## [C056/SQP105]

Intermediate 2 Mathematics Specimen Marking Instructions 2 (Units 1, 2, 3)

NATIONAL QUALIFICATIONS



## Mathematics Intermediate 2 (Paper 2)

1.	ans : $s = 3.35$	1	73
	• <sup>1</sup> process: calculate $-\frac{x}{x}$	•	
	• <sup>2</sup> process: calculate $(x - \frac{1}{x})^2$	• <sup>2</sup>	16, 4, 1, 25, 9, 1
	• <sup>3</sup> process: substitute in formula	•3	$\sqrt{\frac{56}{5}}$
	• <sup>4</sup> process: calculate standard deviation	•4	s = 3.35 (disregard rounding)
	4 marks		
2a.	ans : 650 m <sup>3</sup>		
	•1 strategy: know how to calculate volume of barn	•1	volume of cuboid + volume of $\frac{1}{2}$ cylinder
	• <sup>2</sup> process: substitute into formulae for cuboid and half cylinder	•2	7 X 12 X 5 + $\frac{1}{2}$ X $\pi$ X 3.5 <sup>2</sup> X 12
	• <sup>3</sup> process: calculate total volume	•3	650.9 m <sup>3</sup>
	• <sup>4</sup> process: round answer to 2 significant figures	•4	650 m <sup>3</sup>
	4 marks		

2b.	ans : width = 4.2 m	
	• <sup>1</sup> strategy: know to find expression for volume of extension	• <sup>1</sup> $\left[ 3 \times w + \left( \frac{1}{2} \times w \times 2 \right) \right] \times 12$
	• <sup>2</sup> process: equate with 200 and simplify	• <sup>2</sup> 48 $w = 200$
	• <sup>3</sup> communicate: state width	• <sup>3</sup> width = 4.2 m
	5 marks	
<b>3a.</b>	ans : X	
	• <sup>1</sup> interpret: interpret qualitative graphs	• <sup>1</sup> X
	1 mark	
3b.	ans : X - reason	
	• <sup>1</sup> interpret: interpret qualitative graphs	• <sup>1</sup> X
	• <sup>2</sup> communicate: state reason	• <sup>2</sup> graph shows 2 rates of fall
	2 marks	

4.	ans : 4.69 m • <sup>1</sup> strategy: marshal facts and know to use Pythagoras	x 2.5mx 1.2m
	• <sup>2</sup> process: rearrange equation $e^{2}$	$x^2 = 2.5^2 - 1.2^2$
	• <sup>3</sup> process: calculate $x$	x = 2.19
	• <sup>4</sup> communicate: state the height	<sup>4</sup> 4.69 m
	4 marks	
5.	ans : NO + reason	
	• <sup>1</sup> strategy: identify crucial aspect • <sup>1</sup>	<sup>1</sup> 161
	• <sup>2</sup> strategy: know how to calculate level in 3 years	<sup>2</sup> 0.95 <sup>3</sup> x 161
	• <sup>3</sup> process: calculate within valid • <sup>3</sup> strategy	<sup>3</sup> 138
	• <sup>4</sup> communicate: give response based on previous evidence	<sup>4</sup> NO, with reason
	4 marks	

6.	<ul> <li>ans : x = -3.6 and 1.6</li> <li>•<sup>1</sup> strategy: know to use the quadratic formula</li> </ul>	• <sup>1</sup> quadratic formula
	• <sup>2</sup> process: substitute correctly into quadratic formula	• <sup>2</sup> $x = \frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times -6}}{2}$
	• <sup>3</sup> process: calculate $b^2$ - 4 ac	• <sup>3</sup> 28
	• <sup>4</sup> communicate: state 2 values of $x$ correct to 1 decimal place	• <sup>4</sup> -3.6 and 1.6
	4 marks	
7a.	<ul> <li>ans : 2, 7, 14, 18, 22, 24, 25</li> <li>•<sup>1</sup> communicate: table with cumulative frequencies</li> </ul>	• <sup>1</sup> 2, 7, 14, 18, 22, 24, 25
7b.	ans: median = 2, lower quartile = 1, upper quartile = 4	
	• <sup>1</sup> communicate: median	•1 2
	• <sup>2</sup> communicate: lower quartile	• <sup>2</sup> 1
	• <sup>3</sup> communicate: upper quartile	• <sup>3</sup> 4

8.	ans : 66.9°	
	• <sup>1</sup> strategy: marshal facts	• <sup>1</sup> evidence of link with circumference
	• <sup>2</sup> strategy: express arc as ratio of circumference	$\bullet^2  \frac{7}{\pi \times 12}$
	• <sup>3</sup> strategy: know how to find angle	$\bullet^3 \qquad \frac{7 \times 360^\circ}{\pi \times 12}$
	• <sup>4</sup> process: carry out all calculations	• <sup>4</sup> 66.9°
	4 marks	
9	ans $\cdot k - dt + m$	
~•	• <sup>1</sup> process: "remove" denominator	• <sup>1</sup> $dt = k - m$
	• <sup>2</sup> process: make $k$ the subject	• <sup>2</sup> $k = dt + m$
	2 marks	

10.	ans	: 47.7 m		
	•1	interpret: find size of angle ATB	• <sup>1</sup>	$ATB = 5^{\circ}$
	•2	strategy: know to apply sine rule to find AT	•2	sine rule
	•3	process: substitute into sine rule	•3	$\frac{\mathrm{TA}}{\sin 64^{\circ}} = \frac{4.8}{\sin 5^{\circ}}$
	•4	process: calculate TA	•4	TA = 49.5 m
	•5	strategy: know to apply trigonometry to find TC (C on building horizontally aligned with A)	•5	$\frac{\mathrm{TC}}{\mathrm{TA}} = \sin 69^{\circ}$
	•6	process: calculate TC and height of building	•6	TC = 46.2 m TA = 47.7 m

<b>11a.</b>	ans : <i>x</i> = 73.4 and 286.6	
	• <sup>1</sup> process: solve equation for $\cos x^{\circ}$	• <sup>1</sup> $\cos x^\circ = \frac{2}{7}$
	• <sup>2</sup> process: find one value for $x$	• <sup>2</sup> $x = 73.4$
	• <sup>3</sup> process: final $2^{nd}$ value for x	• <sup>3</sup> $x = 286.6$
	3 marks	
11b.	Proof	
	• strategy: substitute $\cos^2 x$ for $1-\sin^2 x$	• 1 $\frac{\sin^2 x}{\cos^2 x}$
	• <sup>2</sup> communicate: state valid explanation	• <sup>2</sup> $\tan^2 x$
	2 marks	

12a.	ans : 18-2 <i>x</i>		
	• <sup>1</sup> communicate: find formula	•1	18 - 2 <i>x</i>
	1 mark		
12b.	ans: Proof		
	• communicate: state expression for volume in terms of $x$	• <sup>1</sup>	$100 \times \pi \times (18 - 2x) \text{ cm}^3$
	• <sup>2</sup> process: demonstrate clearly the result	•2	$1800x - 200x^2$
	2 marks		
12c.	ans: 100 cm by 9 cm by 4.5 cm		
	• strategy: equate $1800x - 200x^2$ to zero	• <sup>1</sup>	$1800x - 200x^2 = 0$
	• <sup>2</sup> process: solve equation for $x$	•2	x = 0, x = 9
	• <sup>3</sup> process: find $x$ value for maximum volume	•3	<i>x</i> = 4.5
	• <sup>4</sup> communicate: state the dimensions <b>4 marks</b>	•4	100 cm by 9 cm by 4.5 cm

## [END OF MARKING INSTRUCTIONS]