



Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

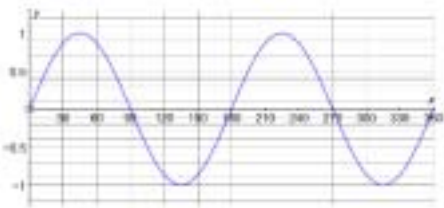
- M** Method marks, awarded for a valid method applied to the problem.
- A** Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.
- B** Mark for a correct result or statement independent of Method marks.

When a part of a question has two or more ‘method’ steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation ‘**dep**’ is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

Abbreviations

awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

Question	Answer	Marks	Partial Marks
A	INVESTIGATION		EQUABLE SHAPES
1	$3.6 \times 4.5 = 16.2$ $2 \times (3.6 + 4.5) \text{ oe} = 16.2$	2	B1 for each
2(a)	$10y$ isw	1	
2(b)	$2y + 20$ oe isw	1	
2(c)	2.5	1	C opportunity
3(a)	$xy = 2x + 2y$ oe	1	
3(b)	$xy - 2x - 2y + 4 = 4$ isw	1	
3(c)	3 by 6 4 by 4	2	B1 for each Deduct 1 for any extras If 0 scored B1 for 1×4 and 2×2 soi
4	$\sqrt{3^2 + 7.2^2}$ oe	B1	
	$7.8 + 7.8 + 6 = 21.6$ oe	B1	
5(a)	$A = ah$ $P = 2a + 2\sqrt{a^2 + h^2}$	2	B1 for each If 0 scored SC1 for both correct expressions
5(b)(i)	$a^2h^2 - 4a^2h + 4a^2 = 4a^2 + 4h^2$ leading to the final answer with at least one correct step.	2	B1 for either side of the equation correct
5(b)(ii)	$[a^2 =] \frac{4h}{h-4}$ oe	1	C opportunity
5(b)(iii)	$h > 4$	1	
5(c)	27	2	B1 for $[a^2 =] 36$ or better C opportunities
Communication: Seen in one of the following questions.		1	
2(c)	$10y = 2y + 20$		
5(b)(ii)	$a^2(h - 4) = 4h$		
5(c)	Correct substitution of h shown		
5(c)	6×4.5 or 7.5 seen with $12 + 2 \times 7.5$ oe		

Question	Answer	Marks	Partial Marks
B	MODELLING		CARBON DIOXIDE MEASUREMENTS
1(a)(i)		2	B1 for correct maxima and minima B1 for correct period
1(a)(ii)	180	1	
1(b)	60	1	
1(c)	9	1	C opportunity
2(a)	[period =] 12 [b =] 30	2	B1 for each C opportunity
2(b)	4 soi	1	
3(a)	Correct 6 points	2	B1 for 5 correct points
3(b)	$y = \frac{1}{6}x + 393$ oe	2	B1 for + 393 or $\frac{1}{6}x$ C opportunity
4	$y = 4 \sin 30x^{101} + \frac{1}{6}x + 393$	1	FT $y = \textit{their}$ functions <u>added</u> together
5	12 24 36 48 60 on the x -axis 395 400 405 on the y -axis	1	
6(a)	405.5	1	
6(b)	401.8	1	FT \textit{their} model as above C opportunity
7	2019 February	2	B1 for 85[.]
8	Valid comment about extrapolation	1	
Communication: Seen in one of the following questions.		1	
1(c)	$360 \div 40$ or $360 \div 9 = 40$		
2(a)	$360 \div 12$ soi		
3(b)	numerical or graphical indication of the gradient fraction giving $\frac{1}{6}$		
6(b)	41		