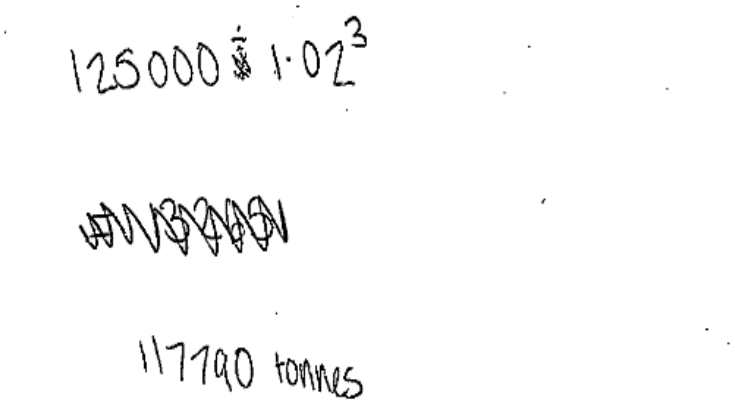
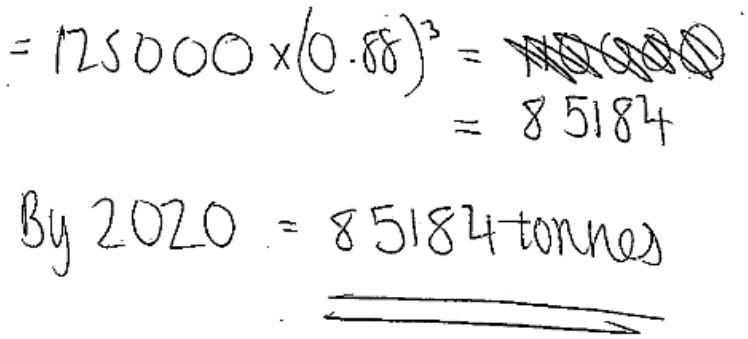
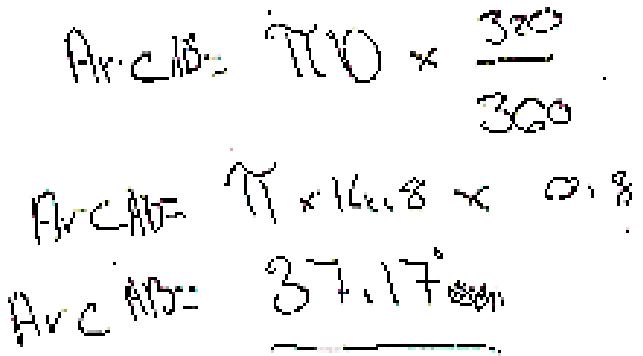
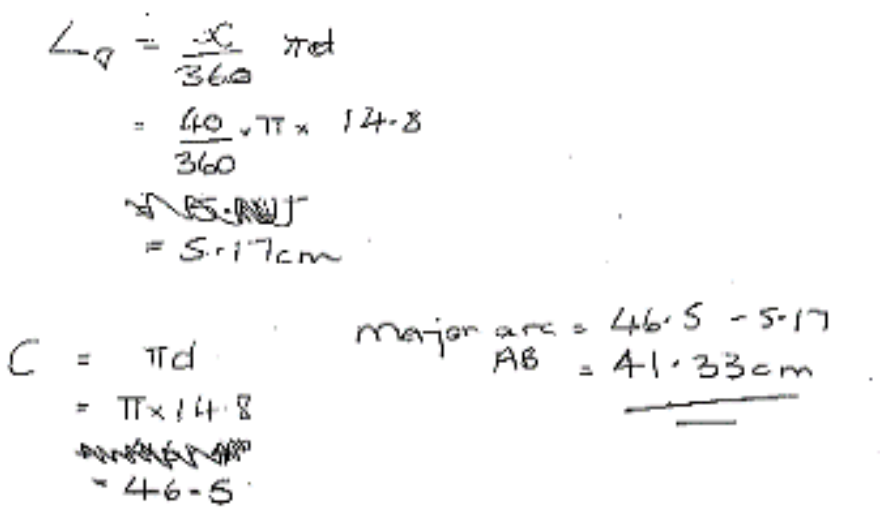
Commentary on paper 2 candidate evidence

The candidate evidence has achieved the following marks for each question of this course assessment component.

Question 1	Candidate response	Commentary
Response 1	100% - 2% = 98% 125000 x 0.98^2 = 120050 tonnes	**Mark: 2/3** The candidate was awarded 2 marks. ✓•1 correct multiplier ×•2 incorrect power ✓•3 follow through working met the criterion for this mark
Response 2	$125,000 \times 1.02^{-3}$ = 117,790.29 tonnes	**Mark: 1/3** The candidate was awarded 1 mark; see note 2 in the marking instructions. ×•1 incorrect multiplier ×•2 incorrect power ✓•3 follow through working met the criterion for this mark

Response 3		**Mark: 1/3** The candidate was awarded 1 mark; see note 3(b) in the marking instructions. ×•¹ this mark is not available where division is used ×•² this mark is not available where division along with an incorrect percentage is used ✓•³ follow through working met the criterion for this mark
Response 4		**Mark: 2/3** The candidate was awarded 2 marks; see note 2 in the marking instructions. ×•¹ incorrect multiplier ✓•² correct power in follow through ✓•³ follow through working met the criterion for this mark

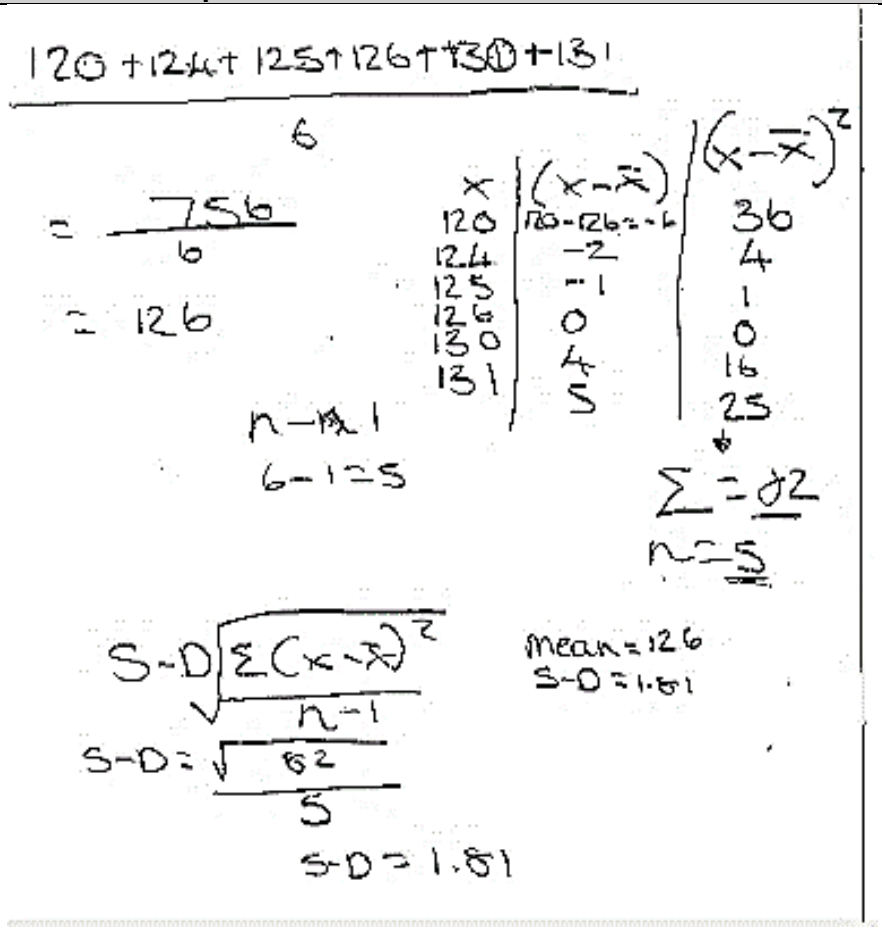
Question 2	Candidate response	Commentary
Response 1		**Mark: 2/3** The candidate was awarded 2 marks. ✓•1 correct fraction ✓•2 correct substitution into arc length formula; 0·8 accepted as evidence of $\frac{320}{360}$ ×•3 calculation mark not available since $\frac{320}{360}$ has not been rounded correctly to at least 2 significant figures; see note 3 in the marking instructions
Response 2		**Mark: 3/3** The candidate was awarded 3 marks; see note 4 in the marking instructions. ✓•1 correct alternative method, ie circumference – length of minor arc ✓•2 correct substitution into circumference and minor arc length formulae ✓•3 correct major arc length calculated

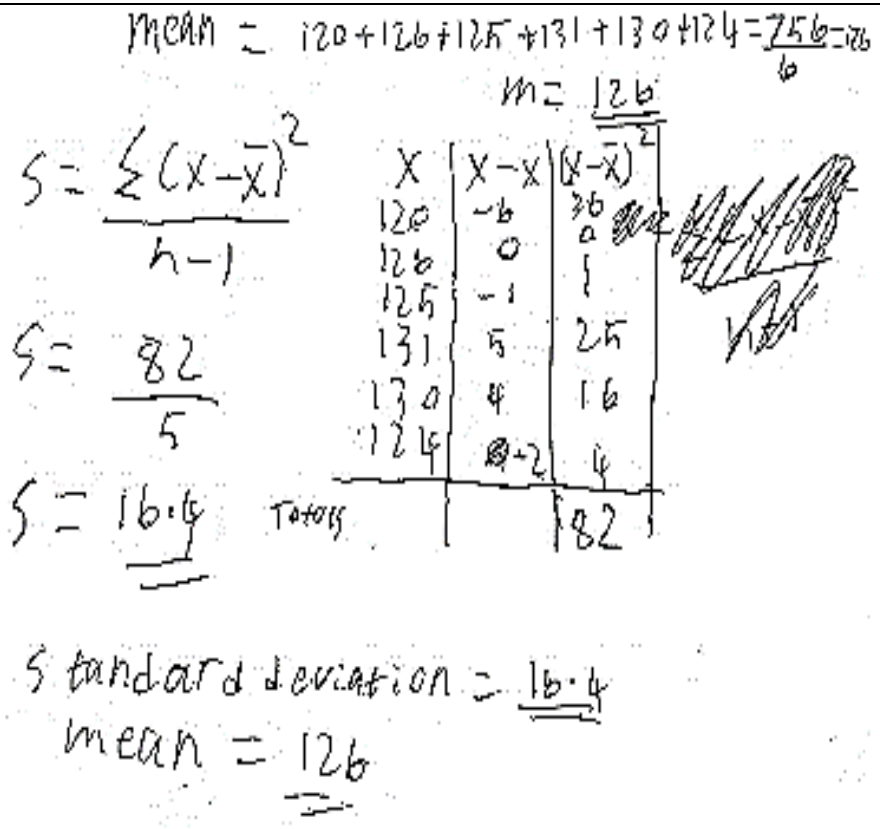
Response 3	$\frac{x}{360} \times 3\pi r^2$ $\frac{320}{360} \times 3 \pi \times 7 \cdot 4^2$ $= 152 \cdot 92 \text{ cm}$	**Mark: 2/3** The candidate was awarded 2 marks; see commonly observed response 2 in the marking instructions. ✓•1 correct fraction ×•2 substitution into area of sector formula instead of arc length formula ✓•3 follow through working met the criterion for this mark
Question 3	**Candidate response**	**Commentary**
Response 1	$\|n\| = \sqrt{24^2 + (-12)^2 + 8^2}$ $= \sqrt{576 + -144 + 64}$ $= \sqrt{432 + 64}$ $= \sqrt{496}$ $= 22 \cdot 27105745$	**Mark: 1/2** The candidate was awarded 1 mark; see commonly observed response 2 in the marking instructions. ✓•1 process started correctly ×•2 incorrect calculation; $(-12)^2 \neq -144$

Response 2	$\sqrt{24^2+12^2+8^2}$ $= \sqrt{784}$	**Mark: 1/2** The candidate was awarded 1 mark; see note 2 in the marking instructions and commonly observed response 1. ✓•1 process started correctly ×•2 incomplete solution
Response 3	$\|r\| = \sqrt{a^2+b^2+c^2}$ $= \sqrt{24^2+12^2+8^2}$ $= \sqrt{576+144+64}$ $\|r\| = \sqrt{784} = 28$	**Mark: 2/2** The candidate was awarded 2 marks. ✓•1 process started correctly; see note 2 in the marking instructions - benefit of doubt is given that the candidate knows that $(-12)^2 = 12^2$ ✓•2 correct solution

Question 4	Candidate response	Commentary
Response 1	$3x < 6(x-1) - 12$ $3x < 6x - 6 - 12$ $-9x < -18$ $x > 2$	**Mark: 2/3** The candidate was awarded 2 marks. ✓•1 right hand side of inequation processed correctly ×•2 incorrect collection of x terms ✓•3 follow through working met the criterion for this mark
Response 2	$3x < 6(x-1) - 12.$ $3x < 6x - 6 - 12$ $3x < 6x - 18$ $-6x \quad -6x$ $\frac{-3x}{-3} < \frac{-18}{-3}$ $x < 6.$	**Mark: 2/3** The candidate was awarded 2 marks; see note 2 in the marking instructions. ✓•1 right hand side of inequation processed correctly ✓•2 correct collection of like terms ×•3 incorrect inequality sign in final solution

Response 3	$3x < 6(x-1) - 12$ $= 3x < 6x - 6 - 12$ $= 3x < 6x - 18$ $= 3x - 6x < 18$ $= -3x < 18$ $= x > -6$	**Mark: 2/3** The candidate was awarded 2 marks. ✓•1 right hand side of inequation processed correctly ×•2 incorrect constant term; see line 4 of working ✓•3 follow through working met the criterion for this mark
Response 4	$3x < 6x - 6 - 72$ $3x - 6x < 6x - 6x - 78$ $\frac{-3x}{-3} < \frac{-78}{-3}$ $x > 26$	**Mark: 2/3** The candidate was awarded 2 marks. ×•1 right hand side of inequation processed incorrectly ✓•2 correct collection of like terms in follow through ✓•3 follow through working met the criterion for this mark

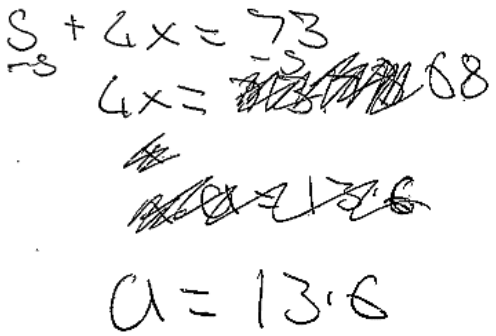
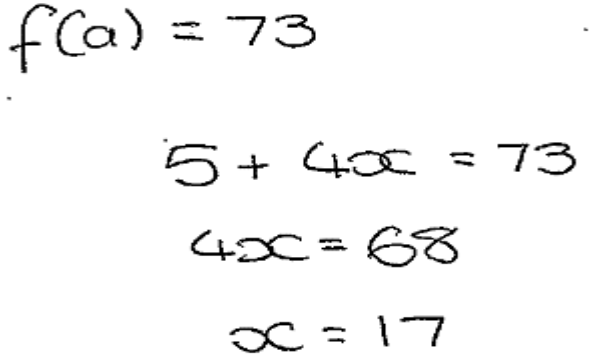
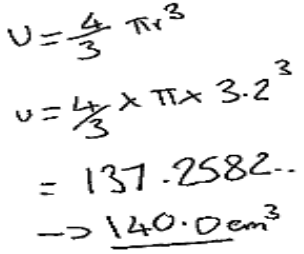
Question 5(a)	Candidate response	Commentary
Response 1		**Mark: 3/4** The candidate was awarded 3 marks; see note 3(b) in the marking instructions. ✓•1 mean correct ✓•2 $(x-\bar{x})^2$ correct; see right hand column of table ×•3 incorrect substitution into standard deviation formula ✓•4 follow through working met the criterion for this mark

Response 2		**Mark: 2/4** The candidate was awarded 2 marks. ✓•1 mean correct ✓•2 $(x-\bar{x})^2$ correct; see right hand column of table ×•3 incomplete standard deviation formula used ×•4 follow through working did **not** meet the criterion for this mark; did not involve square root calculation

Response 3	$120 + 126 + 125 + 131 + 130 + 124 = 631$ $120^2 + 126^2 + 125^2 + 131^2 + 130^2 + 124^2 = 79713$ $Sd = \sqrt{\frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1}}$ $Sd = \sqrt{\frac{79713 - \frac{(631)^2}{6}}{6-1}}$ $Sd = 51.677525...$ $Sd = 51.7$ (2 dp)	**Mark: 2/4** The candidate was awarded 2 marks. ×•1 no mean calculated ×•2 calculated $\sum x^2$ incorrectly ✓•3 consistent substitution into standard deviation formula in follow through ✓•4 follow through working met the criterion for this mark
Question 5(b)	**Candidate response**	**Commentary**
Response 1	On average there was a higher mean of people who visted on Sunday and also Sunday was more consistent but saturday was more consistent with customers	**Mark: 0/2** The candidate was awarded 0 marks. ×•1 similar to note 3(b) (1st bullet point) in the marking instructions; comment refers to the mean rather than the average number of customers ×•2 see note 2 (2nd bullet point, second example) in the marking instructions; candidate's comment does not refer to the **number** of customers

Response 2	Sat mean = 126 Sun mean = 117 SD = 4.05 SD = 6.2 - More customers visited the Six stalls on Saturday on average than on Sunday - The standard deviation of customer visiting is more consistant on Saturday than on Sunday which is less consistent	**Mark: 1/2** The candidate was awarded 1 mark. ✓•1 similar to note 3(a) in the marking instructions ×•2 similar to note 4(b) (5th bullet point) in the marking instructions; comment refers to the consistency of the standard deviation rather than the consistency of the number of customers
Response 3	On average more customers visited the stalls on saturday. However on sunday the numbers of customers was more varied.	**Mark: 2/2** The candidate was awarded 2 marks. ✓•1 similar to note 3(a) (1st bullet point) in the marking instructions ✓•2 similar to note 4(a) (3rd bullet point) in the marking instructions

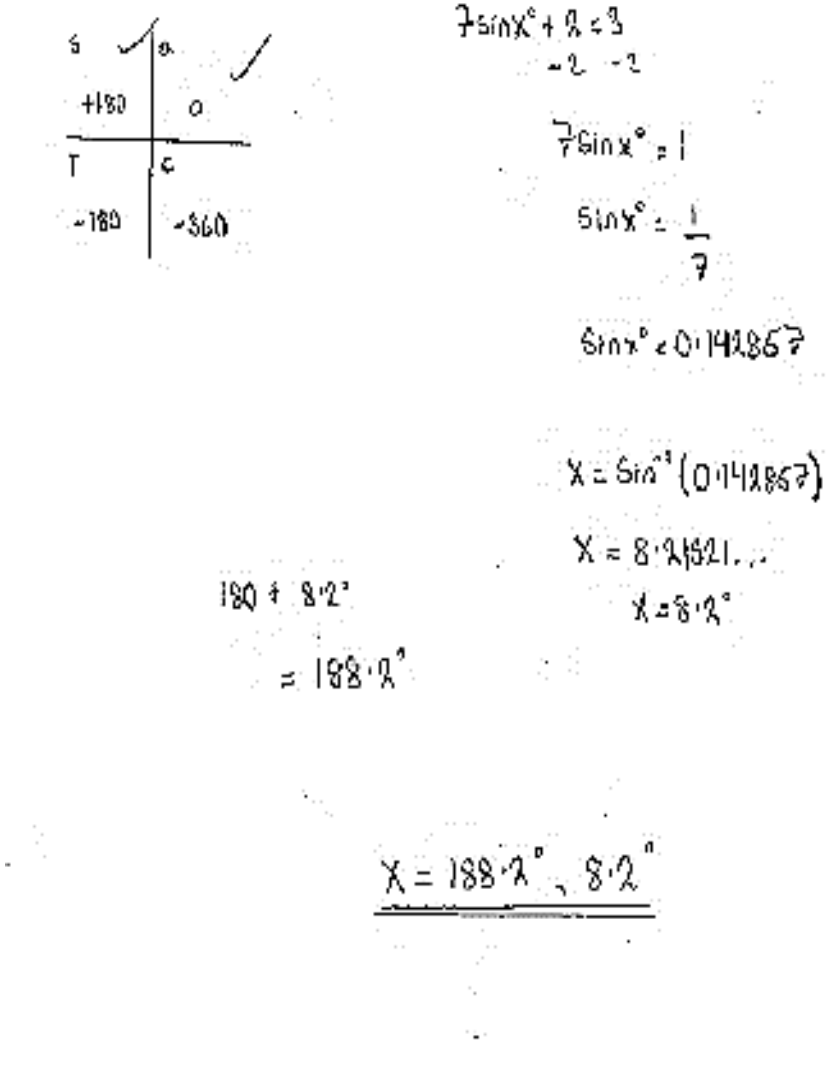
Response 4	• On average less customers visited on Sunday than visited on Saturday. • However the range of amount of customers visiting individual stalls was larger on Sunday than on Saturday.	**Mark: 1/2** The candidate was awarded 1 mark. ✓•1 similar to note 3(a) (1st bullet point) in the marking instructions ×•2 similar to note 4(b) (2nd bullet point) in the marking instructions; use of the word 'range' not accepted since it can mean the difference between the largest and smallest values in the data set
Question 6	**Candidate response**	**Commentary**
Response 1	$q = 17$ $f(17) = 5 + 4 \times 17$ $= 73$	**Mark: 2/2** The candidate was awarded 2 marks. ✓•1 valid strategy; see line 2 of working ✓•2 correct answer; see line 1 of working

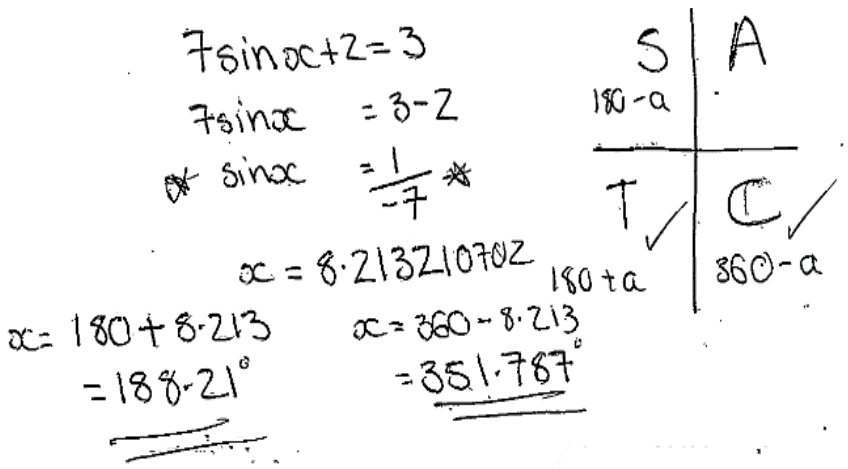
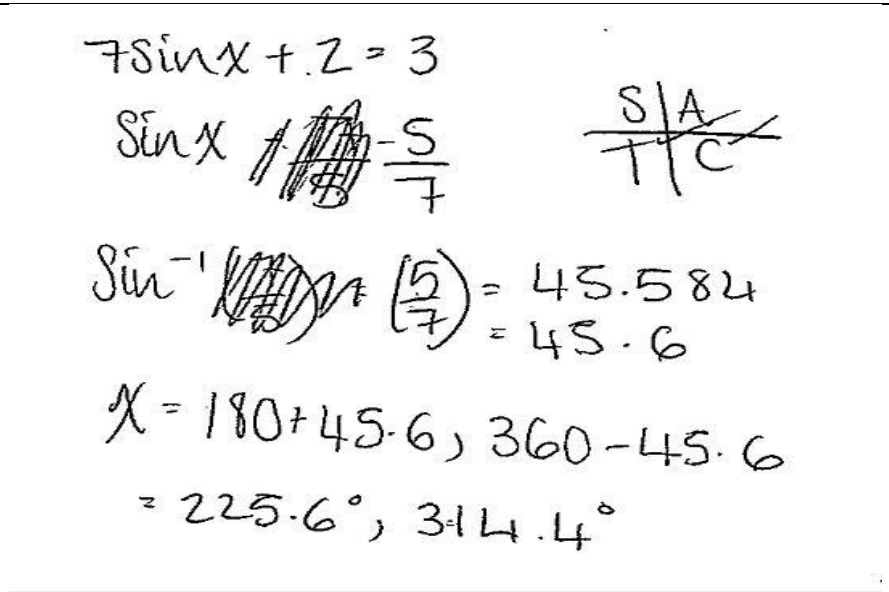
Response 2		**Mark: 1/2** The candidate was awarded 1 mark; see note 3 in the marking instructions. ✓•1 valid strategy with x used in place of a ×•2 incorrect answer
Response 3		**Mark: 2/2** The candidate was awarded 2 marks; see note 3 in the marking instructions. ✓•1 valid strategy with x used in place of a ✓•2 correct value with x used in place of a
Question 7	**Candidate response**	**Commentary**
Response 1		**Mark: 2/3** The candidate was awarded 2 marks. ✓•1 correct substitution into formula ✓•2 correct volume ×•3 incorrect rounding

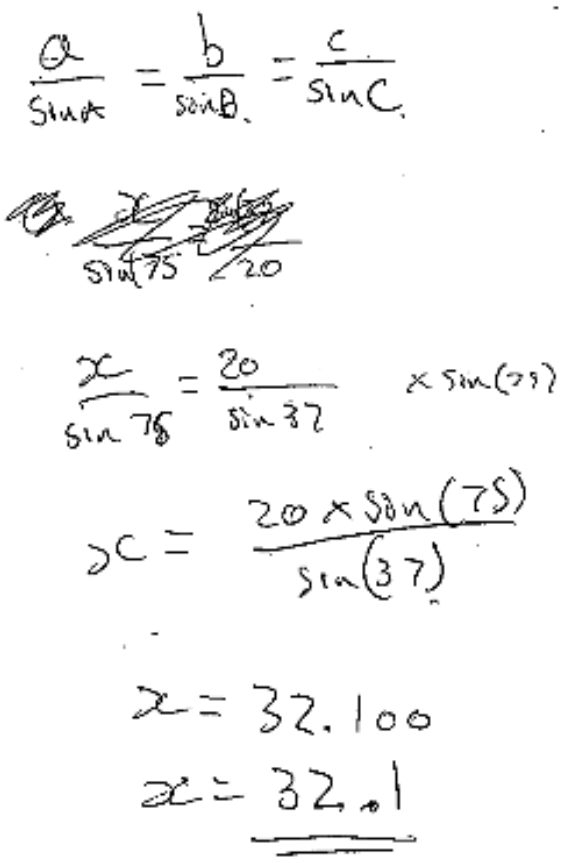
Response 2	$V=\frac{4}{3}\pi r^3$ $V=\frac{4}{3}\pi\times 3.2$ $=13.404$ $=13.4cm$	**Mark: 0/3** The candidate was awarded 0 marks; similar to commonly observed response 4 in the marking instructions, but without rounding mark. $\times\bullet^1$ incorrect substitution into formula $\times\bullet^2$ mark not available; calculation eased since it does not involve a power of r $\times\bullet^3$ incorrect rounding
Response 3	$V=\frac{4}{3}\pi r^3$ $V=\frac{4}{3}\times\pi\times 3.2$ $V=13.404$ (3dp) $V=13cm^3$ $6.4\div 2$ $=3.2$	**Mark: 1/3** The candidate was awarded 1 mark; see commonly observed response 4 in the marking instructions. $\times\bullet^1$ incorrect substitution into formula $\times\bullet^2$ mark not available; calculation eased since it does not involve a power of r $\checkmark\bullet^3$ answer rounded to 2 significant figures

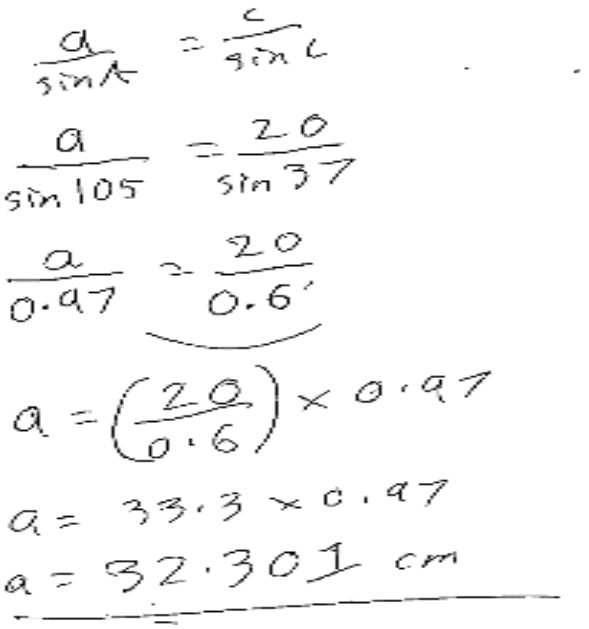
Response 4	$V = \frac{3}{4}\pi r^3$ $V = \frac{3}{4} \times \pi \times 3 \cdot 2^3$ $V = 77.20778...$ $= 77.21$	**Mark: 1/3** The candidate was awarded 1 mark. ×•1 incorrect formula ✓•2 correctly followed through to calculate consistent volume ×•3 incorrect rounding
Question 8	**Candidate response**	**Commentary**
Response 1	$7\sin x^\circ + 2 = 3$ $-2 \quad -2$ $\frac{7}{7}\sin x^\circ = \frac{1}{7}$ $\sin x^\circ = \frac{1}{7}$ $x^\circ = \sin^{-1}\left(\frac{1}{7}\right)$ $x^\circ = 0.143$ S A T C $180 - 0.143 =$ 179.857	**Mark: 2/3** The candidate was awarded 2 marks; see note 5(a) in the marking instructions. ✓•1 correct rearrangement of equation ×•2 value of $\sin^{-1}\left(\frac{1}{7}\right)$ given in radians; this candidate would not be penalised again for inappropriate use of radians in questions 9, 13 or 17 ✓•3 correct follow through to calculate consistent 2nd value of x

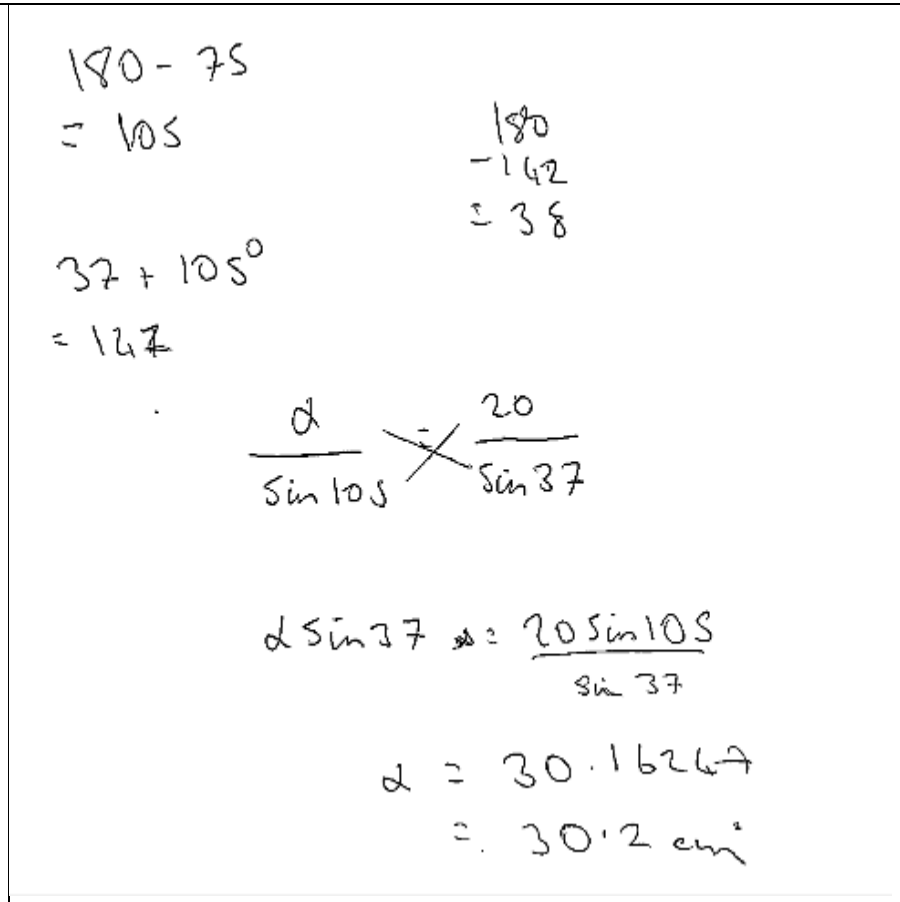
Response 2	$7\sin x + 2 = 3$ $-2 \quad -2$ $\frac{7\sin x}{7} = \frac{1}{7}$ $\sin x = 0{\cdot}14$ $x = \sin^{-1}(0{\cdot}14)$ $x = 8$	**Mark: 2/3** The candidate was awarded 2 marks; see notes 2 and 4(a) in the marking instructions. ✓•1 correct rearrangement of equation ✓•2 correct value of x ×•3 no attempt to calculate 2nd value of x

Response 3		**Mark: 2/3** The candidate was awarded 2 marks. ✓•¹ correct rearrangement of equation ✓•² correct value of x ×•³ incorrect 2nd value of x

Response 4		**Mark: 2/3** The candidate was awarded 2 marks; see commonly observed response 2(a) in the marking instructions. ×•1 incorrect rearrangement of equation ✓•2 correct follow through to calculate consistent value of x ✓•3 correct follow through to calculate consistent 2nd value of x
Response 5		**Mark: 2/3** The candidate was awarded 2 marks; similar to combination of commonly observed responses 1 and 2(a) in the marking instructions. ×•1 incorrect rearrangement of equation ✓•2 correct follow through to calculate consistent value of x ✓•3 correct follow through to calculate consistent 2nd value of x

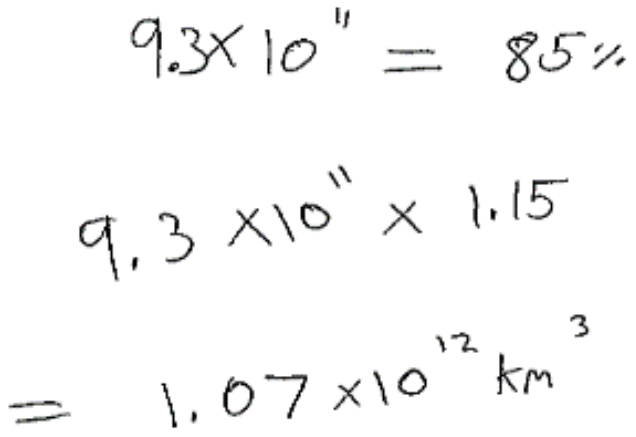
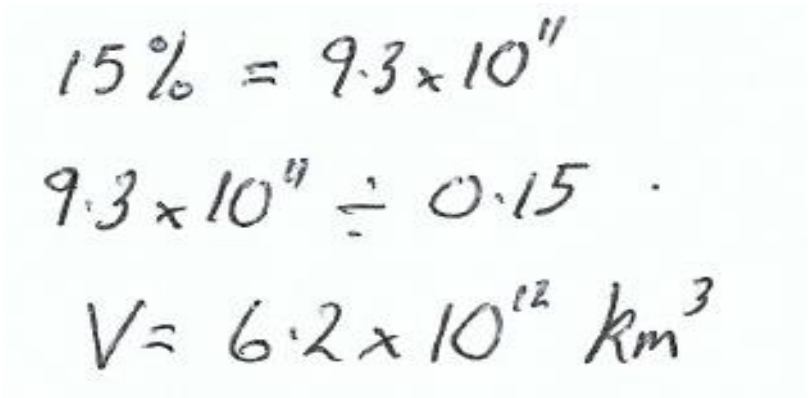
Question 9	Candidate response	Commentary
Response 1		**Mark: 2/3** The candidate was awarded 2 marks; see note 3 in the marking instructions. ✗•1 incorrect substitution into sine rule ✓•2 consistent follow through to re-arrange formula ✓•3 consistent follow through to calculate length

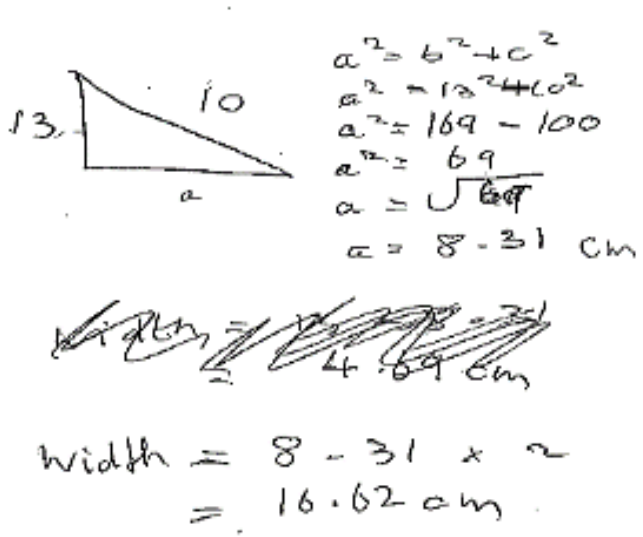
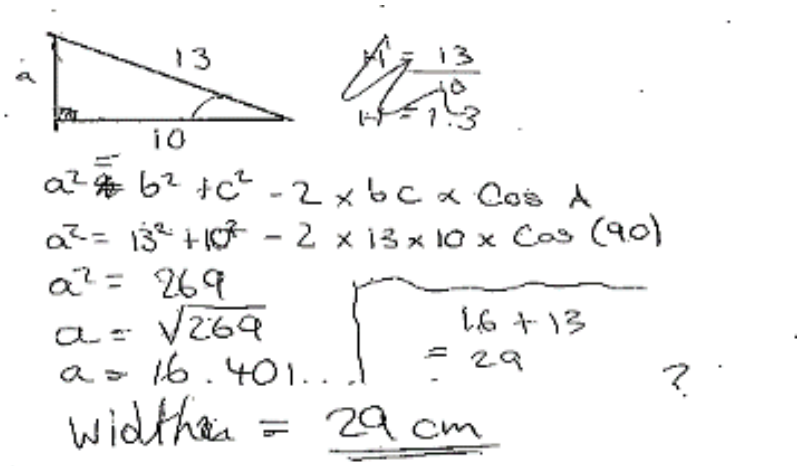
Response 2		**Mark: 3/3** The candidate was awarded 3 marks. ✓•1 correct substitution into sine rule ✓•2 correct re-arrangement of formula ✓•3 correct calculation of length; see note 4 in the marking instructions

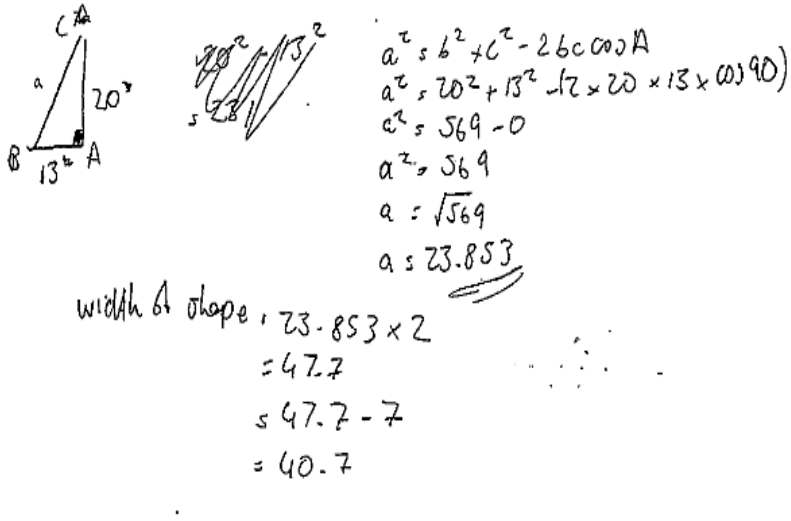
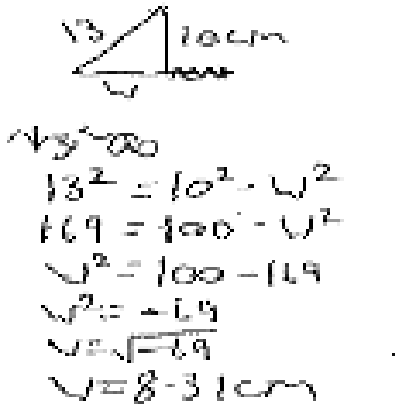
Response 3		**Mark: 2/3 or 3/3** depending on whether the candidate had already been penalised in question 8 for the inappropriate use of radians; see note 5(a) in the marking instructions. The candidate was awarded 2 marks if the use of radians had not already been penalised in question 8. ✓•1 correct substitution into sine rule ✓•2 correct re-arrangement of formula ×•3 incorrect calculation of length; radians used Or The candidate was awarded 3 marks if the use of radians had already been penalised in question 8. ✓•1 correct substitution into sine rule ✓•2 correct re-arrangement of formula ✓•3 incorrect calculation of length but use of radians already penalised in question 8

Response 4	$\frac{a}{\sin 15^\circ} = \frac{20}{\sin 37^\circ}$ $\times \sin 15 \quad \times \sin 15$ $a = \frac{20 \sin 15}{\sin 37^\circ}$ $a = 8.6 \text{ cm}$	**Mark: 2/3** The candidate was awarded 2 marks. ×•1 incorrect substitution into sine rule ✓•2 consistent follow through to re-arrange formula ✓•3 consistent follow through to calculate length
Question 10	**Candidate response**	**Commentary**
Response 1	$\overrightarrow{BC} = -\underset{\sim}{u} - \underset{\sim}{w} + 2\underset{\sim}{u} + \frac{1}{2}\underset{\sim}{w}$	**Mark: 1/2** The candidate was awarded 1 mark; see note 4(a) in the marking instructions. ✓•1 correct expressions for $\overrightarrow{ED}$ in terms of **u** and $\overrightarrow{DC}$ in terms of **w** ×•2 $\overrightarrow{BC}$ not expressed in simplest form

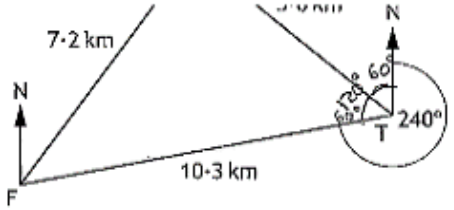
Response 2	$\overrightarrow{BA} + \overrightarrow{AE} + \overrightarrow{ED} + \overrightarrow{DC}$ $= -\underline{u} + (-\underline{w}) + 2\underline{u} + \frac{1}{2}\underline{w}$ $= 2\underline{u} - \underline{u} + (-\underline{w}) + \frac{1}{2}\underline{w}$ $= \underline{u} + (-\frac{1}{2}\underline{w})$	**Mark: 2/2** The candidate was awarded 2 marks. ✓•1 correct expressions for $\overrightarrow{ED}$ in terms of **u** and $\overrightarrow{DC}$ in terms of **w** ✓•2 $\overrightarrow{BC}$ expressed in acceptable simplest form; see note 2 in the marking instructions
Question 11	**Candidate response**	**Commentary**
Response 1	$(9.3 \times 10^{11}) \times 1.15$ $= 1.0695 \times 10^{12}$	**Mark: 0/3** The candidate was awarded 0 marks; see note 2 in the marking instructions. ×•1 no evidence of $85\% = 9 \cdot 3 \times 10^{11}$ ×•2 invalid strategy ×•3 calculation not within valid strategy

Response 2		**Mark: 1/3** The candidate was awarded 1 mark; see note 2 in the marking instructions. ✓•1 $85\% = 9\cdot3\times10^{11}$ stated ×•2 invalid strategy ×•3 calculation not within valid strategy
Response 3		**Mark: 2/3** The candidate was awarded 2 marks; see commonly observed response 3 in the marking instructions. ×•1 no evidence of $85\% = 9\cdot3\times10^{11}$ ✓•2 valid strategy on follow through from $15\% = 9\cdot3\times10^{11}$ ✓•3 follow through working met the criterion for this mark

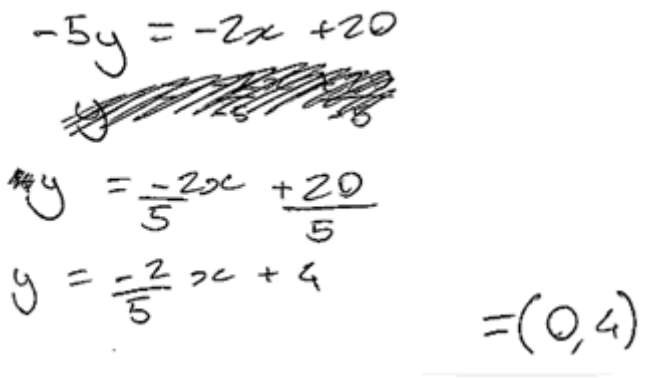
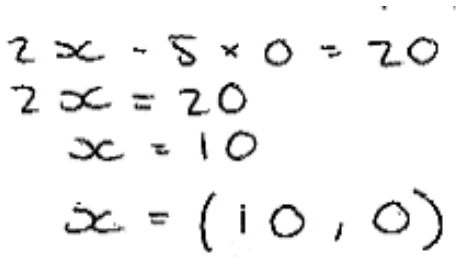
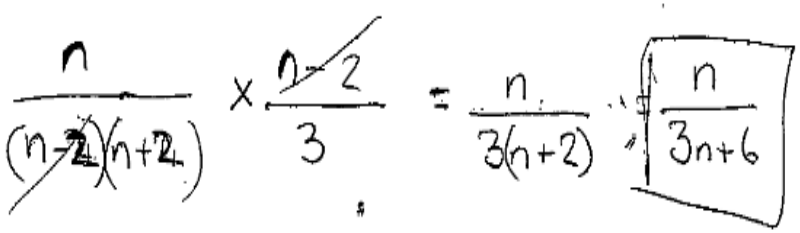
Question 12	Candidate response	Commentary
Response 1		**Mark: 1/4** The candidate was awarded 1 mark; see note 3 in the marking instructions. ×●1 incorrect diagram ×●2 Pythagoras statement inconsistent with candidate's diagram ✓●3 consistent follow through to calculate x ×●4 incorrect method for calculating width
Response 2		**Mark: 3/4** The candidate was awarded 3 marks; see commonly observed response 1(a) in the marking instructions. ✓●1 correct diagram ×●2 incorrect substitution into cosine rule ✓●3 consistent follow through to calculate a ✓●4 consistent follow through to calculate width

Response 3		**Mark: 2/4** The candidate was awarded 2 marks; see note 4 in the marking instructions. ×●[1] incorrect diagram ✓●[2] substitution into cosine rule consistent with candidate's diagram ✓●[3] consistent follow through to calculate a ×●[4] incorrect method for calculating width
Response 4		**Mark: 1/4** The candidate was awarded 1 mark. ✓●[1] correct diagram ×●[2] Pythagoras statement inconsistent with candidate's diagram ×●[3] incorrect calculation of x ; no real value for $\sqrt{-69}$ ×●[4] no attempt to calculate width

Response 5	$a^2 = 6^2 + c^2$ $= 20^2 + 26^2$ $= 400 + 676$ $= 1076$ $= \sqrt{1076} = 32.8$ cm	**Mark: 1/4** The candidate was awarded 1 mark; see commonly observed response 2(c) in the marking instructions. ×●1 no diagram ×●2 incorrect Pythagoras statement ✓●3 consistent follow through to calculate x ×●4 no attempt to calculate width
Question 13	**Candidate response**	**Commentary**
Response 1	$\cos A = \frac{b^2+c^2-a^2}{2bc}$ $\cos A = \frac{5.6^2+10.3^2-7.2^2}{2\times 5.6 * 10.3} = \frac{85.61}{115.36}$ $A = \cos^{-1}(0.742$ $A = 42.1°$ $360 - (240+42.1)$ $360 - 282.1$ $= 77.9°$	**Mark: 3/4** The candidate was awarded 3 marks; see note 2 in the marking instructions ✓●1 correct substitution into cosine rule; accept use of A in place of T where substitution is correct ✓●2 correct calculation of cos A ✓●3 correct calculation of angle A ×●4 incorrect method for calculating bearing

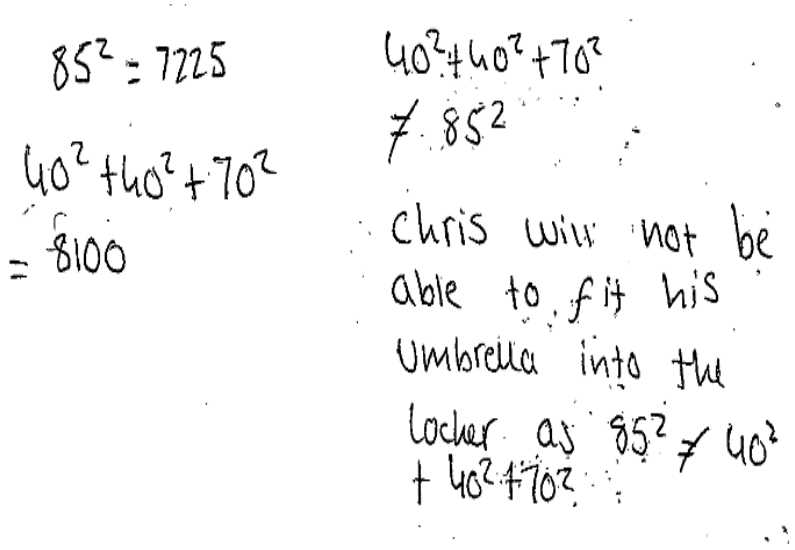
Response 2	$\cos A = \frac{10{\cdot}3^2 + 5{\cdot}6^2 - 7{\cdot}2^2}{2 \times 10{\cdot}3 \times 5{\cdot}6} = \frac{-11{\cdot}63}{115{\cdot}36} = -0{\cdot}1$ $A = 84{\cdot}2^\circ$ bearing $= 324{\cdot}2^\circ$	**Mark: 2/4** The candidate was awarded 2 marks; see note 2 in the marking instructions. ✓●1 correct substitution into cosine rule; accept use of A in place of T where substitution is correct ×●2 incorrect calculation of $\cos A$ ×●3 incorrect calculation of $\cos^{-1}(-0{\cdot}1)$ ✓●4 consistent follow through to calculate bearing
Response 3	 • FY is 7·2 kilometres. • TY is 5·6 kilometres. • FT is 10·3 kilometres. • F is on a bearing of 240° from T. Calculate the bearing of the yacht from the trawler. Bearing of yacht from trawler = 300° = 300° because the full circle is 360° that leaves two sections each 60°. 240° + 60° = 300°	**Mark: 0/4** The candidate was awarded 0 marks; see note 5 in the marking instructions ×●1 incorrect method ×●2 no follow through mark available ×●3 no follow through mark available ×●4 no follow through mark available

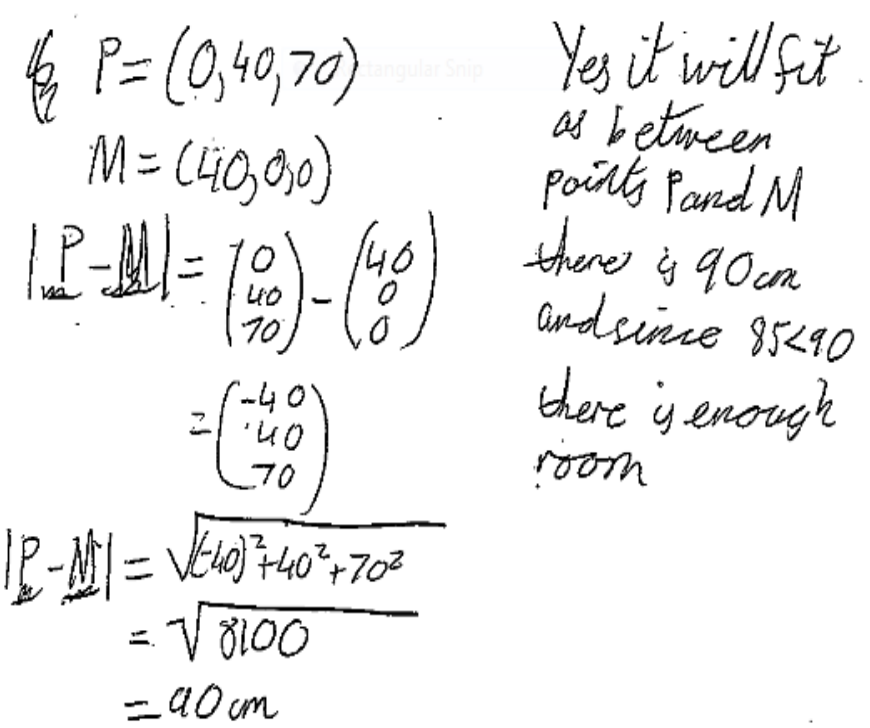
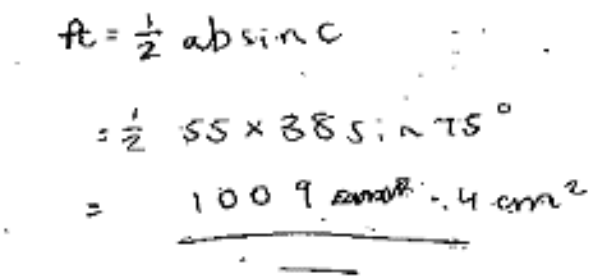
Response 4	$\cos A = \frac{b^2+c^2-a^2}{2bc}$ $\cos A = \frac{7.2^2+5.6^2-10.3^2}{2\times7.2\times5.6}$ $\cos A = -0.283...$ $A = \cos^{-1}(\text{Ans})$ $A = 106.49$ Y is on a bearing of 106.49° from T	**Mark: 2/4** The candidate was awarded 2 marks; see commonly observed response 2(b) in the marking instructions. ×●1 incorrect substitution into cosine rule; do not accept use of A in place of T where substitution is incorrect ✓●2 consistent follow through to calculate cos A ✓●3 consistent follow through calculation of $\cos^{-1}(-0\cdot283\ldots)$ ×●4 no attempt made to calculate bearing
Question 14	**Candidate response**	**Commentary**
Response 1	$2x - 5y = 20$ $2(0) - 5y = 20$ $-5y = 20$ $y = -4$	**Mark: 1/2** The candidate was awarded 1 mark; see commonly observed response 2 in the marking instructions. ✓●1 correct substitution into equation ×●2 coordinates not stated

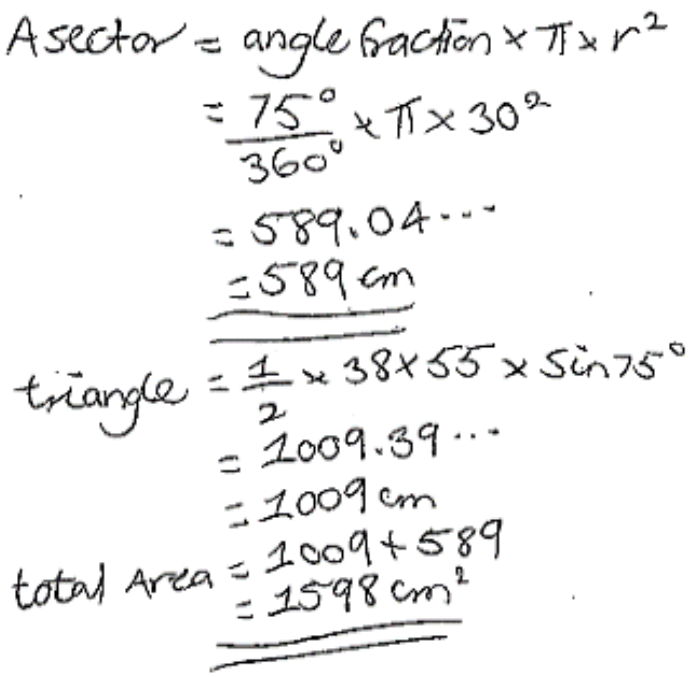
Response 2		**Mark: 1/2** The candidate was awarded 1 mark. ✓●1 correct isolation of y term ×●2 incorrect y term
Response 3		**Mark: 1/2** The candidate was awarded 1 mark; see note 3 in the marking instructions. ×●1 incorrect substitution into equation ✓●2 consistent follow through to state coordinates of x intercept
Question 15	**Candidate response**	**Commentary**
Response 1		**Mark 3/3:** The candidate was awarded 3 marks. ✓●1 evidence of multiplication of first fraction by reciprocal of second fraction ✓●2 correct factorisation of $n^2 - 4$ ✓●3 correct simplification and multiplication

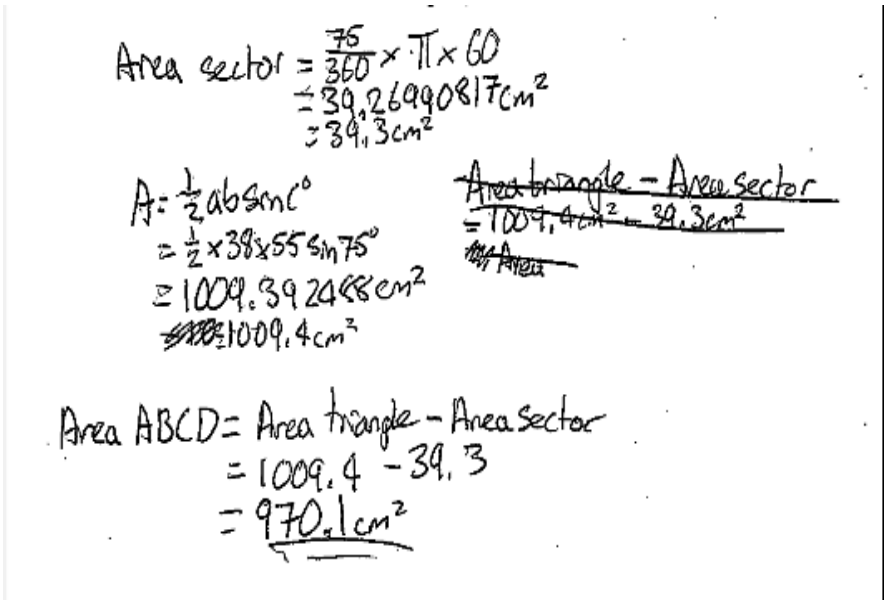
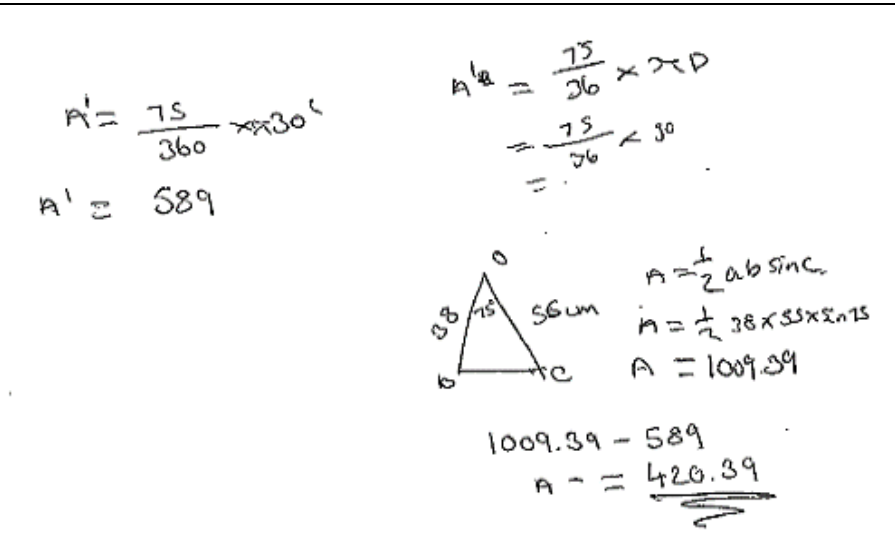
Response 2	$= \frac{n(n-2)}{(n^2-4)(n-2)} \div \frac{3(n^2-4)}{(n^2-4)(n-2)}$ $= \frac{n(n-2)}{(n^2-4)(n-2)} \times \frac{(n^2-4)(n-2)}{3(n^2-4)}$ $= \frac{n(n-2)}{3(n^2-4)}$	**Mark: 1/3** The candidate was awarded 1 mark. ✓●1 evidence of multiplication of first fraction by reciprocal of second fraction ×●2 no attempt to factorise $n^2 - 4$ ×●3 answer not in simplest form
Response 3	$\frac{n}{n^2-4} \div \frac{3}{n-2}$ $\frac{n}{n^2-4} \times \frac{n-2}{3}$ $n \times \frac{n-2}{3}$ $(n-2)(n+2)$ $= 3n$ $(n+2)$	**Mark: 2/3** The candidate was awarded 2 marks. ✓●1 evidence of multiplication of first fraction by reciprocal of second fraction ✓●2 correct factorisation of $n^2 - 4$ ×●3 incorrect multiplication

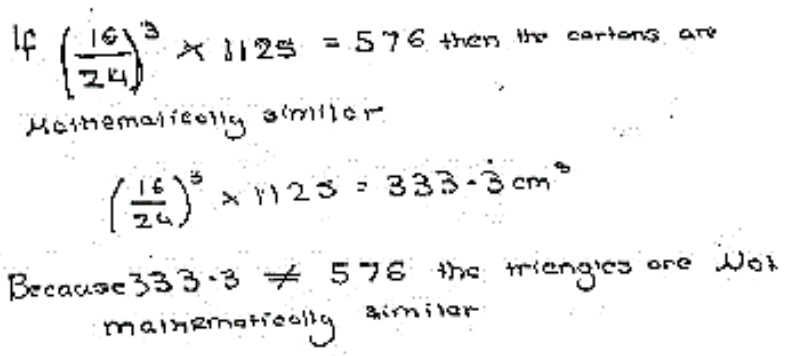
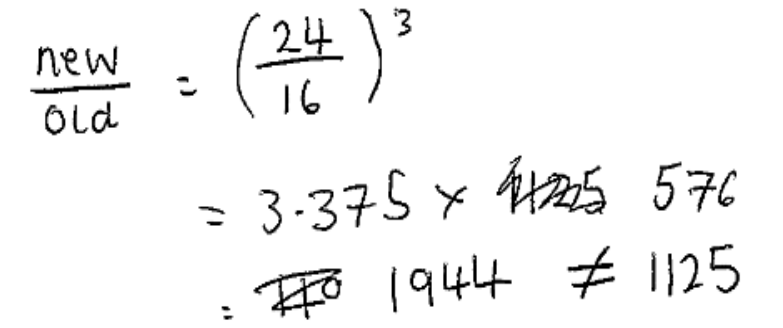
Response 4	$\frac{n}{n^2-4} \div \frac{3}{n-2}$ $\frac{n}{n^2-4} \times \frac{n-2}{3}$ $\frac{n(n-2)}{3(n^2-4)}$ $\frac{n^2-2n}{3n^2-12}$ $\frac{-2n}{2n^2-12}$	**Mark: 1/3** The candidate was awarded 1 mark. ✓●1 evidence of multiplication of first fraction by reciprocal of second fraction ×●2 no attempt to factorise n^2-4 ×●3 incorrect simplification
Question 16	**Candidate response**	**Commentary**
Response 1	$c^2 = b^2 + a^2$ $c^2 = 70^2 + 45^2$ $c^2 = 4900 + 1600$ $c^2 = 6500$ $c = \sqrt{6500}$ $c = 80.62$ cm $PM = 80.62$ cm He will not be able to fit the unbroken in because $85 > 80.62$	**Mark: 2/4** The candidate was awarded 2 marks; see commonly observed response 1(a) in the marking instructions. ✓●1 correct start of valid strategy ×●2 no continuation of valid strategy ×●3 mark not available since calculation has been simplified ✓●4 follow through to consistent valid conclusion with comparison

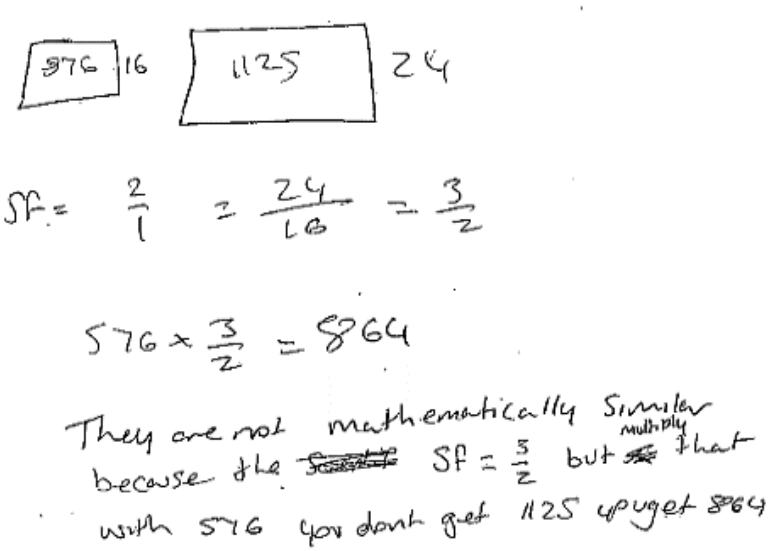
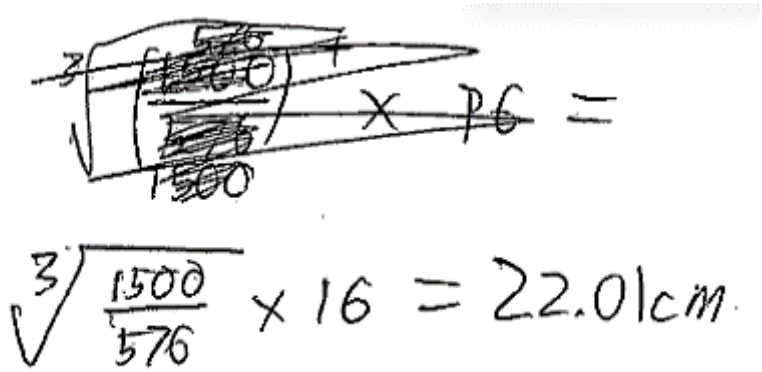
Response 2		**Mark: 3/4** The candidate was awarded 3 marks; see commonly observed response 3(b) in the marking instructions. ✓●1 correct start of valid strategy ✓●2 correct continuation of valid strategy ✓●3 all calculations correct within valid strategy ×●4 comparison does not justify conclusion

Response 3		**Mark: 4/4** The candidate was awarded 4 marks; see note 3 in the marking instructions. ✓●[1] correct start of valid strategy ✓●[2] correct continuation of valid strategy ✓●[3] all calculations correct within valid strategy ✓●[4] valid conclusion with comparison
Question 17	**Candidate response**	**Commentary**
Response 1		**Mark: 1/5** The candidate was awarded 1 mark; see commonly observed response 5 in the marking instructions. ✓●[1] correct substitution into area of triangle formula ×●[2] no attempt to state appropriate fraction for sector ×●[3] no attempt to substitute into area of sector formula

		×●4 no attempt to subtract area of sector from area of triangle ×●5 mark not available since calculations have been simplified
Response 2		**Mark: 4/5** The candidate was awarded 4 marks; see commonly observed response 2 in the marking instructions. ✓●1 correct substitution into area of triangle formula ✓●2 appropriate fraction for sector ✓●3 correct substitution into area of sector formula ×●4 area of sector added to area of triangle ✓●5 follow through working met the criterion for this mark; see note 6 in the marking instructions

Response 3		**Mark: 4/5** The candidate was awarded 4 marks; see commonly observed response 1 in the marking instructions. . ✓●1 correct substitution into area of triangle formula ✓●2 appropriate fraction for sector ×●3 substitution into length of arc formula instead of area of sector formula ✓●4 consistent follow through to subtract length of arc from area of triangle ✓●5 follow through working met the criterion for this mark
Response 4		**Mark: 4/5** The candidate was awarded 4 marks. ✓●1 correct substitution into area of triangle formula ✓●2 appropriate fraction for sector ✓●3 correct substitution into area of sector formula ✓●4 evidence of subtracting area of sector from area of triangle ×●5 correct calculations but no units in final answer

Question 18(a)	Candidate response	Commentary
Response 1		**Mark: 3/3** The candidate was awarded 3 marks; see commonly observed response 1 in the marking instructions. ✓•1 correct linear scale factor ✓•2 correct volume scale factor multiplied by appropriate volume ✓•3 correct calculation, valid comparison and conclusion
Response 2		**Mark: 2/3** The candidate was awarded 2 marks. ✓•1 correct linear scale factor ✓•2 correct volume scale factor multiplied by appropriate volume ×•3 correct calculation, valid comparison but no conclusion

Response 3		**Mark: 1/3** The candidate was awarded 1 mark; see commonly observed response 2(a) in the marking instructions. ✓•1 correct linear scale factor ×•2 linear scale factor used in calculation instead of volume scale factor ×•3 calculation did not involve a power of the scale factor
Question 18(b)	**Candidate response**	**Commentary**
Response 1		**Mark: 2/2** The candidate was awarded 2 marks. ✓•1 correct volume scale factor ✓•2 correct answer

Response 2	$SF = \frac{new}{old} = \frac{1500}{576} = 2.6041... \times 16$ $= 41.6\,cm^3$ The depth of the redesigned large carton is 41.6cm.	**Mark: 1/2** The candidate was awarded 1 mark; see commonly observed response 1 in the marking instructions. ✓•1 correct volume scale factor ×•2 incorrect method