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|  | |  |  | | --- | --- | | **OCR (9-1) Mathematics**  **Formulae Test (Calculator)**  **Higher Tier** |  | | **You may use:**   * A scientific or graphical calculator * Geometrical instruments * Tracing paper | **Recommended time:** 40 minutes | |  | | |  |

|  |  |
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| **Name** |  |

## INSTRUCTIONS

* Use black ink. You may use an HB pencil for graphs and diagrams.
* Complete the box above with your name.
* Answer **all** the questions.
* Read each question carefully before you start to write your answer.
* Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
* Write your answer to each question in the space provided.
* Additional paper may be used if required.

## INFORMATION

* The total number of marks for this paper is **40**.
* The number of marks is given in brackets **[ ]**.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | |  |  | | --- | --- | |  |  | | **1** | Karl and Lisa invest £5800 in a savings account.  The account pays a fixed rate of 2.3% per year compound interest for 5 years.  Calculate how much they will have in the account at the end of 5 years.  £ ............................................ **[3]** | |

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|  | |  |  | | --- | --- | |  |  | | **2** | Solve this equation algebraically.  Give your solutions correct to 2 decimal places.  3x2 + 5x − 1 = 0  *x* = ............................ or *x* = ............................ **[4]** | |

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|  | |  |  | | --- | --- | |  |  | | **3** | In the diagram, the square and the trapezium share a common side of length x cm.   |  | | --- | | diagram |   The area of the square is equal to the area of the trapezium.  Work out the value of x.  *x* = ............................................ **[6]** | |

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|  | |  |  | | --- | --- | |  |  | | **4** | The diagram shows a right-angled triangular prism ABCDEF.  diagram  Calculate angle AFB.  ............................................º **[6]** | |

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|  | |  |  | | --- | --- | |  |  | | **5** | In a group of 46 students   * 28 passed English * 31 passed science * 12 did not pass either.   Find the probability that a student selected at random from those who passed science also  passed English.  ............................................ **[4]** | |

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|  | |  |  | | --- | --- | |  |  | | **6** | A, B, C and D are points on the circumference of a circle, centre O.   |  |  |  | | --- | --- | --- | | diagram |  | **Not to scale** |   Angle CAD = 28° and CD = 6.4 cm.  BD is a diameter of the circle.  Calculate the area of the circle.  ............................................ cm2 **[5]** | |

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|  | |  |  | | --- | --- | |  |  | | **7** | Ratna invests £1200 for 2 years in a bank account paying r % per year compound interest.  At the end of 2 years, the amount in the bank account is £1379.02.  Calculate r.  *r* = ............................................ **[4]** | |

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|  | |  |  | | --- | --- | |  |  | | **8** | OPQ is a sector of a circle, centre O and radius 9 cm.  diagram  Find the perimeter of the sector.  Give your answer in terms of π.  ..................................................... cm **[3]** | |

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|  | |  |  | | --- | --- | |  |  | | **9** | ABD and CBD are triangles.  diagram  BC = 5.6 cm, CD = 8.2 cm and AD = 12.4 cm.  Angle DAB = 63° and angle DBA = 58°.  Calculate the angle marked *x*.  ........................................................... ° **[5]** | |

# Mark scheme

| **Question** | | | **Answer** | **Marks** | **Part marks** | **Guidance** |
| --- | --- | --- | --- | --- | --- | --- |
| **1** |  |  | 6498.40 or 6498.39 | **3** | **M2** for 5800 × 1.0235  Or **M1** for 5800 × 1.023*n***oe** | Where n ⩾ 1, *n* ≠ 5 |
|  |  |  | **Total** | **3** |  | |
| **2** |  |  | -1.85 [0].18 | **4** | **M2** for  or better and condone one error  Or **M1** for the formula with at most two errors  AND  **A1** for -1.85 or [0].18 or for both answers correct but to more than 2dp e.g. 0.180… and  -1.847… | Accept any correct algebraic method e.g. completing the square |
|  |  |  | **Total** | **4** |  | |
| **3** |  |  | 7.17 to 7.18 or 7.2 nfww | **6** | **M3** for x2 − 3x − 30 = 0  Or **M2** for  oe  Or **M1** for  oe  AND  **M2FT** for  or better  or 7.17 to 7.18 and -4.18 to -4.17  Or **M1FT** for either formula with at most two errors | Condone missing brackets for **M1**  **FT** from their 3 term quadratic  Allow **M2FT** for  or better  Alternative by completing the square  **M2FT** for  or  or 7.17 to 7.18 and -4.18 to -4.17  Or **M1FT** for (x − 1.5)2 − 32.25 |
|  |  |  | **Total** | **6** |  | |
| **4** |  |  | 20.9 or 20.89 or 20.886… or 21 with correct working | **6** | **B1** for triangle AFB indicated e.g. drawn on diagram  AND  **M2** for  or 47.16[9…] or 47.17 or 47.2 or  or 50.48… or 50.5  Or **M1** for 252 + 402 [+ 182]  AND  **M2** for e.g. tan−1(18 ÷ their 47.169…)  or sin−1(18 ÷ their 50.48…)  Or **M1** for [tan =] 18 ÷ their 47.169…  or [sin =] 18 ÷ *their* 50.48… | their 47.169 should be an attempt at BF and their 50.48 should be an attempt at AF |
|  |  |  | **Total** | **6** |  | |
| **5** |  |  | oe | **4** | **B3** for 25  Or **M2** for (28 + 31 + 12) − 46 or correct diagram with 3 out of 4 correct elements  Or **M1** for , n < 31 | Accept any correct method |
|  |  |  | **Total** | **4** |  | |
| **6** |  |  | 145.2 to 146.2 | **5** | **B1** for angle CBD = 28 soi or for angle BCD = 90 soi  AND  **M2** for  oe or 13.6[3…] nfww  Or **M1** for  oe  AND  **M1** for | **B1** implied by e.g. 28 or 62 correctly used in trigonometry or 28, 62 or 90 (or symbol) marked in the correct place in the diagram  13.6… can imply **B1** however if it is marked on the wrong side, e.g. on AC, then it scores **0** marks |
|  |  |  | **Total** | **5** |  | |
| **7** |  |  | 7.2[0] or 7.19[9…] nfww | **4** | **M3** for  oe soi by 1.067[…] to 1.072[…]  Or **M2** for  oe soi by 1.14 to 1.15  Or **M1** for 1200x2 = 1379.02  Trials or no working  **SC4** for correct answer 7.2[0] or 7.19[9…] on answer line  Or **SC3** for 1200 × 1.072[0]2 = 1379.02  or 1200 × 1.0719[9…]2 = 1379.02  Or **SC1** for use of 1200x2 oe | Condone % symbol with correct answer  Warning: 1200 ÷ 179.02 = 6.7  Allow  or any letter, including r, in place of x |
|  |  |  | **Total** | **4** |  | |
| **8** |  |  | 7π + 18 | **3** | **M1 for  oe**  **A1** for 7π or for answer 39.99[…] or 40.0 | **M1** implied by 21.99[…] or 22.0 **seen** |
|  |  |  | **Total** | **3** |  | |
| **9** |  |  | 140.76… or 140.8 or 141 | **5** | **M2** for  oe (13.028…)  Or **M1** for  oe  **M2** for [cos *x* =] 8.22 + 5.62 – *(their* 13.028)2 ÷ (2 × 8.2 × 5.6)  Or **M1** for *(their* 13.028)2 = 8.22 + 5.62 −2 × 8.2 × 5.6 × cos *x* |  |
|  |  |  | **Total** | **5** |  | |

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