + \frac{4}{9} \times \frac{3}{8} \times \frac{2}{7}$<br>or **M2** for $\frac{5}{9} \times \frac{4}{8} \times \frac{3}{7}$ or $\frac{4}{9} \times \frac{3}{8} \times \frac{2}{7}$<br>or **M1** for $\frac{5}{9}$, $\frac{4}{8}$, $\frac{3}{7}$ seen or $\frac{4}{9}$, $\frac{3}{8}$, $\frac{2}{7}$ seen<br>If 0 scored, **SC1** for $\frac{5^3 + 4^3}{729}$ oe | |
| 11(a) | $\frac{x-1}{x+2}$ | **2** | | **B1** for either numerator or denominator correct | |

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| 11(b)(i) | **B1** for $\frac{x}{x+3} \times \frac{x-1}{x+2} = \frac{7}{15}$<br>**M1** for<br>$15x(x-1) = 7(x+3)(x+2)$<br>**M1** for<br>$15x^2 - 15x = 7x^2 + 21x + 14x + 42$<br>**A1** for<br>$[8x^2 - 50x - 42 = 0]$<br>$4x^2 - 25x - 21 = 0$ | **4** | | **FT** *their* **(a)(i)** = $\frac{7}{15}$<br>Removes all algebraic fractions<br>**FT** *their* equation if in comparable form<br>Correctly expands all brackets<br>**FT** *their* equation if in comparable form<br>With no errors or omissions seen and one further stage seen after final M1 | |
| 11(b)(ii) | **M2** for $(4x+3)(x-7)[=0]$<br>**B1** for 7 and $-\frac{3}{4}$ | **3** | | **M1** for<br>$4x(x-7) + 3(x-7)$ or $x(4x-3) - 7(4x-3)$ or for $(4x+a)(x+b)$ where either $ab = -21$ or $4b + a = -25$<br>If 0 scored, **SC1** for $4x + 3$ **and** $x - 7$ seen but not in factorised form | |

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|---|---|---|---|---|---|
| 11(b)(iii) | 7 | **1** | | **FT** *their* positive solution | |
| 12 | $\frac{80}{153}$ oe | **3** | | **M2** for $2 \times \frac{10}{18} \times \frac{8}{17}$ oe<br>or **M1** for $\frac{10}{18} \times \frac{8}{17}$ oe<br>If 0 scored, **SC1** for $\frac{160}{324}$ oe | |
| 13 | $\frac{11}{51}$ oe | **4** | | **M3** for $\frac{10}{18} \times \frac{9}{17} \times \frac{8}{16} + \frac{8}{18} \times \frac{7}{17} \times \frac{6}{16}$ oe<br>or **M2** for $\frac{10}{18} \times \frac{9}{17} \times \frac{8}{16}$ oe or $\frac{8}{18} \times \frac{7}{17} \times \frac{6}{16}$ oe<br>or **M1** for $\frac{10}{18}, \frac{9}{17}, \frac{8}{16}$ or $\frac{8}{18}, \frac{7}{17}, \frac{6}{16}$<br>If 0 scored, **SC1** for $\frac{1512}{5832}$ oe | |

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| 14(a) | 111.25 | **4** | | **M1** for midpoints soi (25, 75, 112.5, 137.5, 175)<br>**M1** for $\sum fx$ with $x$ in correct interval including both boundaries<br>**M1** (dep on 2nd **M1**) for $\sum fx \div 20$ | |
| 14(b) | 2 7 11 17 | **2** | | **B1** for three correct | |
| 14(c) | $\frac{3}{20}$ oe | **1** | | | |
| 15(a) | $\frac{94}{200}$ oe | **2** | | **M1** for $\frac{46}{200} + \frac{48}{200}$ oe | |
| 15(b) | 14.1 or 14.07… | **3** | | **M2** for $2\left(\frac{50}{200} \times \frac{56}{199}\right)$ oe<br>or **M1** for $\frac{50}{200} \times \frac{56}{199}$ oe | |
| 16(a) | 14 | **1** | | | |
| 16(b) | 16 | **1** | | | |

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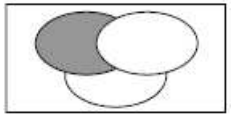
| 16(c) | $\frac{20}{462}$ oe | **3** | | **M2** for $\frac{5}{22} \times \frac{4}{21}$<br>or **M1** for $\frac{5}{22}$ seen | |
| 16(d) | Correct shading<br>  | **1** | | | |
| 17(a) | $\frac{3}{5} > \frac{1}{4}$ oe<br>or $\frac{12k}{20k}$ and $\frac{5k}{20k}$<br>or 0.6 and 0.25<br>or 60% and 25% | **1** | | | |
| 17(b) | $\frac{11}{20}$ oe | **3** | | **M2** for $\frac{3}{5} \times \frac{3}{4} + \frac{2}{5} \times \frac{1}{4}$ oe<br>or $1 - \frac{3}{5} \times \frac{1}{4} - \frac{2}{5} \times \frac{3}{4}$ oe<br>or **M1** for $\frac{3}{5} \times \frac{3}{4}$ or $\frac{2}{5} \times \frac{1}{4}$ oe<br>(but not as part of a larger product) | |

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|---|---|---|---|---|---|
| 18 | $\frac{11}{25}$ oe | **3** | | **M2** for $\frac{3}{5} \times \frac{3}{5} + \frac{2}{5} \times \frac{1}{5}$ oe<br>or $1 - \frac{3}{5} \times \frac{2}{5} - \frac{2}{5} \times \frac{4}{5}$ oe<br>or **M1** for $\frac{3}{5} \times \frac{3}{5}$ or $\frac{2}{5} \times \frac{1}{5}$<br>or for a correct tree showing all 25 outcomes with the 11 correct outcomes identified | |
| 19(a)(i) | $\frac{10}{20} \times \frac{9}{19}$ oe | **M2** | | **B1** for $\frac{9}{19}$ oe seen | |

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| 19(a)(ii) | $\frac{62}{95}$ oe | **4** | | **M3** for $\frac{6}{20} \times \frac{14}{19} + \frac{10}{20} \times \frac{10}{19} + \frac{4}{20} \times \frac{16}{19}$ oe<br>or<br>$1 - \frac{6}{20} \times \frac{5}{19} - \frac{10}{20} \times \frac{9}{19} - \frac{4}{20} \times \frac{3}{19}$ oe<br>or **M2** for the sum of two products of different flavours isw<br>or **M1** for one correct product of different flavours isw | |

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|---|---|---|---|---|---|
| 19(b) | $\frac{5}{57}$ oe | **3** | | **M2** for $N \times \left(\frac{4}{20} \times \frac{3}{19} \times \frac{16}{18}\right) + \frac{4}{20} \times \frac{3}{19} \times \frac{2}{18}$ oe<br>or for $3\left(\frac{4}{20} \times \frac{3}{19} \times \frac{16}{18}\right)$ oe<br>or $1-\left\{N \times \left(\frac{4}{20} \times \frac{16}{19} \times \frac{15}{18}\right) + \frac{16}{20} \times \frac{15}{19} \times \frac{14}{18}\right\}$ oe<br>or **M1** for $\frac{4}{20} \times \frac{3}{19} \times \frac{k}{18}$ oe seen | |

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| 20(a) | $\frac{8}{20}$ oe | **3** | | **M2** for $\frac{2}{5} \times \frac{1}{4} + \frac{3}{5} \times \frac{2}{4}$<br><br>or **M1** for one of these products<br>OR<br>**M1** for probability tree identifying all 20 outcomes with the correct 8 identified<br>OR<br>**M1** for completed possibility space / 2-way table identifying the 8 possible outcomes out of 20, oe<br><br>**SC1** for $\frac{13}{25}$ with replacement | |

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| 20(b) | $\frac{9}{25}$ oe | **3** | | **M2** for $\frac{2}{5} \times \frac{3}{5} + \frac{3}{5} \times \frac{1}{5}$ oe<br>or **M1** for one of these products<br>OR<br>**M1** for probability tree identifying all 25 outcomes with the correct 9 identified<br>OR<br>**M1** for completed possibility space / 2-way table identifying the 9 possible outcomes out of 25, oe | |
| 20(c) | Jojo and e.g. $\frac{40}{100} > \frac{36}{100}$ | **1** | | **1FT** *their* **(a)** and **(b)** dep on being in range 0 to 1 | |
| | | | | | [Total: 115] |

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