Mark Scheme

Mock Paper

GCSE

GCSE Applications of Mathematics (Pilot)
Paper: 5AM1H / 01

NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
   Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
   Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
   The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7   With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8   Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9   Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10   Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11   **Linear equations**
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12   **Parts of questions**
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13   **Range of answers**
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5AM1H_01					
Question		Working	Answer	Mark	Notes

1	a		No time period
			Non-exhaustive responses
			Labels too vague
				2	B2 for TWO aspects from
					    no time period
					    response boxes not exhaustive (restricted range of responses)
					    labels on response boxes are too vague
					(B1 for one aspect only)

	b	eg How many times did you go to the cinema last month? 0, 1-2, 3-5, >5	Question includes time period and proper response boxes	2	B1 for inclusion of time period (this may be implied by the labels to the response boxes) B1 for at least 3 correctly labelled response boxes (non-overlapping) NB: response boxes need not be exhaustive.
2	(a)(i)		500	2	B1 cao
	(ii)		800		B1 cao
	(b)		A × 0.15 D= C+50	3	B1 cao B1 cao B1 cao
3	(a)		8	1	B1 8 or 8.00
	(b)(i)	eg 7.50÷10	£0.75 or 75p	3	M1 use of $\dfrac{y_2 - y_1}{x_2 - x_1}$ or right angled triangle drawn oe A1 0.75
	(ii)				B1 "£0.75" or "75p" using their gradient from (i)

5AM1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
(c)		Draw straight line graph	2	B2 for graph drawn, from origin to at least (10,12.00) (B1 for evidence of at least one point on the line, or coordinates calculated in minutes and £, or a partial line from the origin and when extended would cross between (10,11.75) and (10,12.50)
(d)		7.6-7.8	2	M1 for identification of the point of intersection, or evidence of its use A1 for answer in the range 7.6 to 7.8 minutes, 456 to 468 seconds, oe.
4	Change $ to £: 25.20÷1.40 = £18 Change € to £: 19.80÷1.08 = £18.33 £18<£18.33 so Miami cheaper **OR** Change $ to €: 25.20 ÷ 1.40 × 1.08 or 25.20 ÷ 1.296 or 25.20 × 0.1714 =19.44≤19.80 so Miami **OR** Change € to $: 19.80 ÷ 1.08 × 1.40 or 19.80 ÷ 0.7714 or 19.80 × 1.296 25.66>25.20 so Miami	Miami cheaper	3	M1 for 25.20÷1.40 (=18) M1 for 19.80÷1.08 (= 18.33) C1 £18<£18.33 so Miami cheaper **OR** M2 25.20 ÷ 1.40 × 1.08 or 25.20 ÷ 1.296 or 25.20 × 0.1714 C1 19.44≤19.80 so Miami cheaper **OR** M2 19.80 ÷ 1.08 × 1.40 or 19.80 ÷ 0.7714 or 19.80 × 1.296 C1 25.66>25.20 so Miami cheapest

5AM1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
5	1.72÷2 (=0.86) 7.65 ÷ 9 (=0.85)	Large box with reasons	3	M1 for 1.72 ÷ 2 (=0.86) M1 for 7.65 ÷9 (=0.85) C1 for large box or 9kg with correct calculations **OR** M1 for 2 ÷ 1.72 (=1.162…) M1 for 9 ÷ 7.65 (=1.176…) C1 for large box or 9kg with correct calculations M2 for 7.65×2÷9 (=1.70) or for (1.72÷2)×9 (=7.74) C1 for large box or 9kg with correct calculations **OR** M1 for 1.72×9 (=15.48) M1 for 7.65×2 (=15.30) C1 for large box or 9kg with correct calculations (Accept equivalent methods for comparison)
6	LCM (40,24) = 120 Brad buns 120 ÷ 40 Burgers 120 ÷ 24 **OR** Bread buns: 40 is 2×2×2 (×5) Burgers: 24 is 2×2×2 (×3)	Bread buns 3 Burgers 5	3	M1 attempt to find LCM by eg lists of multiples, or summing of 40s and summing of 24s, with at least 3 numbers in each list A1 identify 120 as LCM A1 cao (both) **OR** M1 expansion of either number into its prime factors in a factor tree or 8×5 or 8×3 A1 both expansions correct A1 cao (both) SC B2 if answers the wrong way around

5AM1H_01				
Question	Working	Answer	Mark	Notes
7	5 miles = 8km (70 miles ÷ 5) × 8 = 112 km OR (120 km ÷8) ×5 = 75 miles	Pablo	3	M1 5 miles = 8 km OR 1km = 0.6(25) miles OR 1 mile = 1.6km oe M1 (70÷5)×8 (=112) or (120 ÷8)×5 (=75) A1 (dep on at least M1) Pablo with correct calculations Refer to both answer line and working NB Pablo or 75 miles or 112 km without working scores 0 marks
8 (a)		Points plotted	1	B1 cao
(b)		Negative	1	B1 cao
(c)		Line of best fit drawn	1	B1 for a reasonable line of best fit
(d)		10-12.5	1	B1 for 10-12.5 or ft from line of best fit
9		=B2*2+C1 D2*2	3	B1 for =B2*2+C2 or =B2+B2+C2 oe B1 for =D2*2 or =D2÷50*100 or =D2/50*100 oe B1 for using correct spreadsheet notation in at least one; condone missing "=" throughout, and/or use of × instead of *
10	½ × 12 × 5 Area ABCD = 17×17 = 289 Area PQRS = 289 – 4×"30"	169 cm^2	6	M1 for ½ × 12 × 5 M1 for use of four triangles M1 for Area ABCD = 17×17 or 289 seen M1 (dep) for Area PQRS = 289 – 4×"30" A1 cao B1 (indep) for units cm^2

5AM1H_01					
Question		Working	Answer	Mark	Notes
11	(a)	$\dfrac{240}{1140} \times 100 = 21.05 =$ $\dfrac{500}{1140} \times 100 = 43.86 =$ $\dfrac{400}{1140} \times 100 = 35.09 =$	21 44 35	3	M1 for sight of method eg (240/1140)×100 or (500/1140)×100 or (400/1140)×100 or sight of one answer correct A1 for two answers from 21.05, 43.86, 35.09 or better A1 for 21, 44, 35
	(b)	(125×8)+(135×16)+(145×25)+(155 ×30)+(165×21) = 1000+2160+3625+4650+3465= 14900=14900÷100=	149	4	M1 for $f \times h$ for at least 3 consistent values of h in or at either end of intervals M1 (dep) for use of all correct mid-interval values (for 1st interval accept 124.5 to 125 etc.) M1 (dep on 1st M1) for $\Sigma fh \div \Sigma f$ A1 cao
12	(i)	2(4x+5)+2(3x-2+2) = 8x + 10 + 6x = 14x + 10 14x + 10 = 87 14x = 77	x = 5 ½	6	M1 states perimeter as the sum of sides or 2(4x+5)+2(3x) oe M1 attempt to simplify algebra M1 equates to 87 A1 for x=5 ½
	(ii)	4x+5 = 4×5.5 + 5 = 27	27		M1 substitution of value(s) into expressions for sides, or identification of the longest side as 4x+5 A1 value as 27, or ft 4×"5.5"+5

5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
13		½ × 6 × 5.2 = ½ × 31.2 = 15.6 Total for hex: 6 × 15.6 = 93.6 Trapezium: ½×4(18+22)=80 Total 93.6+80=	173.6	5	M1 area of a triangle: or ½ × 31.2 (= 15.6) oe M1 total for hex: 6 × (½ × 6 × 5.2) or 93.6 M1 Trapezium: ½×4(18+22) (=80) M1 (dep on at least one previous M1) overall method to find area of hexagon added to area of trapezium A1 cao
14	a	1 box is 24 kg 4 × 24 = 96 kg < 100 kg so 4 boxes per truck 45 ÷ 4 = 11.25 or 12 loads	12	3	M1 for 4 boxes per truck M1 for 45 ÷ "4" or 11.25 seen A1 cao

	b	×3 or ×7 $2x + 5y = 214.5$
		×5 or ×2 $7x + 3y = 236$
		eg
		 $6x + 15y = 643.5$
		 $35x + 15y = 1180$
		  $29x = 536.5$
		eg
		 $14x + 35y = 1501.5$
		 $14x + 6y = 472$
		   $29y = 1029.5$
		or substitution method
			small box = 18½
			large box = 35½
				5	B1 for correct equations expressed in terms of x and y (oe)
					M1 for correct process to eliminate either x or y (condone one arithmetic error)
					A1 for either x = 18 ½ or 35 ½ oe
					M1 (dep on 1st M1) for correct substitution of their found variable
					OR
					M1 (indep of 1st M1 for a correct process to eliminate the other variable (condone one arithmetic error)
					A1 cao for both 18 ½ and 35 ½ oe
					[SC B1 for 18 ½ or 35 ½ oe if M0 scored]

5AM1H_01					
Question		Working	Answer	Mark	Notes
15	(a)	85% is 238 (238 ÷ 85) × 100 =	280	3	M1 for recognizing that 85% is equivalent to 238 M1 for 238 ÷ 85 × 100 oe A1 cao
	(b)	4500 × 1.04^2	4867.20	3	M2 for 4500×1.04^2 or 4500×1.04^3 A1 for 4867.2(0) cao SC: 367.2(0) seen B2 **OR** M1 for 4500×1.04 or for 4500 + 0.04×4500 or for 4680 or 180 or 360 or 4860 M1 (dep) "4680"×1.04 or for "4680" + 0.04×"4680" A1 for 4867.2(0) cao
	(c)		0.64	2	M1 for sight of 0.8^2 A1 cao
16	(a)	96/24 or 4 √4 or 2	8	3	M2 for √(96/24) or √(24/96) or √("4") or 2 or 1/2 oe (M1 for 96/24 or 24/96 or 4 or ¼ oe) A1 cao
	(b)	1.2 × 2^3	9.6	3	M1 for "2"^{3} M1 1.2 × "2"^{3} A1 cao

5AM1H_01				
Question	Working	Answer	Mark	Notes
17 (a)		$x + y \,, \ 800$ $x \ldots 100, y \ldots 200$	3	B3 three of of $x + y \,, 800, x \ldots 100, y \ldots 200$ (B2 for 2 correct, or all 3 correct ignoring inequality signs) (B1 for 1 correct or 2 correct ignoring inequality signs)
(b)		Inequalities drawn & shaded	4	M1 for $3x \ldots y$ drawn & shaded M1 for $x + y \,, \ 800$ drawn & shaded M1 for $x \ldots 100, y \ldots 200$ drawn & shaded A1 cao for indicating a combined region NB: line segments should be drawn between *x*=0 and *x*=800; for at least M2 shading must be consistently in or out; accept incorrect line style for M marks.
(c)	At (200,600) £30+£60 = £90 At (600,200) £90+£20=£110 At (100,200) £15+£20=£35 At (100,300) £15+£30=£45	110	4	M1 for indication of use of the intersection points M1 for attempt to find the number of buns and rolls to maximize return eg use of £90, £20 at intersection points M1 use of money to calculate maximum profit A1 cao SC: without intersection point: B2 for 110

5AM1H_01				
Question	Working	Answer	Mark	Notes
18 (a)		Heights 30, 40	2	B1 cao for bar from 15-17.5, height 30 small squares B1 cao for bar from 17.5 – 20, height 40 small squares
(b)		Freqs 32, 16, 12	2	B2 cao for all 3 correct (B1 for any 1 or 2 correct)
(c)	Area up to 12.5 = 170x Area above 21 = 156x Frequency = (156x÷170x)×110	101	3	M1 for attempt to find area up to 12.5 and area above 21 consistently M1 for (156/170) × 110 or 156×110/170 oe A1 101 cao SC: if no marks earned B1 for area of 5 small squares= 1 person oe or any other reference to frequency density SC: B2 for 100.9 (or better)