1.3 Sets, Set Notation and Venn Diagrams: 1-hour Pack

AQA 8365 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A = {x : 9 < x ≤ 18, x is an integer}. B = {x : x is one of the square numbers}. List the members of A intersect B'.

(Total for Question 1 is 3 marks)

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2 23 people were asked about a bike and a scooter. 13 of them chose a bike, 12 chose a scooter, and 1 chose neither. Work out how many people chose both.

(Total for Question 2 is 3 marks)

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3 n(E) = 16, n(A) = 10, n(B) = 8 and n(A intersect B) = 4. Work out n((A union B)'), the number of elements in neither A nor B.

(Total for Question 3 is 3 marks)

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4 n(A) = 23, n(B) = 16, n(C) = 16, n(A intersect B) = 5, n(A intersect C) = 10, n(B intersect C) = 4 and n(A intersect B intersect C) = 1. Work out n(A union B union C).

(Total for Question 4 is 3 marks)

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5 60 students were asked which of two clubs, A and B, they belong to. x + 3 belong to A only, x belong to both clubs, 3x + 4 belong to B only, and 8 belong to neither. Form and solve an equation to find x.

(Total for Question 5 is 4 marks)

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6 E = {1, 2, 3, ..., 20}. A = {multiples of 3} and B = {factors of 36}, taken from E. List the members of A' intersect B.

(Total for Question 6 is 3 marks)

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7 A = {x : 8 < x ≤ 16, x is an integer}. B = {x : x is one of the multiples of 5}. List the members of A intersect B'.

(Total for Question 7 is 3 marks)

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8 27 people were asked about tea and coffee. 13 of them chose tea, 15 chose coffee, and 6 chose neither. Work out how many people chose both.

(Total for Question 8 is 3 marks)

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9 55 students were asked which of two clubs, A and B, they belong to. x + 1 belong to A only, x belong to both clubs, 3x + 0 belong to B only, and 9 belong to neither. Form and solve an equation to find x.

(Total for Question 9 is 4 marks)

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10 n(A) = 20, n(B) = 18, n(C) = 18, n(A intersect B) = 9, n(A intersect C) = 10, n(B intersect C) = 9 and n(A intersect B intersect C) = 6. Work out the number of elements that are in exactly one of the sets A, B and C.

(Total for Question 10 is 3 marks)

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11 A = {x : 1 < x ≤ 10, x is an integer}. B = {x : x is one of the multiples of 4}. List the members of A intersect B.

(Total for Question 11 is 3 marks)

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12 E = {1, 2, 3, ..., 24}. A = {multiples of 2} and B = {factors of 30}, taken from E. List the members of A intersect B'.

(Total for Question 12 is 3 marks)

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13 35 students were asked which of two clubs, A and B, they belong to. x + 5 belong to A only, x belong to both clubs, 2x + 2 belong to B only, and 8 belong to neither. Form and solve an equation to find x.

(Total for Question 13 is 4 marks)

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14 23 people were asked about drama and music. 14 of them chose drama, 14 chose music, and 3 chose neither. One person who chose drama is picked at random. Work out the probability that this person also chose music.

(Total for Question 14 is 4 marks)

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15 E = {1, 2, 3, ..., 10}. F = {2, 4, 6, 8, 10}. G = {1, 2, 3, 5, 7}.

(a) Write down the elements of F' (the complement of F). **(1)**

.....

(b) List the elements of F' intersect G. **(2)**

(c) Find n(F union G). **(1)**

.....

(Total for Question 15 is 4 marks)

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16 40 students were surveyed about whether they play chess (C) or the guitar (G). 15 students play chess only, 8 students play both chess and the guitar, 12 students play the guitar only, and the rest play neither.

(a) Find the number of students who play neither chess nor the guitar. **(2)**

.....

(b) Find n(C). **(1)**

.....

(c) A student is chosen at random from the 40 students. Find the probability that the student plays the guitar but not chess. **(1)**

.....

(Total for Question 16 is 4 marks)

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Mark scheme · 1.3 Sets, Set Notation and Venn Diagrams: 1-hour Pack

Question 1

lists A: 10 to 18	**M1**
identifies the square numbers in A	**M1**
{10, 11, 12, 13, 14, 15, 17, 18} cao	**A1**

Answer: {10, 11, 12, 13, 14, 15, 17, 18}

Question 2

23 - 1 = 22 chose at least one	**M1**
13 + 12 - 22	**M1**
3 cao	**A1**

Answer: 3

Question 3

n(A union B) = 10 + 8 - 4	**M1**
14 found	**A1**
16 - 14 = 2 cao	**A1**

Answer: 2

Question 4

adds n(A), n(B), n(C)	**M1**
subtracts the three pairwise intersections	**M1**
37 cao	**A1**

Answer: 37

Question 5

(x + 3) + x + (3x + 4) + 8 = 60	**M1**
5x + 15 = 60 or equivalent	**M1**
5x = 45	**M1**
x = 9 cao	**A1**

Answer: x = 9

Question 6

lists the members of A or the members of B	**M1**
applies the set operation A' intersect B	**M1**
{1, 2, 4} cao	**A1**

Answer: {1, 2, 4}

Question 7

lists A: 9 to 16	**M1**
identifies the multiples of 5 in A	**M1**
{9, 11, 12, 13, 14, 16} cao	**A1**

Answer: {9, 11, 12, 13, 14, 16}

Question 8

27 - 6 = 21 chose at least one	**M1**
13 + 15 - 21	**M1**
7 cao	**A1**

Answer: 7

Question 9

(x + 1) + x + (3x + 0) + 9 = 55	**M1**
5x + 10 = 55 or equivalent	**M1**
5x = 45	**M1**
x = 9 cao	**A1**

Answer: x = 9

Question 10

finds at least one 'only' region correctly	**M1**
combines all three 'only' regions	**M1**
18 cao	**A1**

Answer: 18

Question 11

lists A: 2 to 10	**M1**
identifies the multiples of 4 in A	**M1**
{4, 8} cao	**A1**

Answer: {4, 8}

Question 12

lists the members of A or the members of B	**M1**
applies the set operation A intersect B'	**M1**
{4, 8, 12, 14, 16, 18, 20, 22, 24} cao	**A1**

Answer: {4, 8, 12, 14, 16, 18, 20, 22, 24}

Question 13

(x + 5) + x + (2x + 2) + 8 = 35	**M1**
4x + 15 = 35 or equivalent	**M1**
4x = 20	**M1**
x = 5 cao	**A1**

Answer: x = 5

Question 14

finds the number choosing both	**M1**
8 correct	**A1**
8/14 or equivalent	**M1**
4/7 cao	**A1**

Answer: 4/7

Question 15

(a) {1, 3, 5, 7, 9} cao	**B1**

(a) Answer: {1, 3, 5, 7, 9}

(b) uses their F' to find the common elements with G	**M1**
(b) {1, 3, 5, 7} cao	**A1**

(b) Answer: {1, 3, 5, 7}

(c) n(F union G) = 9 cao	**B1**

(c) Answer: 9

Question 16

(a) sums the three known groups, 15 + 8 + 12 = 35	**M1**
(a) 5 cao	**A1**

(a) Answer: 5 students

(b) n(C) = 23 cao	**B1**

(b) Answer: 23

(c) 3/10 cao (oe 0.3, 30%)	**B1**

(c) Answer: 3/10

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