COMPONENT 1: NON-CALCULATOR MATHEMATICS, HIGHER TIER

Specimen Assessment Materials Non-calculator Higher	Mark	Elements linked to AOs	Comments
1. (a) 9 (b) –6 (c) –3	B1 B1 B1 (3)	1.3a 1.3a 1.3a (3)AO1 (0)AO2 (0)AO3	
2. (a) 68000 (b) $8{\cdot}53 \times 10^{-5}$ (c) $1{\cdot}5 \times 10^{9}$	B1 B1 B2 (4)	1.2 1.2 1.3b (4)AO1 (0)AO2 (0)AO3	B1 for correct value not in standard form e.g. 15×10^{8} or 1500 000 000
3. Correctly engaging with ratios to find values that can be used on the graph e.g. Finding the ratio of red : white to be 4 : 5 OR *Reducing* the ratio of 4 : 9 to enable use on graph e.g. 2 : 4·5 or 1 : 2·25 Using a value for white paint to find a non-zero value of red paint. **e.g.** 2 litres of white paint gives 1·6 litres of red paint. OR (4·5 – 2 =) 2·5 litres of white paint gives 2 litres of red paint. OR 1·25 litres of white paint gives 1 litre of red paint. Using the red paint value found to fill in one of the non-zero values required on the red paint axis. e.g. 1·6 found from conversion, then 1·5 indicated on the axis. (The values are 0·5, 1, 1·5, 2, 2·5.) Correctly filling in all the remaining numbers on the red paint axis: 0, 0·5, 1, 1·5, 2, 2·5	M1 M1 A1 A1 (4)	2.3a 3.1b 3.1b 2.3b (0)AO1 (2)AO2 (2)AO3	Seen or implied. Ignore incorrect use of 4 : 9 as red : white for this M1 The value must be one that can be read off the graph. This may be implied from markings on the diagram but the value does not need to be indicated on the diagram. Do NOT F.T. from incorrect interpretation of 4 : 9 as red paint : white paint This mark depends on both previous M marks. Some correct working must be shown. (This could be in the diagram.) C.A.O.
4.(a) Correctly completing the tree diagram 0·6, 0·3. 0·3, 0·7 (b) $0{\cdot}4 \times 0{\cdot}7$ $= 0{\cdot}28$ (c) $0{\cdot}6 \times 0{\cdot}7$ $= 0{\cdot}42$	B2 M1 A1 M1 A1 (6)	2.3b 2.3a 1.3a 2.3a 1.3a (2)AO1 (4)AO2 (0)AO3	B1 for any one pair of branches correct (total 1) Or other complete method. F.T. for their P(walk to college) ×P(walk home) correctly evaluated, or by alternative method

Specimen Assessment Materials Non-calculator Higher	**Mark**	**Elements linked to AOs**	**Comments**
5. Method to find prime factors 2, 2, 2, 2, 3, 3, 5, 5 $2^4 \times 3^2 \times 5^2$	M1 A1 B1 (3)	1.1 1.3a 1.2 (3)AO1 (0)AO2 (0)AO3	2 correct before 2nd error Ignore 1s for A1, but not for B1 F.T. provided index >1. Accept "."
6. Method to form two correct equations and eliminate one variable First variable found correctly Substitute to find the second variable Tin = £5 and Brush = £2	M1 A1 m1 A1 (4)	3.1d 1.3a 3.1d 3.3 (1)AO1 (0)AO2 (3)AO3	Allow 1 error in one term, not one with equal coefficients Tin = £5 or Brush = £2. F.T. 'their first variable'
7. An arc, centre P, of radius 5 cm Correctly constructing a perpendicular bisector Correct shading	B1 B2 B1 (4)	2.3a 2.3a 2.3b (0)AO1 (4)AO2 (0)AO3	Allow $\pm$ 0·2cm B1 for drawing by eye or using a protractor F.T. for an arc centre P and a line crossing PQ. Shading needs to be on both sides of line PQ
8. 5 parts = (£)30 OR 30 ÷ 5 OR $7x - 2x = 30$ OR equivalent (1 part) = (£)6 (Amount shared =) 6 × 9 =(£)54	M1 A1 m1 A1 (4)	3.1d 1.3b 3.1d 1.3b (2)AO1 (0)AO2 (2)AO3	Accept 5/9 = 30 F.T their 1 part, provided M1 awarded Award M1A1m1A0 for answers of £12 and £42
9. (a) $2x(3x + 4)$ (b) $(x - 10)(x + 10)$	B2 B1 (3)	1.3a 1.3a (3)AO1 (0)AO2 (0)AO3	B1 for a correct partially factorised expression OR sight of $2x(3x \ldots\ldots)$ or $2x(\ldots\ldots+4)$

Specimen Assessment Materials Non-calculator Higher	**Mark**	**Elements linked to AOs**	**Comments**
10. Setting up one of two models (needing 3 strips along 8m or 5 strips along 13m)	S1	3.1d	For the strategy and finding the need for 3 or 5 strips of carpet as appropriate
(Cost along 8 m side =) $13 \times 3 \times$ (£) 25	M1	3.1d	Finding the cost of the carpet for their model F.T. their number of strips
(Cost along 13 m side =) $8 \times 5 \times$ (£) 25	M1	3.1d	Finding the cost of the carpet for their model F.T. their number of strips
(£) 975 AND (£) 1000	A1	1.3a	
8 m method is cheaper by (£) 25	A1	3.4b	F.T. for their costs provided at least S1 awarded. Must state which method is cheaper for their costs
	(5)	(1)AO1 (0)AO2 (4)AO3	
11. Attempt to find vector **EF** e.g. **ED** + **DF** or $-$**DE** + **DF**	M1	3.1b	Accept intention, i.e. missing brackets e.g. $-3\mathbf{a} - 2\mathbf{b}$ instead of $-3\mathbf{a} + 2\mathbf{b}$
$= -\mathbf{a} + 7\mathbf{b}$	A1	1.3a	C.A.O.
EF $\times -3$	M1	2.3a	F.T. 'their $-\mathbf{a} + 7\mathbf{b}$' $\times -3$ M1 for sight of $-3\mathbf{a} + 21\mathbf{b}$ or $\mathbf{a} - 7\mathbf{b}$ or $-3(-\mathbf{a} + 7\mathbf{b})$
$3\mathbf{a} - 21\mathbf{b}$	A1	1.3a	
	(4)	(2)AO1 (1)AO2 (1)AO3	

Specimen Assessment Materials Non-calculator Higher	**Mark**	**Elements linked to AOs**	**Comments**
12. (a) $24 \times \frac{45}{30}$	M1	3.1c	Or equivalent.
$\times \frac{10}{15}$	M1	3.1c	Or equivalent (the 24 must have been used). M1 for correctly using two of the operators '×45', '÷30', '×10' and '÷15' with the 24.
= 24 (workers)	A1	1.3a	C.A.O. Do not penalise pre-approximations as long as 24 is given as the final answer. *Alternative presentation:* *Area Time Workers* *30 10 24* *….Award M1 for correct step(s) to 45* *….Award M1 for correct step(s) to 15* *…. …. ….* *45 15* ***24*** *A1 C.A.O.*
(b) Stating one assumption made e.g. 'similar work will be carried out on the other site' or 'all workers will work at the same rate' or similar.	E1	3.4a	
Stating an impact e.g. 'if the work is harder or the workers are slower, then more workers will be needed.'	E1 (5)	3.5 (1)AO1 (0)AO2 (4)AO3	
13.(a)(i) $m_1 = -3$	B2	2.3a	B1 for evidence of interpreting the graph to find the gradient e.g. $(9-0)/(0-3)$ or equivalent or stating $m_1 = 3$
(ii) $m_2 = \frac{1}{3}$	B1	1.1	F.T. as long as $m_1 \times m_2 = -1$
(b) Method to find the intercept of line L_2 e.g. substituting m_2, 1, 6 into $y = mx + c$	M1	3.1b	
$c = \frac{17}{3}$ or equivalent	A1	1.3a	
Finding the equation of L_2 e.g. substituting m_2 and c into $y = mx + c$ to give $y = \frac{1}{3}x + \frac{17}{3}$ or equivalent	M1	3.1b	
$x - 3y + 17 = 0$	A1 (7)	1.3a (3)AO1 (2)AO2 (2)AO3	

Specimen Assessment Materials Non-calculator Higher	**Mark**	**Elements linked to AOs**	**Comments**
14. (Distance =) 3×40 $= 120$ (miles) (Time =) $120 \div 30$ $= 4$ (hrs) (average speed =) $\frac{120 + 120}{3 + 4}$ = 34(·2…mph) 'So not correct'.	M1 A1 M1 A1 M1 A1 (6)	2.2 1.3a 2.2 1.3a 2.2 2.5a (2)AO1 (4)AO2 (0)AO3	F.T. 'their calculated values'. OR 7×35 M1 OR $240 / 35$ M1 = 245 (miles) A1 =6(·8..)(hrs) A1 Calculation AND statement required.
15. (For triangles *BCP* and *CBQ*) $P\hat{C}B = Q\hat{B}C$ (or equivalent) Base angles of an isosceles triangle. (So) $P\hat{B}C = Q\hat{C}B$ Angles were bisected. Side *BC* is common (*BC* = *BC*) Reasons given (So triangles *BCP* and *BCQ* are congruent) ASA	B1 B1 B1 E1 B1 (5)	2.4b 2.4b 2.4b 2.4b 2.1a (0)AO1 (5)AO2 (0)AO3	The first two reasons noted above must be given for E1 to be awarded. For correctly giving the condition for congruence.

Specimen Assessment Materials Non-calculator Higher	**Mark**	**Elements linked to AOs**	**Comments**
16.(a) Entries 30, 30, 40, 35, 5	B2	2.3a	B1 for any 3 correct entries F.T. for their entries for M marks only in (b)
(b) (Number of cars exceeding limit = 40/100 × 140 =) 56 cars	B1	3.1d	Accept 60/100 × 140 = 84.
56 – 35 – 5 = 16 cars in 30-40 group. (OR 84 – 30 – 30 = 24)	M1	3.2	For attempting to identify the number of 'cars fined' (or not fined) in the correct single group.
16/40 × 10 = 4 mph (OR 24 /40 × 10 = 6 mph)	M1	3.1d	F.T. 'their 56' or 'their 84'. For translating this number into a speed. F.T. their number of cars
Estimate of speed = 40 – 4 = 36 mph (OR 30 + 6 = 36 mph)	A1	1.3a	
(c) 3, 4, 2, 1·5, 0·5	B1	1.3a	
Axes correct and labelled, no gaps between bars	M1	2.3b	Histogram needs to be attempted.
Correct histogram	A1	2.3b	F.T. candidate's frequency density if table completed incorrectly but the idea of frequency density is used. SC1 if correct but not labelled.
(d) Yes, with reason e.g. 'there were more slower speeds recorded'.	B1	2.1b	F.T from their histogram in (c) if necessary. Other reasons could include: '40 cars exceeded 40mph before but only 20 afterwards.' '80 cars exceeded 30mph before but only 40 afterwards.' 'Only 28% exceeded 36mph instead of 40%.'
	(10)	(2)AO1 (5)AO2 (3)AO3	
17. Sight of $y \propto \frac{1}{x}$ or $y = \frac{k}{x}$	B1	1.1	May be implied in further work
$16 = \frac{k}{1/2}$	M1	1.3b	
$k = 8$	A1	1.3b	
$y = \frac{8}{x}$	A1	1.3b	F.T, 'their 8'
	(4)	(4)AO1 (0)AO2 (0)AO3	

Specimen Assessment Materials Non-calculator Higher	**Mark**	**Elements linked to AOs**	**Comments**
18. $\dfrac{3\sqrt{7}}{4+\sqrt{7}} = \dfrac{3\sqrt{7}\left(4-\sqrt{7}\right)}{\left(4+\sqrt{7}\right)\left(4-\sqrt{7}\right)}$ Numerator $12\sqrt{7}-21$ Denominator 9 $\dfrac{4\sqrt{7}-7}{3}$	M1 A1 A1 A1 (4)	1.3b 1.3b 1.3b 1.3b (4)AO1 (0)AO2 (0)AO3	C.A.O.
19. $a = 6$ $b = -22$	B1 B1 (2)	1.3a 1.3a (2)AO1 (0)AO2 (0)AO3	.
20.(a) x = 0·7878…**and** $100x$ = 78·78.. with an attempt to subtract. $\underline{78}$ (= $\underline{26}$) 99 (33) (b) 1/9 × 3 = 0·333…	M1 A1 B2 B1 (5)	1.3a 1.3a 1.3a 1.1 (5)AO1 (0)AO2 (0)AO3	Or equivalent method. B1 for each. Must be convincing as a recurring decimal.
21. Interpreting diagram to get formula for area of either rectangle e.g. $x(x+2) = y$ or equivalent OR $12(4+x) = 4y$ or equivalent Equating formulae e.g. $x(x+2) = 12 + 3x$ OR $12(4+x) = 4x(x+2)$ OR equivalent Deriving a quadratic equation e.g. $x^2 - x - 12 = 0$ OR $4x^2 - 4x - 48 = 0$ Factorising and solving their quadratic equation e.g. $(x+3)(x-4) = 0$ $x = -3$ or $x = 4$ Statement about ignoring $x = -3$ as it leads to negative lengths Dimensions 4 (cm) and 6 (cm)	B1 M1 A1 M1 A1 E1 A1 (7)	2.3a 3.1b 1.3b 3.1b 1.3b 3.4b 3.3 (2)AO1 (1)AO2 (4)AO3	This B1 mark maybe implied by the correct quadratic, hence if M1 awarded also award this B1 mark. ISW Allow 1 error, e.g. missing brackets, or from incorrect expansion. FT provided equivalent level of difficulty Must equate to zero FT provided equivalent level of difficulty Must have both solutions F.T provided on +ve and one –ve solution

Specimen Assessment Materials Non-calculator Higher	**Mark**	**Elements linked to AOs**	**Comments**
22.(a) Concave down curve translated left Point (−7,0) shown. Point (1, 0) shown. (b) Concave down curve symmetrical about the *y*-axis. Stationary points at (0, 3). (c) A comment regarding no scale or coordinates shown.	 B1 B1 B1 B1 B1 B1 (6)	 2.3a 2.3b 2.3b 2.3a 2.3b 2.5b (0)AO1 (6)AO2 (0)AO3	*Allow appropriate marking of axes if coordinates not given.*
23.(a) (i) $0{\cdot}7 \times 0{\cdot}7 \times 0{\cdot}3$ $= 0{\cdot}147$ (ii) Indicates three possible situations e.g.HMM or MHM or MMH $0{\cdot}441$ Less than a 50% chance. (b) (i) Evaluating the method used e.g. Indicates that the first ball selected is returned to the box before the second ball is selected or 2 attempts are independent. (ii) Stating how the results would be different e.g. if the first ball was not returned then the probability of winning would be less than 1/16.	M1 A1 M1 A1 A1 E1 E1 (7)	3.1c 1.3a 3.1c 1.3a 2.1a 3.4a 3.5 (2)AO1 (1)AO2 (4)AO3	 May be indicated by $0{\cdot}3{\times}0{\cdot}7{\times}0{\cdot}7 \times 3$ or equivalent. F.T. 'their $0{\cdot}147' \times 3$ F.T. 'their $0{\cdot}441$'.
24. $\frac{1}{2}\, x\, (x + 3)\sin 60° = \sqrt{300}$ $\frac{1}{2}\, x\, (x + 3)\frac{\sqrt{3}}{2} = \sqrt{300}$ $x^2 + 3x - 40 = 0$ $(x + 8)(x - 5) = 0$ $x = 5$ $BA^2 = 8^2 + 5^2 - 2 \times 8 \times 5 \cos 60$ Sight of $\cos 60° = \frac{1}{2}$ BA = 7 (cm)	M1 m1 A1 M1 A1 M1 B1 A1 (8)	3.1d 3.2 3.2 1.3a 3.3 3.2 1.1 1.3a (3)AO1 (0)AO2 (5)AO3	Allow missing brackets Or similar progress F.T. 'their $\sin 60°$' Accept $BA^2 = (x+3)^2 + x^2 - 2 \times x \times (x+3)\cos 60°$.