


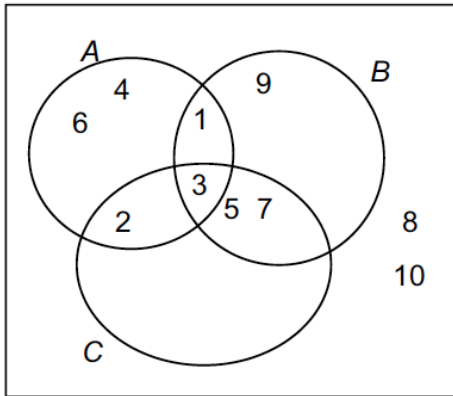
Extended Mathematics
Topic :Sets
Year :May 2013 -May 2023
Paper -4
Answers

Question 1

(a)	$4 - x$ correctly placed $5 - x$ correctly placed 7 correctly placed	1 1 1	SC3 for 1, 2 and 7 all correctly placed instead of expressions in x
(b)	$4 + 11 + (6 - x) + x + 9 + (4 - x) + (5 - x) + 7 = 40$ oe $46 - 2x = 40$ nfw $x = 3$	M1 A1 B1	FT from their Venn diagram, condone omission of one subset Must be in the form $a + bx = c$, ie each side simplified, or better
(c) (i)	$\frac{9}{40}$ or 0.225 or 22.5%	1	ISW cancelling or conversion after correct answer seen
(ii)	2	1FT	FT from their Venn diagram and their x provided $n(B \cap P \cap T') \neq 5$
(iii)	15	1FT	FT from their Venn diagram
(iv)	25	1FT	FT from their Venn diagram
(v)	4	1	
(d)	Correct region shaded. 	1	

Question 2

(a) (i)



3

B2 for 8 or 9 numbers correct

B1 for 6 or 7 numbers correct

(ii) \in cao

1

{3}

1FT

FT *their* intersection of all 3 sets – *their* diagram

\emptyset or {}

1

(iii) 5

1FT

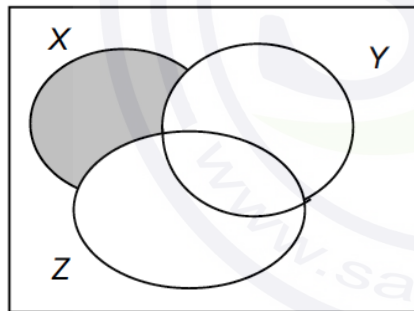
FT *their* set B on diagram

(b) (i) \subset

1

(ii)

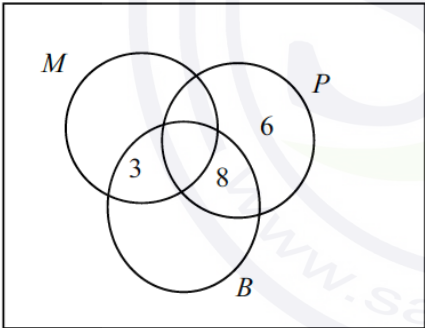
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Question 3

(a)	5	1	
(b)	$C \cap M$ oe	1	Allow e.g. $(B \cap C \cap M) \cup (C \cap M)$
(c)	3	1	
(d) (i)	$\frac{8}{30}$ oe	1	0.267 or better
(ii)	$\frac{14}{30}$ oe	1	0.467 or better
(e)	$\frac{30}{272}$ oe	3	M2 for $\frac{6}{17} \times \frac{5}{16}$ or M1 for $\frac{6}{17}$ seen 0.110[2...] or better

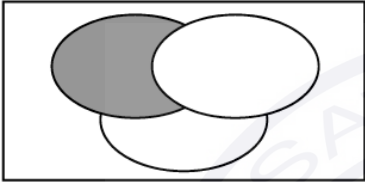
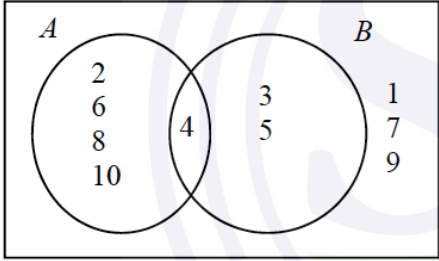
Question 4

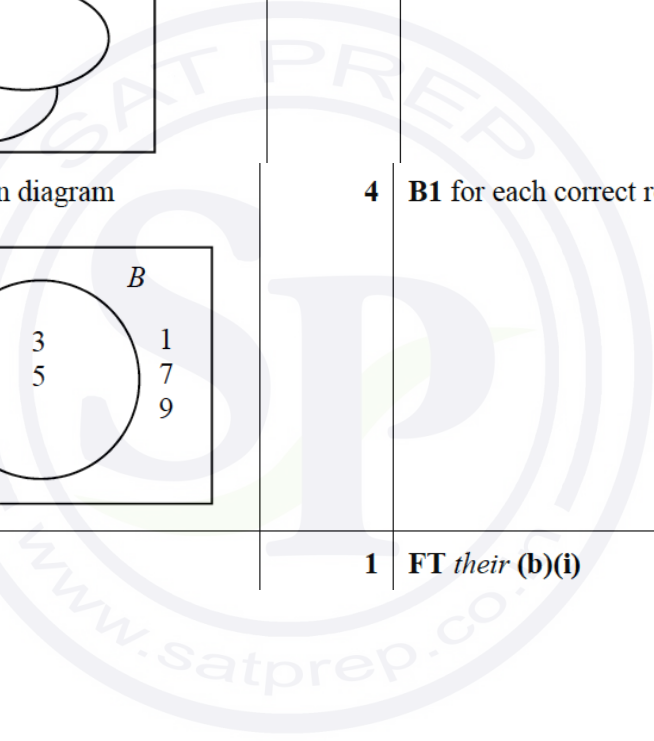
(a) (i)		3	B1 for each
(ii)	46	1FT	FT 29 + <i>their</i> 3 values from (a)
(iii)	11	1	
(iv)	$\frac{7}{19}$ oe	2	M1 for $\frac{n}{16 + \text{their } 3}$ ($0 < n < (16 + \text{their } 3)$) or $\frac{4 + \text{their } 3}{k}$ ($k > (4 + \text{their } 3)$)

Question 5

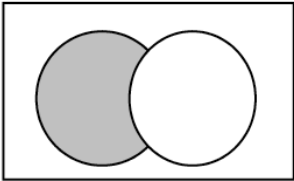
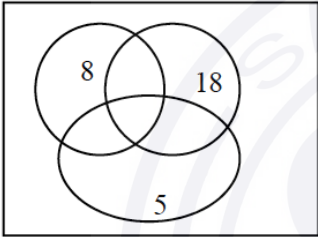
(a)		<p>4 All 8 regions correct</p> <p>M3 for 6 or 7 regions correct</p> <p>M2 for 4 or 5 regions correct</p> <p>M1 for 3 regions correct</p>
(b)(i)	\neq	1
(b)(ii)	\emptyset	1
(c)	21, 23, 24, 29	<p>2FT Correct or FT</p> <p>SC1 for 1 omission or 4 correct and 1 extra</p>
(d)(i)	5	1FT Correct or FT if less than 10
(d)(ii)	9	1FT Correct or FT if less than 10
(e)	\subset or \subseteq	1
Question 6		
(a)	75	<p>3 M2 for $79.5 \div 1.06$ oe</p> <p>or M1 for 79.5 associated with 106 [%]</p>
(b)	962.5 cao	2 B1 for 35 or 27.5 seen
(c)(i)	16	1
(c)(ii)	50	1
(c)(iii)	$\frac{4}{50}$ oe	<p>2 FT <i>their</i> (c)(ii) for 1 or 2 marks</p> <p>B1 for $\frac{4}{k}$, $k > 4$ or $\frac{k}{\text{their}50}$, $k < 50$</p>
(c)(iv)	19	1

Question 7

(a)(i)	14	1	
(a)(ii)	16	1	
(a)(iii)	$\frac{20}{462}$ oe	3	M2 for $\frac{5}{22} \times \frac{4}{21}$ or M1 for $\frac{5}{22}$ seen
(a)(iv)	Correct shading 	1	
(b)(i)	Fully correct Venn diagram 	4	B1 for each correct region
(b)(ii)	3 4 5	1	FT their (b)(i)



Question 8

(a)(i)(a)	\in	1	
(a)(i)(b)	$A \cap B$	1	
9(a)(ii)	B or A'	1	
(b)		1	
(c)(i)	$3x + 7 = 19$ oe	M1	must see 19 and 7
	$3x = 19 - 7$ or better leading to $x = 4$	A1	with no errors seen
(c)(ii)		2	B1 for 2 correct
(c)(iii)	\emptyset or $\{ \}$	1	
(c)(iv)	15	1	

Question 9

(a)		2	B1 for any one correct
(b)	110	1	FT their 110 in Venn diagram
(c)	$\frac{10}{240}$ oe	1	FT $\frac{their10}{240}$
(d)	$\frac{870}{1560}$ oe	3	M2 for $\frac{their30}{40} \times \frac{their30-1}{39}$ or M1 for $\frac{p}{q} \times \frac{p-1}{q-1}$ $p < q$ or for $\frac{their30}{40}$

Question 10

(a)		3	B2 for 5 correct entries including '2' correctly placed at the intersection of the 3 sets or M1 for $k + 8 - k + 3 - k + 6 - k = 40 - (7 + 9 + 11)$ oe or for $k, 8 - k, 3 - k, 6 - k$, seen correctly placed on diagram with 7, 11 and 9 correctly placed
(b)	11	1	
(c)	\emptyset or $\{\}$	1	
(d)	$\frac{7}{260}$ oe	2	M1 for $\frac{7}{40} \times \frac{6}{39}$ oe
(e)	$\frac{14}{95}$ oe	2	FT their Venn diagram M1 for $\frac{8}{20} \times \frac{7}{19}$

Question 11

(a)	Correct Venn diagram	3	B2 for 8 or 9 numbers correct or B1 for 6 or 7 numbers correct
(b)(i)	41, 43, 47	1	FT <i>their</i> Venn diagram
(b)(ii)	44, 46, 49, 50	1	FT <i>their</i> Venn diagram
(c)	0	1	FT <i>their</i> Venn diagram

Question 12

(a)(i)		2	B1 for two correct values Or B1 5 outside and total in G = 15 and total in S = 18
(a)(ii)	$\frac{3}{8}$ oe	1	FT <i>their</i> $\frac{12}{32}$
(a)(iii)	$\frac{2}{5}$ oe	1	FT <i>their</i> $\frac{6}{15}$
(b)	96	2	M1 for $\frac{36}{64} = \frac{54}{x}$ oe or $36 = \frac{54}{(54+b)} \times 100$ oe If 0 scored SC1 for answer 150
(c)(i)	$\frac{9}{25}$ oe	2	M1 for $\frac{15}{25} \times \frac{15}{25}$ oe
(c)(ii)	$\frac{16}{25}$ oe	1	FT 1 – <i>their</i> (c)(i)

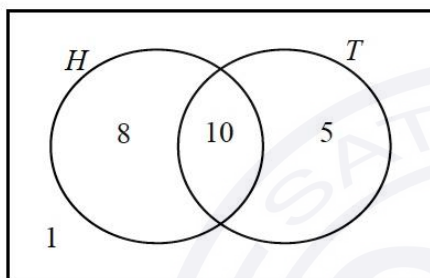
(d) $\frac{17}{20}$ oe

3 **M2** for $1 - \frac{10}{25} \times \frac{9}{24}$ oe
 or for $\frac{15}{25} \times \frac{14}{24} + \frac{15}{25} \times \frac{8}{24} + \frac{15}{25} \times \frac{2}{24} + \frac{8}{25} \times \frac{15}{24}$
 $+ \frac{2}{25} \times \frac{15}{24}$ oe

or **M1** for one correct relevant product

Question 13

(a)



2 i.e. 8, 10 and 5 correctly placed

B1 for 10 correctly placed
 or **M1** for $18 - x$, x and $15 - x$ correctly placed on diagram and $x = 10$ seen

(b) 10

1 **FT** their Venn diagram

(c) 5

1 **FT** their Venn diagram

(d) $\frac{5}{24}$ oe

1 **FT** their 5 on the Venn diagram

(e) 0

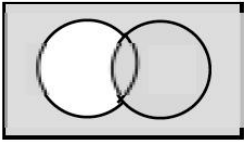
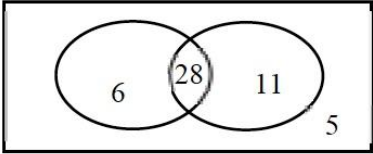
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(f) $\frac{5}{17}$ oe

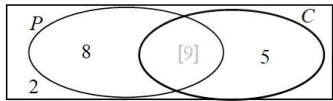
3 **M2** for $\frac{\text{their}10}{18} \times \frac{\text{their}9}{17}$
 or **B1FT** for $\frac{\text{their}10}{18}$ or $\frac{\text{their}9}{17}$ seen

After 0 scored, **SC1** for answer $\frac{25}{81}$ oe

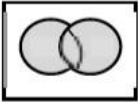
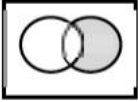
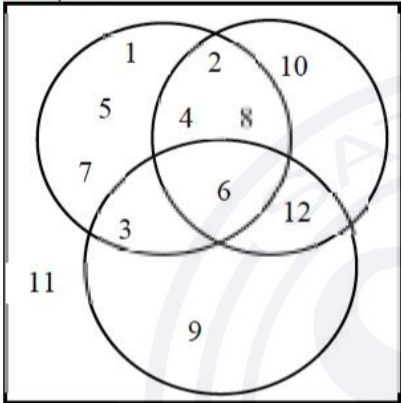
Question 14

(a)		1	
(b)		2	B1 for 2 or 3 correct elements or M1 for $34 - x$, x and $39 - x$ correctly placed on diagram and $x = 28$
(c)(i)	8	1	
(c)(ii)	11	1	
(c)(iii)	2	1	
(c)(iv)	$C \cap S \cap B'$ oe	1	
(c)(v)	$\frac{19}{30}$ oe	1	
(c)(vi)	$\frac{2}{57}$ oe	3	M2 for $\frac{4}{19} \times \frac{3}{18}$ or M1 for $\frac{4}{19}$ seen
(c)(vii)	Equal numbers 15 or equal probability $\frac{15}{30}$ oe	1	

Question 15

(a)	Completed Venn diagram. ε 	2	B1 for two correct values
(b)(i)	8	1	FT <i>their (a) their 8 dep < 24</i>
(b)(ii)	19	1	FT <i>their (a) 24 - their 5 dep on positive answer</i>
(c)	$\frac{15}{92}$ oe	3	M2 for $[2 \times] \frac{9}{24} \times \frac{their 5}{23}$ oe or M1 for $\frac{9}{24}$ and $\frac{their 5}{23}$ or $\frac{their 5}{24}$ and $\frac{9}{23}$ If 0 scored SC1 for answer $\frac{5}{32}$ oe
(d)	$\frac{9}{34}$ oe	2	B1 for $\frac{9}{17}$ seen

Question 16

(a)(i)	<i>r, l, t, e, a</i>	1	
(a)(ii)	2	1	
(b)		1	
		1	
(c)(i)	Fully correct 	3	B2 for 7, 6, or 5 sections correct or B1 for 4, 3 or 2 sections correct
(c)(ii)	5	1FT	strict FT from their diagram

