HIGHER

1.1 Sets and Venn Notation: 30-minute Pack

EDEXCEL 4MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 In a Venn diagram for sets A and B, the number of elements in 'only A' is 3x + 4, in 'both A and B' is 2x, in 'only B' is 2x + 4, and 5 elements are in neither set. The universal set has 41 elements.

(a) Find the value of x.

(b) Work out n(A union B).

(Total for Question 1 is 4 marks)

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2 The universal set is the set of whole numbers from 1 to 18.

A = {numbers greater than 5}, B = {prime numbers}.

List the members of the set A union B.

(Total for Question 2 is 4 marks)

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3 A Venn diagram of the universal set shows these numbers of elements in each region: outside both sets: 8, only B: 3, only A: 5, both A and B: 5.

Work out n(A union B').

(Total for Question 3 is 2 marks)

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4 50 members were asked about their activities. 21 of them swim, 25 of them cycle, and 9 of them do neither.
One of the members who cycle is chosen at random. Find the probability that they also swim.

(Total for Question 4 is 4 marks)

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5 In a Venn diagram for sets A and B, the number of elements in 'only A' is $3x + 3$, in 'both A and B' is $2x + 2$, in 'only B' is $2x + 1$, and 3 elements are in neither set. The universal set has 72 elements.
(a) Find the value of x.
(b) Work out n(A union B).

(Total for Question 5 is 4 marks)

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6 The universal set is the set of whole numbers from 1 to 15.
A = {multiples of 6}, B = {even numbers}.
List the members of the set B'.

(Total for Question 6 is 4 marks)

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Mark scheme · 1.1 Sets and Venn Notation: 30-minute Pack

Question 1

forms 3x + 4 + 2x + 2x + 4 + 5 = 41	**M1**
collects terms: 7x + 13 = 41	**M1**
x = 4	**A1**
n(A union B) = 41 - 5 = 36	**A1**

Answer: (a) x = 4; (b) 36

Question 2

A = {6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18}	**B1**
B = {2, 3, 5, 7, 11, 13, 17}	**B1**
applies A union B to these lists	**M1**
A union B = {2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18}	**A1**

Answer: A union B = {2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18}

Question 3

identifies which regions are in A union B'	**M1**
8 + 5 + 5 = 18	**A1**

Answer: n(A union B') = 18

Question 4

uses n(A union B) = 50 - 9 = 41	**M1**
uses n(A intersection B) = 21 + 25 - 41	**M1**
5 members do both	**A1**
probability = 5/25 = 1/5	**A1**

Answer: 1/5

Question 5

forms 3x + 3 + 2x + 2 + 2x + 1 + 3 = 72	**M1**
collects terms: 7x + 9 = 72	**M1**
x = 9	**A1**
n(A union B) = 72 - 3 = 69	**A1**

Answer: (a) x = 9; (b) 69

Question 6

uses the universal set of whole numbers from 1 to 15 inclusive; may be implicit in a correct complement	**B1**
B = {2, 4, 6, 8, 10, 12, 14}	**B1**
removes the members of B from the universal set, oe; may be implicit in a correct complement	**M1**
B' = {1, 3, 5, 7, 9, 11, 13, 15}	**A1**

Answer: B' = {1, 3, 5, 7, 9, 11, 13, 15}

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