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**MATHEMATICS (SYLLABUS D)**

**4042/22**

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
nfw	not from wrong working
soi	seen or implied

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

Question	Answer	Marks	Partial Marks
2(c)	49.3	3	<b>M1</b> for $(12 \times 10 + 28 \times 30 + 45 \times 50 + 22 \times 70 + 13 \times 90)$ <b>and</b> <b>B1 dep</b> 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	<b>B1</b> 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)	(290 630 537.5[0])	2	<b>B1</b> for two correct values seen in a row of 3 elements or column of 3 elements isw
3(c)(ii)	48.7%	3	<b>M1FT</b> for <i>their</i> $(440 + 540)$ and <i>their</i> $(290 + 630 + 537.5)$ <b>and</b> <b>M1</b> for $(\textit{their} 1457.5 - \textit{their} 980) \div \textit{their} 980$ oe
4(a)(i)	Triangle <i>B</i> at (4, -1), (4, -4), (5, -4)	2	<b>B1</b> 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	<b>B1</b> for correct size and orientation, incorrect position <b>or</b> for triangle with two vertices correct <b>or</b> for triangle at (-3, 0), (-5, 0), (-5, 6)
4(b)(i)	Triangle <i>Q</i> at (3, 1), (9, 1), (6, 3)	2	<b>B1</b> for coordinates (3, 1), (9, 1) and (6, 3) soi or for triangle with two vertices correct
4(b)(ii)	(Stretch) factor 3  y-axis invariant <b>or</b> parallel to <i>x</i> -axis	2	<b>B1</b> for either

Question	Answer	Marks	Partial Marks
5(a)	$\frac{14-x}{(x-2)(x+1)}$ Final answer	2	<b>M1</b> for $\frac{4(x+1)-5(x-2)}{(x-2)(x+1)}$ or better soi
5(b)	-4 or 1.5 oe	3	<b>B1</b> for $2x^2 + 5x - 12 [= 0]$ <b>and</b> <b>M1</b> for $(2x - 3)(x + 4) [= 0]$ <b>OR</b> <b>M1</b> for FT factorising their 3-term quadratic equation Or for correct FT substitution into formula oe <b>and</b> <b>A1FT</b> 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	<b>M1</b> for a correct method to eliminate one variable <b>A1</b> for either $p = 0.6[0]$ or $n = 1.5[0]$ www After <b>A0</b> , <b>B1FT</b> for a correct substitution to find the other variable After <b>0</b> , <b>SC1</b> 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	<b>M1</b> for $14 + 10 + 24 - x = 40$ oe or for correct Venn diagram with algebraic expressions. <b>Or B1</b> 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 $\pm 1$ 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 = $90^\circ$	<b>2FT</b>	FT dependent on expressions in $y$  <b>B1</b> for $2y$
8(b)	<i>EFC</i>	<b>1</b>	
8(c)	Any two of <ul style="list-style-type: none"> <li>• <math>\angle OCG</math> is common oe</li> <li>• <math>\angle ADC = \angle OGC</math> [= <math>90^\circ</math>]</li> <li>• <math>\angle DAC = \angle GOC</math> [= <math>y</math>]</li> </ul> with no incorrect reason or fact stated	<b>2</b>	<b>B1</b> for one pair of angles
8(d)	Trapezium	<b>1</b>	
8(e)(i)	$1 : 4$ oe	<b>1</b>	
8(e)(ii)	$1 : 8$ oe	<b>1</b>	
9(a)	7.54	<b>2</b>	<b>M1</b> for $\pi \times 0.4^2 \times 15$
9(b)	53.7	<b>4</b>	<b>M1</b> for $\frac{1}{2} \times 4.5^2 \times \sin 110$ oe  <b>M1</b> for $\frac{250}{360} \times \pi \times 4.5^2$ or $\frac{110}{360} \times \pi \times 4.5^2$  <b>M1</b> for <i>their</i> 9.514 + <i>their</i> 44.18 oe
9(c)	2 minutes 20 seconds	<b>2</b>	<b>M1</b> for figs $175 \div 45$ soi

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

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