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MATHEMATICS (SYLLABUS D)

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Paper 2

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MARK SCHEME

Maximum Mark: 100

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Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)	A by 240	4	B3 for 4980 and 5220 seen or difference = 240 Or M1 for $4500 \div 5$ and 12×340 oe and M1 for 0.12×4500 and 24×195 oe and M1 for the difference between <i>their</i> 5220 and <i>their</i> 4980
1(b)	10.61 cao	3	M2 for $240 \div 100 \times 5.2 \times 0.85$ soi Or M1 for $240 \div 100 \times 5.2$ or <i>their</i> 12.48×0.85 or 5.2×0.85
1(c)	42	3	B2 for 280 Or M1 for $1.15 x = 322$ soi and M1 for $322 - \text{their } 280$
2(a)(i)	12 40 85 107	1	
2(a)(ii)	Correct cumulative frequency curve	2	B1FT for at least 5 correct plots
2(b)(i)	47 to 49	1FT	
2(b)(ii)	28 to 32	2FT	B1 for 63 to 65 or 32 to 35

Question	Answer	Marks	Partial Marks
2(c)	49.3	3	M1 for $(12 \times 10 + 28 \times 30 + 45 \times 50 + 22 \times 70 + 13 \times 90)$ and B1 dep for <i>their</i> $\Sigma fx \div 120$
3(a)	$\begin{pmatrix} 5 \\ 6 \\ 8 \end{pmatrix}$ cao	1	
3(b)(i)	$\begin{pmatrix} 440 \\ 540 \end{pmatrix}$ cao	2	B1 for one element correct
3(b)(ii)	The amount Anya makes for men's T-shirts and women's T-shirts	1	
3(c)(i)	$(290 \quad 630 \quad 537.5[0])$	2	B1 for two correct values seen in a row of 3 elements or column of 3 elements isw
3(c)(ii)	48.7%	3	M1FT for <i>their</i> $(440 + 540)$ and <i>their</i> $(290 + 630 + 537.5)$ and M1 for $(\text{their } 1457.5 - \text{their } 980) \div \text{their } 980$ oe
4(a)(i)	Triangle <i>B</i> at $(4, -1), (4, -4), (5, -4)$	2	B1 For triangle <i>B</i> the correct size and orientation
4(a)(ii)	Triangle <i>C</i> at $(1, 4), (3, 4), (3, -2)$	2	B1 for correct size and orientation, incorrect position or for triangle with two vertices correct or for triangle at $(-3, 0), (-5, 0), (-5, 6)$
4(b)(i)	Triangle <i>Q</i> at $(3, 1), (9, 1), (6, 3)$	2	B1 for coordinates $(3, 1), (9, 1)$ and $(6, 3)$ soi or for triangle with two vertices correct
4(b)(ii)	(Stretch) factor 3 <i>y</i> -axis invariant or parallel to <i>x</i> -axis	2	B1 for either

Question	Answer	Marks	Partial Marks
5(a)	$\frac{14-x}{(x-2)(x+1)}$ Final answer	2	M1 for $\frac{4(x+1)-5(x-2)}{(x-2)(x+1)}$ or better soi
5(b)	-4 or 1.5 oe	3	B1 for $2x^2 + 5x - 12 [= 0]$ and M1 for $(2x - 3)(x + 4) [= 0]$ OR M1 for FT factorising their 3-term quadratic equation Or for correct FT substitution into formula oe and A1FT for solutions from their quadratic equation
5(c)(i)	$3p + 2n = 4.8[0]$ or $3p + 2n = 480$ $5p + 4n = 9[.00]$ or $5p + 4n = 900$	1	
5(c)(ii)	0.6[0] 1.5[0]	3FT	M1 for a correct method to eliminate one variable A1 for either $p = 0.6[0]$ or $n = 1.5[0]$ www After A0 , B1FT for a correct substitution to find the other variable After 0 , SC1 for a pair of values that satisfy either equation
6(a)(i)	1	1	
6(a)(ii)	10, 12, 14, 15, 16, 18, 20	1	
6(a)(iii)	$\frac{7}{11}$ oe	1	
6(b)(i)	8	2	M1 for $14 + 10 + 24 - x = 40$ oe or for correct Venn diagram with algebraic expressions. Or B1 for Venn diagram with at least 3 numbers correct

Question	Answer	Marks	Partial Marks
6(b)(ii)	$\frac{28}{45}$ oe	2FT	M1 for $\frac{\text{their } 8}{k} \times \frac{\text{their } 7}{k-1} [\times 2]$ where $k > \text{their } 8$ Or SC1 for $\left(\frac{\text{their } 8}{10}\right)^2$
7(a)(i)	–4.5 –4.5	1	Both correct
7(a)(ii)	Correct smooth curve	3FT	B2FT for 8 or 9 points correctly plotted Or B1FT for 6 or 7 points correctly plotted Or B1 for the correct scales drawn
7(a)(iii)	–2.4 to –1.6 dependent on tangent drawn	2	Accept a correctly formed $\Delta y \div \Delta x$ isw B1 for tangent drawn at (3, 1.5)
7(a)(iv)(a)	–2 cao		
7(a)(iv)(b)	–2.4 to –2.3 and 4.3 to 4.4		FT reading their graph at $y = \text{their } -2$ Tolerance ± 1 small square B1 FT for one correct
7(b)(i)	4	1	
7(b)(ii)	3	1	
7(b)(iii)	324	1	
8(a)(i)	$\frac{y}{2}$ oe angle at centre = twice angle at circumference oe	2	B1 for $\frac{y}{2}$
8(a)(ii)	90 – y oe [Angle between] radius and tangent = 90°, [sum of angles in a triangle]	2	B1 for 90 – y

Question	Answer	Marks	Partial Marks
8(a)(iii)	$2y$ oe or $2(90 - \text{their (a)(ii)})$ or $180 - 2 \text{ their (a)(ii)}$ Angle in semicircle = 90°	2FT	FT dependent on expressions in y B1 for $2y$
8(b)	<i>EFC</i>	1	
8(c)	Any two of $\angle OCG$ is common oe $\angle ADC = \angle OGC [= 90^\circ]$ $\angle DAC = \angle GOC [= y]$ with no incorrect reason or fact stated	2	B1 for one pair of angles
8(d)	Trapezium	1	
8(e)(i)	$1 : 4$ oe	1	
8(e)(ii)	$1 : 8$ oe	1	
9(a)	7.54	2	M1 for $\pi \times 0.4^2 \times 15$
9(b)	53.7	4	M1 for $\frac{1}{2} \times 4.5^2 \times \sin 110$ oe M1 for $\frac{250}{360} \times \pi \times 4.5^2$ or $\frac{110}{360} \times \pi \times 4.5^2$ M1 for <i>their</i> 9.514 + <i>their</i> 44.18 oe
9(c)	2 minutes 20 seconds	2	M1 for figs $175 \div 45$ soi

Question	Answer	Marks	Partial Marks
9(d)	146.5°	4	B3 for 33.5° Or M2 for $\sin Q = \frac{450 \sin 62}{720}$ Or M1 for $\frac{\sin Q}{450} = \frac{\sin 62}{720}$ AND M1 for 180 – <i>their</i> Q
10(a)	$3x^2 + 16x - 460 = 0$ correctly derived	4	B1 for $(x + 4)(3x + 4)$ oe and M1 for expanding brackets and collecting like terms and M1 for <i>their</i> area = 476 and A1 for correct simplification leading to $3x^2 + 16x - 460 = 0$
10(b)	10 and $-\frac{46}{3}$ oe (–15.3)	3	B2 for $(x - 10)(3x + 46)$ Or M1 for such as $(x + a)(3x + b)$ with $ab = -460$ or $3a + b = 16$ A1FT for solutions from their factors
10(c)	[Height =] 14 [Length =] 34	2FT	B1FT for either, or for both correct but in the wrong places
10(d)	61.6 or 16(<i>their</i> +ve root + 1) × 0.35	3FT	M2 for $(\text{their } 476 - \text{their } 10 \times \text{their } 30) \times 0.5 \times 0.7$ oe Or M1 for $\text{their } 476 - \text{their } 10 \times \text{their } 30$ oe

Question	Answer	Marks	Partial Marks
11(a)	Need to see 2.58 rounded from a correctly obtained 2 581 or better.	3	Method 1 M2 for $AY = 3.65 \cos 45$ or $(3.65 \div 2) \div \sin 45$ or M1 for e.g. $\frac{AY}{3.65} = \cos 45$ or $\sin 45 = \frac{3.65 \div 2}{AY}$ Method 2 M1 for such as $AY^2 + AY^2 = 3.65^2$ or $3.65^2 + 3.65^2 = AC^2$ so M1 for $AY^2 = \frac{3.65^2}{2}$ oe A1 for $AY = 2.580[9\dots]$
11(b)	7.93	2	M1 for $7.5^2 + 2.58^2$
11(c)	26.6° or $2 \sin^{-1} \left(\frac{0.5 \times 3.65}{\text{their } 7.93} \right)$	3FT	M2 for $2 \sin^{-1} \left(\frac{0.5 \times 3.65}{\text{their } 7.93} \right)$ or $\cos [\dots] = \frac{\text{their } 7.93^2 + \text{their } 7.93^2 - 3.65^2}{2 \times \text{their } 7.93^2}$ Or M1 for $\sin [\dots] = \frac{0.5 \times 3.65}{\text{their } 7.93}$ or $3.65^2 = \text{their } 7.93^2 + \text{their } 7.93^2 - 2 \times \text{their } 7.93^2 \times \cos [\dots]$
11(d)(i)	11.18 or 11.2	2	M1 for $\tan 77 = \frac{XY}{2.58}$ oe
11(d)(ii)	80.7°	2FT	M1 for $\tan [\dots] = \frac{\text{their } 11.2}{3.65 \div 2}$