cookie

Practice paper: mark scheme

GCSE Maths Higher, practice paper 2 (calculator) (AQA style)

In the style of AQA GCSE Mathematics (8300) Paper 2 Higher

Practice paper written by cookie in the style of AQA GCSE Mathematics (8300) Paper 2 Higher. Not an AQA paper; not affiliated with or endorsed by AQA.

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

- M method marks, for a correct method
- A accuracy marks, which depend on the method mark before them
- B marks for a correct answer or step, independent of method
- P process marks, for a correct step in solving a problem
- C communication marks
- ft follow through from an earlier error; oe or equivalent; cao correct answer only

Do it online, timed and marked:
cookie.education/past-papers/gcse/cookie/maths-aqa-style

Question	Answer and marking	Marks
01	**Answer: 27.5 (C)** B1 for 27.5	**1**
02	**Answer: 25 (C)** B1 for 25	**1**
03	**Answer: y = 3x + 5 (B)** B1 for y = 3x + 5	**1**
04	**Answer: geometric (B)** B1 for geometric	**1**
05	**Answer: £5267.58** M1 for 1.032 seen, or 4500 × 1.032 (= 4644), or 4500 × 0.032 (= 144) M1 for 4500×1.032^5 (oe), or a correct year-by-year method for all 5 years A1 for £5267.58 (accept £5267.57 to £5267.58) *Simple interest (4500 + 5 × 144 = £5220) scores M1 M0 A0. 4500×1.032^4 or 4500×1.032^6 scores M1 M0 A0. An answer of £767.58 (the interest only) scores M1 M1 A0.*	**3**
06.1	**Answer: 1.872 kg** M1 for 12 × 5 × 4 × 7.8 (= 1872 g) A1 for 1.872 kg (accept 1.87 kg) *1872 with no conversion to kilograms scores M1 A0.*	**2**
06.2	**Answer: 3070 N/m^2 (3066.6…)** M1 for area = 60 cm^2 or 0.006 m^2 M1 for 18.4 ÷ 0.006, or 18.4 ÷ 60 (= 0.306…) then × 10 000 A1 for 3066.6… or 3067 or 3070 *0.306… N/cm^2 (no conversion) scores M1 M0 A0. Dividing by 600 or 6000 for the area in m^2 scores M1 M0 A0. Using a different face (e.g. 12 × 4) scores M0 M0 A0 unless the method mark is ft as 18.4 ÷ their area in m^2: then M0 M1 A0.*	**3**
07	**Answer: 73.9°** M1 for cos x = 1.8/6.5 (oe), or a full alternative, e.g. the height $\sqrt{(6.5^2 - 1.8^2)}$ = 6.245… then a correct trig ratio M1 for $\cos^{-1}(1.8/6.5)$ (oe) A1 for 73.9 (73.92…) *16.1° (the angle between the ladder and the wall) scores M1 M0 A0 unless 90 − 16.1 follows. Answers in radians or gradians (1.29 or 82.1) score M1 M1 A0.*	**3**
08.1	**Answer: £12 607.23** M1 for $18\,500 \times 0.88^3$ (oe), or a correct year-by-year method A1 for £12 607.23 (accept £12 607 or £12 607.2) *18 500 × 0.64 = £11 840 (12% × 3 taken off as simple depreciation) scores M0 A0.*	**2**

08.2 **Answer: 6 years** **2**

M1 for 0.88^5 (= 0.527…) and 0.88^6 (= 0.464…), or the values after 5 and 6 years (£9763 and £8591 to the nearest pound), or a comparison with £9250

A1 for 6

An answer of 6 with no working scores M0 A0. 5 years with correct values shown scores M1 A0.

09.1 **Answer: 51/80** **3**

M1 for 80 − 17 (= 63) students study at least one language

M1 for 45 + 30 − 63 (= 12) study both, or 33 French only or 18 Spanish only (a correct Venn diagram is evidence of both method marks)

A1 for 51/80 (oe, e.g. 0.6375 or 63.75%)

09.2 **Answer: 12/30 = 2/5** **1**

B1ft for 12/30 (oe, e.g. 2/5 or 0.4), ft their number who study both ÷ 30

Do not accept 12/80.

---

10 **Answer: 8.68 m/s** **3**

B1 for 137.5 or 15.85 seen

M1 for 137.5 ÷ 15.85

A1 for 8.68 (8.675…)

Accept 15.849… for 15.85. 142.5 ÷ 15.75 (= 9.05, the upper bound) scores B1 M0 A0. 140 ÷ 15.8 (= 8.86) scores B0 M0 A0.

---

11 **Answer: PR = 16.6 km; bearing 093°** **5**

B1 for angle PQR = 90°, with a reason or a correct calculation, e.g. 240 − 150 = 90

M1 for $14^2 + 9^2$ (= 277)

A1 for PR = 16.6 (16.64…) km

M1 for $\tan^{-1}(9/14)$ (= 32.7…°), or another correct trig method for angle QPR

A1 for 093° (accept 92.7… to 93)

Treating the turn as anything other than 90° scores B0, then the method marks for PR and angle QPR can only be earned through a correct cosine rule with their angle. A bearing of 032.7° (angle QPR alone) scores M1 A0 for that pair. A correct method using east and north components (R is 16.62… km east and 0.79… km south of P) is equally valid: it earns the B1 in place of the right angle, and can score full marks.

---

12 **Answer: x = 2.59 or x = −0.26** **3**

M1 for a correct substitution into the quadratic formula, e.g. $(7 \pm \sqrt{((-7)^2 - 4 \times 3 \times -2)}) / (2 \times 3)$; allow one sign error

A1 for $(7 \pm \sqrt{73})/6$ (oe), or one correct solution

A1 for 2.59 and −0.26

Answers from trial and improvement or a graph with no algebraic method: B1 for each correct answer, maximum 2 marks. Completing the square correctly is an equally valid method.

---

13 **Answer: Group B's median is lower, so on average Group B was quicker; Group B's interquartile range (5) is smaller than Group A's (13), so Group B's times were more consistent.** **3**

B1 for both interquartile ranges, 13 and 5, or both ranges, 29 and 18
B1 for a correct comparison of the medians in context, e.g. 'on average Group B took less time' or 'Group A's median time is 2 minutes longer'
B1 for a correct comparison of the spread in context, using IQR or range, e.g. 'Group B's times are more consistent' or 'Group A's times are more spread out'
Comparisons must refer to the context (time, quickness, consistency). 'Group A's median is higher' with no context scores B0 for that comparison. Do not accept comparisons of the shortest or longest times alone for the spread mark.

14.1 **Answer: 1080 ml** **2**

M1 for $(18/12)^3$ (= 3.375) or 1.5^3 seen, or 320×1.5^3
A1 for 1080 cao
320 × 1.5 = 480 or 320 × 2.25 = 720 scores M0 A0.

14.2 **Answer: 216 cm^2** **2**

M1 for $486 \div 1.5^2$ or $486 \times (12/18)^2$ (oe)
A1 for 216 cao
486 ÷ 1.5 = 324 or 486 ÷ 3.375 = 144 scores M0 A0.

---

15 **Answer: 37.8 cm** **3**

M1 for $140/360 \times 2 \times \pi \times 8.5$ (oe), or $140/360 \times \pi \times 17$
M1dep for their arc length + 2 × 8.5 (= + 17)
A1 for 37.8 (37.76… to 37.77…)
20.8 (the arc length only) scores M1 M0 A0. Using the area formula ($140/360 \times \pi \times 8.5^2 = 88.3$) scores M0 M0 A0.

16.1 **Answer: 6.97 cm** **3**

M1 for $9.2^2 + 7.5^2 - 2 \times 9.2 \times 7.5 \times \cos 48$ (oe)
M1 for 48.5… or √(their 48.5…)
A1 for 6.97 (6.967…)
An answer of 15.1 (cos 48 worked out in radians) scores M1 M0 A0 if the correct expression is seen.

16.2 **Answer: 25.6 cm^2** **2**

M1 for $1/2 \times 9.2 \times 7.5 \times \sin 48$ (oe)
A1 for 25.6 (25.63… to 25.64)
1/2 × 9.2 × 7.5 = 34.5 scores M0 A0.

---

17 **Answer: 3.02 kg** **4**

M1 for the volume of the cylinder: $\pi \times 3^2 \times 10$ (= 90π or 282.7…)
M1 for the volume of the hemisphere: $1/2 \times 4/3 \times \pi \times 3^3$ (= 18π or 56.5…)
M1 for (their 90π + their 18π) × 8.9, or 108π × 8.9 (= 3019.6…)
A1 for 3.02 kg
Using a whole sphere (36π) gives 126π × 8.9 = 3.52 kg: M1 M0 M1 A0. 3020 g with no conversion scores M1 M1 M1 A0.

18.1 **Answer: 5249** **1**

B1 for 5249 (accept 5248 or 5248.8)

18.2 **Answer: 10 hours** **2**

M1 for N worked out for t = 9 (99 179 to 99 180) and t = 10 (178 523 to 178 524), or 1.8^9 (= 198.3…) and 1.8^{10} (= 357.0…) compared with 200

A1 for 10

An answer of 10 with no working scores M0 A0. 9 hours (rounding 99 180 up to 100 000) scores M1 A0.

19.1 **Answer: At x = 1 the value is −4; at x = 2 it is 7; there is a change of sign, so a solution lies between 1 and 2.** **2**

M1 for substituting x = 1 and x = 2: 1 + 4 − 9 = −4 and 8 + 8 − 9 = 7

A1 for both values correct with a statement, e.g. 'change of sign, so there is a solution between 1 and 2'

Accept the rearranged form $x^3 + 4x = 9$ with $5 < 9 < 16$ and a conclusion.

19.2 **Answer: $x_2 = 1.4422$, $x_3 = 1.4784$, $x_4 = 1.4560$** **2**

M1 for $\sqrt[3]{(9 - 4 \times 1.5)}$ or $\sqrt[3]{3}$ seen, or $x_2 = 1.4422$ (1.442 24…)

A1 for $x_2 = 1.4422$, $x_3 = 1.4784$ and $x_4 = 1.4560$

Rounded or unrounded previous values give the same values to 4 decimal places.

---

20 **Answer: w = (5a + 2)/(a − 3)** **3**

M1 for a(w − 5) = 3w + 2, or aw − 5a = 3w + 2

M1 for collecting the w terms on one side and the other terms on the other side, e.g. aw − 3w = 5a + 2

A1 for w = (5a + 2)/(a − 3) (oe)

Accept w = (−5a − 2)/(3 − a). An answer that still has w on both sides scores at most M1 M0 A0.

21.1 **Answer: 59.4 m** **3**

M1 for the area of at least one correct trapezium, e.g. 1/2 × 2 × (5.2 + 8.6) (= 13.8), or the first triangle 1/2 × 2 × 5.2 (= 5.2)

M1 for the sum of all four areas: 5.2 + 13.8 + 19 + 21.4, or 2/2 × (0 + 11.0 + 2 × (5.2 + 8.6 + 10.4))

A1 for 59.4 cao

Rectangles (strips of height 5.2, 8.6, 10.4, 11.0 or 0, 5.2, 8.6, 10.4) score M0 M0 A0.

21.2 **Answer: Underestimate: the graph curves above the straight tops of the trapeziums.** **1**

B1 for 'underestimate' with a correct reason, e.g. 'the curve is above the tops of the strips' or 'the strips miss some of the area under the curve'

'Underestimate' with no reason or an incorrect reason scores B0.

---

22 **Answer: x = 4.65 or x = −0.65** **4**

M1 for multiplying through by (x + 2)(x − 1), e.g. 3(x − 1) + 2(x + 2) = (x + 2)(x − 1)

M1 for $5x + 1 = x^2 + x - 2$ (both sides correctly expanded)

A1 for $x^2 - 4x - 3 = 0$ (oe three-term quadratic = 0)

A1 for 4.65 and −0.65 (from $2 \pm \sqrt{7}$)

Answers with no working score 0. Accept $2 \pm \sqrt{7}$ followed by correct decimals.

23.1 **Answer: $6/n \times 5/(n-1) = 1/3$, so $90 = n(n-1)$, so $n^2 - n - 90 = 0$** **3**

M1 for $6/n \times 5/(n-1)$ (oe)
M1 for $30/(n(n-1)) = 1/3$ (oe), or $90 = n(n-1)$
A1 for a fully correct argument leading to $n^2 - n - 90 = 0$ with no errors
$6/n \times 6/n$ (with replacement) scores M0 M0 A0. Working backwards from n = 10 is not a proof: M0 M0 A0.

23.2 **Answer: 10** **2**

M1 for $(n-10)(n+9) = 0$, or the quadratic formula correctly used, or n = 10 and n = −9 seen
A1 for 10 only (−9 rejected or not given as the answer)
Answers of 10 and −9 with no choice made score M1 A0. 10 by trial (checking 6/10 × 5/9 = 1/3) scores M1 A1.

---

24 **Answer: (2.62, 3.62) and (−3.62, −2.62)** **4**

M1 for substituting $y = x + 1$ into the circle: $x^2 + (x+1)^2 = 20$
M1 for $2x^2 + 2x - 19 = 0$ (oe three-term quadratic = 0)
M1 for a correct method to solve their quadratic, e.g. $(-2 \pm \sqrt{156})/4$
A1 for x = 2.62, y = 3.62 and x = −3.62, y = −2.62 (correctly paired)
Substituting $x = y - 1$ instead is equally valid. Answers from a scale drawing or with no algebra score 0. Correct x values with no y values score M1 M1 M1 A0.

Total: 80 marks