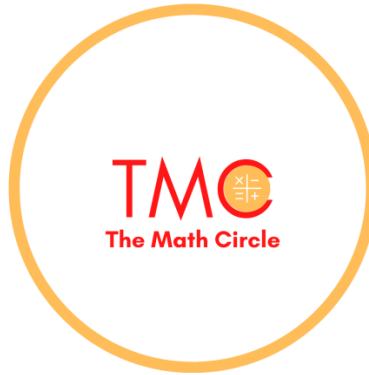


THE MATH CIRCLE



O-LEVEL

Paper 1

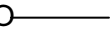
Sets

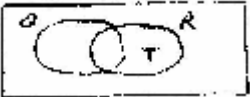
Marking Scheme

Compiled By: Mr. M. Zaheer ul Islam

Contact: +923160570527

1	(a)	$A \cap (B \cup C)'$ or $A \cap B' \cap C'$	1	
	(b)		1	Accept without label
	(c)	8, 10	1	Ignore embellishments
	(d)	3	1	Ignore embellishments

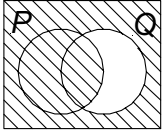
2	(a)	(i) $-1 < x \leq 4$	1	Accept in other form if equivalent		
		(ii) 	1	Line must go to $x = 3$ or further or show an indication it continues		
	(b)	(1,3) (1,5) (3,5) (5,3) Accept without brackets if pairs clear	2	At least two pairs correct. Any extra pairs or terms, -1.	C1	4

3	(a)		1	
	(b)	(i) Squares	1	
		(ii) 	1	Any clear indication of a set in $R \cap Q'$

4	(a)	2 pairs of angles stated equal Reasons + conclusion (dep on 1 st B1)	B1 B1	2	Lost for wrong or irrelevant statements
	(b)	(i) 12		1	
		(ii) $\frac{x}{14-x} = \frac{2}{3}$ o.e.	M1		
		BX = $\frac{28}{5}$ o.e.	A1	2*	

5	(a)	y marked in correct region	1	Within $A \cap B'$. Not just shading
	(b)	(i) 6	1	<u>Without</u> brackets or braces
		(ii) 4, 5	1 3	Ignore extra braces

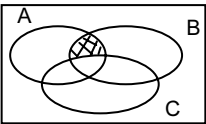
6	(a)	$B \cap C \cap A'$	1	
	(b)	(i) 31 (ii) 9 or f.t. 40 – their (b)(i)	1 1 ✓	

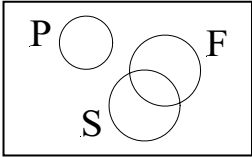
7	(a)		1	
	(b)	9	2 *	or B1 for $n(B \cap S) = 10$ soi

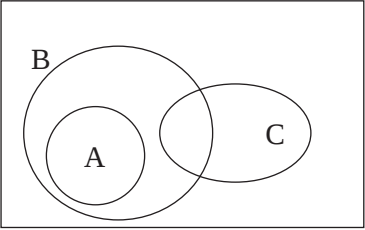
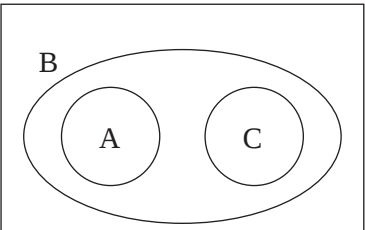
8	(a)	(i) 1,2,3,4	1	Condone extra brackets 3 repeated is 0.	
		(ii) 1,2	1		
	(b)	22	2 *	$(35 - x) + x + (29 - x) + 3 = 60$ or better or $(35 - x)$, x , $(29 - x)$, 3 correctly placed in a Venn Diagram	M1
				28,7,22,3 in diagram	SC1

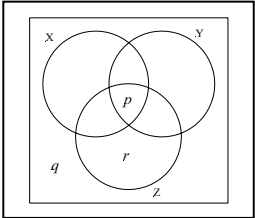
9	(a)	8	1	
	(b)	{5, 6, 7, 8, 9}	1	
	(c)	$\frac{3}{10}$ or 0.3	1	

10	(a)	$A \cup (B \cap C)$ oe	1	
	(b)	Correct region shaded	1	

11	(a)		1	
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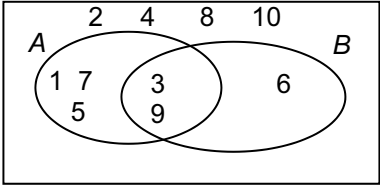
12	(a)		2	or C1 for a separate P or C1 for an S that intersects F but not P (unless a null intersection is indicated). or B1 for three intersecting loops with correctly placed integers, all greater than 5, that illustrate the sets correctly – with spaces for nulls.
	(b)	10 or 14 or 22 or 26 etc	1	

13	 OR 	2	or C1 for A inside B or C1 for C intersecting B, but not A (if A drawn) or for C inside B and not intersecting A (if A drawn)
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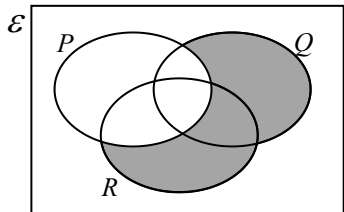
14	(a) 7 (b) correct p correct q correct r	1 1 1 1	
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15	(a) Both $p = 6$ and $q = 4$ (b) 33 or f.t. $29 + \text{their } q$ (provided q has a value) (c) 34	1 $1\frac{1}{4}$ 1	
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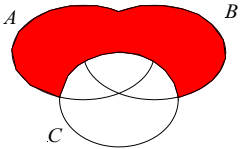
16	(a) (i) $\begin{pmatrix} 6 & 9 \\ 1 & 3 \end{pmatrix}$ (ii) $\frac{1}{5} \begin{pmatrix} 1 & 3 \\ -1 & 2 \end{pmatrix}$	1	
		2	B1 for $\det = 5$ soi or for $k \begin{pmatrix} 1 & 3 \\ -1 & 2 \end{pmatrix}$
	(b) 1, 2, 3, 4, 6, 8, 12	2	B1 for 5 correct with no extras
	(c) $M' \cap N$	1	

17	(a)		1	
	(b)	6	1	
	(c)	1, 5, 7.	1	

18	(a)	$(A \cup B) \cap C$	1	
	(b)	(i) 6	1	
		(ii) d, e, f	1	

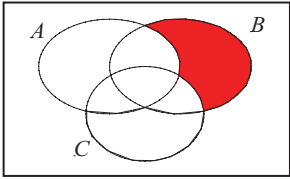
19	(a)		1	
	(b)	12	2	B1 for 8 seen

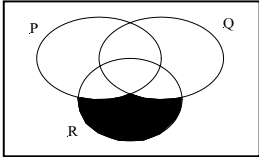
20	(a)	$P \cap Q \cap R'$ or	1	
	(b)	47	2	M1 for Cricket set inside the Football set, e.g. in a Venn diagram; Ans. = $30+8+9$; “30 play both cricket and football”.

21	(a)	Correct region shaded	1	
	(b)	3	1	

22	(a) (i)	3	1	
	(ii)	42, 48	1	
	(b)	smallest = 11 largest = 19	2	M1 for Venn diagram with $n-11$, 11 and 6 correctly placed or $n-11+11+x+6=25$ so Or B1 for either answer correct Or C1 for reversed answers

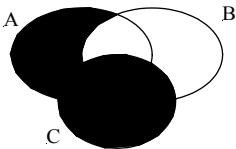
23	(a)	p, q, r, s, t, u	1	
	(b)	s, v	1	

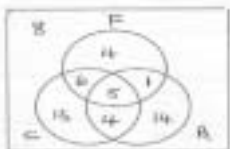
24	(a)		1	
	(b) (i)	6	1	
	(ii)	10, 14, 16	1	

25	(a)		1	
	(b) (i)	24	1	
	(ii)	8	1	
	(iii)	22 or 26 or 30	1	

26	16	2*	B1 for 15, 8 and 11 correctly placed and 26 not placed in Venn diagram or for $x + 26 + 8 = 50$ oe or for $50 - 26 - 8$ oe leading to answer
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27	(a)	0.5 oe	1	
	(b)	$\frac{2}{3}$ oe	1 *	
	(c)	(-) 8	1	

28	(a)		1	
	(b)	8	2*	M1 for $23 + 17 - (36 - 4)$ or M1 for $23 - x + x + 17 - x + 4 = 36$ oe or B1 for $S \cap F' = 15$ or $F \cap S' = 9$

29 (a)(i)	Correct Venn diagram	1	Ft their line with negative gradient
		2	B1 if 1 or 2 errors in the numbers
(a)(ii)	55	1	
(b)(i)	40	1	
(b)(ii)	39	1	

30(a)	$A \cap B'$ oe	1	
(b)	$\subset$	1	