



GCSE MARKING SCHEME

SUMMER 2019

MATHEMATICS – COMPONENT 2 (HIGHER TIER) C300UB0-1

INTRODUCTION

This marking scheme was used by WJEC for the 2019 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCSE MATHEMATICS

COMPONENT 2 – HIGHER TIER

SUMMER 2019 MARK SCHEME

	Mark	Comment
1*. 13 × 6 – 17 ³	B1	
or $26 \times 3 - 17^3$ or $39 \times 2 - 17^3$		
1.34 × 232	B1	Do not accept 134% × 232
0.82 × 4530	B1	
-4835 and 310.88 and 3714.6	B1	CAO. Independent mark
		<u>Misreads</u> : e.g. $5 \times 13 - 17^3 = -4848$ is B0, but FT as misread for possible final B1
	(4)	This read for possible that B f
2*(a)(i) Mid points: 15, 25, 35, 45	B1	
$15 \times 5 + 25 \times 20 + 35 \times 23 + 45 \times 52$	M1	FT provided 'their midpoints' within the 'bounds' inclusive
(= 75 + 500 + 805 + 2340 = 3720)	4	
÷100 37(.2mm)	m1 A1	Unsupported 37.2, award all 4 marks
, ,		
$2^*(a)(ii) 40 \le x < 50$	B1	Accept any unambiguous indication
2(b) Explanation such as:	E1	Do not accept indication of 'Yes' or an explanation
'the mean doesn't tell you about the spread of the data',		implying 'Yes' Do not accept contradictions
'all the depths could be very close to 37.2		Allow if range of Marie's display is used, with lower and
mm (whilst Marie's table shows her		upper values considered at 10 mm and 50 mm, or within 1st and last groups
display is spread out)'		Do not accept arguments based on shapes or styles of
	(0)	frames, reasoning and validity of argument must be based only on the depth of lens
3*. sin f = 8.4/12.3	(6) M1	
(f =) 43(.07°)	A2 (3)	A1 for (f =) sin ⁻¹ 0.68(29)

4*(a) 2500 × 0.84 ⁿ with any value of n from n=1 to n=10 or equivalent	M1	$(2500 \times 0.84 = £2100)$ $(2500 \times 0.84^2 = £1764)$
I TOTAL TO THE TO OF EQUIVARENT		$(2500 \times 0.84^3 = £1481.76)$
2500 × 0.84 ⁿ with a second value of n	m1	$(2500 \times 0.84^4 = £1244.6784)$
from n=1 to n=10 or n = 6 or equivalent		$(2500 \times 0.84^5 = £1045.529)$
leading to an answer closer to £1000 than		$(2500 \times 0.84^6 = £878.245)$
the previous trial		$(2500 \times 0.84^7 = £737.725)$ $(2500 \times 0.84^8 = £619.689)$
		$(2500 \times 0.84^9 = £520.539)$
		$(2500 \times 0.84^{10} = £437.253)$
6 (years)	A1	CAO
		If no working, award SC2 for an answer of 6 (years)
4(b) 500 × (1 + 325/100) ³	M2	M1 for 500 × (1 + 325/100) (= £2125) or equivalent
4(b) 300 × (1 + 323/100)	IVIZ	M1 implied by sight of a×500×3.25 + b×500 or
		a×1625 + b×500, or 5375, or 6375, where a≠0 and b≠0
(£) 38 382.81(25)	A1	Accept (£)38382 or 38383
		If no marks, award SC1 for sight of (325/100) ³ or
	(0)	equivalent or sight of 17164.0625 (= 3.25 ³ ×500)
$5*(a) 3x^2 + 18xy + 5xy + 30y^2$	(6) B2	B1 for any 2 terms correct
$3x^2 + 23xy + 30y^2$	B1	FT for equivalent level of difficulty, providing at least 3
		terms to consider and like terms to collect
5*(b) (x – 9)(x - 4)	B2	B1 for (x 9)(x 4)
, , , , , ,		, , , ,
5*(c) (w + 9)(w - 2) = 0 w = -9 with $w = 2$	B2 B1	B1 for (w9)(w 2) STRICT FT from 'their pair of brackets'
W = -9 With W= 2	ы	Alternative:
		$(w=) \{-7 \pm \sqrt{(7^2 - 4 \times 1 \times -18)}\}/2$ M1
		$(=) (-7 \pm \sqrt{121})/2$ A1
		w = -9 with w = 2 A1
		Accept trial & improvement method only if both solutions
		are found correctly for B3
5(d) (y – 11)(y + 11)	B1	
5(e) c = 16	B1	
$0 = (-2)^2 + b \times - 2 + c$	M1	Allow -2 ² + b×-2 + c
$0 = (-2)^2 + b \times - 2 + 16$	M1	FT 'their derived 16'. Do not allow -2 ² + b×-2 + 16 unless -
	_	2 ² seen or implied later as 4
b = 10	A1	
6*. (First distance) 45 × 40 ÷ 60	(13) M1	(30 miles)
(Second distance) 60 × 25 ÷ 60	M1	(25 miles)
(Total distance) 55 (miles)	A1	CAO. May be implied in further working
(Overall average speed) 55 ÷ (65/60)	m1	FT 'their 55' depends on M1 previously awarded and 'their
or equivalent in stages	A1	total distance' is the sum of two derived distances
50.7(69mph) or 50.8(mph) or 51(mph)	AI	If no marks, award SC2 for an answer of 50.7(69) from
		(45×40 + 25×60)/(40 + 25) or equivalent
	(5)	

7(a) (Volume sphere) $4/3 \times \pi \times 2.7^3$ (Volume of cuboid)	M1	(≈ 82.4 cm³)
$14.2 \times \text{height} = 4/3 \times \pi \times 2.7^3$	M1	FT for 'their volume of sphere'
Height = $4/3 \times \pi \times 2.7^3 \div 14.2$	m1	FT for 'their volume of sphere'
Answer in the range 5.8 to 5.81 (cm ³)	A1	CAO
7(b) 86 = π × Diameter, or 86 = 2 × π × Radius	M1	
Diameter = $86 \div \pi$ or Radius = $86 \div 2\pi$	m1	(Diameter = 27.37 to 27.4 cm) (Radius = 13.68 to 13.7 cm)
Perimeter semi-circle 86 ÷ 2 + Diameter, or	M1	FT 'their derived diameter' or
86 ÷ 2 + 2 × Radius 70.4 (cm) or 704 mm	A2	'their derived 2 × radius', independent of previous marks CAO. For A2 if units are given they must be correct
	(0)	A1 for a correct answer given to the wrong level of accuracy (70.37 to 70.39 or 70(cm)).
	(9)	
8*. 7a + 2g = 6(.)15 AND 5a + 8g = 9(.)19	B1	Both equations are required for the award of B1
Method to eliminate variable, e.g. equal coefficients and	M1	FT provided at least one equation is correct and the other is of equivalent difficulty.
method to find second variable		Allow 1 error in one term, not one with equal coefficients
First variable	A1	a = 67(p) or $a = (£ 0).67or g = 73(p) or g = (£ 0).73$
Second variable	A1	FT their first variable provided M1 previously awarded
(£)4.99	B1 (5)	CAO, not FT
9(a) 86 AND 140	B1	
9(b) (0) -273.15 (100) -173.15 (200) -73.15	B2	B1 for 1 correct entry or for all 3 negative entries with correct differences
9(c) 320 kelvin to Celsius: working with 100 difference in both kelvin and Celsius	M1	e.g. sight of 20 + 26.85, 126.85 – 80, 320-273.15
46.85 (degrees Celsius)	A1	Look for response in the table Accept 46.8, 46.9, 47 Look for evidence in the table
Answer for Fahrenheit <u>between 104 and 122</u> exclusive	B1	CAO, independent of all other marks Look for evidence in the table
Suitable calculation, e.g. • 104 + (6.85/10)×18	m1	FT from rounding or truncation of 46.85 (Celsius) e.g. 7 tenths of 18 FT 'their derived 46.85 °C' provided M1 previously
• 122 – (<u>10 – 6.85)</u> ×18 10		awarded
116(.33 Fahrenheit)	A1	Accept 116 (Fahrenheit)) from correct working
	(8)	Accept 110 (Lamerinal) Horri correct working

10(a) y α 1/x OR y = k/x			T
A1	10(a) y α 1/x OR y = k/x	B1	Allow y α k/x
10(b)			
Do not accept y a 2241 x 24.9 x 24.9 y 4482 2241 90 24.9 y 4482 2241 90 24.9 y 4482 2241 90 25.0 27	y = 2241/x	A1	
10(b)			
Note			Do not accept y α 2241/x
Note			
Y 4482 2241 90 4182 2241 90 55 Allow 24.9 given as 25 provided k = 2241 seen in (a) or (b)		B2	·
11. 100g = 0.22 pounds or 1 pound = (1 + 2.2 =) 0.4545kg 12. **pound or 8 ounces ≈** (100 + 0.22) × 0.5 (g) or (1 + 2.2) ÷ 2 (kg) 227(.2727g) or 0.227(27kg) A1 Answer in the range (£)24.97 to (£)25.00 A1 A1 FT or a similar range from rounding or truncation to a whole number if final Mo, A0 due to 200g or 300g considered following otherwise correct working, award SC1 for answers of £22 or £33 respectively Alternative 1: (Far) £11 gets 0.22 lbs (of steak) (Ray be embedded) (8 oz costs) 8 × 11 + 3.52 (Far) £10 gets 2.2 lbs (of steak) (Ray be embedded) A1 FT use of 'their 227(.2727)' provided at least 1 mark previously awarded FT for a similar range from rounding or truncation to a whole number if final Mo, A0 due to 200g or 300g considered following otherwise correct working, award SC1 for answers of £22 or £33 respectively Alternative 1: (Far) £11 gets 0.22 lbs (of steak) B1 Alternative 2: (For) £110 gets 2.2 lbs (of steak) B1 110 + 2.2 = (£)50 (per lb) A1 (8 ounces costs) 50 + 2 M1 (8 ounces costs) 50 + 2 A1 (9 ounces costs) 50 + 2 A1 (10 or 10 = 540 or 10 = 540 + 110 or 10 = 540 or 10 = 540 + 110 or 10 = 540 or 10 = 540 + 110 or 10 = 650 x = 65(*) A1 CAO FT in their 10 x - 110' = n where n ≥ 360 A1 CAO FT provided similar outcome (6) Award B1 for (1)n² ± 'any number', provided this number / fin o marks, award SC1 for n² - 8n			
11. 100g = 0.22 pounds or 1 pound = (1 + 2.2 =) 0.4545kg 12 pound or 8 ounces ≈ (100 + 0.22) × 0.5 (g) or (1 + 2.2) + 2 (kg) 227(.2727) × 11 + 100 or (£) 0.227(27) × 11 + 100 Answer in the range (£)24.97 to (£)25.00 A1 FT for a similar range from rounding or truncation to a whole number if final M0, A0 due to 200g or 300g considered following otherwise correct working, award SC1 for answers of £22 or £33 respectively Alternative 1: (For) £11 gets 0.22 lbs (of steak) (B oz costs) 8 × 11 + 3.52 (may be embedded) (B oz costs) 8 × 11 + 3.52 (may be embedded) (B oz costs) 8 × 11 + 3.52 (may be embedded) (B oz costs) 8 × 11 + 3.52 (may be embedded) (B oz costs) 8 × 11 + 3.52 (may be embedded) (B oz costs) 8 × 11 + 3.52 (may be embedded) (B oz costs) 8 × 11 + 3.52 (E) 50 (per lb) A1	y 4482 2241 90	4-1	Allow 24.9 given as 25 provided k = 2241 seen in (a) or (b)
27			
½ pound or 8 ounces ≈ (100 + 0.22) × 0.5 (g) or (1 + 2.2) + 2 (kg) M1 Or equivalent Award of M1 implies award of B1 previously 227(.2727) y 17() x 11 × 100 or (£) 0.227(27) × 11 × 1000 + 100 M1 FT use of 'their 227(.2727)' provided at least 1 mark previously awarded Answer in the range (£)24.97 to (£)25.00 A1 FT for a similar range from rounding or truncation to a whole number if final M0, A0 due to 200g or 300g considered following otherwise correct working, award SC1 for answers of £22 or £33 respectively Alternative 1: (For) £11 gets 0.22 lbs (of steak) B1 (Which is) 16 × 0.22 M1 (may be embedded) (8 oz costs) 8 × 11 + 3.52 M1 (FT16 × 0.22) M1 (FT16 × 0.22) Alternative 2: (For) £110 gets 2.2 lbs (of steak) B1 (may be embedded) (8 ounces costs) 50 + 2 M1 (8 ounces costs) M1 (6) ounces costs) 50 + 2 M1 (8 ounces costs) M1 (10 + 2 × x + 40 + 2x - 30 + 3x - 120 + 3x B1 (Interior angle sum) 3 × 180(°) or alternative FULL method M1 540(°) A1 10x -110 = 540 or 10x = 540 + 110 or 10x = 650 x = 65(°) M1 6(5(°), 105(°), 100(°), 75(°),) 195(°) (so this angle is greater than 180°) E1 13. n² - 8 Award B1 for (1)n² ± 'any number', provided this number ±0 from arks, award SC1 for n² - 8n		В1	May be embedded in working
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or (£) 0.227(27) × 11 × 1000 + 100 Answer in the range (£)24.97 to (£)25.00 A1 FT for a similar range from rounding or truncation to a whole number if final M0, A0 due to 200g or 300g considered following otherwise correct working, award SC1 for answers of £22 or £33 respectively Alternative 1: (For) £11 gets 0.22 lbs (of steak) (Mich is) 16 × 0.22 M1 = 3.52 oz A1 (may be embedded) (8 oz costs) 8 × 11 + 3.52 M1 (FT16 × 0.22) = (£)25 A1 Alternative 2: (For) £110 gets 2.2 lbs (of steak) B1 110 + 2.2 M1 (8 ounces costs) 50 + 2 M1 (8 ounces costs) 50 + 2 M1 12. x + x + 40 + 2x - 30 + 3x - 120 + 3x (Interior angle sum) 3 × 180(°) or alternative FULL method 540(°) A1 10x - 110 = 540 or 10x = 540 + 110 or 10x = 650 x = 65(°) A1 FT 'their 10x - 110' = n where n ≥ 360 CAO FT provided similar outcome FT provided similar outcome A1 A2 Award B1 for (1)n² ± 'any number', provided this number ≠ 0 if no marks, award SC1 for n² - 8n	(f) 227(2727) x 11 ÷ 100	N/1	FT use of 'their 227/ 2727 \' provided at least 1 mark
Answer in the range $(\pounds)24.97$ to $(\pounds)25.00$ A1 FT for a similar range from rounding or truncation to a whole number If final M0, A0 due to 200g or 300g considered following otherwise correct working, award SC1 for answers of £22 or £33 respectively Alternative 1: (For) £11 gets 0.22 lbs (of steak) B1 (Which is) 16×0.22 M1 = 3.52 oz A1 (may be embedded) (8 oz costs) $8 \times 11 + 3.52$ M1 (FT16 \times 0.22) = $(\pounds)25$ A1 Alternative 2: (For) £110 gets 2.2 lbs (of steak) B1 110 + 2.2 M1 = $(\pounds)50$ (per lb) A1 (8 ounces costs) $50 + 2$ M1 = $(\pounds)25$ A1 12. x+ x + 40+ 2x - 30 +3x - 120+ 3x [Interior angle sum) $3 \times 180(\degree)$ or alternative FULL method 540(°) A1 10x - 110 = 540 or 10x = 540 + 110 or 10x = 650 x = 65(°) A1 FT fro a similar range from rounding or truncation to a whole number (6) A2 FT for a similar range from rounding or truncation to a whole number (\pounds) where (\pounds) and (\pounds) is a similar substitution of (\pounds) and (\pounds) is a similar variable of (\pounds) and (\pounds) is a similar outcome A2 FT for a similar range from rounding or truncation to a whole number (\pounds) is a similar outcome.		1711	
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or £33 respectively Alternative 1: (For) £11 gets 0.22 lbs (of steak) (Musch is) 16×0.22 $= 3.52$ oz A1 (may be embedded) (8 oz costs) $8 \times 11 \div 3.52$ $= (£)25$ A1 Alternative 2: (For) £110 gets 2.2 lbs (of steak) B1 $110 \div 2.2$ $= (£)50$ (per lb) A1 (8 ounces costs) $50 \div 2$ $= (£)25$ A1 $(8 \circ 2 \circ 3) \times 50 \div 2$ $= (£)25 \times 41$ A1 $(8 \circ 3) \times 50 \div 2$ $= (£) \times 50 \times 10$ A1 (Interior angle sum) 3×180 (°) or alternative FULL method $(8 \circ 3) \times 50 \div 2$ $= (£) \times 50 \times 10$ A1 $(8 \circ 3) \times 50 \div 2$ $= (£) \times 50 \times 10$ A1 $(8 \circ 3) \times 50 \div 2$ $= (£) \times 50 \times 10$ A1 $(8 \circ 3) \times 50 \div 2$ $= (£) \times 50 \times 10$ A1 FT 'their 10x – 120 may be seen in later working A1 FT 'their 10x – 110' = n where $n \ge 360$ CAO (65(°), 105(°), 100(°), 75(°),) 195(°) (50 this angle is greater than 180°) A2 Award B1 for (1) $n^2 \pm 1$ 'any number', provided this number $\ne 0$ If no marks, award SC1 for $n^2 - 8n$			
Alternative 1: (For) £11 gets 0.22 lbs (of steak) B1 (Which is) 16×0.22 M1 = 3.52 oz A1 (may be embedded) (8 oz costs) $8 \times 11 + 3.52$ M1 (FT16 × 0.22) = (£)25 A1 Alternative 2: (For) £110 gets 2.2 lbs (of steak) B1 110 + 2.2 M1 = (£)50 (per lb) A1 (8 ounces costs) $50 + 2$ M1 (8 ounces costs) $50 + 2$ M1 = (£) 25 A1 12. x + x + 40 + 2x - 30 + 3x - 120 + 3x (Interior angle sum) $3 \times 180(^{\circ})$ M1 or alternative FULL method 540($^{\circ}$) A1 FT 'their $10x - 110' = n$ where $n \ge 360$ CAO (65($^{\circ}$), $105(^{\circ}$), $100(^{\circ}$), $75(^{\circ}$), $195(^{\circ}$) (5) The provided similar outcome (6) Award B1 for (1) $^{\circ}$ ± 'any number', provided this number $\frac{1}{2}0$ If no marks, award SC1 for $n^{2} - 8n$			
			,
			Alternative 1:
			(For) £11 gets 0.22 lbs (of steak) B1
			(Which is) 16 × 0.22 M1
			(may be embedded)
Alternative 2: (For) £110 gets 2.2 lbs (of steak) 110 ÷ 2.2 = (£)50 (per lb) A1 (8 ounces costs) 50 ÷ 2 M1 = (£) 25 A1 12. x+ x + 40+ 2x - 30 + 3x - 120+ 3x (Interior angle sum) 3 × 180(°) or alternative FULL method 540(°) A1 $ 10x - 110 = 540 \text{ or } 10x = 540 + 110 \text{ or } 10x = 650 x = 65(°) A1 FT 'their 10x - 110' = n where n ≥ 360 CAO (65(°), 105(°), 100(°), 75(°),) 195(°) (so this angle is greater than 180°) B2 Award B1 for (1)n² ± 'any number', provided this number ≠0 If no marks, award SC1 for n² - 8n$			(8 oz costs) 8 × 11 ÷ 3.52
			$= (\pounds)25 \qquad A1$
$ (8 \ ounces \ costs) 50 \div 2 \qquad M1 \\ = (\pounds) \ 25 \qquad A1 $ $ (5) $ $ 12. \ x+x+40+2x-30+3x-120+3x \qquad B1 \qquad 3(x-40)=3x-120 \ may \ be \ seen \ in \ later \ working $ $ (Interior \ angle \ sum) \ 3 \times 180(°) \qquad M1 \qquad A1 $ $ 10x-110=540 \ or \ 10x=540+110 \qquad M1 \qquad FT \ 'their \ 10x-110'=n \ where \ n \geq 360 $ $ x=65(°) \qquad A1 \qquad CAO $ $ (65(°), \ 105(°), \ 100(°), \ 75(°), \ 195(°) \qquad E1 \qquad FT \ provided \ similar \ outcome $ $ (6) \qquad B2 \qquad Award \ B1 \ for \ (1)n^2 \pm \ 'any \ number', \ provided \ this \ number \ \neq 0 $ If no marks, award SC1 for \ n^2 - 8n			
(5) $= (£) 25$ A1 12. x+ x + 40+ 2x - 30 +3x - 120+ 3x B1 $3(x - 40) = 3x - 120$ may be seen in later working (Interior angle sum) 3 × 180(°) or alternative FULL method 540(°) A1 10x -110 = 540 or 10x = 540 + 110 or 10x = 650			
(Interior angle sum) $3 \times 180(^{\circ})$ M1 or alternative FULL method $540(^{\circ})$ A1 $10x - 110 = 540 \text{ or } 10x = 540 + 110$ or $10x = 650$ $x = 65(^{\circ})$ (So this angle is greater than 180°) (65) $13. n^2 - 8$ (5) $B1$ $3(x - 40) = 3x - 120 \text{ may be seen in later working}$ $M1$ $A1$ $A1$ $A1$ $A1$ $A1$ $A1$ $A1$ A			
12. $x + x + 40 + 2x - 30 + 3x - 120 + 3x$ B1 $3(x - 40) = 3x - 120$ may be seen in later working (Interior angle sum) $3 \times 180(^{\circ})$ or alternative FULL method $540(^{\circ})$ A1 $10x - 110 = 540 \text{ or } 10x = 540 + 110$ or $10x = 650$ $x = 65(^{\circ})$ A1 FT 'their $10x - 110' = n$ where $n \ge 360$ CAO (65(°), $105(^{\circ})$, $100(^{\circ})$, $75(^{\circ})$,) 195(°) (so this angle is greater than 180°) B2 Award B1 for (1) $n^2 \pm$ 'any number', provided this number ≠0 If no marks, award SC1 for $n^2 - 8n$		(5)	$= (£) 25 \qquad A1$
(Interior angle sum) $3 \times 180(^{\circ})$ M1 or alternative FULL method $540(^{\circ})$ A1 $10x - 110 = 540$ or $10x = 540 + 110$ or $10x = 650$ 0 0 0 0 0 0 0 0 0	40 40 . 0		2(+, 40) = 2+, 400
or alternative FULL method $540(^{\circ})$ A1 $10x - 110 = 540$ or $10x = 540 + 110$ M1 FT 'their $10x - 110$ ' = n where $n \ge 360$ or $10x = 650$ A1 CAO $(65(^{\circ}), 105(^{\circ}), 100(^{\circ}), 75(^{\circ}),)$ 195($^{\circ})$ (so this angle is greater than 180°) E1 FT provided similar outcome (6) Award B1 for $(1)n^2 \pm$ 'any number', provided this number $\neq 0$ If no marks, award SC1 for $n^2 - 8n$	12. X+ X + 40+ 2X - 30 +3X – 120+ 3X	B1	3(x -40) = 3x - 120 may be seen in later working
or alternative FULL method $540(^\circ)$ A1 $10x - 110 = 540 \text{ or } 10x = 540 + 110 \text{ or } 10x = 650$ M1 FT 'their $10x - 110$ ' = n where $n \ge 360$ $x = 65(^\circ)$ A1 CAO $(65(^\circ), 105(^\circ), 100(^\circ), 75(^\circ),)$ 195(°) (so this angle is greater than 180°) (6) $13. n^2 - 8$ B2 Award B1 for $(1)n^2 \pm$ 'any number', provided this number $\ne 0$ If no marks, award SC1 for $n^2 - 8n$	(Interior angle sum) 2 × 100/°)	1/14	
540(°) A1 10x -110 = 540 or 10x = 540 + 110 or 10x = 650 $x = 65(°)$ (65(°), 105(°), 100(°), 75(°),) (so this angle is greater than 180°) B2 A1 FT 'their 10x - 110' = n where n ≥ 360 A1 CAO FT provided similar outcome (6) A3. $n^2 - 8$ B2 Award B1 for (1) $n^2 \pm$ 'any number', provided this number ≠0 If no marks, award SC1 for $n^2 - 8n$		IVIT	
10x -110 = 540 or 10x = 540 + 110 or 10x = 650		۸ 1	
or $10x = 650$ $x = 65(°)$ A1 CAO $(65(°), 105(°), 100(°), 75(°),)$ $(so this angle is greater than 180°)$ E1 FT provided similar outcome (6) $13. n^2 - 8$ B2 Award B1 for $(1)n^2 \pm \text{ 'any number', provided this number} \neq 0$ If no marks, award SC1 for $n^2 - 8n$	540(*)	AI	
or $10x = 650$ $x = 65(°)$ A1 CAO $(65(°), 105(°), 100(°), 75(°),)$ $(so this angle is greater than 180°)$ E1 FT provided similar outcome (6) $13. n^2 - 8$ B2 Award B1 for $(1)n^2 \pm \text{ 'any number', provided this number} \neq 0$ If no marks, award SC1 for $n^2 - 8n$	10x - 110 = 540 or 10x = 540 + 110	1/11	FT 'their 10y = 110' = n where n > 360
$x = 65(^{\circ})$ A1 CAO (65($^{\circ}$), 105($^{\circ}$), 100($^{\circ}$), 75($^{\circ}$), 195($^{\circ}$) (so this angle is greater than 180 $^{\circ}$) E1 FT provided similar outcome (6) A3. $n^2 - 8$ B2 Award B1 for (1) $n^2 \pm$ 'any number', provided this number $\neq 0$ If no marks, award SC1 for $n^2 - 8n$		IVII	
(65(°), 105(°), 100(°), 75(°),) 195(°) (so this angle is greater than 180°) E1 FT provided similar outcome (6) Award B1 for (1)n² ± 'any number', provided this number ≠0 If no marks, award SC1 for n² − 8n		Δ1	CAO
(so this angle is greater than 180°) (6) 13. n² - 8 B2 Award B1 for (1)n² ± 'any number', provided this number ≠0 If no marks, award SC1 for n² – 8n	X = 00()	'`'	
(so this angle is greater than 180°) (6) 13. n² - 8 B2 Award B1 for (1)n² ± 'any number', provided this number ≠0 If no marks, award SC1 for n² – 8n	(65(°), 105(°), 100(°), 75(°), 195(°)	E1	FT provided similar outcome
(6) 13. $n^2 - 8$ B2 Award B1 for (1) $n^2 \pm$ 'any number', provided this number $\neq 0$ If no marks, award SC1 for $n^2 - 8n$		'	p.odod olimiai odtoomo
13. n^2 - 8 B2 Award B1 for (1) n^2 ± 'any number', provided this number $\neq 0$ If no marks, award SC1 for n^2 – 8n	((6)	
≠0 If no marks, award SC1 for n² – 8n	13. n ² - 8		Award B1 for (1)n ² ± 'anv number', provided this number
If no marks, award SC1 for n ² – 8n		_ 	l · · · · · · · · · · · · · · · · ·
· ·			If no marks, award SC1 for n ² – 8n
		(2)	

14(a) Method to find the rate, e.g.	M1	
7.5 cm per hour, or 1.25 cm per 10 minutes		
0.125 (cm/min)	A1	
14(b)(i) 20 (cm) or 200 (mm)	B1	CAO. If units are given they must be correct
14(b)(ii) Statement, e.g. 'container might overflow', 'may not continue at the same rate',	E1	
'cross section of the container might change'		
45*() (14) 0 4 40 4	(4)	
15*(a) (Mass =) 2.4 × 13.4 32.16 (g)	M1 A1	CAO, accept 32.2(g) from correct working
15(b) (P =) 135 ÷ 0.36 or (135 ÷ 3600) × 100 ²	M2	or equivalent full method which may be seen in stages M1 for 135 ÷ 3600 or 135 ÷ 'digits 36 with incorrect place value'
375 (N/m²)	A1 (5)	CAO
16(a) Area of sector <u>42</u> × π × 3.6 ² 360	M1	
Answer in range 4.748 (m ²) to 4.75 (m ²)	A1	May be implied later
(Area ACD) ½× 3.6 × 4.1 ×sin 67(°)	M1	
6.79(m ²)	A1	May be implied later
Total area 11.53(8m²) to 11.54(m²) AND Yes	B1	FT provided at least M2 A1 previously awarded (with appropriate conclusion)
16(b) (Arc length) 2 × <u>42</u> × π × 3.6 360	M1	
2.64 (m)	A1	Accept 2.63(m)
(Triangle ACD) AD ² = 18.2(356) AD = 4.27(m)	M2 A1	M1 for AD ² = 4.1 ² +3.6 ² -2×4.1×3.6×cos67(°) Accept 4.3(m)
(Perimeter) (4.1 + 3.6 + 2.64 + 4.27) 14.6(1 m) AND No	B1	FT correct evaluation of 'their arc' + 'their AD' + 4.1 + 3.6 provided at least M2 and A1 previously awarded
	(11)	·

17(a) Reflection in the x-axis	M1	
(0, 2)	A1	Accept 2 indicated correctly on the y-axis
17(b) Horizontal translation	B1	Any horizontal translation without including any other transformation
Correct translation with (1, 0) and (3,0) indicated on the x-axis	B2	Accept indication of 1 and 3 on the x-axis with the correct translation
		B1 for a correct translation with only one of the values 1 and 3 indicated, or for a horizontal translation with $(-1, 0)$ and $(1, 0)$ indicated on the x-axis as intersections, or for a horizontal translation to show $y = g(x)$ with $(0, 0)$ and $(2, 0)$ indicated on the x-axis as intersections
17(c) Correct negative enlargement	B2 (7)	B1 an enlargement with scale factor -½, with correct orientation with incorrect placement.
18. Showing $x^2 + 2x - 132.48 = 0$ or $2x^2 + 4x - 264.96 = 0$	B2	B1 for $x^2 + (x + 2)^2 = 16.4^2$
$x = \frac{-4 \pm \sqrt{(4^2 - 4 \times 2 \times -264.96)}}{2 \times 2}$ or $x = \frac{-2 \pm \sqrt{(2^2 - 4 \times 1 \times -132.48)}}{2 \times 1}$ or $(x + 1)^2 - 133.48 = 0$	M1	FT for equivalent level of difficulty Allow 1 slip in substitution, not use of incorrect formula
$x = -4 \pm \sqrt{2135.68}$ or $x = -2 \pm \sqrt{533.92}$ 4 or $x + 1 = \sqrt{133.48}$	A1	Either negative x-value not given or ignored in further working
x = 10.55(cm) or 10.6(cm)	A1	Candidate must not show working with negative x-value
(Volume =) $\frac{1}{3} \times \pi \times 10.55^2 \times 12.55$	M1	FT provided at least 2 marks previously awarded
Answer in the range 1462 (cm³) to 1483 (cm³)	A1 (7)	Must be from correct working FT for an answer in a similar range, not allowing truncation of 'their x' to a whole number or 1 d.p.

19(a) 0.78 x 1 or equivalent, AND an attempt to consider the other 22%	M1	Not for sight of 78% alone
0.22 x ¼ or equivalent	M1	
Showing the need to add (0.78 + 0.055)	M1	Method considers 78% + 22% of 1/4
0.835 or 83.5%	A1	Alternative: (Number of questions) $0.78 \times 50 + (50 - 0.78 \times 50) \times 0.25$ M1 $(= 39 + 2.75 =)$ 41.75 A1 (Probability) 41.75/50 (FT from M1) M1 $= 0.835$
19(b)Probability from part (a)×50	M1	FT from part (a), apart from 78% giving an answer of 39, this is M0 A0
41.75 with interpretation 'No'	A1 (6)	FT from part (a), apart from 78%, with appropriate interpretation ≥ 43 as 'yes' or <43 as 'no' Award M1 A1 for an appropriate conclusion without working only if the alternative method is used in (a) Alternative 1: (43/50 as) 86% compared with probability 83.5% M1 Interpretation 'No' A1 Alternative 2: (With 83.5% seen in (a)) 41 or 42 questions correct M1 Interpretation 'No' A1
20(a) Correct sketch	B1	
20(b) 23.578(°) and 156.42(°) alone	B2 (3)	B1 for either angle Accept rounding and truncation of angles

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