1				3	B3	for all entries correct
					(B2	for 3 sections of the Venn diagram correct)
					(B1	for 2 sections of the Venn diagram correct)
						Total 3 marks

2	(a)		2, 4, 6, 12	1	B1	
	(b)		5, 7, 8, 9, 10, 11, 13, 14	1	B1	
	(c)			2	M1	for $\dfrac{a}{14}$ with $a < 14$ **or** $\dfrac{3}{b}$ with $b > 3$ **or** for 3 and 14 used with incorrect notation e.g. 3 : 14
			$\dfrac{3}{14}$		A1	for $\dfrac{3}{14}$ oe **or** 0.214(…)
						Total 4 marks

3	ai		b, l, u, e, g, r, y	1	B1	No incorrect or repeats
	aii		w, h, i, t	1	B1	No incorrect or repeats
	b		No with reason	1	B1	eg 'e is in all three sets' **OR** 'all three sets share a member' **OR** $B \cap G \cap W = (\{\}e\{\})$
						Total 3 marks

4			3	B3	B3 for all 4 correct regions B2 or 2 or 3 correct regions B1 for 1 correct regions
					Total 3 marks

5		Fully correct Venn diagram	3	B3	for all 4 correct regions B2 for 3 correct regions B1for 2 correct regions
					Total 3 marks

6	(a)(i)	other seen orders of letters: a, b, d, e, i, l, n, r, z b, r, I, a, e, z, l, n, d	b, r, a, z, i, l, e, n, d	1	B1	no repeats, letters can be in any order. Condone capital letters rather than lower case letters. (no need for commas)
	(ii)		b, z	1	B1	No repeats, letters can be in any order. Condone capital letters. (no need for commas)
	(b)		correct explanation that shows they know the meaning of intersection and empty set	1	B1	eg letter 'a' is in both sets $B \cap K = \{a\}$ Set B and set K have an element (or letter) in common. There is a letter that is in set B and in set K There is an intersection so it isn't the null set There is a letter in common (do **not** allow 'letters' or 'elements' (plural) in common) (If students mention the letter that is in common, it must be the correct one (ie a))
						Total 3 marks

7	a		Fully correct Venn diagram	3	B3	fully correct Venn diagram
					(B2	for 2 or 3 sections correct
					B1	for 1 section correct)
	b				M1	ft from (a) $\dfrac{'4'}{a}$ where $a \geq 4$ **or** $\dfrac{b}{12}$ where $b \leq 12$
			$\dfrac{4}{12}$	2	A1	oe
						Total 5 marks
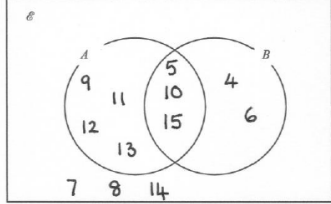
8	(a) (i)		24, 30	1	B1	No repeats
	(ii)		21, 23, 25, 27, 29	1	B1	No repeats
	(b)		$(A \cup B)'$ or $A' \cap B'$	1	B1	or $(B \cup A)'$ or $B' \cap A'$
						Total 3 marks
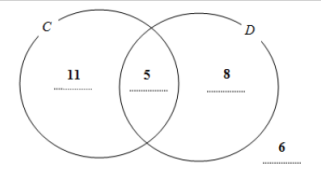
9	(i)		21, 27	1	B1	
	(ii)		21, 23, 24, 25, 27, 29	1	B1	
						Total 2 marks
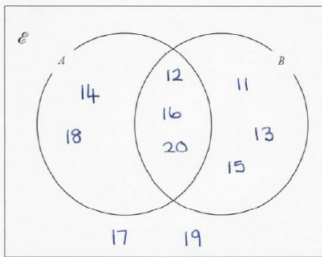
10	(a)(i)		9, 15	1	B1	no repeats
	(a)(ii)		9, 11, 12, 13, 15, 17, 18, 19	1	B1	no repeats or omissions
	(b)	**No must be ticked along with a reason for the award of this mark**	No with a correct reason	1	B1	No with eg 24/it is not in the universal set, 24/it is not between 9 and 20 (need some sort of reference that the numbers in the sets do not go beyond 20)
	(c)		10, 18 and two from 9, 11, 13, 15, 17, 19	2	B2	for 10, 18 and two from 9, 11, 13, 15, 17, 19
					(B1	a set of 4 numbers of which 3 are correct or a set of 5 numbers including 10, 18, and no more than one incorrect number or a set of 3 or more numbers from {10, 18, 9, 11, 13, 15, 17, 19})
						Total 5 marks

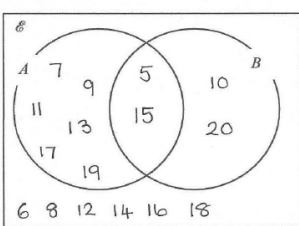| 11				3	B3	For all 4 regions of Venn diagram correct (B2 for 2 or 3 regions correct, B1 for 1 region correct) numbers must not be repeated in a region
						Total 3 marks

12				3	B3	for a fully correct Venn diagram
					(B2	for 3 correct values)
					(B1	for 1 or 2 correct values)
						Total 3 marks

13			3	B3	all 4 parts of diagram correct
				(B2	for 2 or 3 parts correct)
				(B1	for 1 part correct)
					SCB1 if no marks scored, award B1 if 4,6 in the section $A \cap B'$ and 9, 11, 12, 13 in the section $A' \cap B$
					Total 3 marks

14	(a)		Correct Venn diagram	3	B3	for all sections completed correctly
						If not B3 then award B2 for 3 correct sections B1 for 1 or 2 correct sections
	(b)(i)		$\dfrac{13}{30}$	1	B1	oe, ft their Venn diagram
	(ii)		$\dfrac{6}{30}$	1	B1	oe, ft their Venn diagram
						Total 5 marks

15				3	B3	Fully correct (B2 for 2 or 3 'regions' correct, B1 for one 'region' correct)
						Total 3 marks

16	(a)(i)	7, 11, 13, 5	5, 7, 11, 13	1	B1	
	(ii)	5, 15, 10, 6, 8, 12, 14	5, 6, 8, 10, 12, 14, 15	1	B1	
	(b)		Correct reason	1	B1	eg 9 is not a member of C **or** 9 is not in C **or** C only contains 6, 8, 10, 12, 14 **or** 9 is outside of C there must be no contradictory or incorrect statements
						Total 3 marks

17		Numbers placed correctly in Venn diagram	3	B3	for a completely correct Venn diagram
				B2	for 2 or 3 correct regions
				B1	for 1 correct region
					Total 3 marks