General Certificate of Education Ordinary Level 2020
Mathematics 4048/01
Syllabus 4048 Paper 1
SUGGESTED Solutions & Marking Scheme Mark Allocation
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1		Total value $= \$2500 + \$2500 \times 1.6\% \times 3$	M1	Calculates annual interest s.o.i.	
		\$2620	A1		
					[2]
2		By Pythagoras' Theorem, $20.5^2 = 13.3^2 + AB^2$	M1	Attempt to use PT s.o.i.	
		$AB = \sqrt{20.5^2 - 13.3^2} = 15.6$ cm	A1		
					[2]
3	(a)	Distance $= 80 \times 3 = 240$ km	B1	'80' and '3' must be seen in working	
	(b)	The speed and time are both rounded down; thus the actual distance is greater than the estimated value.	B1	Rounded down mentioned o.e.	
					[2]
4	(a)	0.32	B1	o.e.	
	(b)	42 White Marbles	B1	c.a.o.	
					[2]
5		$\frac{3x}{4} - \frac{2(x-4)}{3} = \frac{9x - 8(x-4)}{12}$	M1	Join fraction	
		$= \frac{9x - 8x + 32}{12}$ $= \frac{x + 32}{12}$	A1		
					[2]
6		1 2 15 21 21	B2	B1 Any 3 correct B1 All 5 correct	
					[2]
7		Height of cuboid $= \frac{1200}{150} = 8$ cm	M1	s.o.i.	
		15 cm by 10 cm by 8 cm	A1	c.a.o.	
					[2]
8		Number of visitors in 2018 $= 7690000 \times 240.6\%$	M1	240% o.e.	
		$= 18502140$ $= 18500000$ (3 s.f.)	A1	Accept nearest ten thousand	
					[2]

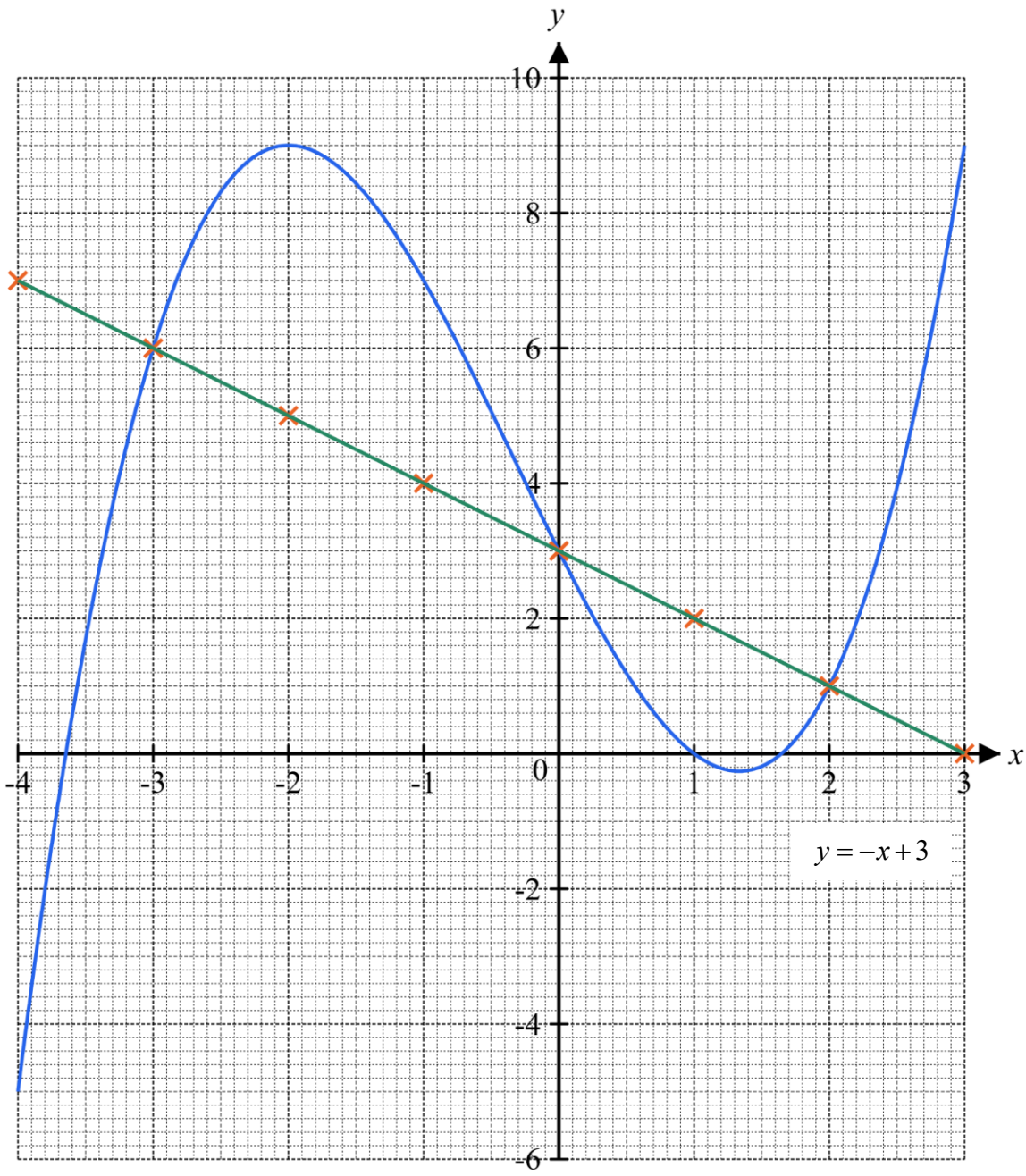
9	(a)	$x = -\frac{5}{2}$	B1	o.e.	
	(b)	$8a - 5b - 6a - 9b$	M1	Expand	
		$= 2a - 14b$	A1	c.a.o.	
					[3]
10		<table><tr><th></th><th>Frequency</th><th>**Sector angle**</th></tr><tr><td>Walk</td><td>24</td><td>160°</td></tr><tr><td>Bus</td><td>21</td><td>140°</td></tr><tr><td>Cycle</td><td>9</td><td>60°</td></tr></table> Sector angle $= \frac{\text{Frequency}}{54} \times 360°$	B3 OR M1 A2	B1 for each angle OR M1 Attempt to find any angle A1 for any angle correct A1 for all angles	
					[3]
11		Exterior angle $= \frac{1}{8} \times 180° = 22.5°$	*M1*	Find exterior angle	
		Number of sides $= \frac{360}{22.5}$	*M1*		
		16 sides	*A1*		
		Alternative (longer) method:			
		Interior angle $= \frac{7}{8} \times 180° = 157.5°$	*M1*	Find interior angle	
		$(n-2) \times 180° = 157.5n$	*M1*	Form equation	
		$180n - 360 = 157.5n$ $22.5n = 360 \Rightarrow n = 16$			
		16 sides	*A1*		
					[3]
12	(a)	The elements of A are the factors of 12.	B1		
	(b)	$A' \cap B' = \{7, 8, 9, 10, 11, 13, 14\}$	B1		
	(c)	6	B1		
					[3]

13	(a)	475000	B1	Accept ± 5000	
	(b)	The number of people aged 0–9 has fallen (2017 bar is shorter than 2007) from 2007 to 2017.	B1	Accept length of bar o.e.	
	(c)	In general, the population of residents aged above 40 has increased and the population of residents aged below 40 has decreased.	M1	Must define ages clearly	
		Hence, the mean age of the resident population has increased.	A1		
					[4]
14	(a)	Angle ABC = Angle ADE (Given) Angle EAD = Angle CAB (Shared angle)	M1		
		Hence, triangles ABC and ADE are similar. (AA Similarity Test)	A1		
	(b)	$\frac{AD}{10} = \frac{9}{12}$	M1		
		$AD = \frac{9}{12} \times 10 = 7.5$ cm $CD = 12 - 7.5 = 4.5$ cm (Shown)	A1 AG		
					[4]
15	(a)	$4x^2 + 12px + 9p^2$	B2	B1 for any two correct terms B1 for all correct	
	(b)	$p = -3$	B1		
					[3]
16	(a)	$t = 4$	B1		
	(b)	$E = kv^2$ (k is a constant)			
		Let the initial and new speed be v_1 and v_2 respectively.			
		$E_1 = kv_1^2 \Rightarrow v_1 = \sqrt{\frac{E_1}{k}}$ $E_2 = kv_2^2 \Rightarrow v_2 = \sqrt{\frac{E_2}{k}} = \sqrt{\frac{0.25E_1}{k}} = \frac{1}{2}\sqrt{\frac{E_1}{k}}$	M1	Find expression for new speed in terms of old energy s.o.i.	
		50% reduction	A1	A0 for –50%	
					[3]

17		$\frac{16x^4}{y^2}$	B2	B1 for 16 B1 for $\frac{x^4}{y^2}$	
					[2]
18	(a)	$1081\frac{3}{37}$ litres/km or 1090 litres/km (3 s.f.)	B1	o.e.	
	(bi)	5.5 m	B1		
	(bii)	$\frac{\text{Volume of fuel tank}}{1.228\times10^6}=\left(\frac{1}{60}\right)^3$	M1		
		$\text{Volume of fuel tank}=\left(\frac{1}{60}\right)^3\times1.228\times10^6$ $=5.685185185=5.69$ litres (3 s.f.)	A1		
					[4]
19		Angle $ACB=180°-82°-56°=42°$	M1	s.o.i.	
		Using sine rule, $\frac{AB}{\sin 42°}=\frac{15.6}{\sin 56°}$	M1		
		$AB=\frac{15.6\sin 42°}{\sin 56°}=12.59103062$ cm			
		$\text{Area}=\frac{1}{2}(15.6)(12.59103062)\sin 82°$	M1		
		$=97.25426547$ cm^2 $=97.3$ cm^2 (3 s.f.)	A1		
					[4]
20	(ai)	$2^4\times3^2$	B1		
	(aii)	36	B1		
		48	B1		
	(b)	$p=2$	B1		
		$q=7$	B1		
					[5]

21	(a)	$6x^2+3xy-2x-y$ $=3x(2x+y)-(2x+y)$	M1	or M0	
		$=(3x-1)(2x+y)$	A1	or B1 per term	
	(b)	$(4x+3)(2x-3)=0$	M1		
		$x=-\frac{3}{4}$ or $\frac{3}{2}$	A2	A1 for each value	
					[5]
22	(a)	$\mathbf{M}=\begin{pmatrix}5 & 4 & 2\\ 6 & 3 & y\end{pmatrix}$	B1		
	(b)	$\mathbf{P}=\begin{pmatrix}476 & 286+5x\\ 336+68y & 117+6x+65y\end{pmatrix}$	B2	B1 Any two correct B1 All elements	
	(c)	It represents Tom's total cost of buying garden centre *A*.	B1		
	(d)	$x=38$	B1		
	(e)	$y=4$	B1		
					[6]

23	(a)	Drawing of a suitable tangent at (2, 1)	M1		
		Gradient $= \frac{5-(-5)}{3-0.5} = 4$	A1	Accept ± 0.1	
	(bi)	$x^3 + x^2 - 6x = 0$ $x^3 + x^2 - 8x + 6 = -2x + 6$	M1	Attempt to manipulate s.o.i.	
		$\frac{x^3 + x^2 - 8x + 6}{2} = -x + 3$ $y = -x + 3$	A1		
	(bii)	Drawing of straight line with three relevant points	M1	FT from (b)(i)	
		$x = -3$ or 0 or 2	A1		
					[6]


y
x
10
8
6
4
2
0
-2
-4
-6
-4
-3
-2
-1
1
2
3
$y = -x + 3$

24	(a)	0.25 m/s^2	B1		
	(bi)	$8T$ m	B1		
	(bii)	Distance travelled by $A = \frac{1}{2}(5+10)(20)+(10)(T-20)$	M1		
		$150+10T-200=8T+90$	M1	Form equation	
		$2T=140$	M1	Isolate or simplify	
		$T=70$	A1		
					[6]

END OF MARKING SCHEME