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Practice paper: mark scheme

GCSE Maths Higher, practice paper 1 (non-calculator) (Edexcel style)

In the style of Pearson Edexcel GCSE Mathematics (1MA1) Paper 1 Higher

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This mark scheme was written by cookie with its practice paper. Each row gives the answer, the marks and how they are given; where an answer is worded differently but means the same, give the mark.

Key

P process marks, for a correct step in solving a problem
M method marks, for a correct method
A accuracy marks, which depend on the method mark before them
B unconditional accuracy marks, independent of method
C communication marks
ft follow through; oe or equivalent; cao correct answer only; isw ignore subsequent working

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Question	Answer and marking	Marks
1(a)	**Answer: $2^2 \times 3^2 \times 5$** M1 for a complete method, e.g. a factor tree or repeated division with at most one error A1 for $2^2 \times 3^2 \times 5$ (accept $2^2 \times 3^2 \times 5^1$) *$2 \times 2 \times 3 \times 3 \times 5$ scores M1 A0 (not in index form).*	**2**
1(b)	**Answer: (i) 12 (ii) 1260** B1 for HCF = 12 B1 for LCM = 1260 *Accept $2^2 \times 3$ and $2^2 \times 3^2 \times 5 \times 7$ for the two answers.*	**2**
2	**Answer: £800** P1 for finding the fraction left after rent, 3/5 P1 for 1/4 × 3/5 = 3/20 (fraction spent on food) P1 for 9/20 of the money = £360, or 360 ÷ 9 × 20 A1 for £800 cao *Working backwards is fine: 360 ÷ 3/4 = 480 (P1 P1), 480 ÷ 3/5 (P1), 800 (A1).* *Taking 1/4 of the original amount (2/5 + 1/4 = 13/20, 360 ÷ 7/20) scores P1 only.*	**4**
3	**Answer: 200** M1 for rounding at least two of the numbers correctly to 1 significant figure: 20, 5, 0.5 M1 for 100 ÷ 0.5 or 20 × 10 (ft their rounding) A1 for 200 *An accurate answer (198.858…) with no rounding shown scores 0. Rounding 4.87 to 4.9 instead of 5 (20 × 4.9 ÷ 0.5 = 196) scores M1 M1 A0.*	**3**
4	**Answer: x = 34/5 (or 6.8)** M1 for multiplying all terms by 12 (or a multiple of 12), e.g. 3(3x − 2) − 4(x + 1) = 24 M1 for 5x = 34 or 9x − 6 − 4x − 4 = 24 (a correct expansion and collection of terms) A1 for 34/5 (oe), e.g. 6.8 or 6 4/5 *The common sign error 3(3x − 2) − 4x + 4 = 24 gives 5x = 26: M1 M0 A0.*	**3**
5	**Answer: 4.875 g/cm^3** P1 for finding the mass of one metal, e.g. 150 × 8 (= 1200) or 250 × 3 (= 750) P1 for (1200 + 750) ÷ (150 + 250), i.e. 1950 ÷ 400 A1 for 4.875 (oe, e.g. 39/8 or 4 7/8) *Do not accept (8 + 3) ÷ 2 = 5.5 for any marks.*	**3**
6	**Answer: 16** P1 for interior + exterior = 180, e.g. 7x + x = 180 P1 for exterior angle = 22.5° and 360 ÷ 22.5 A1 for 16 cao	**3**
7(a)	**Answer: 4n + 3** M1 for 4n + k, where k ≠ 3 A1 for 4n + 3 (oe)	**2**

7(b)	**Answer: No, 4n + 3 = 101 gives n = 24.5, which is not a whole number.** C1 for 'No' with a correct reason, e.g. n = 24.5 is not an integer, or 99 and 103 are terms but 101 is not (ft their nth term)	**1**
7(c)	**Answer: $2n^2 - n + 3$** M1 for second differences of 4, or $2n^2$ seen M1 for subtracting $2n^2$ from the terms to get 2, 1, 0, −1, −2 (or forming three equations in a, b, c) A1 for $2n^2 - n + 3$ (oe)	**3**
8(a)	**Answer: 12** P1 for 60 − 9 = 51 study at least one language, or 35 + 28 = 63 A1 for 12 cao	**2**
8(b)	**Answer: 12/35** M1 for a fraction with denominator 35, or their (a) as numerator over 35 A1ft for 12/35 (oe), ft their answer to (a) *12/60 scores M0 A0 (wrong denominator).*	**2**
9	**Answer: £9720** M1 for 12 000 × 0.9 (= 10 800) or 10% of 12 000 = 1200 subtracted M1 for 10 800 × 0.9, or 12 000 × 0.9^2, or 10 800 − 1080 A1 for £9720 cao *Simple depreciation (12 000 − 2 × 1200 = 9600) scores M1 M0 A0.*	**3**
10(a)	**Answer: y = −2x + 5** M1 for gradient = (−1 − 7)/(3 − (−1)) = −2 M1 for substituting a point into y = their m x + c A1 for y = −2x + 5 (oe)	**3**
10(b)	**Answer: y = 1/2 x − 1** M1 for gradient of M = 1/2 (ft −1 ÷ their gradient of L) M1 for y − 1 = 1/2(x − 4) or 1 = 1/2 × 4 + c A1 for y = 1/2 x − 1 (oe, e.g. 2y = x − 2)	**3**
11(a)	**Answer: 18** M1 for 12 × 15 + 18 × 20 (= 180 + 360 = 540) A1 for 18 cao *(15 + 20) ÷ 2 = 17.5 scores M0 A0.*	**2**
11(b)	**Answer: e.g. Group B had a higher median (28 s vs 25 s), so on average Group B took longer; Group B had a smaller interquartile range (9 s vs 12 s), so their times were more consistent.** C1 for a correct comparison of medians (25 and 28) in the context of the times C1 for a correct comparison of interquartile ranges (12 and 9) or ranges (29 and 25), in context *Comparisons must be in context (e.g. 'took longer', 'more consistent'), not just 'B's median is bigger'. Do not accept a comparison of minimum or maximum values alone.*	**2**

12 — **Answer: 128 cm^3** — **3**

P1 for the length scale factor √(80/45) = 4/3 (oe)
P1 for the volume scale factor $(4/3)^3 = 64/27$, or 54 ÷ 27 × 64
A1 for 128 cao
Using the area scale factor 16/9 for volume (96) scores 0.

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13 — **Answer: x = (a + 2y)/(y − 3)** — **4**

M1 for multiplying both sides by (x − 2): y(x − 2) = 3x + a
M1 for expanding and collecting the x terms on one side, e.g. xy − 3x = a + 2y
M1 for factorising: x(y − 3) = a + 2y
A1 for x = (a + 2y)/(y − 3) (oe, e.g. (−a − 2y)/(3 − y))

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14 — **Answer: 18 cm^2** — **2**

M1 for 1/2 × 8 × 9 × sin 150° with sin 150° = 1/2
A1 for 18 cao
Using sin 150° = −1/2 or cos 150° scores M0.

15(a) — **Answer: 1 + √5** — **2**

M1 for at least three of the four terms correct: 6, −2√5, +3√5, −5
A1 for 1 + √5 cao

15(b) — **Answer: a = 3, b = 2** — **3**

M1 for multiplying numerator and denominator by (√5 + 1)
M1 for numerator 6 + 2√5 and denominator 4
A1 for (3 + √5)/2, so a = 3 and b = 2

16(a) — **Answer: (5, 5)** — **1**

B1 for (5, 5)

16(b) — **Answer: (2, 9)** — **1**

B1 for (2, 9)

16(c) — **Answer: (1, 5)** — **1**

B1 for (1, 5)

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17 — **Answer: (x − 3)/(2x − 1)** — **3**

M1 for $x^2 − 9 = (x + 3)(x − 3)$
M1 for $2x^2 + 5x − 3 = (2x − 1)(x + 3)$
A1 for (x − 3)/(2x − 1)
Cancelling terms rather than factors (e.g. $x^2/2x^2$) scores 0.

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18 — **Answer: x = 3, y = 4 and x = −4, y = −3** — **5**

M1 for substituting: $x^2 + (x + 1)^2 = 25$
M1 for expanding correctly and forming a three-term quadratic = 0, e.g. $2x^2 + 2x − 24 = 0$ (oe)
M1 for a correct method to solve their quadratic, e.g. (x + 4)(x − 3) = 0
A1 for x = 3 and x = −4
A1 for the correct pairs: x = 3, y = 4 and x = −4, y = −3
Answers by inspection or trial with no algebra score 0 (the question says algebraically). Unpaired values score at most M1 M1 M1 A1 A0.

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19 **Answer: $x = 2 \pm \sqrt{3}$** **4**

M1 for multiplying through by $(x + 1)(x - 1)$: $3(x - 1) + (x + 1) = (x + 1)(x - 1)$
M1 for a correct quadratic = 0: $x^2 - 4x + 1 = 0$
M1 for a correct method to solve their quadratic, e.g. $(x - 2)^2 - 3 = 0$ or $x = (4 \pm \sqrt{12})/2$
A1 for $2 \pm \sqrt{3}$
$(4 \pm \sqrt{12})/2$ left unsimplified scores M1 M1 M1 A0.

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20 **Answer: OA = OB = OC (radii), so triangles OAC and OBC are isosceles. Let angle OAC = angle OCA = x and angle OBC = angle OCB = y. In triangle ABC, x + y + (x + y) = 180°, so x + y = 90°, so angle ACB = 90°.** **4**

M1 for using OA = OC = OB (radii) to identify isosceles triangles OAC and OBC
M1 for labelling equal base angles, e.g. angle OAC = angle OCA = x and angle OBC = angle OCB = y
M1 for using the angle sum of triangle ABC: $2x + 2y = 180°$
C1 for a complete proof with all reasons given, concluding angle ACB = $x + y = 90°$
Reasons needed for C1: 'radii are equal', 'base angles of an isosceles triangle are equal', 'angles in a triangle add up to 180°'. Accept an equivalent method using the angle at the centre on each side with full reasons.

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21 **Answer: ON = 1/3 a + 2/3 c and OM = 1/2 a + c, so ON = 2/3 OM: parallel with the common point O, so O, N and M are collinear.** **4**

M1 for the vector from A to C = c − a (or from C to A = a − c)
M1 for ON = a + 2/3(c − a) = 1/3 a + 2/3 c (oe)
M1 for OM = c + 1/2 a (oe)
C1 for showing ON = 2/3 OM (or another correct multiple, e.g. NM = 1/2 ON) and stating that the vectors are parallel and share the point O, so O, N and M lie on a straight line
Stating only 'parallel' without a common point scores M1 M1 M1 C0.

Total: 80 marks