GCSE · Edexcel · Maths

2 hours 24 questions

Exam Questions

Simple Probability Diagrams

Two-Way Tables / Frequency Trees / Set Notation & Venn Diagrams / Probabilities from Venn Diagrams

Easy (6 questions)	/18
Medium (10 questions)	/42
Hard (8 questions)	/39
Total Marks	**/99**

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Easy Questions

1 (a) A cat rescue centre has 20 cats. There are male and female cats, and they are either long-haired or short-haired.

Complete the missing information in the two-way table below.

	Long	**Short**	**Total**
Male		10	
Female	3		
Total		12	20

(3 marks)

(b) One of the cats is chosen at random.

Write down the probability that this cat is a female, long-haired cat.

(1 mark)

2 (a) A zoo has a colony of 75 penguins.

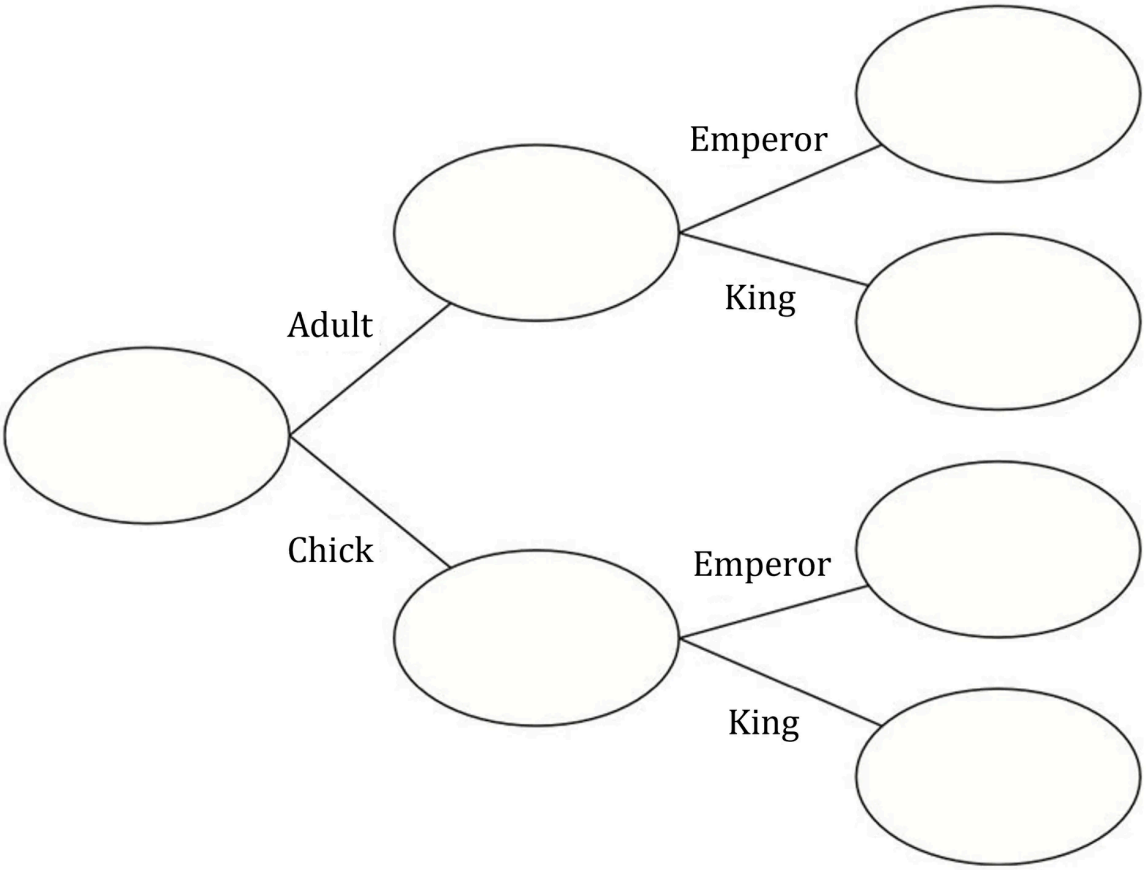
There are two species; emperor penguins and king penguins.

The penguins are either adults or chicks.

20 of the 48 adults are emperor penguins.

15 of the chicks are king penguins.

Use this information to complete the frequency tree.



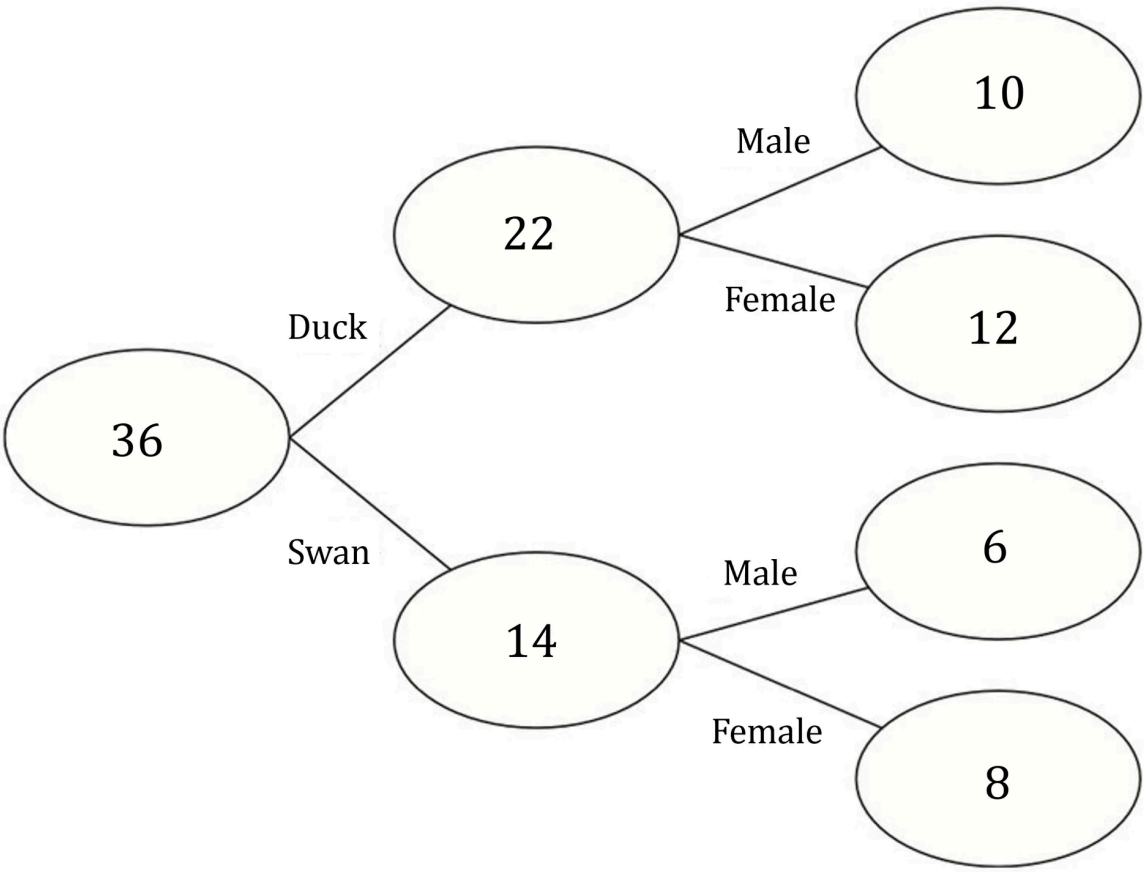
(3 marks)

(b) One of the penguins is selected at random.

Find the probability that this penguin is an adult king penguin.

(1 mark)

3 A bird watcher makes the following frequency tree for male and female ducks and swans that they spot on their local duck pond.

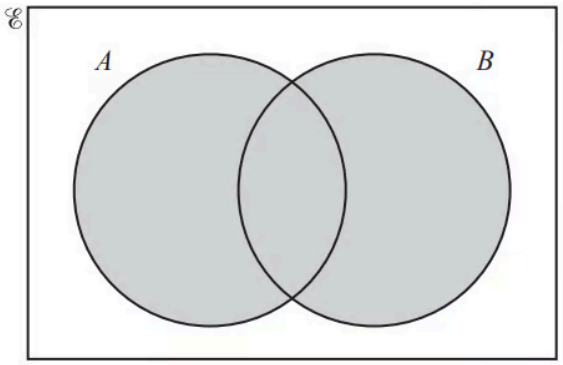


Use the frequency tree to complete the two-way table.

	Duck	**Swan**	**Total**
Male			
Female			
Total			

(3 marks)

4 Use set notation to describe the shaded region in each Venn diagram.



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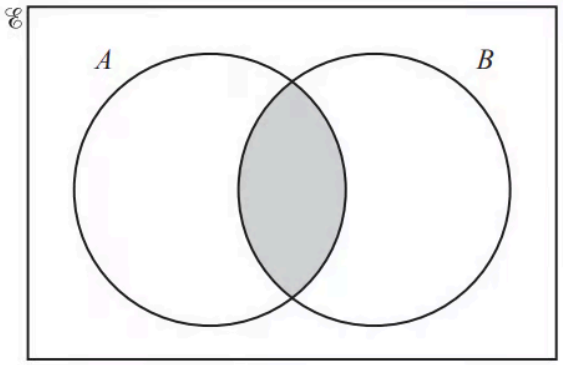

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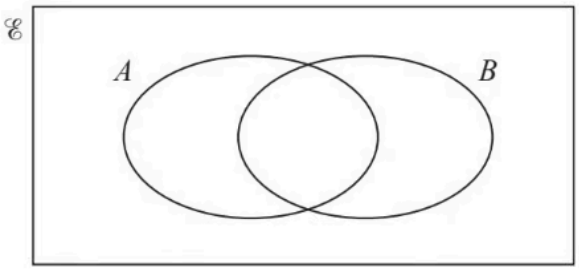
(2 marks)

5 (a)



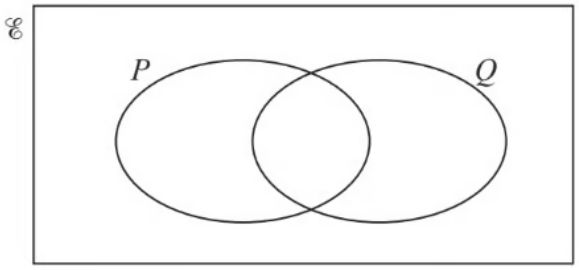
On the Venn diagram, shade the region $A \cap B$.

(1 mark)

(b) $\mathscr{E}$ = {1, 2, 3, 4, 5, 6}

P= {x : x is an even number}

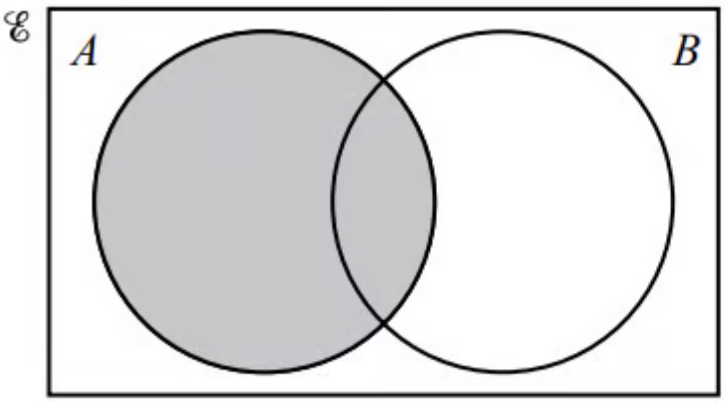
Q = {x : x is a prime number}



Complete the Venn diagram.

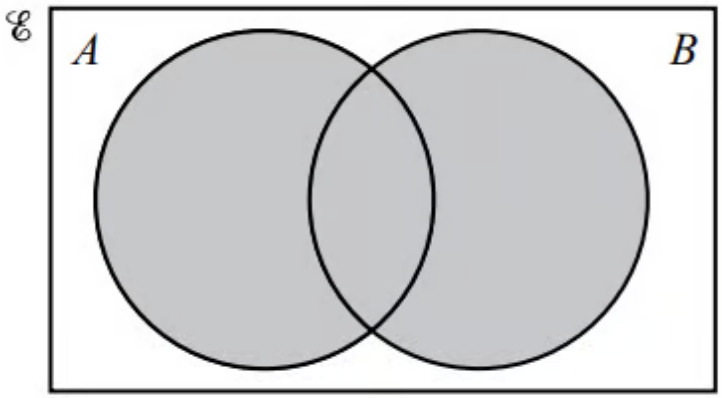
(2 marks)

6 (a) Use set notation to describe the shaded regions in each Venn diagram.



(1 mark)

(b)



(1 mark)

Medium Questions

1 (a) A veterinary centre tracks the number of black and white cats and dogs who enter the practice on a particular day.

14 are counted in total.

6 of these are dogs.

4 of the dogs are black.

There is 1 white cat.

Use this information to complete the two-way table.

	Dog	**Cat**	**Total**
Black			
White			
Total			

(3 marks)

(b) A **cat** is selected at random.

Write down the probability of the cat being white.

(1 mark)

2 (a) A survey is taken in an office to see how many staff like to drink tea.

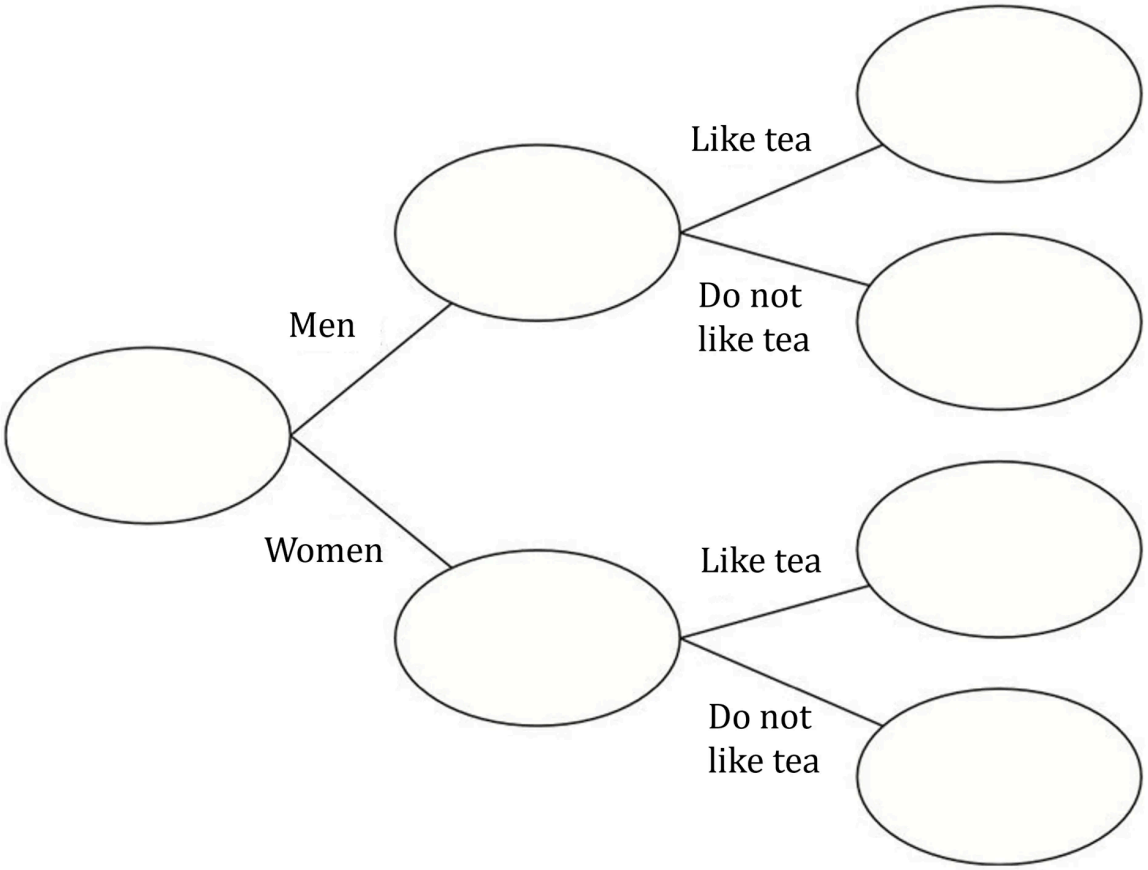
70 staff are asked in total.

42 of these people are women.

49 of the 70 staff like to drink tea.

10 of the men do not like to drink tea.

Use this information to complete the frequency tree.



(3 marks)

(b) One of the people who like to drink tea is chosen at random.

Find the probability that this person is a woman.

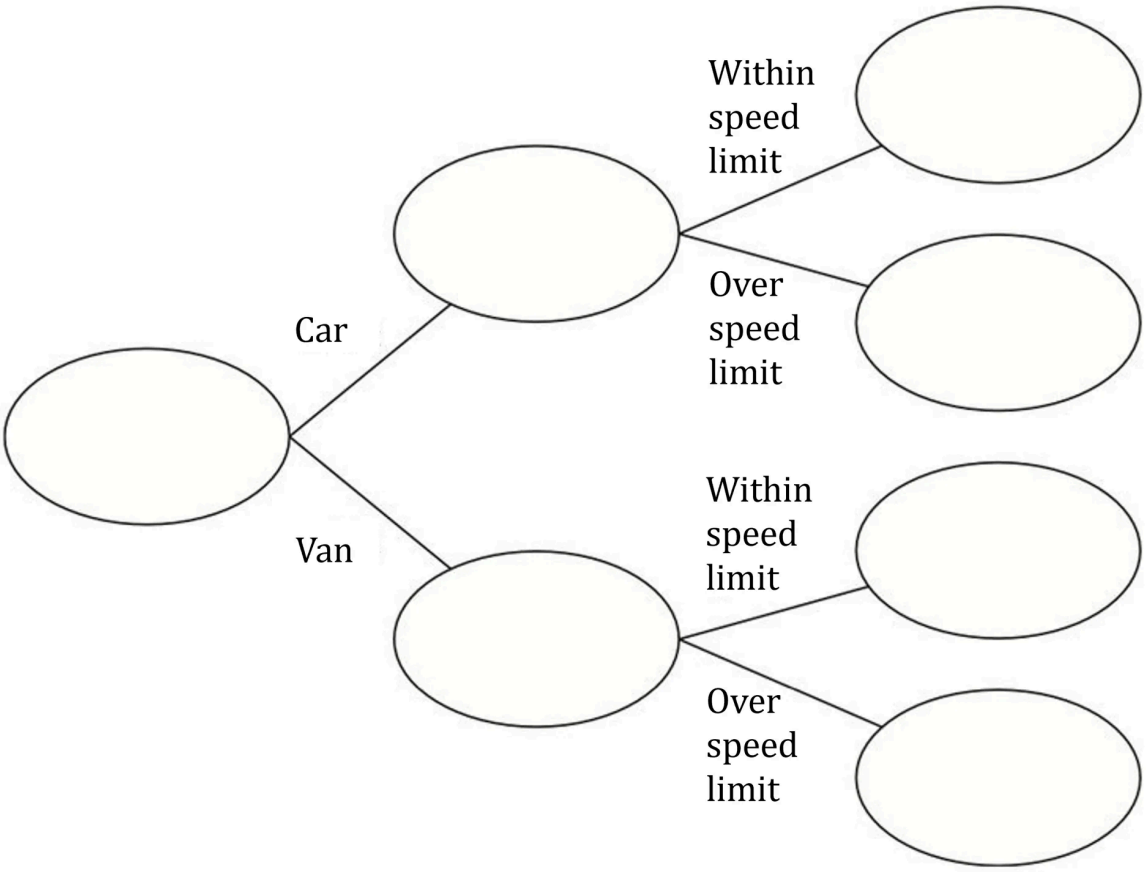
(1 mark)

3 A police officer is checking if cars and vans on a particular road are driving within the speed limit, or over the speed limit.

The police officer produces the following two-way table which is incomplete.

	Within speed limit	**Over speed limit**	**Total**
Car	25		33
Van			15
Total	35	13	

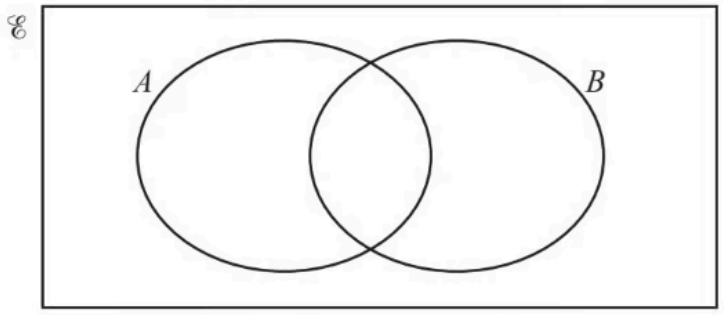
By using the two-way table to help you, fill in the frequency tree below.



(3 marks)

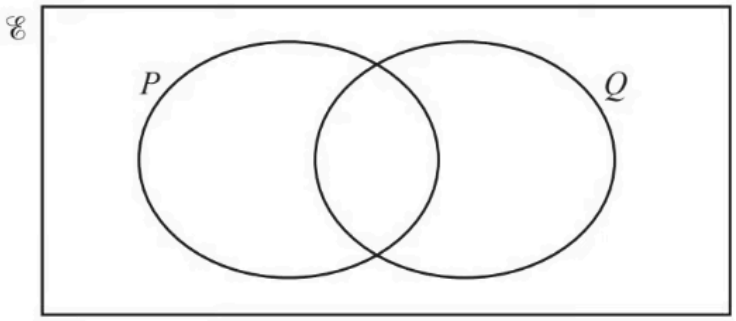
4 i) $\mathscr{E}$ = {2, 4, 8, 16, 32, 64}
A = {square numbers}
B = {cube numbers}

Use this information to complete the Venn diagram.



[2]

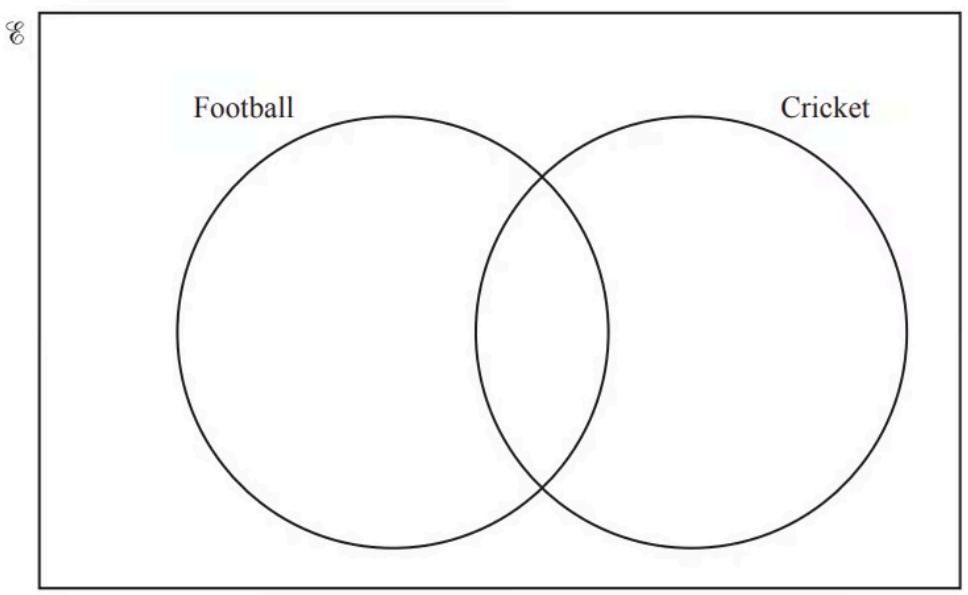
ii) On this Venn diagram, shade the region $P \cup Q$.



[1]
(3 marks)

5 In a group of 40 students,

- 24 students like football
- 19 students like cricket
- 10 students like football but not cricket.



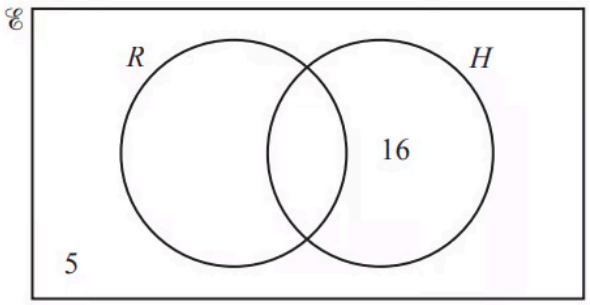
Complete the Venn diagram.

(3 marks)

6 (a) $\mathscr{E}$ = {children in a group}
R = {children who own a rabbit}
H = {children who own a hamster}

There are 40 children in the group.
19 children own a rabbit.
27 children own a hamster.

Complete the Venn diagram.



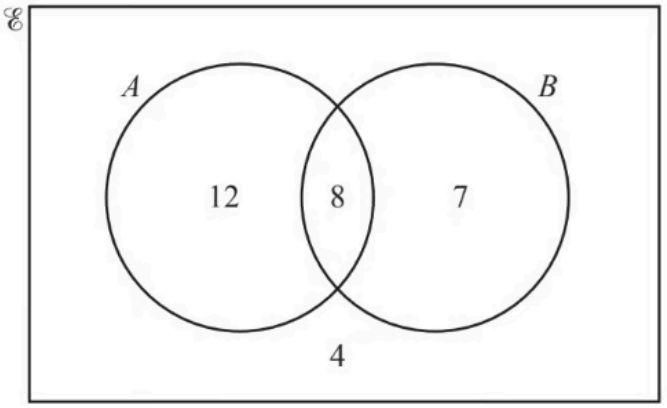
(2 marks)

(b) Write down $n(R \cap H)$.

[1]

(1 mark)

7 The Venn diagram shows information about the number of students in a class who like apples (A) and bananas (B).



i) Work out the number of students in the class.

[1]

ii) Work out the number of students who like bananas.

[1]

iii) Work out $n(A \cup B)$.

[1]

iv) How many more students like apples than like bananas?

[1]

v) One of the students is chosen at random.

Find the probability that this student does not like apples and does not like bananas.

[1]

(5 marks)

8 The table gives some information about the numbers of visitors at a leisure centre one day.

	Adult	Child	Total
Male		144	240
Female	129		260
Total	225	275	500

i) Complete the table.

[1]

ii) Work out how many more child visitors than adult visitors there are.

[1]

iii) Write down the fraction of visitors that are adults.
Give your answer in its lowest terms.

[2]

iv) Write the ratio number of males : number of females.
Give your answer in its simplest form.

..... : ..... [2]

v) One of these visitors is selected at random.
Find the probability that this visitor is a male child.

[1]

(7 marks)

9 There are 50 employees in a company.

Each employee either works in the Sales, Marketing or IT department.

Each employee either works remotely or on-site.

There are 20 employees in the IT department.

12 of the Marketing employees work remotely.

10 of the Sales employees work on-site.

18 employees in total work remotely.

6 of the IT employees work remotely.

How many more employees work in Marketing than in Sales?

(4 marks)

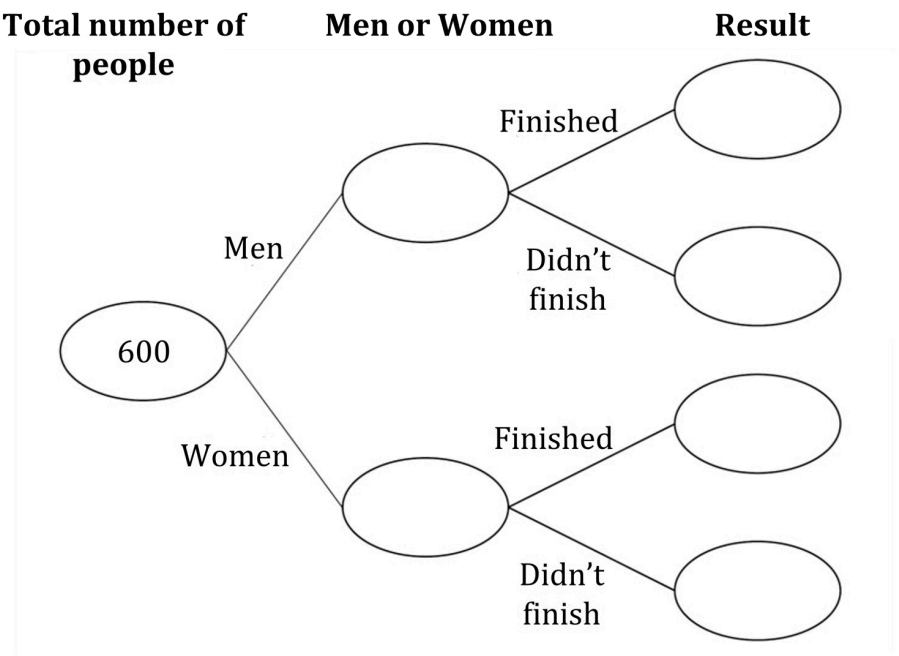
10 (a) 600 people started a marathon.

360 were men and the rest were women.

65% of the men finished the marathon.

40 women did not finish the marathon.

Complete the frequency tree.



(3 marks)

(b) A woman is selected at random.

What is the probability that she did not finish the marathon?

(1 mark)

(c) Find the percentage of the 600 people that finished the marathon.

Give your answer to 2 significant figures.

(2 marks)

Hard Questions

1 (a) A group of conservationists note the numbers of male and female giraffes and zebras they see while on safari.

They spot 28 giraffes and zebras in total.

12 of these are female zebras.

They also spot 2 male giraffes.

The conservationists note that they saw 4 times more male zebras than male giraffes.

Use this information to fill in the two-way table.

	Giraffes	**Zebras**	**Total**
Male			
Female			
Total			

(3 marks)

(b) The conservationists find a large herd of 100 zebras.

Using the data in part (a), how many of these 100 zebras are expected to be female?

(2 marks)

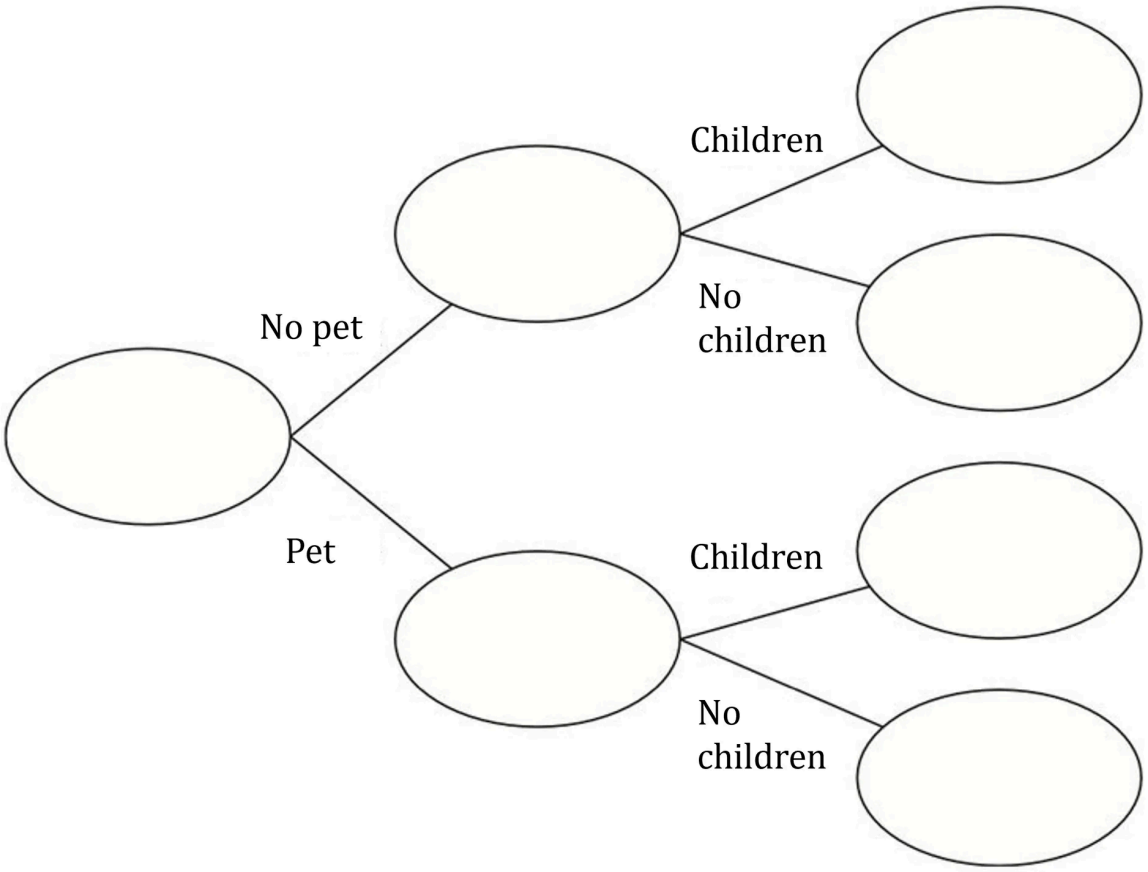
2 (a) There are 180 households in a village.

70 households do not have a pet.

45 households do not have a pet, and do not have children either.

There are 105 households who have children.

Use this information to complete the frequency tree.



(3 marks)

(b) One of the households in the village is picked at random.

Find the probability of the household having either:
no pets and no children
or
having both pets and children.

(1 mark)

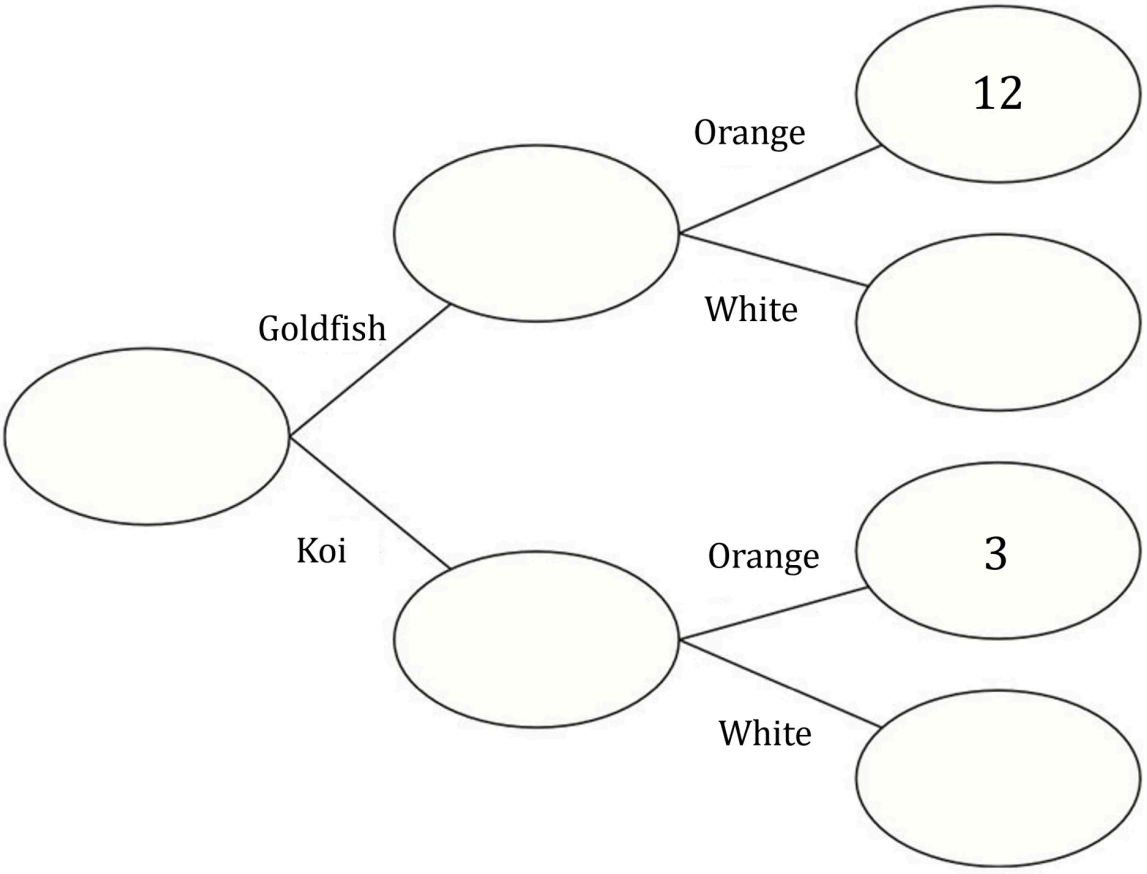
3 Naomi and Jamie own a fish pond that contains two types of fish: Goldfish and Koi.

The Goldfish and Koi are either orange or white in colour.

Jamie starts to create a frequency tree of the fish, and Naomi starts to create a two-way table of the fish.

Both of their incomplete diagrams are shown below.

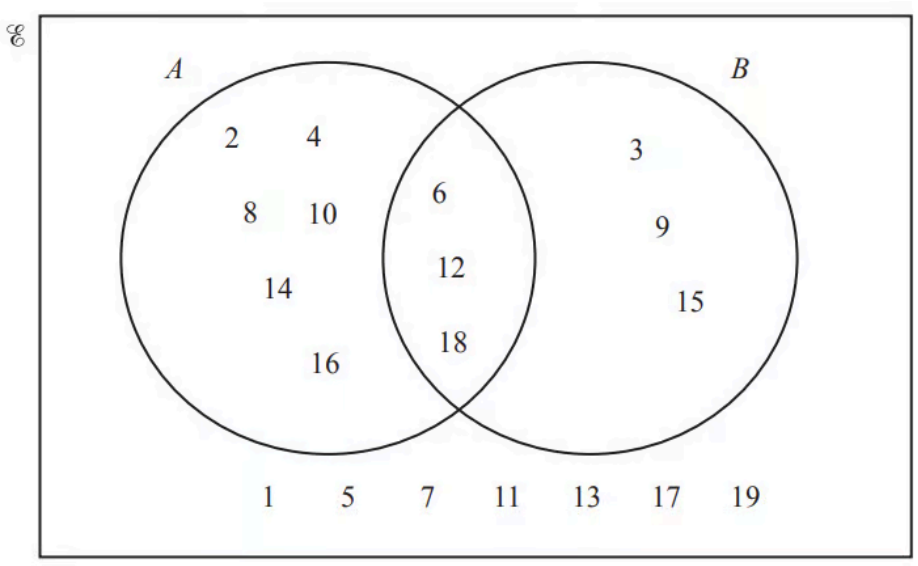
Complete **both** diagrams.



	Orange	White	Total
Goldfish		8	
Koi			
Total			29

(4 marks)

4 $\mathscr{E}$ = {x : x is a positive integer less than 20}
A = {x : x is an even number}
B = {x : x is a multiple of 3}



i) Write down $\mathrm{n}(A)$.

[1]

ii) List the elements of set B.

B = { ..... } [2]

One of these 19 numbers is picked at random.

Work out the probability that this number is

iiia) not in set A and not in set B,

[1]

iiib) in $A \cup B$

[1]

iv) Complete the statement.

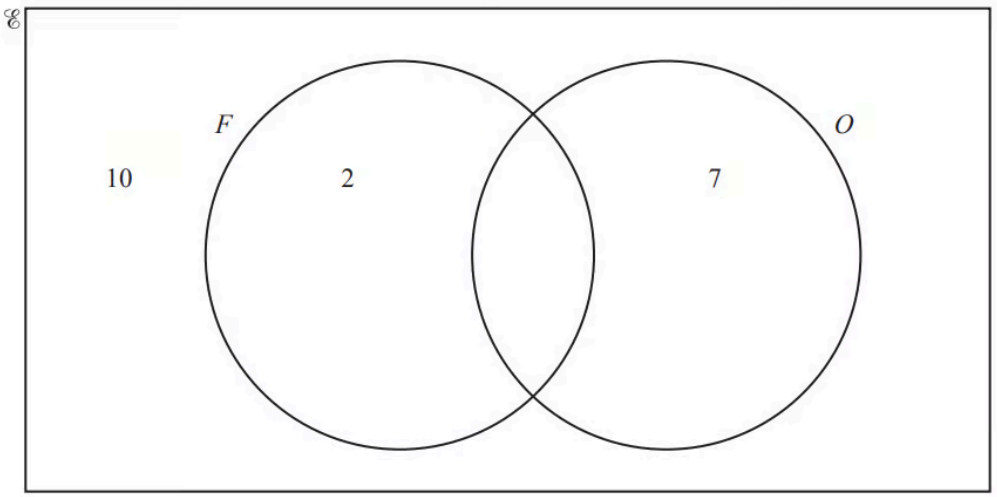
$A \cap B = \{x : x \text{ is } .....\}$

[1]

(6 marks)

5 $\mathscr{E} = \{x : x \text{ is a natural number } \leqslant 15\}$
$F = \{x : x \text{ is a factor of } 12\}$
$O = \{x : x \text{ is an odd number}\}$

i) Complete the Venn diagram to show the elements of these sets.



[2]

ii) Write down one number that is in set O, but not in set F.

[1]

iii) Find $\mathrm{n}(F \cup O)$.

[1]

iv) A number is chosen at random from $\mathscr{E}$.

Work out the probability that this number is in set O.

[1]

(2 marks)

6 $\mathscr{E}$ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14}

F = {x: x is a factor of 14}

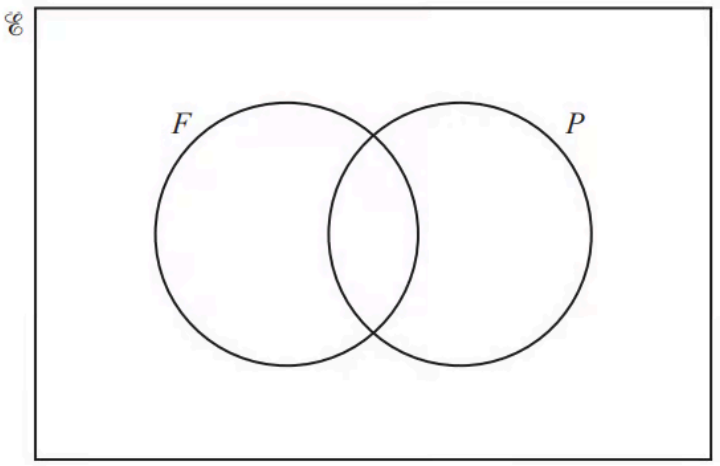
P = {x: x is a prime number less than 14}

i) Write down the elements in set F.

F = { ..... } [2]

ii) Write down the elements in set P.

P = { ..... } [2]



iiia) Complete the Venn diagram.

[2]

iiib) Write down the number of elements in the set $F \cap P$,

[1]

iiic) A number is chosen at random from the universal set $\mathscr{E}$.

Write down the probability that the number is in the set $F \cup P$.

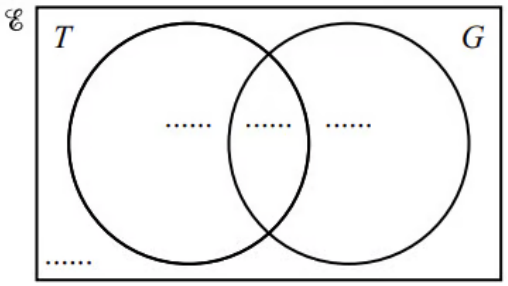
[2]

(9 marks)

7 (a) $\mathscr{E}$ = {children who go to the park}
T = {children who play tennis}
G = {children who play golf}

120 children go to the park.
50 play tennis.
75 play golf.
25 do not play tennis or golf.

Complete the Venn diagram.



(2 marks)

(b) Find the number of people in the set $T \cap G$.

[1]

(1 mark)

8 (a) The 262 students at a college each study one of the languages shown in the table.

	French	German	Spanish	Italian	Japanese	Total
Boys	27		48	19		123
Girls		32	54		12	
Total		53		30		262

Complete the table.

[3]

(3 marks)

(b) Find the probability that

i) a girl, chosen at random, studies Spanish,

[1]

ii) a boy, chosen at random, studies French or Italian,

[1]

iii) a student, chosen at random, does not study German.

[1]

(3 marks)