GCSE
MATHEMATICS
8300/1H

Higher tier

Paper 1 non-calculator

Shadow paper based on November 2023 paper

Mark scheme

November 2023

Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values a $\leqslant$ value < b
3.14 …	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles.

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

Q	Answer	Mark	Comments
1	60	B1	

Q	Answer	Mark	Comments
2	72	B1	

Q	Answer	Mark	Comments
3	4, –3	B1	

Q	Answer	Mark	Comments
4	$5a + 7$ or $7 + 5a$	B1	

Q	Answer	Mark	Comment
5	$(2^3 \times 2^4 =)\ 2^7$ or $(2^{10} \div 2 =)\ 2^9$ or 128 or 512 or $2^3 \times 2^4 \div 2^{10} \times 2$	M1	
	$(2^7$ or 128$) \div (2^9$ or 512$)$ or $2^{(3+4-10+1)}$ or $2^7 \times 2^{-9}$ or 2^{-2} or $\frac{1}{4}$	M1dep	oe in the form $2^n \div 2^{(n+2)}$ oe where index sums to -2 oe in the form $2^n \times 2^{(-n-2)}$ oe fraction
	(0).25	A1	
	Additional Guidance		
	(0).25 and either 2^{-2} or $\frac{1}{4}$ on the answer line		M1M1A1
	(0).25 in working and 2^{-2} on the answer line		M1M1A0
	If a student attempts numerical and index working award the higher mark		

Q	Answer	Mark	Comment
6(a)	Valid description	B1	eg as number of products sold online increases, so does number of products sold in-store products sold online are about $\left[\frac{2}{3}, \frac{5}{6}\right]$ times as many as sold in-store products sold in-store are about $\left[1\frac{1}{5}, 1\frac{1}{2}\right]$ times as many as sold online.
	Additional Guidance		
	Ignore 'Positive correlation'		
	Condone references to causality eg an increase in online sales causes an increase in in-store sales		B1
	As one goes up the other goes up / Both go up at a similar rate		B1
	They both go up		B0
	Online sales are always more than in-store sales		B0
	They are in direct proportion		B0
	The relationship is linear		B0

Q	Answer	Mark	Comment
6(b)	**Alternative method 1 – reading from the graph**		
	2 × 8000 or 16 000 or [9500, 9700]	M1	oe
	2 × 8000 + 1.5(0) × [9500, 9700] or 16 000 + [14250, 14550]	M1dep	oe 1.5(0) may be 1 or 2
	[30 250, 30 550]	A1ft	ft 1 or 2 for 1.5(0)
	Alternative method 2 – using a multiplier		
	2 × 8000 or 16 000 or 8000 × [1.2, 1.5]	M1	oe
	2 × 8000 + 1.5 × 8000 × [1.2, 1.5]	M1dep	oe 1.5(0) may be 1 or 2
	[30 400, 34 000] with 8000 × [1.2, 1.5] seen	A1ft	ft 1 or 2 for 1.5(0)
	Additional Guidance		
	Check graph for working		
	Working may be in pence, units not required for up to M2 Final answer in pence must have units to award A1		

Q	Answer	Mark	Comment
7	Correct method to find 1%, 2%, 5%, 10%, 100% or 520% of the number	M1	
	Fully correct method	M1dep	
	390	A1	
	Additional Guidance		
	Up to M2 may be awarded for multiple attempts if no answer chosen		

Q	Answer	Mark	Comments
8	**Alternative method 1: using algebra**		
	$\frac{1}{2} \times k \times 20$ or $10k$ or $3 \times k + 5 \times m$ or $3k + 5m$	M1	oe correct expression for either area eg $3(k-5) + 5(m+3)$ or $k(m+3) - m(k-5)$
	$\frac{1}{2} \times k \times 20 = 3 \times k + 5 \times m$ or $7k = 5m$	M1dep	oe equation
	5 : 7	A1	oe ratio
	Alternative method 2: substituting a value for k		
	Substitutes a value for k and gives correct method or value for area of triangle or correct area in m for L-shape	M1	eg $k = 10$ and area of triangle is 100 or $k = 10$ and area of L-shape is $30 + 5m$
	Correct equation connecting the two areas or correct value of m for their k	M1dep	eg $k = 10$ and $100 = 30 + 5m$ or $k = 10$ and $m = 14$
	5 : 7	A1	oe ratio

Q	Answer	Mark	Comment
9	$(x =) -2$ and $(x =) -6$	B2	B1 $(x =) -2$ or $(x =) -6$ or one or both values identified but not given in correct notation eg $(-2, 0)$ and/or $(-6, 0)$ or $-6 < x < -2$ or -6 and/or -2 written on the graph or in working
	Additional Guidance		
	$x =$ can be $x \approx$		
	-2 and/or -6 with one extra value		B1
	-2 and/or -6 with more than one extra value		B0
	Answer from use of formula or completing the square		B0

Q	Answer	Mark	Comment
10	$(\pi \times) \left(\frac{\sqrt{11}}{2}\right)^2$	M1	oe condone missing brackets
	$\frac{11}{4}\pi$ or $2\frac{3}{4}\pi$ or 2.75π	A1	oe fraction, mixed number or decimal
	$(\pi \times) 4^2$ or $(\pi \times) 16$ or $\frac{60}{360}$ used	M1	oe
	$\frac{16}{6}\pi$ or $\frac{8}{3}\pi$ or $2\frac{4}{6}\pi$ or $2\frac{2}{3}\pi$ or $2.6(6\ldots)(\pi)$ or $2.67(\pi)$	A1	oe fraction, mixed number or decimal
	A with values in comparable form or A by $\frac{1}{12}(\pi)$ or A by $0.08(3\ldots)(\pi)$	A1	eg values $\frac{33}{12}(\pi)$ and $\frac{32}{12}(\pi)$ $2.75\ (\pi)$ and $2.6(6\ldots)\ (\pi)$ $2.75\ (\pi)$ and $2.67\ (\pi)$ accept 'circle' for A allow comparison of fraction or decimal parts only if integer parts shown as equal
	Additional Guidance		
	For the final mark, presence or absence of π must be the same for both values		
	Accept consistent use of a numerical value of π throughout. The value can be 3 or 3.1 or 3.14 or 3.142 or better		

Q	Answer	Mark	Comment
11	$(x-3)(x-4)$	B2	either order B1 $(x+a)(x+b)$ where $ab = 12$ or $a+b=-7$
	Additional Guidance		
	Condone a multiplication sign between the brackets		
	Condone missing final bracket		
	Ignore an attempt to solve $(x-3)(x-4)=0$		

Q	Answer	Mark	Comment
12(a)	12000	B1	

Q	Answer	Mark	Comment
12(b)	0.5 or $\frac{1.2\times10^4}{2.5\times10^{-1}}$ or $\frac{\text{their } 12000}{2.5\times10^{-1}}$ or $0.48 \times 10^{4-(-1)}$ or 0.48×10^5	M1	oe their 12000 from part (a)
	48000 or 4.8×10^4	A1ft	ft $4 \times$ their 12000 in part (a)

Q	Answer	Mark	Comments
13	$21x - 7d$ or $21x = cx$ or $-7d = 35$	M1	
	$21x = cx$ and $-7d = 35$ or $c = 21$ or $d = -5$	M1dep	
	$c = 21$ $d = -5$	A1	

Q	Answer	Mark	Comments
14	$11x = 4x + 14$ or $\frac{x-14}{x} = \frac{4}{11}$ or $\frac{x+14}{x} = \frac{11}{4}$ or $14 \div (11-4)$ or $14 \div 7$ or 2	M1	oe any letter
	$11 \times 14 \div (11-4)$ or 22 or $4 \times 14 \div (11-4)$ or 8 or $(11+4) \times 14 \div (11-4)$	M1dep	oe hours for Job A hours for Job B total hours
	30	A1	

Q	Answer	Mark	Comments
15(a)	29.5	B1	

Q	Answer	Mark	Comments
15(b)	**Average**		
	Indicates that the statement is incorrect and uses the median to support their decision	B2	eg No, as median is higher (in 2020) B1 median is higher in 2020 with no or incorrect decision or median (for 2019) is 22.5
	Consistency		
	Indicates that the statement is correct and uses the IQR to support their decision	B2	eg Yes, as IQR is smaller (in 2019) B1 IQR is lower in 2019 with no or incorrect decision or IQR (for 2019) is 6 or IQR (for 2020) is 8

Additional Guidance	
Average	
For B2 or B1, ignore reference to the LQ or UQ	
Condone 22.30 for the median	
For B2 or B1, if using 'average' for 'median' the value(s) must be given	
Incorrect value for the 2019 median can score B1 if lower than 24 eg It's correct, the 2019 median was 23.5	B1
Reference to IQR	B1max
Median is 22.5, so true	B2
Incorrect, the median is 2.5 higher in 2020 / No, it was 2.5 minutes slower in 2020	B2
Consistency	
Allow calculation seen to imply IQR eg (2019) $26 - 20 = 6$	
Ignore reference to the range in 2019	
Reference to median	B1max
$26 - 20 < 28 - 20$ so this is true	B2
6 not accompanied by a calculation or reference to IQR	B0
6 stated to be the range	B0

Q	Answer	Mark	Comments
16(a)	$2x + x + 15 + 8 = 50$ or $3x + 23 = 50$ or $50 - 15 - 8$ or 27 or $\frac{x+8}{50}$ or $\frac{x+8}{3x+23}$	M1	oe implied by $\frac{27}{50}$
	$(x =) \frac{50-15-8}{3}$ or $\frac{27}{3}$ or 9 or 17	M1dep	oe implied by $\frac{9}{50}$
	$\frac{17}{50}$ or 0.34 or 34%	A1	oe fraction, decimal or percentage
	Additional Guidance		
	Ignore incorrect conversion after correct answer seen		

Q	Answer	Mark	Comments
16(b)	$\frac{8}{23}$ or 0.3478… or 34.78…% or 0.348 or 34.8%	B1	oe fraction, decimal or percentage
	Additional Guidance		
	Ignore incorrect conversion after correct answer seen		

Q	Answer	Mark	Comments
17	$2 \leqslant x \leqslant 6$ or $4 \leqslant 2x \leqslant 12$ or $x = 6$ or $2x = 12$	M1	may be in two parts implied by $(y =)$ 27 or $(x =)$ 2, 3, 4, 5 or $(3x =)$ 6, 9, 12, 15
	$y - 2 \times 6 < 16$ or $y < 16 + 2 \times 6$ or $y < 28$ or $y - 2 \times 6 \leqslant 15$ or $y \leqslant 15 + 2 \times 6$ or $y \leqslant 27$	M1dep	oe may be seen in a double-sided inequality eg condone $20 < y < 28$ using $\leqslant$ or $=$
	27	A1	SC1 19
	Additional Guidance		
	SC1 is for the use of 2 instead of 6		
	All inequalities may be reversed, eg $2 \leqslant x \leqslant 6$ may be $6 \geqslant x \geqslant 2$		

Q	Answer	Mark	Comments
18(a)	**Rotation about (1, 0)**		
	90° anticlockwise or 270° clockwise	B1	oe description of rotation condone 90° counter-clockwise eg quarter turn anticlockwise
	Translation		
	$\begin{pmatrix} 0 \\ -4 \end{pmatrix}$	B1	oe description of translation eg 0 left and 4 down condone missing brackets SC1 B0B0 and point (–3, 2) identified
	Additional Guidance		
	Condone missing degrees sign		
	(0, –4)		B0
	Compound transformation		B0 for that part

Q	Answer	Mark	Comments
18(b)	(4, 4) and (7, 7) or (5, 5) and (6, 6) or () (3, 3) and (8, 8)	B1	condone (2, 2) and (9, 9) or (1, 1) and (10, 10) or (0, 0) and (11, 11) either order

Q	Answer	Mark	Comments
19	**Alternative method 1**		
	$(0.\dot{5} =) \frac{5}{9}$ or $10x - x = 5$ or $9x = 5$	M1	oe eg $100x - x = 55$ or $99x = 55$ or $100x - 10x = 50$ or $90x = 50$ any letter
	$\frac{8}{9} \div 10$ or $\frac{8}{90}$ or $10y - y = 0.8$ or $9y = 0.8$	M1	oe eg $100y - y = 8.8$ or $99y = 8.8$ or $100y - 10y = 8$ or $90y = 8$ any letter
	$\frac{7}{15}$ or $\frac{14}{30}$ or $\frac{21}{45}$ or $\frac{42}{90}$	A1	oe single fraction
	Alternative method 2		
	$0.4\dot{6}$	M1	oe
	$10x - x = 4.2$ or $9x = 4.2$	M1dep	oe eg $100x - x = 46.2$ or $99x = 46.2$ or $100x - 10x = 42$ or $90x = 42$ any letter
	$\frac{42}{90}$	A1	oe single fraction
	Additional Guidance		
	For M marks, allow fractions with decimal numerator or denominator eg in alt 1, $\frac{0.8}{9}$ scores M1 and in alt 2, $\frac{4.2}{9}$ scores M2		

Q	Answer	Mark	Comments
20	$(x =)$ 30 or $(4x =)$ 120 or $(y =)$ 90	M1	implied by cos 30 or sin 90 must be selected and not just in a table
	$4 \times 30 - 90$ or $120 - 90$ or $(w =)$ 30 or tan 30	M1dep	
	$\frac{\sqrt{3}}{3}$ or $\frac{1}{\sqrt{3}}$ with M2 awarded	A1	
	Additional Guidance		
	$\frac{\sqrt{3}}{3}$ or $\frac{1}{\sqrt{3}}$ with no working		M0M0A0
	Condone degrees sign on answer with correct working		M1M1A1

Q	Answer	Mark	Comments
21	$5(2x)^2 + 16$	M1	oe
	$20x^2 + 16$	M1dep	dep on 2nd M1 may be implied by 4th mark
	$8x + 16$	M1	may be implied by 4th mark
	$20x^2 - 8x = 0$ or $20x^2 = 8x$	M1	oe equation with brackets expanded rearranges their $f^{-1}(x)$ = their $gh(x)$ to correctly collect terms
	0 and $\frac{2}{5}$	A1	oe eg 0 and $\frac{8}{20}$ or 0 and 0.4
	Additional Guidance		
	With no terms to collect in their equation the 4th mark cannot be awarded		
	$8x + 16 = 10x^2 + 36$ $0 = 10x^2 - 8x + 20$		M0M0M1 M1A0
	$8x - 16 = 10x^2 + 36$ $0 = 8x^2 - 8x + 52$		M0M0M0 M1A0
	$8x + 16 = 5(2x)^2 + 16$ $8x + 16 = 4x^2 + 16$ $8x = 16x^2$		M1M0M1 M1A0
	$8x + 16 = 2x(5x^2 + 16)$ $0 = 10x^3 + 24x - 16$		M0M0M1 M1A0

Q	Answer	Mark	Comments
22	**Alternative method 1**		
	$\frac{180}{8+2}$ or 18 or $2 \times \frac{180}{8+2}$ or 36 or $8 \times \frac{180}{8+2}$ or 144	M1	oe eg $180 \times \frac{1}{4+1}$ or $180 \div 5$ size of angle c size of angle a
	$3 \times \frac{180}{8+2}$ or or 3×18 or 54 or $7 \times \frac{180}{8+2}$ or $(8+3+2) \times \frac{180}{8+2}$ or 234	M1dep	oe size of angle b
	126	A1	
	Alternative method 2		
	$a : b : c : d = 8 : 3 : 2 : 7$ or $b : d = 3 : 7$	M1	oe implied by $d = 7$
	$\frac{7}{8+3+2+7} \times 360$ or $\frac{7}{20} \times 360$ or $\frac{7}{3+7} \times 180$ or $\frac{7}{10} \times 180$ or 7×18	M1dep	oe allow numerator to be 3
	126	A1	

Q	Answer	Mark	Comments
23	**Alternative method 1**		
	$\frac{9\sqrt{7}}{\sqrt{50}} \times \frac{\sqrt{50}}{\sqrt{50}}$	M1	oe eg $\frac{9\sqrt{7}}{\sqrt{5}\sqrt{10}} \times \frac{\sqrt{5}\sqrt{10}}{\sqrt{5}\sqrt{10}}$
	$\frac{9\sqrt{350}}{50}$	M1dep	oe single rationalised fraction
	$\frac{9\sqrt{14}}{10}$ or $\frac{45\sqrt{14}}{50}$	A1	oe in the form $\frac{x\sqrt{14}}{y}$ where x and y are integers
	Alternative method 2		
	$\frac{9\sqrt{7}}{5\sqrt{2}}$	M1	
	$\frac{9\sqrt{7}}{5\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$	M1dep	oe rationalisation eg $\frac{9\sqrt{7}}{5\sqrt{2}} \times \frac{5\sqrt{2}}{5\sqrt{2}}$
	$\frac{9\sqrt{14}}{10}$ or $\frac{45\sqrt{14}}{50}$	A1	oe in the form $\frac{x\sqrt{14}}{y}$ where x and y are integers

Mark scheme and Additional Guidance continue on the next page

Q	Answer	Mark	Comments
23 cont	**Alternative method 3**		
	$\frac{9}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$ or $\frac{9\sqrt{5}}{5}$ or $\frac{\sqrt{7}}{\sqrt{10}} \times \frac{\sqrt{10}}{\sqrt{10}}$ or $\frac{\sqrt{70}}{10}$	M1	oe
	$\frac{9\sqrt{5}}{5} \times \frac{\sqrt{70}}{10}$ or $\frac{9\sqrt{350}}{50}$	M1dep	oe rationalised
	$\frac{9\sqrt{14}}{10}$ or $\frac{45\sqrt{14}}{50}$	A1	oe in the form $\frac{x\sqrt{14}}{y}$ where x and y are integers
	Alternative method 4		
	$\frac{9}{\sqrt{5}} \times \frac{\sqrt{7}}{\sqrt{10}} \times \frac{\sqrt{2}}{\sqrt{2}}$	M1	oe
	$\frac{9\sqrt{2}}{\sqrt{10}} \times \frac{\sqrt{7}}{\sqrt{10}}$ or $\frac{9}{\sqrt{5}} \times \frac{\sqrt{14}}{\sqrt{20}}$ or $\frac{9\sqrt{14}}{\sqrt{100}}$	M1dep	oe one term or product of two terms with numerator $9\sqrt{14}$
	$\frac{9\sqrt{14}}{10}$ or $\frac{45\sqrt{14}}{50}$	A1	oe in the form $\frac{x\sqrt{14}}{y}$ where x and y are integers

Q	Answer	Mark	Comments
24	3	B1	oe

Q	Answer	Mark	Comments
25	$r^2 = \frac{18}{25}$ or $\sqrt{\frac{18}{25}}$ or $\frac{3\sqrt{2}}{\sqrt{25}}$ or $\frac{\sqrt{18}}{5}$ or $\frac{3\sqrt{2}}{5}$ or $\left(\sqrt{\frac{18}{25}}\right)^3$ or $\frac{18\sqrt{18}}{125}$	M1	oe eg $\left(\frac{18}{25}\right)^{\frac{1}{2}}$ allow $\pm\sqrt{\frac{18}{25}}$ etc
	$\frac{54\sqrt{2}}{125}$	A1	oe in the form $\frac{c\sqrt{2}}{d}$ where c and d are integers

Q	Answer	Mark	Comments
26(a)	$\sqrt[3]{15\frac{5}{8}}$ or $\left(15\frac{5}{8} =\right)\frac{125}{8}$ or $\frac{125^{\frac{1}{3}}}{8^{\frac{1}{3}}}$ or $\left(125^{\frac{1}{3}} =\right) 5$ or $\left(8^{\frac{1}{3}} =\right) 2$	M1	oe eg $\sqrt[3]{\frac{125}{8}}$ condone missing brackets
	$\frac{5}{2}$ or $2\frac{1}{2}$ or 2.5	A1	

Q	Answer	Mark	Comments
26(b)	$\left(2^{4m}\right)^{1.5}$ or $16^{1.5m}$ or $\left(2^4\right)^{1.5m}$	M1	oe with base changed to 2 and/or brackets removed
	2^{6m}	A1	

Q	Answer	Mark	Comments
27	$x < -7$ $x > 7$ or $-7 > x$ $7 < x$	B1	Must have both parts. Ignore any words between the parts

Q	Answer	Mark	Comments
28	$(\overrightarrow{XR} =)\ \frac{3}{2}(2\mathbf{a} + 6\mathbf{b})$ or $3\mathbf{a} + 9\mathbf{b}$ or $(\overrightarrow{QR} =)\ \frac{5}{2}(2\mathbf{a} + 6\mathbf{b})$ or $5\mathbf{a} + 15\mathbf{b}$	M1	oe may be on diagram
	$(\overrightarrow{PS} =) -5\mathbf{a} + 2\mathbf{a} + 6\mathbf{b}$ $+ \frac{3}{2}(2\mathbf{a} + 6\mathbf{b}) + \mathbf{a} - 12\mathbf{b}$ or $(\overrightarrow{PS} =) -5\mathbf{a} + \frac{5}{2}(2\mathbf{a} + 6\mathbf{b}) + \mathbf{a} - 12\mathbf{b}$ or $(\overrightarrow{PS} =) \mathbf{a} + 3\mathbf{b}$	M1dep	oe may be on diagram
	$(\overrightarrow{PS} =) \mathbf{a} + 3\mathbf{b}$ and indication why *PS* is parallel to *QR*	A1	eg $2(\mathbf{a} + 3\mathbf{b}) = 2\mathbf{a} + 6\mathbf{b}$ or $5\mathbf{a} + 15\mathbf{b} = 5(\mathbf{a} + 3\mathbf{b})$ or $\mathbf{a} + 3\mathbf{b}$ and $\overrightarrow{QR}$ is a multiple of $\overrightarrow{PS}$
	Additional Guidance		
	Some or all vectors may be reversed and the final mark can be from using a negative constant eg $\overrightarrow{RX} = -3\mathbf{a} - 9\mathbf{b}$ $\overrightarrow{PS} = \mathbf{a} + 3\mathbf{b}$ $-3(\mathbf{a} + 3\mathbf{b}) = -3\mathbf{a} - 9\mathbf{b}$		M1 M1 A1

Q	Answer	Mark	Comments
29(a)	None of the graphs pass through (180°, 1)	B1	

Q	Answer	Mark	Comments
29(b)	$y = \sin x$ passes through (270°, –1)	B1	