GCSE MARKING SCHEME

AUTUMN 2023

GCSE
MATHEMATICS – NUMERACY
UNIT 2 – HIGHER TIER
3310U60-1

INTRODUCTION

This marking scheme was used by WJEC for the 2023 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.

WJEC GCSE MATHEMATICS – NUMERACY

AUTUMN 2023 MARKING SCHEME

GCSE Numeracy **Unit 2: Higher Tier**	Mark	Comments
1. (Number of revolutions is) $\frac{1000}{\pi \times 29 \div 12}$ or $\frac{1000 \times 12}{\pi \times 29}$ or equivalent	M3	Complete method May be seen in stages M2 for any one of the following, or equivalents: • $\pi \times 29 \div 12$ • $\frac{1000}{\pi \times 29}$ • $\frac{\pi \times 29}{1000 \times 12}$ • $\frac{1000}{\pi \times (29 \div 2) \div 12}$ • $\frac{1000}{\pi \times (2 \times 29) \div 12}$ M1 for any one of the following, that may be embedded in other working: • $29 \div 12$ (= 2.4(1666…)) • 1000×12 (= 12000) • $\pi \times 29$ (= 91.06 to 91.118) • $\frac{1000}{\pi \times n \div 12}$ where $n \neq 0$, e.g. $1000 \times 12 \div (\pi \times 29^2)$ • $\frac{1000}{29 \div 12}$ (= 413.79…) • $1000 \times 12 \div 29$ (= 413.79…)
Answer in the inclusive range 131 to 132 (revolutions)	A1	CAO

2(a)(i) Unambiguously indicates or states 'Yes' with a reason, e.g. 'both 25 kg to 35 kg', 'the highest frequencies at the same mass'	E1	*Ignore any additional spurious or contradictory statements provided 'Yes' selected* Allow 'Yes' with a reason, e.g. 'both at 30 kg', 'both at the same mass', 'both have the same mass', 'tallest (highest frequency) is 30 kg for both polygons' Do not accept 'Yes' with a reason, e.g. 'don't know', 'both in the same place', 'the groups have the same width', 'the graph tells us this'
2(a)(ii) Unambiguously indicates or states 'Can't tell' with a reason, e.g. 'there were 30 dogs with a masses between 15 kg and 25 kg', 'no raw data is given', 'the actual mass of each dog is not given', 'the data is grouped'	E1	*Ignore any additional spurious or contradictory statements provided 'Can't tell' selected* Allow 'Can't tell' with a reason, e.g. 'doesn't show this', 'you can't tell the exact number of dogs' 'doesn't give the amount of dogs' Do not accept 'Can't tell' with a reason, e.g. 'don't know', 'it is an estimate', 'it isn't accurate', 'because they can be anywhere from 10 kg to 20 kg'
2(a)(iii) Unambiguously indicates or states 'Correct' with a reason, e.g. 'Pencwm polygon shows a greater drop for greater masses', 'fewer dogs but more large dogs in Glanafon', 'more dogs in Pencwm, but fewer large dogs', 'about the same number of large dogs, with fewer dogs in Glanafon', 'about the same number of large dogs, with more dogs in Pencwm',	E1	*Ignore any additional spurious or contradictory statements provided 'Correct' selected* **Do not** allow a reason based on calculations of proportions **alone**, e.g. Pencwm 27.5%, Glanafon 41.6% Allow 'Correct' with a reason, e.g. 'Pencwm (polygon) shows a steeper drop from 30 kg', 'line for Pencwm is steeper (drop)' 'Glanafon (polygon) has a less steep drop for larger dogs', 'the greater masses are more frequent (in Glanafon)', '2 of the 3 points for Glanafon are above Pencwm', 'Pencwm line drops below Glanafon after 40 (kg)', Do not accept 'Correct' with a reason, e.g. '36 dogs in Pencwm and 37 dogs in Glanafon' alone without considering proportion, 'the greatest is 45 kg', 'higher frequency in Glanafon', 'Pencwm is bigger but doesn't have higher proportion' 'as seen by the skew in (the) Glanafon (polygon)', 'seen by the shape (of the polygon) for Glanafon'

2(b) (Total number of dogs 20 + 30 + 45 + 25 + 7 + 4 =) 131	B1	May be implied by the sight of ((20 + 30 + 45 + 25 + 7 + 4) ÷ 6 =) 21.8(33….)
10×20 + 20×30 + 30×45 + 40×25 + 50×7 + 60×4 (= 200 + 600 + 1350 + 1000 + 350 + 240) (= 3740)	M1	Ignore any additional products seen FT 'their midpoints' provided at least 5 are within or at the bounds of the relevant groups e.g. use of • lower bounds of each group gives 3085 • upper bounds of each group gives 4395
÷ 131	m1	FT an error in summing 20, 30, 45, 25, 7 and 4
(28.5(496.... kg) so) 3.95 (kg) (less)	A2	CAO ISW further rounding or truncation Allow 4 (kg) from correct working Accept (29 (kg) and) 3.5 (kg) from correct working Award A1 for any of the following as the final answer • 28.5(496.... kg) • 29 (kg) (from correct working) OR Award A1 on FT from M1 m1 previously awarded for a correct evaluation of 'their estimate mean' e.g. use of lower bounds gives (3085/131 =) 23.54…
2(b) <u>Alternative MS if Glanafon's last 2 points used for possible award of B1 M1 m1 only</u>		
(Sight of 20 + 30 + 45 + 25 + 10 +7 =) 137	*B1*	*May be implied by the sight of* *((20 + 30 + 45 + 25 + 10 + 7) ÷ 6 =) 22.8(33….)*
10×20 + 20×30 + 30×45 + 40×25 + 50×10 + 60×7 *(= 200 + 600 + 1350 + 1000 + 500 + 420)* *(= 4070)*	*M1*	*Ignore any additional products seen* *FT 'their midpoints' provided at least 5 are within or at the bounds of the relevant groups* *e.g. use of* • *lower bounds of each group gives 3385* • *upper bounds of each group gives 4755*
÷ 137	*m1*	*FT an error in summing 20, 30, 45, 25, 10 and 7*

3(a) (Difference 60 million – 41 000 000 =) 19 000 000 or 19 million (Underspend) $\frac{19\,000\,000}{60\,000\,000}$ (× 100) or equivalent 31.67(%)	B1 M1 A1	May be implied in further working Allow 19 m(il) FT 'their 60 million – 41 000 000' including if a place value error made CAO (must be 2 d.p.) Answer space takes precedence
3(a) <u>Alternative method</u> *(Underspend)* *(100 -)* $\frac{41\,000\,000}{60\,000\,000}$ *(× 100) or equivalent* *31.67(%)*	*M1* *A2*	*Allow place value error* *CAO (must be 2 d.p.)* *Answer space takes precedence* *A1 for 31.6(6…%), 31.7(%), 32(%) or 68.33(%)*
3(b) 4×10^6	B1	

3(c) (Change to $) 350 × 1.25 ($)437.5(0)	 M1 A1	*Do not penalise slips in giving incorrect use of £ for $*
(Only $10 and $50 notes available so he can buy) ($)430	A1	FT 'their ($)437.5(0)' (provided not a multiple of 10) rounded down to nearest multiple of 10 Accept stated or implied as ($)7.50 can't be converted ($)430 implies previous M1 A1, provided not from incorrect working
(Fewest number of notes making up $430) **8** $50 (notes) and **3** $10 (notes)	A1	FT 'their $430' provided it is a multiple of 10 (and provided M1 previously awarded) Must be fewest number of notes, that may be listed Sight of correct number of notes with no incorrect working implies previous A1, unless contradicted
(Cost in £ to buy $430 is) 430 ÷ 1.25 or 350 – 7.5(0) ÷ 1.25 (= 350 – 6)	M1	FT 'their whole number multiple of $10' ÷ 1.25 Ignore attempt at any further calculation if 430 ÷ 1.25 seen
(£)344	A1	Must be <(£)350 **and** depends on M1 M1 previously awarded Mark final answer If final M0 A0, then award SC1 for (£) 6 (left) or similar on FT, provided not from incorrect or inappropriate working
3(c) <u>Alternative method</u> *£40 = $50 and £8 = $10* *8 $50 notes, 3 $10 notes*	 *M1* *A3*	 *A2 for 8 $50 notes* ***and** sight of 350 – 8 × 40 or equivalent* *OR* *A1 for 8 $50 notes*
(Cost to buy £350 is) 8 × 40 + 3 × 8 *(£)344*	*M1* *A1*	
Organisation and communication	OC1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanations and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
Writing	W1	For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc.

4(a)(i) 440 × 48 ÷ 2.2 9600 (kg)	M1 A1	May be seen in stages Mark final answer Allow answers in the inclusive range 9588 to 9601 from premature approximation Answer space takes precedence
4(a)(ii) 230 000 000 000	B1	
4(b) (Area) 2.47 × 40000 ÷ 10000 or equivalent 9.88 (acres) (Density of trees) 615 ÷ 9.88 62(.2...trees per acre) (>60)	 M1 A1 m1 A1	**Throughout, if 4 marks are awarded, penalise -1 if conclusion 'Yes' is not indicated** **On FT the conclusion may be different to 'Yes'** May be implied in further working Allow 9.8 (acres), 9.9 (acres) or 10 (acres) Depends on M1 m1 previously awarded
4(b) Alternative method 1 *(Area) 2.47 × 40 000 ÷ 10 000 or equivalent* *9.88 (acres)* *(Maximum number of trees) 9.88 × 60* *592(.8) (trees) or 593 (trees) (< 615)*	*M1* *A1* *m1* *A1*	*May be implied in further working* *Allow 9.8 (acres), 9.9 (acres) or 10 (acres)* *Depends on M1 m1 previously awarded* *Allow suitable rounding, e.g. 590 or 600*
4(b) Alternative method 2 *(Area) 2.47 × 40 000 ÷ 10 000 or equivalent* *9.88 (acres)* *(Minimum area) 615 ÷ 60* *10.25 (acres) (> 9.88)*	*M1* *A1* *M1* *A1*	*May be implied in further working* *Allow 9.8 (acres), 9.9 (acres) or 10 (acres)* *Do not allow embedded in further working* *Allow rounded to 10 (acres) provided 'their area' ($9.88m^2$) has not been rounded to 10*
4(b) Alternative method 3 *(Minimum area) 615 ÷ 60* *10.25 (acres)* *(Convert to m^2) 10 000 × 10.25 ÷ 2.47* *41 497(.97 m^2) or 41 498(m^2) (>40 000)*	*M1* *A1* *m1* *A1*	*May be implied in further working* *Allow 10 (acres)* *Depends on M1 m1 previously awarded* *Accept suitable rounding, e.g. 41 000 or 41 500*
4(b) Alternative method 4 *(Trees in 2.47 acres) 615 ÷ (40 000 ÷ 10 000) or equivalent* *153.75 (trees)* *(Density of trees) 153.75 ÷ 2.47* *62(.2...trees per acre) (> 60)*	*M1* *A1* *m1* *A1*	*May be implied in further working* *Allow 153, 153.8 or 154 (trees)* *Depends on M1 m1 previously awarded*
4(b) Alternative method 5 *(Forest area per tree) 40 000 ÷ 615* *65(.0406.. m^2)* *(Fire risk, area per tree) 10 000 ÷ (60 × 2.47)* *67(.476…m^2) (> 65)*	*M1* *A1* *M1* *A1*	*Do not allow embedded in further working*

4(c)(i) (Height of the tree =) 21 × tan 39	M2	*OR alternative full method* M1 for tan 39 = $\frac{\text{height of tree}}{21}$
17.(…. m)	A1	CAO
4(c)(i) Alternative method 1 *Hypotenuse = 21/cos39 (= 27.02…)* ***AND** Height =* $\sqrt{(27(.02)^2 - 21^2)}$	*M2*	*M1 for Hypotenuse = 21/cos39 (= 27.02…)* ***AND** Height² = 27(.02)² – 21²*
16.9(7…) (m) to 17.(0..m)	*A1*	*CAO*
4(c)(i) Alternative method 2 *(Angle of elevation)* $\tan^{-1}\frac{17}{21}$	*M2*	*M1 tan (elevation) =* $\frac{17}{21}$
38.9(9...°) or 39(°)	*A1*	*CAO*
4(c)(i) Alternative method 3 *(Horizontal distance)* $\frac{17}{\tan 39}$	*M2*	*M1 for tan 39 =* $\frac{17}{\text{distance}}$
20.9(98…m) or 21m	*A1*	*CAO*
4(c)(ii) diameter = $\frac{1.75}{\pi}$ or (radius =) $\frac{1.75}{2 \times \pi}$	M2	M1 for any one of the following: • 1.75 = π × diameter • 1.75 = 2 × π × radius (Note: radius = $\frac{7}{8\pi}$ m, radius ≈ 0.28m)
(Area of cross section =) π × (1.75 ÷ 2π)²	M1	FT for 'their derived radius' provided it is from a calculation involving the use of π (Note: area of cross section = $\frac{49}{64\pi}$ m² area of cross section ≈ 0.24 m²)
× 17 ÷ 2	m1	FT provided previous M1 awarded
(Volume) answer in the range 2.07 (m³) to 2.15 (m³)	A1	CAO, accept an answer of 2 (m³) from correct working without sight of premature approximation leading to an answer outside the range
5. 2500 × (1 – 0.23) × (1 – 0.04)³⁹ × (1 + 0.14)¹⁰ or 2500 × 0.77 × 0.96³⁹ × 1.14¹⁰ or equivalent	M3	May be seen in stages M2 for a product with any 3 correct terms OR M1 for a product with any 2 correct terms
(£) 1452(.30)	A1	CAO, ignore premature rounding in working provided answer is (£) 1452.(…), allow rounded to (£)1450 from correct working
		Note: **2500 × 0.77 = (£) 1925** 2500 × 0.96³⁹ = (£) 508.766…. 2500 × 1.14¹⁰ = (£) 9268.053… 0.77 × 0.96³⁹ = 0.15669… 0.77 × 1.14¹⁰ = 2.854… 0.96³⁹ × 1.14¹⁰ = 0.7544… **2500 × 0.77 × 0.96³⁹ = (£) 391.7498…** 2500 × 0.77 × 1.14¹⁰ = (£) 7136.401… 2500 × 0.96³⁹ × 1.14¹⁰ = (£)1886.108… 0.77 × 0.96³⁹ × 1.14¹⁰ = 0.5809… Values may differ by rounding at individual stages

6(a) 150 ÷ (22+3) × 22 OR 150 ÷ (22+3) × 3 (Volume of copper =) 132 (cm^3) AND (Volume of tin =) 18 (cm^3)	M1 A1	May be implied in further working
(Mass of statue =) 132×8.96 + 18×7.31 (1182.72 + 131.58)	m1	Allow m1, but A0, for use of rounded or truncated values of 8.96 and 7.31 FT 'their 132' and 'their 18'
(Mass of statue =) 1314(.3) (g)	A1	ISW FT provided one of their volumes is correct. Accept 1.3(143) kg from sight of 1314(.3) (g) or 1.314(3) (kg)
6(a) <u>Alternative method calculating mass directly:</u> *(Mass of statue =)* *150÷(22+3)×22×8.96 + 150÷(22+3)×3×7.31*	*M2*	*Allow M2, and possible A1 only, for use of rounded or truncated values of 8.96 and 7.31* *M1 for 150÷(22+3)×22×8.96 (=1182.72) OR 150÷(22+3)×3×7.31 (=131.58)*
(Mass of statue =) 1314(.3) (g)	*A2*	*ISW* *Accept 1.3(143) kg from sight of 1314(.3) (g) or 1.314(3) (kg)* *Award A1 for* • *1182.7(2) or 1183 OR* • *131.5(8) or 131.6 or 132*
6(b) (Volume factor =) $\left(\frac{21.6}{12}\right)^3$ OR $\left(\frac{12}{21.6}\right)^3$ or 1.8^3 OR $0.555\ldots^3$ (=5.832) (=0.171…)	B1	or $\left(\frac{9}{5}\right)^3$ OR $\left(\frac{5}{9}\right)^3$
(Volume of bigger statue =) $150 \times \left(\frac{21.6}{12}\right)^3$ OR $150 \div \left(\frac{12}{21.6}\right)^3$	M1	Implies the previous B1
= 874(.8) or 875 (cm^3)	A1	

7(a) (Monthly payments =) $\frac{\frac{0.033}{12} \times 18000}{1-\left(1+\frac{0.033}{12}\right)^{-4\times12}}$ OR $\frac{0.00275 \times 18000}{1-(1+0.00275)^{-48}}$ or equivalent = (£)400.81	 M2 A1	<u>The correct answer alone, without any workings is awarded M0A0, since it is given in the question</u> M1 for an expression with only 1 (possibly repeated) incorrect substitution, but do not allow use of r = 3.3 Accept (£)400.80(89843…) Convincing working must be seen
7(b) (Saving =) 362.05×5×12 − 400.81×4×12 (− 2000) or 362.05×60 − 400.81×48 (− 2000) = (£)484.12	M1 A2	Use of accurate values of (£)362.05 and/or (£)400.81 can be accepted FT if more accurate values used e.g. • (£)484.17 or (£)484.16(8755) from use of accurate Option B monthly payment • (£)483.95 or (£)484.94(84006) from use of both accurate monthly payments A1 for sight of any one of the following: • an answer of (£)484 to (£)485 as a result of premature rounding • (£) 2484.12 • (£)2484.17 or (£)2484.16(8755) from use of accurate Option B monthly payment • (£)2483.95 or (£)2484.94(84006) from use of both accurate monthly payments
8(a) $\frac{360-15}{360} \times \pi \times 60$ (+60) = 241 (mm)	M1 A2	A1 for any one of the following: • answer of 240.5(5) to 240.7 • answer of $\frac{115}{2}\pi + 60$ or $57.5\pi + 60$ • sight of (180.5(5) to 180.7) + 'their 60' correctly rounded to the nearest mm • sight of 181

8(b)		<u>An answer of 68 tins does not imply full marks should be awarded, as it can be a result of inaccuracy in workings</u>
(Greatest possible area of a part =) $\pi\times80.5\times30.25 + \frac{4\times\pi\times30.25^2}{2}$ (7646.2 to 7651.2) (5746.59 to 5750.3)	M3	M2 for • $\pi\times80.5\times30.25 + 4\times\pi\times30.25^2$ OR • $\pi\times$'their 80.5'$\times$'their 30.25' + $\frac{4\times\pi\times\text{'their } 30.25^2\text{'}}{2}$ where 80 < 'their 80.5' $\leq$ 81 and 30 < 'their 30.25' $\leq$ 30.5 and where 'their 30.25' could have different values in the two terms, but both have to be in the range shown M1 for • the sum of 2 terms with 1 correct and with bounds in the same ranges as for M2 OR • $\pi\times80\times30 + \frac{4\times\pi\times30^2}{2}$ $(= 4200\pi)$
= 13392.79 to 13401.5 or 4265.25π (mm^2)	A1	CAO. May be implied by sight of 267 857 600 to 268 028 400 (total surface area of 20 000 parts)
(Minimum number of tins needed =) 20 000 × 13399.678.. ÷ 3 950 000	M1	FT 'their 13399.678…' provided it has come from the use of 'their upper bounds' of 80mm and 60mm if bounds used Allow M1 only for 20 000 × 13399.678.. ÷ 'their 3 950 000' where 3 900 000 $\leq$ 'their 3 950 000' < 4 000 000
= 68 (tins)	A1	A0 for 67.8…tins If no marks awarded, and from a misinterpretation of the question, SC3 for an **answer of 65** tins from $20000\times(\pi\times79.5\times29.75 + \frac{4\times\pi\times29.75^2}{2}) \div 4\,050\,000$ OR SC2 for an **answer of 64(.1...)** tins from $20000\times(\pi\times79.5\times.29.75 + \frac{4\times\pi\times29.75^2}{2}) \div 4\,050\,000$ OR SC1 for a correct evaluation (rounded, truncated or unrounded) of the calculation $20000\times(\pi\times79.5\times29.75 + \frac{4\times\pi\times29.75^2}{2}) \div 4\,050\,000$ where 79 $\leq$ 'their 79.5' < 80 and 29.5 $\leq$ 'their 29.75' < 30 and 4 000 000 < 'their 4 050 000' $\leq$ 4 100 000 OR If no marks awarded, SC1 for use of 80.5 and 30.25

8(c) Statements required: • Number the parts from (0000)1 to 20000 • Consider successive 5-digit numbers • Use numbers in the range e.g. Use numbers from (0000)1 to 20000 or Do not use 0000 or numbers > 20000 • Ignore repeats (Working in rows would give parts) (0)1325, 18266, ~~(0)1325~~, (0)5929, 10429, (0)2891 OR (Working in columns would give parts) (0)5929, (0)1325, 10429, ~~(0)1325~~, (0)2891, 18266	E2 B1	All 4 needed for E2 E1 for any 2 or 3 correct statements Allow an equivalent numbering system e.g. (0000)0 to 19 999 Their numbering system can be implied by the range of numbers they state they will choose from Allow the 2nd statement to be implied by their numbering of the parts (from 00001) AND their use of 5-digit numbers in their answer OR 5-digit numbers used in their answer and e.g. 01325 seen Do not allow 'Use numbers less than 20000' if they have numbered the parts from 00001 to 20000 ISW. Part numbers can be given in any order
8(c) <u>Alternative method:</u> *Statements required:* • *Number the parts from (0000)1 to 20000* • *Consider successive 5-digit numbers* • *Divide each number by 20000 and use the remainder to choose a part* • *If the 5-digit number is 00000, then part 20000 is chosen, and ignore repeats.* *(Working in rows would give parts)* *(0)6923, (0)1325, 18552, ~~(0)6923~~, (0)8925, 12712* *OR* *(Working in columns would give parts)* *(0)6923, (0)8925, 15775, (0)5929, ~~(0)8925~~, (0)1325*	*E2* *B1*	*All 4 needed for E2* *E1 for any 2 or 3 correct statements* *Allow an equivalent numbering system e.g. (0000)0 to 19 999* *Their numbering system can be implied by the range of numbers they state they will choose from* *Allow the 2nd statement to be implied by their numbering of the parts (from 00001) AND their use of 5-digit numbers in their answer OR* *5-digit numbers used in their answer and e.g. 06923 seen* *If (0000)0 to 19 999 used, when the remainder is 0, part (0000)0 is selected* *ISW*

9(a) 160 + 20 + 73 or 180 + 73 or 180 – 73 = 107 AND 360 – 107	B1	Allow 160 + 93
9(b) (Distance Swansea to Port Talbot =) $\sqrt{11^2 + 7.5^2 - 2 \times 11 \times 7.5 \times cos93(°)}$ (=$\sqrt{185.885\ldots}$) = 13.6(339…) (km)	M2 A1	FT 'their 93(º)' M1 for $11^2 + 7.5^2 - 2\times11\times7.5\times\cos93(º)$ CAO. Mark final answer
$(N\hat{S}P =)\ sin^{-1}\left(\frac{sin93(°)}{13.6(339\ldots)} \times 7.5\right)$ OR $(N\hat{S}P =)\ cos^{-1}\left(\frac{11^2 + 13.6(339\ldots)^2 - 7.5^2}{2\times11\times13.6(339\ldots)}\right)$ OR $(N\hat{P}S =)\ sin^{-1}\left(\frac{sin93(°)}{13.6(339\ldots)} \times 11\right)$ OR $(N\hat{P}S =)\ cos^{-1}\left(\frac{7.5^2 + 13.6(339\ldots)^2 - 11^2}{2\times7.5\times13.6(339\ldots)}\right)$ $(N\hat{S}P =)$33(.321…(º)) OR $(N\hat{P}S =)$ 53.6(781…) or 53.7 or 54(º) (Bearing =) 286(º)	M2 A1 A1	FT 'their derived 13.6(339…)' and 'their 93(º)' M1 for $\frac{\text{sin angle}}{7.5} = \frac{\sin93(º)}{13.6(339\ldots)}$ or equivalent OR M1 for $7.5^2 = 11^2 + 13.6(339\ldots)^2 - 2\times11\times13.6(339\ldots)\times\cos NSP$ or equivalent OR M1 for $\frac{\text{sin angle}}{11} = \frac{\sin93(º)}{13.6(339\ldots)}$ or equivalent OR M1 for $11^2 = 7.5^2 + 13.6(339\ldots)^2 - 2\times7.5\times13.6(339\ldots)\times\cos NPS$ or equivalent e.g. FT use of 13.6 leads to $(N\hat{S}P =)$ 33.4(160…(º)) with $(N\hat{P}S =)$ 53.8(732…(º)) Accept 286(.32…) (º) FT from second M2 only FT 180 + 73 + 'their $N\hat{S}P$' OR FT 360 – 20 – 'their $N\hat{P}S$'
10. $10.97^2 + (7.32\div2)^2$ OR $(7.32\div2)^2 + 2.44^2$ OR $2.44^2 + 10.97^2$ or $\sqrt{10.97^2 + (7.32\div2)^2}$ OR $\sqrt{(7.32\div2)^2 + 2.44^2}$ OR $\sqrt{2.44^2 + 10.97^2}$ (Distance from penalty spot to A =) $\sqrt{10.97^2 + (7.32\div2)^2 + 2.44^2}$ (Distance from penalty spot to A =) 11.82 (m) or an answer in the range 11.814 to 11.821 (m)	M1 M2 A1	May be embedded within incorrect work and possibly in stages May be seen in stages Implies previous M1 M1 for $10.97^2 + (7.32\div2)^2 + 2.44^2$ Allow 11.8 or 11.81 (m) Needs to come from use of √139.5872 to √139.7332 if method done in stages with premature rounding