OCR
Oxford Cambridge and RSA

GCSE

Methods in Mathematics (Pilot)

Unit **B392/01:** Methods in Mathematics 2 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for November 2016

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotations used in the detailed Mark Scheme.

Annotation	Meaning
	Correct
	Incorrect
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working (after correct answer obtained), provided method has been completed
M0	Method mark awarded 0
M1	Method mark awarded 1
M2	Method mark awarded 2
A1	Accuracy mark awarded 1
B1	Independent mark awarded 1
B2	Independent mark awarded 2
MR	Misread
SC	Special case
^	Omission sign

These should be used whenever appropriate during your marking.

The **M**, **A, B**, etc annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks. It is vital that you annotate these scripts to show how the marks have been awarded.
It is not mandatory to use annotations for any other marking, though you may wish to use them in some circumstances.

Subject-Specific Marking Instructions

1. **M** marks are for using a correct method and are not lost for purely numerical errors.
   A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
   B marks are independent of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
   SC marks are for special cases that are worthy of some credit.

2. Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is 'banded', then if the correct answer is clearly given and is not from wrong working **full marks** should be awarded.

   Do not award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and the correct answer clearly follows from it.

3. Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct.

   Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, eg FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '$5^2 + 7^2$'). Answers to part questions which are being followed through are indicated by eg FT 3 × *their* (a).

   For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

4. Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

5. The following abbreviations are commonly found in GCSE Mathematics mark schemes.

   - **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point eg 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
   - **isw** means **ignore subsequent working** after correct answer obtained and applies as a default.
   - **nfww** means **not from wrong working**.
   - **oe** means **or equivalent**.
   - **rot** means **rounded or truncated**.
   - **seen** means that you should award the mark if that number/expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.
   - **soi** means **seen or implied**.

6. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (ie **isw**) unless the mark scheme says otherwise, indicated by the instruction 'mark final answer'.

7. In questions with a final answer line following working space,

(i) if the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

(ii) if the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

(iii) if the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation ✗ next to the wrong answer.

8. In questions with a final answer line:

(i) If one answer is provided on the answer line, mark the method that leads to that answer.

(ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.

(iii) If more than one answer is provided on the answer line and there is more than one method provided, award zero marks for the question unless the candidate has clearly indicated which method is to be marked.

9. In questions with no final answer line:

(i) If a single response is provided, mark as usual.

(ii) If more than one response is provided, award zero marks for the question unless the candidate has clearly indicated which response is to be marked.

10. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the MR annotation. **M** marks are not deducted for misreads.

11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

12. Ranges of answers given in the mark scheme are always inclusive.

13. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

Anything in the mark scheme which is in square brackets […] is not required for the mark to be earned, but if present it must be correct.

Question			Answer	Marks	Part Marks and Guidance	
1	(a)		[*c*=]60° [*d* =] 300°	3	**B1** for *c* =60 **and** **M1** for *d* = 360 – their '60' **A1** for *d* = their 300 ft their '60'	
	(b)		[*e*=]136° [*f*=] 44°	3	**B1** for *f* = 44 **and** **B2** for e = 136 **or** **M1** for *e* = 180 – their 44	
2			0.1(0) 10% 2/5 40% 7/20 0.35	4	**B3** 4 or 5 correct entries **OR** **B2** 3 correct entries **OR** **B1** 1 or 2 correct entries or 4/10 or 35/100	Condone omission % sign
3	(a)	(i)	-1.3	1	oe	
		(ii)	-3.78	1	oe	
	(b)		2816	2	**M1** for 704 or 25344 or evidence of using ÷ 9 and x4 or x4 and ÷9 **SC1** figs 2816 seen	
4	(a)	(i)	5	1		
		(ii)	25p or £0.25 or FT their (i)	2	**M1** for figs 175 or 25 or 0.25	

Question			Answer	Marks	Part Marks and Guidance	
	(b)		7 [bananas] 3 [oranges] 2 [peaches] 4 5 2 5 2 4 2 4 4	**4**	**M3** for at least 2 further trials with a minimum of 2 bananas, 2 oranges and 2 peaches (must have evidence of reaching £1.70) **or** **M2** for cost of 2 bananas, 2 oranges, 2 peaches [£]1.70 **AND** **M1 dep** for at least 2 further trials with a minimum of 2 bananas, 2 oranges and 2 peaches **OR** **M1** for sensible strategy eg attempts to find cost of 2 of each	Candidate has to show evidence of 20 + 20, 30 + 30 and 35 + 35 and then attempt to find at least 2 combinations that have at least 2 of each plus extras to be awarded M3 Eg evidence of 3 bananas, 3 oranges and 3 peaches = £2.55 and 3 bananas, 4 oranges and 3 peaches = £2.85 would score M3 if the candidate has indicated the cost of 2 bananas, 2 oranges and 2 peaches, otherwise it would be M1.
5	**(a)**		Correct pattern	**1**		
	(b)		7 9 9 16	**1**	Allow FT from (a)	
	(c)		21 100	**4**	**B2** 21 **B2** 100 **M1** for add 2 **M1** for + 3, +5, +7 or square numbers up to 36 soi **or** **M1** for correct diagram	
6	**(a)**		A (-3,4) and B (5,-4) plotted	**2**	**B1, B1**	
	(b)		(1,0)	**2**	**M1** for midpoint correctly marked on diagram **or** **B1** for one correct coordinate	

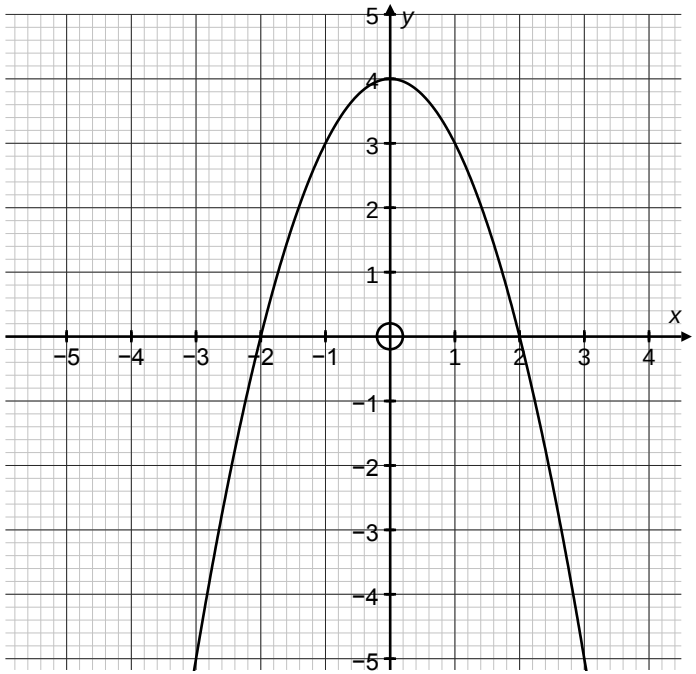
Question			Answer	Marks	Part Marks and Guidance	
7	(a)		320 800 1600	1		
	(b)		Straight line through (100,160) and (1000, 1600)	2	**M1** for 2 points plotted correctly from their table	
*	(c)		Jules by 120 km (or 75 miles)	3	**2** for Jules and 120 (or 75) with no working or Jules with 1040 and 920 (or 650 and 575). Allow their readings from their graph. **1** for 1040 or 575 or their reading from their graph	Readings from graph: accept half square out for graph use, that is: 110-130 km and 65-85 miles Accept 1030-1050 and 565-585 Condone k used for km
8			F £6, £6 F both 0.25 and 0.5 seen **or** F with '¼ is less than ½' score 2 marks.	2 2	**M1** for £6 **M1** for ¼ If 0 scored, **SC1** for F	
9	(a)	(i)	[*P* =] 5*a* +2*b* oe	1		
		(ii)	34 or FT their (i)	2	**M1** for 20 or 14 or 4 + 8 + 4 + 7 + 4 + 7 or 5x4 + 2x7	
		(iii)	9.5 or FT their (i)	3	**FT M1** for 49 = 30 + 2*b* **and** **FT M1** for 2*b* = 19	Allow M1 for 49 – 30 = 19 And M1 for 19÷2 = 9.5 30 can be given as 5x6
	(b)		4.5	3	**B1** for 40 for lower area **and** **M1** for 8x = 36 Or ALT method **M1** for (x + 5) × 8 = 76 **and** **M1** 8*x* + 40 = 76 or *x* + 5 = 76/8	

Question			Answer	Marks	Part Marks and Guidance	
10			Triangle Circle Parallelogram Square 17.5 19.6 20 25 Condone TCPS or similar	8	**B1** for correct order T C P S **B1** for 25 [square] **B2** for 20 [parallelogram] or **M1** for 5 × 4 or 4+12+4 **B2** for 17.5 [triangle] or **M1** for part areas 7 or 10.5 or for ½ x 7 x 5 **B2** for 19.6... [circle] or **M1** for π ×2.5×2.5	Areas may be on diagrams
11	(a)		5 [cm]	2	**M1** for 10 x 4 x ? = 200 oe	
11	(b)		2 from 1 × 1 × 200 2 × 2 × 50 5 × 5× 8 10 × 10 × 2	3	**B2** for 1 correct or **M1** for 1 square base	Allow any integral length up to 10.

12*			Clear, complete proof that angles of a quadrilateral add up to 360º eg Quadrilateral divided into two triangles One triangle is 180º 2 x 180 = 360	2	**1** for some progress towards a proof but not completely watertight eg correct diagram with two triangles or one triangle = 180 or 2 x 180 = 360	

Question			Answer	Marks	Part Marks and Guidance	
13	(a)		1.3 **or** $1\frac{3}{10}$ **or** $\frac{13}{10}$	3	**M1** for $10x - 5 = 8$ or $2x - 1 = \frac{8}{5}$ **M1** ft for *x* terms on one side and numbers on the other **OR** **M1** correct ft from $ax = b$ to $x = \frac{b}{a}$	ft from *their* ax + b = c
	(b)		$x > -5$	2	**M1** for $3x > -15$	**SC1** for $x = -5$ or $x \geq -5$ or $x < -5$
14			(6, 5)	5	**B1** for *y* coord = 5 **M1** for right angled triangle in correct position **M2** ft for $\sqrt{5^2 - 3^2}$ **OR** **M1** for Pythagoras statement with 5 and *their* 3	eg (x, 5) where x is positive Allow for 4 coming from recognition of 3, 4, 5 triangle Could be eg $\sqrt{5^2 + 3^2}$
15	(a)		$\frac{3}{8}$	1		
	(b)		580	2	**M1** for $\frac{348}{3} \times 5$ or 116 or 1740	
	(c)		87	FT3	**M2** for 435 **OR** **M1** for $\frac{\text{their } b}{4} \times 3$ or 145	Ft their (b) as long as final answer is a whole number – max marks if not whole no is M2

Question			Answer	Marks	Part Marks and Guidance
15	(d)*		Clear, correct comparison of amount of honey for same cost or cost for same amount of honey leading to a conclusion that the smaller jar is better value. eg 250g jar = 180 ÷ 250 = 0.72 per gram 400g jar = 320 ÷ 400 = 0.80 per gram So 250g jar is better value	3	**2** for correct working to get cost of both for same amount or correct working to get amount of both for same cost but answers could be incorrect or conclusion could be missing, incorrect or unclear. **1** finding correct cost for another amount (or correct amount for another cost) but not going on to do the other jar. NB 1p is 1.38….g or 1.25g 50g is 36p or 40p 20p buys 27.7777... g or 25g

Question			Answer	Marks	Part Marks and Guidance	
16	(a)		-5, 3, 3, 0	2	**B1 for** 2 values correct	
	(b)			2	**B1** for at least four of *their* points correctly plotted **AND** **B1** for a correct smooth curve	Within half a small square Within half a small square Curve must have one max turning point - **B0** for multiple or "hairy" curves
	(c)		-1.7, 1.7 (± 0.1)	FT2	**B1** for each value If 0 scored then **M1** for evidence of reading from *y*=1	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553