GCSE
MATHEMATICS
8300/2H

Higher Tier

Paper 2 Calculator

Shadow paper based on 2020 question paper

Mark scheme

Version: 1.3

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	$2x + 4x \equiv 6x$	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
2	SAS	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
3	9.2×10^{-9}	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
4	a^4	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
5(a)	Plots at least 3 points correctly	M1	$\pm\frac{1}{2}$ square
	All four points correctly plotted and joined	A1	$\pm\frac{1}{2}$ square ignore working for part (b)
	Additional Guidance		
	$\pm\frac{1}{2}$ square means half a small square horizontally **and** vertically		
	If a point is within tolerance the line must be within $\pm\frac{1}{2}$ square of their point		
	Mark intention for joining point to point		

Q	Answer	Mark	Comments
5(b)	[88, 96]	B1	
	Additional Guidance		
	Answer in range with or without working, with no graph or incorrect graph		B1
	94 – 96 on answer line (both values in range)		B1

Q	Answer	Mark	Comments
6	16	B2	B1 answer 2 or 4 or 8 or answer 2^4 or answer 2 (×) 2 (×) 2 (×) 2 or (112 =) 2 (×) 2 (×) 2 (×) 2 (×) 7 or (112 =) 2^4 (×) 7 or (144 =) 2 (×) 2 (×) 2 (×) 2 (×) 3 (×) 3 or (1) 2 4 8 16 7 14 28 56 (112) or (1) 2 4 8 16 3 6 12 24 48 3 9 18 36 72 (144)

Additional Guidance	
Prime factor responses for B1 may be seen in repeated division, on a factor tree or in a Venn diagram	
eg1 2 2 2 2 7 in repeated division or factor tree for 112	B1
eg2 2 2 2 2 7 inside one circle of a Venn diagram	B1
eg3 2 2 2 2 inside the intersection of a Venn diagram	B1
For products of prime factors, repeated division, factor trees and Venn diagrams, ignore inclusion of factors of 1	
A repeated division needs to reach the final prime factor but does not need to reach 1	
B1 can be awarded even if LCM is subsequently worked out	
List of factors may be seen as factor pairs	

Q	Answer	Mark	Comments
7(a)	2 and 5 with no other roots	B2	either order B1 at least one correct root with up to one incorrect root SC1 (2, 0) or (5, 0) or (2, 5) or (5, 2)
	Additional Guidance		
	$x = 2$ and $x = 5$		B2
	2, 5 or 5, 2		B2
	(2, 0) and (5, 0) and 2 and 5		SC1
	(2, 0) and (5, 0) and –2 and –5		B0
	2, 0 and 5, 0 (both pairs imply coordinates)		SC1
	2, 0 or 5, 0 (one pair implies roots)		B1
	(0, 2) and (0, 5)		B0
	0, 2 and 0, 5 (both pairs imply coordinates)		B0
	0, 2 or 0, 5 (one pair implies roots)		B1
	Both answers embedded $2^2 - 7 \times 2 + 10 = 0$ and $5^2 - 7 \times 5 + 10 = 0$		B1
	$(x - 2)(x - 5)$		B0

Q	Answer	Mark	Comments
7(b)	3.5	B1	oe
	Additional Guidance		
	$x = 3.5$		B1
	$3.5x$		B0
	Ignore any y-coordinate even with brackets omitted eg (3.5, –2.25) or 3.5, –2 or $x = 3.5$ $y = -2.25$ or $x = 3.5$ $y = 2$		B1
	(–2.25, 3.5)		B0

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="5">8</td><td>33 (girls) and 36 (boys)
and No
or
33 : 36 and No
or
69 and No
or
2 (girls arrive) and 3 (boys leave)
and No</td><td>B2</td><td>oe
B1 33 (girls) and 36 (boys)
or 33 : 36
or 69
or 2 (girls arrive) and 3 (boys leave)</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">NB 69 from incorrect working eg 31 + 38 = 69</td><td>B0</td></tr>
<tr><td colspan="2">For B1 the values may be seen among others
eg1 22 : 24 33 : 36 44 : 48 55 : 60
eg2 11, 22, 33, 44, 55, … and 12, 24, 36, 48, 60, …
eg3 $\frac{36}{69}$ (implies 69)</td><td>B1</td></tr>
<tr><td colspan="2">For B2 the value(s) must be chosen by eg circling or a list stopping at that point and No must be indicated</td><td></td></tr>
</table>

Q	Answer	Mark	Comments
9(a)	**Alternative method 1**		
	$300 - 2 \times 5 \times 5$ or $300 - 50$ or 250 or $4 \times 5 \times y$ or $20y$	M1	oe eg $5y + 5y + 5y + 5y$ implied by 62.5
	$4 \times 5 \times y = 300 - 2 \times 5 \times 5$ or $4 \times 5 \times y = 300 - 50$ or $4 \times 5 \times y = 250$ or $250 \div 4 \div 5$ or $250 \div 20$ or 12.5	M1dep	oe eg $20y = 250$
	312.5	A1	oe
	Alternative method 2		
	$300 - 2 \times 5 \times 5$ or $300 - 50$ or 250	M1	oe implied by 62.5
	$250 \div 4 \times 5$ or 62.5×5	M1dep	oe
	312.5	A1	oe
	Additional Guidance		
	Embedded 12.5 eg $4 \times 5 \times 12.5 = 250$		M1M1

Q	Answer	Mark	Comments
9(b)	It is bigger than the answer to part (a)	B1	

Q	Answer	Mark	Comments
10	**Alternative method 1** Total % for A after 5 tests – total % for B after 5 tests		
	60×5 or 300 or 55×5 or 275	M1	oe
	$\frac{24}{60} \times 100$ or 0.4×100 or 40	M1	oe 340 implies M1M1
	$60 \times 5 + \frac{24}{60} \times 100 - 55 \times 5$ or $300 + 40 - 275$ or 65	M1dep	oe eg $348 - 260$ dep on M1M1
	39	A1	allow $\frac{39}{60}$
	Alternative method 2 Total score for A after 5 tests – total score for B after 5 tests		
	$\frac{60}{100} \times 60$ or 36	M1	oe allow $\frac{36}{60}$
	$\frac{55}{100} \times 60$ or 33	M1	oe allow $\frac{33}{60}$
	$\frac{60}{100} \times 60 \times 5 + 24 - \frac{55}{100} \times 60 \times 5$ or $180 + 24 - 165$	M1dep	oe dep on M1M1
	39	A1	allow $\frac{39}{60}$

Mark scheme and Additional Guidance continues on the next two pages

Q	Answer	Mark	Comments
10 cont	**Alternative method 3** Total score for A after 6 tests – total score for B after 5 tests		
	60×5 or 300	M1	oe
	$\frac{60}{100} \times 60 \times 5$ or 180 and $\frac{55}{100} \times 60 \times 5$ or 165	M1dep	oe
	$\frac{60}{100} \times 60 \times 5 + 24 - \frac{55}{100} \times 60 \times 5$ or $180 + 24 - 165$	M1dep	oe
	51	A1	allow $\frac{39}{60}$
	Alternative method 4 Difference in scores after 5 tests + 6th score for A		
	$60 - 55$ or 5	M1	oe
	$\frac{60-55}{100} \times 60$ or 3	M1dep	oe eg $\frac{60}{100} \times 60 - \frac{55}{100} \times 60$ or $36 - 33$
	$\frac{60-55}{100} \times 60 \times 5 + 24$ or $3 \times 5 + 24$ or $15 + 24$	M1dep	oe
	39	A1	allow $\frac{39}{60}$

Additional Guidance is on the next page

10 cont	**Additional Guidance**	
	To award the 3rd M a calculation or a value (not an equation) must be seen	
	Select the scheme that favours the student for the first 2 M marks even if not subsequently used	

Q	Answer	Mark	Comments
11	6755 ÷ 350 or 6.755 ÷ 350 or 6755 ÷ 0.000 35 or answer with digits 193	M1	oe eg $\frac{6.755 \times 1000}{350}$
	19.3	A1	oe
	Additional Guidance		
	Digits 193 may have additional zeros before 1 or after 3 eg1 0.000 193 eg2 19 300 eg3 19.03		 M1A0 M1A0 M0A0

Q	Answer	Mark	Comments
12	$\frac{10-1}{1--2}$ or $\frac{9}{3}$ or $3x$ (+ c) where c is a constant	M1	oe
	3	A1	
	Additional Guidance		
	$3x$ may be implied		M1A0

Q	Answer	Mark	Comments
13	$\frac{1}{2}$ × (2.3 + 1.9) (× h) or 2.1(h)	M1	oe eg 2.3(h) + 0.5(h) × 1.9 any letter may be implied
	$\frac{1}{2}$ × (2.3 + 1.9) × h = 35.7 or (2.3 + 1.9) × h = 35.7 × 2 or 35.7 ÷ 2.1 or 71.4 ÷ 4.2	M1dep	oe equation or calculation
	17	A1	SC1 8.5
	Additional Guidance		
	Different letter used eg 1.9h + 0.5x × 2.3 is M0 unless recovered		

Q	Answer	Mark	Comments
14	**Alternative method 1**		
	12 000 × 1.06 or 12 720	M1	oe eg 12 000 + 0.06 × 720 or 12 720 + 720 may be implied eg 14 880
	12 000 × 1.06^4 or 15 149.(…) or 15 150	M1dep	oe eg their 12 720 × 1.06 or 13 483.2 and their 13 483.2 × 1.06 or 14292.192 and their 14292.192 x 1.06 12 720 × 1.06^3 is M2
	15 149.(…) and No or 15 150 and No	A1	oe eg 15 149.(…) which is less than 16 000
	Alternative method 2		
	1.06^4 or 1.262… or 1.262 or 1.26 or $\frac{16000}{12000}$ or 1.33(3…) or 1.333	M1	oe
	1.06^4 or 1.262… or 1.262 or 1.26 and $\frac{16000}{12000}$ or 1.33(3…) or 1.333	M1dep	oe
	1.262… or 1.26 and 1.333(3…) and No	A1	

Additional Guidance is on the next page

	Additional Guidance	
14 cont	Working is implied by a correct value 15149.(…) and No with no working 15150 and No with no working 15149.(…) with no working 15150 with no working	 M1M1A1 M1M1A1 M1M1A0 M1M1A0
	15149 < 16000	M1M1A1
	15149 > 16000	M1M1A0
	For year on year working allow truncation/rounding eg 12 720 × 1.06 = 13483 13483 × 1.06 = 14291.98 No	 M1 M1A1
	Increasing by 6% five or more times can score a maximum of M1M1A0	
	Increasing by 6% three times can score a maximum of M1M0A0	
	Do not allow misreads of 6%	

Q	Answer	Mark	Comments	
15	**Alternative method 1**			
	$ac = b - 2c$	M1	oe fraction eliminated	
	$ac + 2c = b$ or $c(a + 2) = b$ or $\frac{b}{a+2}$	M1dep	oe terms in c collected	
	$c = \frac{b}{a+2}$	A1		
	Alternative method 2			
	$a + 2 = \frac{b}{c}$	M1		
	$\frac{1}{a+2} = \frac{c}{b}$ or $\frac{a+2}{b} = \frac{1}{c}$ or $c(a + 2) = b$ or $\frac{b}{a+2}$	M1dep		
	$c = \frac{b}{a+2}$	A1		
	Additional Guidance			
	$c = \frac{b}{a+2}$ in working lines with $\frac{b}{a+2}$ on answer line			M1M1A1

Q	Answer	Mark	Comments
16	$\frac{5}{13} \times 26$ or 10 or $\frac{75}{100} \times 8$ or 6 or $26 \times 9 \times 8$ or 1872 or $\frac{5}{13} \times \frac{75}{100}$ or $\frac{375}{1300}$ or $\frac{15}{52}$	M1	oe accept $\frac{10}{26}$ for 10 accept $\frac{6}{8}$ for 6
	$\frac{5}{13} \times 26 \times 9 \times \frac{75}{100} \times 8$ or $10 \times 9 \times 6$	M1dep	oe eg $\frac{5}{13} \times \frac{3}{4} \times 1872$ or $\frac{15}{52} \times 1872$ or $\frac{10}{26} \times \frac{9}{9} \times \frac{6}{8}$ or $\frac{540}{1872}$
	540	A1	allow 540 out of 1872
	Additional Guidance		
	$\frac{540}{1872}$		M1M1A0
	$\frac{15}{52}$ from $\frac{540}{187}$ 2		M1M1A0
	~~15~~ 52 from ~~5~~ 13 × ~~75~~ 100 (×1)		M1M0A0
	Allow [0.38, 0.385] for ~~5~~ 13 eg $0.38 \times 26 = 9.88$ (allow 9 if method seen) $9.88 \times 9 \times 6$ (or $9 \times 9 \times 6$)		M1 M1A0

Q	Answer	Mark	Comments
17(a)	[82.5, 83.5]	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
17(b)	71	B1	accept 70 or 72
	their 71 × (0.)15 or 1065 or 10.65 and (200 – their 71) × (0.)18 or 129 × (0.)18 or 2322 or 23.22	M1	0 < their 71 < 200 but their 71 cannot be 80 3396 implies B1M1
	33.87	A1ft	ft their 71
	Additional Guidance		
	70 70 × 0.15 + 130 × 0.18 = 10.5 + 23.4 = 33.9		B1 M1 A1
	72 72 × 0.15 + 128 × 0.18 = 10.8 + 23.04 = 33.84		B1 M1 A1
	73 73 × 0.15 + 127 × 0.18 = 10.95 + 22.86 = 33.81		B0 M1 A1ft
	80 80 × 0.15 + 120 × 0.18 = 12.00 + 21.60 = 33.60		B0 M0 A0

Q	Answer	Mark	Comments
18	**Alternative method 1**		
	$\tan 65 = \frac{h}{11}$	M1	oe eg $\tan(90 - 65) = \frac{11}{h}$ or $\frac{h}{\sin 65} = \frac{11}{\sin 25}$ any letter
	$11 \times \tan 65$ or 23.6 or [23.589, 23.6]	M1dep	oe eg $\frac{11}{\tan 25}$ or $\frac{11}{\sin 25} \times \sin 65$
	$\sin x = \frac{\text{their } 23.6}{45}$ or $\sin x = 0.52(4\ldots)$	M1dep	oe eg $\sin x = \frac{11 \times \tan 65}{45}$ or $\cos x = \frac{\sqrt{45^2 - \text{their } 23.6^2}}{45}$
	[31.3, 31.6]	A1	accept 32 with M3 seen
	Alternative method 2		
	$\left(\frac{11}{\cos 65}\right)^2 - 11^2$ or [556, 556.5]	M1	oe
	$\sqrt{\left(\frac{11}{\cos 65}\right)^2 - 11^2}$ or [23.58, 23.6]	M1dep	oe
	$\sin x = \frac{\text{their } 23.6}{45}$ or $\sin x = 0.52(4\ldots)4$	M1dep	oe eg $\cos x = \frac{\sqrt{45^2 - \text{their } 23.6^2}}{45}$
	[31.3, 31.6]	A1	accept 32 with M3 seen
	Additional Guidance		
	Answer in range with truncation to 32		M1M1M1A1

Q	Answer	Mark	Comments
19	$10a + 5b$ and $6a + 3b$	M1	
	$5(2a + b)$ or $3(2a + b)$	M1	
	$\frac{5(2a+b)}{3(2a+b)}$ and $\frac{5}{3}$ or $\frac{5(2a+b)}{3(2a+b)}$ and 1.666…	A1	
	Additional Guidance		
	$\frac{5}{3}$ with no working or only from substitution of values		M0M0A0
	Ignore substitution of values eg $\frac{5(2a+b)}{3(2a+b)} = \frac{5}{3}$ followed by substitution of values		M1M1A1
	$\frac{10a+5b}{6a+3b} = \frac{5}{3}$		M1M0A0
	$5b + 10a$ and $3b + 6a$ are equivalent to $10a + 5b$ and $6a + 3b$ etc		

Q	Answer	Mark	Comments
20	$180 - \frac{360}{9}$ or $180 - 40$ or $1260 \div 9$ or 140	M1	oe eg $(9 - 2) \times 180 \div 9$ may be seen on diagram
	$\frac{540 - 3 \times \text{their } 140}{2}$ or $\frac{540 - 420}{2}$ or $\frac{120}{2}$ or $360 - 90 - \text{their } 140 - \frac{\text{their } 140}{2}$ or $\text{their } 140 - 90$	M1dep	oe eg $\frac{(5 - 2) \times 180 - 3 \times \text{their } 140}{2}$
	60	A1	
	Additional Guidance		
	$540 \div 9 = 60$		M0M0A0
	140 worked out but not used		M1M0A0

Q	Answer	Mark	Comments
21(a)	(0.8, 2.5)	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
21(b)	Valid criticism	B1	eg the graph should go through (4, 16)
	Additional Guidance		
	(4, 15) should be (4, 16)		B1
	It should be (4, 16)		B1
	Graph should end at (y =) 16		B1
	(4, 15) is not on the graph		B1
	The point at x = 4 is wrong		B1
	The point at 4 is wrong		B0
	2^4 is 16		B1
	4^2 is 16		B0
	The last point is wrong		B1
	One of the points is wrong		B0
	Graph isn't high enough		B0

Q	Answer	Mark	Comments
22	D	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
23	**Alternative method 1**		
	$8^2 + 15^2$ or 289 or $\sqrt{8^2 + 15^2}$ or 17	M1	oe
	$\sqrt{20^2 - \text{their } 289}$ or $\sqrt{20^2 - \text{their } 17^2}$ or $\sqrt{111}$ or [10.53, 10.54]	M1dep	oe eg $\sqrt{20^2 - 8^2 - 15^2}$ may be implied eg [21.0, 21.1]
	0.5 × 8 × 15 × 2 × their [10.53, 10.54]	M1dep	oe
	[1264, 1265] or $120\sqrt{111}$	A1	SC3 [2528, 2529] or $240\sqrt{111}$
	Alternative method 2		
	$20^2 - 8^2$ or 336 or $\sqrt{20^2 - 8^2}$ or 18.33 or 18.3	M1	oe
	$\sqrt{\text{their } 336 - 15^2}$ or $\sqrt{\text{their } 18.33^2 - 15^2}$ or $\sqrt{111}$ or [10.53, 10.54]	M1dep	oe eg $\sqrt{20^2 - 8^2 - 15^2}$ may be implied eg [21.0, 21.1]
	0.5 × 8 × 15 × 2 × their [10.53, 10.54]	M1dep	oe
	[1264, 1265] or $120\sqrt{111}$	A1	SC3 [2528, 2529] or $240\sqrt{111}$
	Additional Guidance		
	Lengths may be seen on the diagram		
	1st and 2nd M marks can be awarded even if not subsequently used		
	$8^2 + 15^2 + 20^2$		M1M0M0A0

Q	Answer	Mark	Comments
24(a)	(4, 2)	B2	B1 point (4, 2) from rotation may be seen on the diagram or point (4, 2) marked on diagram
	Additional Guidance		
	(4, 2) marked on diagram and answer (2, 4)		B1

Q	Answer	Mark	Comments
24(b)	$y = x + 6$	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
25	$(5x - 3)(x + 2)$	B2	oe product of brackets eg $(x + 2)(5x - 3)$ or $(5x - 3)(2 + x)$ or $-(3 - 5x)(x + 2)$ B1 $(5x + a)(x + b)$ where $ab = -6$ or $a + 5b = 7$ or $5x(x + 2) - 3(x + 2)$ or $x(5x - 3) + 2(5x - 3)$

Additional Guidance	
Ignore attempts to solve $5x^2 + 7x - 6 = 0$	
$(5x + 3)(x - 2)$	B1
$(5x + 3)(x + 2)$	B0
$(5x + 2)(x + 1)$	B1
$(3x + 1)(x - 2)$	B0
Condone multiplication signs between brackets for B2 eg $(5x - 3) \times (x + 2)$	B2
Condone multiplication signs between brackets for B1 eg $(5x - 1) \times (x + 6)$	B1
Condone missing final bracket eg1 $(5 - 3)(x + 2$ eg2 $(5x - 6)(x + 1$	B2 B1
Do not allow $x5$ for $5x$ etc	

Q	Answer	Mark	Comments
26	11.5 or 12.5 or 5.45 or 5.55	B1	accept 12.49 for 12.5 accept 5.549 for 5.55
	60 × their 12.5 or 750 or 40 × their 5.55 or 222	M1	their 12.5 must be (12, 13] their 5.55 must be (5.5, 5.6]
	60 × their 12.5 + 40 × their 5.55 or 750 + 222 or 972	M1dep	oe eg 960 – 60 × their 12.5 – 40 × their 5.55 their 12.5 must be (12, 13] their 5.55 must be (5.5, 5.6]
	12.5 and 5.55 and 972 and No	A1	oe eg 12.5 and 5.55 and 12 and No
	Additional Guidance		
	Only using lower bounds can score a maximum of B1M0M0A0		
	Condone 12.50 for 12.5 etc		
	972 and No without both 15.5 and 5.55 is A0 but the B mark and M marks are possible eg 60 × 15.5 + 40 × 5.54 (= 971.6) = 972 No		B1M1M1A0
	972 and No with no working		Zero
	No can be implied eg1 60 × 12.5 + 40 × 5.55 = 972 which is more than 960 eg2 60 × 12.5 + 40 × 5.55 = 972 so he can't		B1M1M1A1 B1M1M1A1

Q	Answer	Mark	Comments
27	$\frac{4}{16} \times \frac{12}{15}$ or $\frac{48}{240}$ or $\frac{1}{5}$ or $\frac{5}{16} \times \frac{7}{15}$ or $\frac{35}{240}$ or $\frac{7}{48}$ or $\frac{5}{16} \times \frac{2}{15}$ or $\frac{10}{240}$ or $\frac{1}{24}$	M1	oe fractions or decimals condone $\frac{4}{16} \times \frac{12}{16}$ etc
	Any 2 of $\frac{4}{16} \times \frac{12}{15}$ or $\frac{48}{240}$ or $\frac{1}{5}$ and $\frac{5}{16} \times \frac{7}{15}$ or $\frac{35}{240}$ or $\frac{7}{48}$ and $\frac{5}{16} \times \frac{2}{15}$ or $\frac{10}{240}$ or $\frac{1}{24}$	M1dep	oe fractions or decimals
	$\frac{4}{16} \times \frac{12}{15} + \frac{5}{16} \times \frac{7}{15} + \frac{5}{16} \times \frac{2}{15}$ or $\frac{48}{240} + \frac{35}{240} + \frac{10}{240}$	M1dep	oe fractions or decimals
	$\frac{93}{240}$ or $\frac{31}{80}$ or 0.3875 or 38.75%	A1	accept 0.39 or 39% with full working SC2 $\frac{93}{256}$ or 0.363… or 36.3…%

	Additional Guidance	
	Ignore simplification or conversion attempt after correct answer seen	
	For M marks accept oe decimals rounded to 2 dp or better	
	Select the scheme that favours the student for the first 2 M marks even if not subsequently used	
	Using $\frac{4}{16} \times \frac{12}{16}$ etc can score M1M0M0A0 or SC2	
	Do not award marks if a fraction comes from an incorrect method	M0

Q	Answer	Mark	Comments
28	$0.5 \times 4 \times 10$	M1	oe may be seen on graph
	$0.5 \times 4 \times 10 + 5 \times 10$ or $20 + 50$	M1dep	oe may be embedded eg $5 \times 10 = 50$
	70	A1	oe
	Additional Guidance		

Q	Answer	Mark	Comments
29	$3(x^2 + 5)$ or $3x^2 + 15$ or $4x(2x - 1)$ or $8x^2 - 4x$	M1	oe ignore any denominators
	$3(x^2 + 5) = 4x(2x - 1)$ or $3x^2 + 15 = 8x^2 - 4x$	M1dep	oe allow both sides to have denominator $(2x - 1)(x^2 + 5)$ oe
	$5x^2 - 4x - 15$ (= 0)	M1dep	oe equation with terms collected eg $5x^2 - 4x = 15$ no denominator allowed unless recovered in subsequent working
	$\frac{4 \pm \sqrt{4^2 - 4 \times 5 \times -15}}{2 \times 5}$ or $\frac{4 \pm \sqrt{316}}{10}$ or $\frac{4}{10} \pm \frac{\sqrt{316}}{10}$ or 2.177… and –1.377… and $5x^2 - 4x - 15$ (= 0) seen	M1	oe ft their 3-term quadratic allow correct factorisation of their 3-term quadratic
	2.18 and –1.38 and $5x^2 - 4x - 15$ (= 0) seen	A1	oe eg 2.18 and –1.38 with $5x^2 - 4x$ (= 15) seen

Additional Guidance is on the next page

29 cont	**Additional Guidance**	
	2.18 and -1.38 and $5x^2 - 4x - 15$ (= 0) not seen	Zero
	2.177… and $-1.377…$ and $5x^2 - 4x - 15$ (= 0) not seen	Zero
	One solution and $5x^2 - 4x - 15$ (= 0) not seen	Zero
	Missing brackets must be recovered	
	$\frac{5x^2 + 4x - 15}{(2x-1)(x^2+5)} = 0$ followed by $5x^2 - 4x - 15 = (2x - 1)(x^2 + 5)$	M1M1M0M0A0
	$\frac{5x^2 + 4x - 15}{(2x-1)(x^2+5)} = 0$ followed by 2.18 and -1.38	M1M1M1M1A1