5.6 Venn Diagrams and Set Notation: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 In a class of 31 pupils, 15 play French, 16 play Spanish and 2 play both French and Spanish.
One pupil is chosen at random. Work out the probability that the pupil plays neither French nor Spanish.

(4)

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2 In a class of 28 pupils, 16 play tea, 14 play coffee and 4 play both tea and coffee.
One pupil is chosen at random. Work out the probability that the pupil plays both tea and coffee.

(2)

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3 In a class of 28 pupils, 9 play French, 12 play Spanish and 4 play both French and Spanish.
One pupil is chosen at random. Work out the probability that the pupil plays both French and Spanish.

(2)

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4 In a class of 23 pupils, 9 play cats, 18 play dogs and 6 play both cats and dogs.
One pupil is chosen at random. Work out the probability that the pupil plays neither cats nor dogs.

(4)

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5 The universal set is the whole numbers from 1 to 15. Set A = {2, 8, 11, 12} and set B = {5, 8, 12}.
List the numbers that are in A or in B or in both.

(2)

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6 The universal set is the whole numbers from 1 to 20. Set A = {6, 7, 8, 10, 12, 14} and set B = {8, 9, 11}.
List the numbers that are in both A and B.

(2)

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7 The universal set is the whole numbers from 1 to 12. Set A = {2, 3, 8, 9, 11} and set B = {1, 6, 7, 8, 10, 11}.
List the numbers that are in A or in B or in both.

(2)

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8 In a class of 39 pupils, 28 play French, 10 play Spanish and 4 play both French and Spanish.
One pupil is chosen at random. Work out the probability that the pupil plays neither French nor Spanish.

(4)

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9 In a class of 48 pupils, 23 play French, 21 play Spanish and 4 play both French and Spanish.
One pupil is chosen at random. Work out the probability that the pupil plays both French and Spanish.

(2)

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10 The universal set is the whole numbers from 1 to 12. Set A = {4, 9, 10, 11, 12} and set B = {1, 2, 3, 8, 11}.
List the numbers that are in both A and B.

(2)

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11 The universal set is the whole numbers from 1 to 15. Set A = {1, 3, 4, 6, 8, 9} and set B = {1, 7, 12}.
List the numbers that are in A or in B or in both.

(2)

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12 In a class of 42 pupils, 18 play French, 26 play Spanish and 6 play both French and Spanish.
One pupil is chosen at random. Work out the probability that the pupil plays both French and Spanish.

(2)

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13 The universal set is the whole numbers from 1 to 20. Set A = {6, 7, 8, 16, 19, 20} and set B = {3, 6, 18}.
List the numbers that are in both A and B.

(2)

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14 The universal set is the whole numbers from 1 to 10. Set A = {1, 4, 7, 8, 9, 10} and set B = {1, 3, 4, 7, 8, 10}.
List the numbers that are not in A (the complement of A).

(2)

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15 The universal set is the whole numbers from 1 to 20. Set A = {1, 3, 8, 11, 15, 16} and set B = {5, 8, 17, 19}.
Work out the number of elements in A or B or both.

(2)

---

16 In a class of 53 pupils, 26 play cats, 29 play dogs and 5 play both cats and dogs.
One pupil is chosen at random. Work out the probability that the pupil plays both cats and dogs.

(1)

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17 In a class of 47 pupils, 10 play football, 30 play hockey and 5 play both football and hockey.
How many pupils play football only?

(2)

---

18 In a class of 46 pupils, 21 play cats, 26 play dogs and 4 play both cats and dogs.
How many pupils play neither cats nor dogs?

(3)

---

19 The universal set is the whole numbers from 1 to 15. Set A = {1, 5, 9, 10, 14} and set B = {7, 9, 10, 12}.
List the numbers that are in both A and B.

(2)

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20 In a class of 21 pupils, 8 play French, 12 play Spanish and 4 play both French and Spanish.
How many pupils play neither French nor Spanish?

(3)

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21 The universal set is the whole numbers from 1 to 20. Set A = {6, 9, 17, 18} and set B = {2, 11, 14, 15, 17, 19}.
Work out the number of elements in A or B or both.

(2)

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22 The universal set is the whole numbers from 1 to 12. Set A = {4, 8, 12} and set B = {2, 3, 5, 9, 12}.
Work out the number of elements in A or B or both.

(2)

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23 The universal set is the whole numbers from 1 to 12. Set A = {1, 4, 6, 7} and set B = {3, 4, 5, 7, 8, 9}.
Work out the number of elements in A or B or both.

(2)

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24 In a class of 40 pupils, 19 play football, 16 play hockey and 1 play both football and hockey.
How many pupils play neither football nor hockey?

(3)

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25 The universal set is the whole numbers from 1 to 20. Set A = {1, 3, 10, 13, 17, 19} and set B = {11, 15, 16, 18, 19}.
List the numbers that are not in A (the complement of A).

(2)

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26 The universal set is the whole numbers from 1 to 12. Set A = {3, 4, 11, 12} and set B = {1, 3, 4, 5, 9, 12}.
List the numbers that are not in A (the complement of A).

(2)

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27 In a class of 55 pupils, 27 play tea, 27 play coffee and 5 play both tea and coffee.
How many pupils play neither tea nor coffee?

(3)

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28 The universal set is the whole numbers from 1 to 10. Set A = {2, 5, 6, 7, 9, 10} and set B = {1, 3, 4, 5}.
Work out the number of elements in A or B or both.

(2)

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29 In a class of 40 pupils, 21 play cats, 17 play dogs and 2 play both cats and dogs.
One pupil is chosen at random. Work out the probability that the pupil plays both cats and dogs.

(2)

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30 In a class of 36 pupils, 12 play tea, 15 play coffee and 1 play both tea and coffee.
How many pupils play neither tea nor coffee?

(3)

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31 The universal set is the whole numbers from 1 to 10. Set A = {2, 3, 6, 7, 9, 10} and set B = {1, 2, 4, 5, 6, 10}.
Work out the number of elements in A or B or both.

(2)

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32 In a class of 41 pupils, 19 play cats, 20 play dogs and 7 play both cats and dogs.
One pupil is chosen at random. Work out the probability that the pupil plays both cats and dogs.

(1)

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33 In a class of 34 pupils, 14 play tea, 19 play coffee and 5 play both tea and coffee.
One pupil is chosen at random. Work out the probability that the pupil plays both tea and coffee.

(1)

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34 The universal set is the whole numbers from 1 to 10. Set A = {2, 7, 9} and set B = {1, 2, 3, 5, 7, 9}.
List the numbers that are in A or in B or in both.

(2)

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35 In a class of 47 pupils, 19 play cats, 23 play dogs and 6 play both cats and dogs. How many pupils play cats only?

(2)

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36 Set A and its complement A' cover the whole universal set U with no other elements. n(A) = 27 and n(A') = 18. Find n(U).

(2)

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37 In a group of 50 people, n(A) = 31, n(A n B) = 12 and n(A u B) = 45. Find n(B).

(2)

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38 In a survey of 200 shoppers, 120 buy bread, 90 buy milk, and 40 buy both bread and milk.

(a) Find the number of shoppers who buy at least one of bread or milk. **(2)**

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(b) Find the probability that a randomly selected shopper buys neither bread nor milk, giving your answer as a fraction in simplest form. **(2)**

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39 State what the notation A u B means.

(1)

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40 State what the notation A' means, where A is a subset of the universal set U.

(1)

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41 The universal set U has 40 elements. Set A has 24 elements. Find n(A').

(1)

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42 In a group of 30 students, 20 are in set A and 15 are in set B. 8 students are in both A and B. Work out n(A u B).

(2)

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43 n(U) = 50, n(A) = 22, n(B) = 19, n(A n B) = 7. Find n(A u B).

(2)

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Mark scheme · 5.6 Venn Diagrams and Set Notation: 2-hour Pack

Question 1

13 French only, 14 Spanish only, 2 both	M1
29 play at least one	M1
31 - 29	M1
2/31 cao	A1

Answer: **2/31**

Question 2

4/28	M1
1/7 cao	A1

Answer: **1/7**

Question 3

4/28	M1
1/7 cao	A1

Answer: **1/7**

Question 4

3 cats only, 12 dogs only, 6 both	M1
21 play at least one	M1
23 - 21	M1
2/23 cao	A1

Answer: **2/23**

Question 5

at least half the numbers	M1
2, 5, 8, 11, 12 cao	A1

Answer: **2, 5, 8, 11, 12**

Question 6

at least one correct number or a clear method	M1
8 cao	A1

Answer: **8**

Question 7

at least half the numbers	M1
1, 2, 3, 6, 7, 8, 9, 10, 11 cao	A1

Answer: **1, 2, 3, 6, 7, 8, 9, 10, 11**

Question 8

24 French only, 6 Spanish only, 4 both	M1
34 play at least one	M1
39 - 34	M1
5/39 cao	A1

Answer: **5/39**

Question 9

4/48	M1
1/12 cao	A1

Answer: **1/12**

Question 10

at least one correct number or a clear method	M1
11 cao	A1

Answer: **11**

Question 11

at least half the numbers	M1
1, 3, 4, 6, 7, 8, 9, 12 cao	A1

Answer: **1, 3, 4, 6, 7, 8, 9, 12**

Question 12

6/42	M1
1/7 cao	A1

Answer: **1/7**

Question 13

at least one correct number or a clear method	M1
6 cao	A1

Answer: **6**

Question 14

at least half the numbers	M1
2, 3, 5, 6 cao	A1

Answer: **2, 3, 5, 6**

Question 15

n(A) + n(B) - n(both)	M1
9 cao	A1

Answer: **9**

Question 16

5/53 cao	B1

Answer: **5/53**

Question 17

10 - 5	M1
5 cao	A1

Answer: **5**

Question 18

21 + 26 - 4 = 43	M1
46 - 43	M1
3 cao	A1

Answer: **3**

Question 19

at least one correct number or a clear method	M1
9, 10 cao	A1

Answer: **9, 10**

Question 20

8 + 12 - 4 = 16	M1
21 - 16	M1
5 cao	A1

Answer: **5**

Question 21

n(A) + n(B) - n(both)	M1
9 cao	A1

Answer: **9**

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Question 22

n(A) + n(B) - n(both)	M1
7 cao	A1

Answer: **7**

Question 23

n(A) + n(B) - n(both)	M1
8 cao	A1

Answer: **8**

Question 24

19 + 16 - 1 = 34	M1
40 - 34	M1
6 cao	A1

Answer: **6**

Question 25

at least half the numbers	M1
2, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16, 18, 20 cao	A1

Answer: **2, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16, 18, 20**

Question 26

at least half the numbers	M1
1, 2, 5, 6, 7, 8, 9, 10 cao	A1

Answer: **1, 2, 5, 6, 7, 8, 9, 10**

Question 27

27 + 27 - 5 = 49	M1
55 - 49	M1
6 cao	A1

Answer: **6**

Question 28

n(A) + n(B) - n(both)	M1
9 cao	A1

Answer: **9**

Question 29

2/40	M1
1/20 cao	A1

Answer: **1/20**

Question 30

12 + 15 - 1 = 26	M1
36 - 26	M1
10 cao	A1

Answer: **10**

Question 31

n(A) + n(B) - n(both)	M1
9 cao	A1

Answer: **9**

Question 32

7/41 cao	B1

Answer: **7/41**

Question 33

5/34 cao	B1

Answer: **5/34**

Question 34

at least half the numbers	M1
1, 2, 3, 5, 7, 9 cao	A1

Answer: **1, 2, 3, 5, 7, 9**

Question 35

19 - 6	M1
13 cao	A1

Answer: **13**

Question 36

27 + 18 oe	M1
45 cao	A1

Answer: **45**

Question 37

rearranges n(A u B) = n(A) + n(B) - n(A n B) to n(B) = 45 - 31 + 12	M1
26 cao	A1

Answer: **26**

Question 38

(a) 120 + 90 - 40 oe	M1
(a) 170 cao	A1
(a) Answer: **170**	
(b) neither = 200 - 170 = 30, probability 30/200	M1
(b) 3/20 cao	A1
(b) Answer: **3/20**	

Question 39

elements that are in A or B or both (union) cao	B1

Answer: **elements in A or B or both**

Question 40

elements in U that are not in A (complement) cao	B1

Answer: **elements not in A**

Question 41

16 cao	B1

Answer: **16**

Question 42

20 + 15 - 8 oe	M1
27 cao	A1

Answer: **27**

Question 43

22 + 19 - 7 oe	M1
34 cao	A1

Answer: **34**

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