1 The time, t minutes, taken by each of 80 people to travel to work is recorded.
The table shows information about these times.

Time (t minutes)	$0 < t \leqslant 5$	$5 < t \leqslant 10$	$10 < t \leqslant 20$	$20 < t \leqslant 35$	$35 < t \leqslant 60$
Frequency	3	7	18	28	24

(a) One of these 80 people is chosen at random.

Find the probability that this person took longer than 10 minutes to travel to work.
Give your answer as a fraction in its simplest form.

..... [2]

(b) Two people are chosen at random from those taking 20 minutes or less to travel to work.

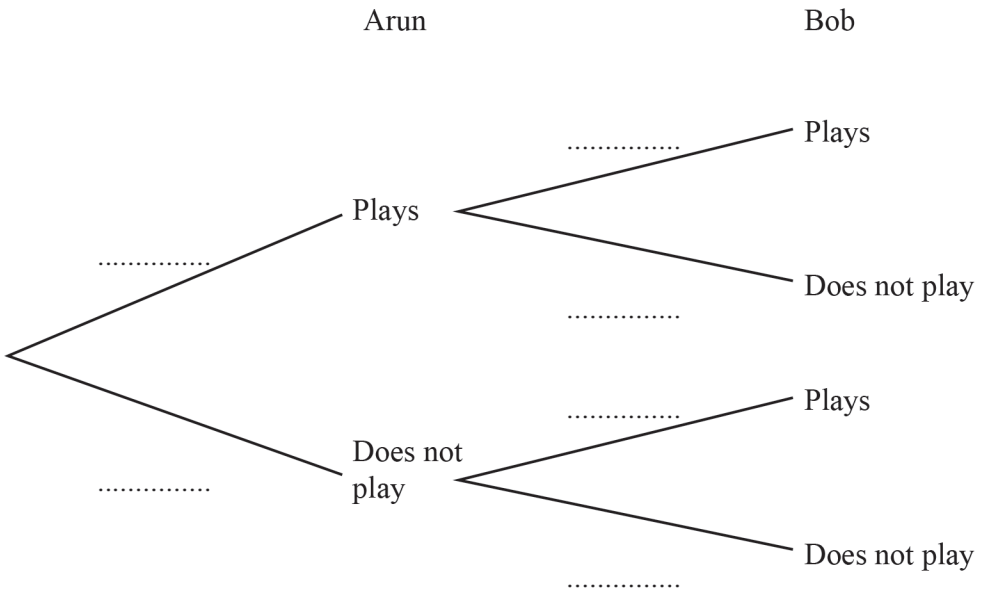
Calculate the probability that one of these people took 5 minutes or less and the other took more than 5 minutes.

..... [3]

[Total: 5]

2 On any Saturday, the probability that Arun plays football is $\frac{3}{4}$.
On any Saturday, the probability that Bob plays football is $\frac{2}{5}$.

(a) **(i)** Complete the tree diagram.



[2]

(ii) Calculate the probability that, one Saturday, Arun and Bob both play football.

..... [2]

(iii) Calculate the probability that, one Saturday, either Arun plays football or Bob plays football, but not both.

..... [3]

(b) Calculate the probability that Bob plays football for 2 of the next 3 Saturdays.

..... [3]

(c) When Arun plays football, the probability that he scores the winning goal is $\frac{1}{7}$.

Calculate the probability that Arun scores the winning goal one Saturday.

..... [2]

[Total: 12]

3 The probability that the school bus is late is $\frac{9}{10}$.

If the school bus is late, the probability that Seb travels on the bus is $\frac{15}{16}$.

If the school bus is on time, the probability that Seb travels on the bus is $\frac{3}{4}$.

Find the probability that Seb travels on the bus.

..... [3]

[Total: 3]

4 In a class activity, all the 15 students wear hats.
7 students wear red hats, 6 students wear green hats and 2 students wear white hats.

(a) One of these students is picked at random.

Find the probability that this student wears a red hat.

..... [1]

(b) Two of the 15 students are picked at random.

Show that the probability that these two students wear hats of the same colour is $\frac{37}{105}$.

[3]

(c) Three of the 15 students are picked at random.

Find the probability that at least two of these three students wear red hats.

..... [4]

[Total: 8]

5 12 friends travel to a festival.
5 travel by car, 4 travel by bus and 3 travel by train.
Two people are chosen at random from the 12 friends.

Calculate the probability that they travel by different types of transport.

..... [4]

[Total: 4]

6 Mahika records how 120 students from Year 1 and Year 2 travel to school.
Each student walks, cycles or travels by bus.

- 48 students are in Year 1.
- 77 students walk.
- 5 students in Year 2 cycle.
- 36 students travel by bus.
- $\frac{4}{9}$ of the students who travel by bus are in Year 1.

(a) Complete the table.

	Walk	Cycle	Bus	Total
Year 1				
Year 2				
Total				120

[3]

(b) One of the 120 students is chosen at random.

Work out the probability that this student does not travel by bus to school.

..... [2]

[Total: 5]

7 Paul has a set of 8 cards, each with a number written on it.
The numbers on the cards are 1, 1, 2, 3, 3, 3, 4, 5.
One card is taken at random.

Write down the probability that the number on the card is

(a) 1,

..... [1]

(b) an odd number,

..... [1]

(c) a prime number,

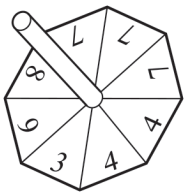
..... [1]

(d) a number less than 6.

..... [1]

[Total: 4]

8 The diagram shows a fair 8-sided spinner.



The numbers on the spinner are 3, 4, 4, 7, 7, 7, 8 and 9.

(a) The spinner is spun once.

Write down the probability that the spinner lands on

(i) the number 7,

..... [1]

(ii) a number greater than 2.

..... [1]

(b) The spinner is spun 160 times.

Work out the expected number of times the spinner lands on the number 7.

..... [1]

[Total: 3]

9 Soraya makes 30 flags.
11 flags are pink, 7 are yellow, 5 are blue, 4 are silver and 3 are green.
Soraya takes a flag at random.

Find the probability that the flag she takes is

(a) pink,

..... [1]

(b) not blue,

..... [1]

(c) red.

..... [1]

[Total: 3]

10 A box contains 22 coloured pencils.
6 pencils are pink, 9 pencils are blue and 7 pencils are yellow.

A pencil is taken at random from the box.

Write down the probability that this pencil is green.

..... [1]

[Total: 1]

11 Mario tests new cars.
The probability that a car is faulty is 0.04 .

(a) Find the probability that a car is not faulty.

..... [1]

(b) In one week Mario tests 850 cars.

Find the number of cars that are expected to be faulty.

..... [2]

[Total: 3]

12 A 4-sided spinner is numbered 1, 2, 3 and 4.
The table shows the probability of the spinner landing on 1, 2 and 4.

Number	1	2	3	4
Probability	0.27	0.18		0.32

Complete the table.

[2]

[Total: 2]

13 The probability that Jane wins a game is $\frac{7}{10}$.

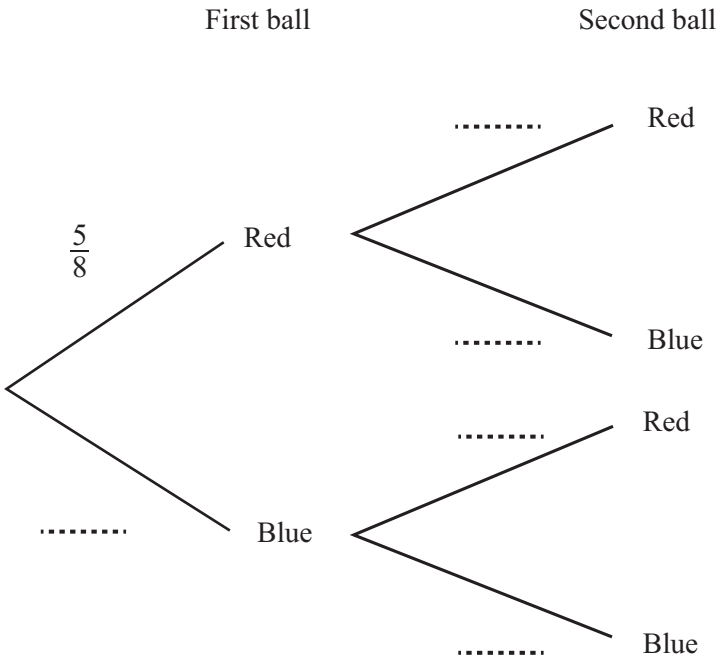
Find the probability that Jane does not win the game.

..... [1]

[Total: 1]

14 A bag contains 5 red balls and 3 blue balls.
Sophie takes a ball at random, notes its colour and then puts it back in the bag.
She does this a second time.

(a) Complete the tree diagram.



[2]

(b) Work out the probability that both of the balls she takes are blue.

..... [2]

[Total: 4]

15 The probability of picking a red sweet from a bag is 0.05 .

Find the probability of not picking a red sweet.

..... [1]

[Total: 1]

16 Malik goes to a shop every day to buy bread.

On any day, the probability that Malik goes to the shop in the morning is 0.7 .

If he goes in the morning, the probability that there is bread for Malik to buy is 0.95 .
If he goes later, the probability that there is bread for Malik to buy is 0.6 .

Calculate the probability that, on any day, there is bread for Malik to buy.

..... [3]

[Total: 3]

17 A bag contains 5 red balls, 4 blue balls and 3 green balls.

(a) Megan picks a ball at random.

Write down the probability that the ball is red or blue.

..... [1]

(b) Megan replaces the ball.
She picks a ball at random, notes the colour and replaces the ball.
She repeats this 60 times.

Calculate the number of times the ball is expected to be red or blue.

..... [1]

[Total: 2]

18

V	E	N	N	D	I	A	G	R	A	M

The diagram shows 11 cards.

(a) One of these cards is chosen at random.

Write down the probability that the letter on the card is **not** A.

..... [1]

(b) A card is chosen at random from these 11 cards and then replaced.
A second card is then chosen at random.

Find the probability that exactly one card has the letter N.

..... [3]

[Total: 4]

19 Sushila has a bag that contains 10 red balls and 8 blue balls.
She takes one ball at random from the bag.

Find the probability that she takes a red ball.

..... [1]

[Total: 1]

20 20 students each record the mass, p grams, of their pencil case.
The table below shows the results.

Mass (p grams)	$0 < p \leqslant 50$	$50 < p \leqslant 100$	$100 < p \leqslant 125$	$125 < p \leqslant 150$	$150 < p \leqslant 200$
Frequency	2	5	4	6	3

(a) Calculate an estimate of the mean mass.

..... g [4]

(b) Use the frequency table above to complete the cumulative frequency table.

Mass (p grams)	$p \leqslant 50$	$p \leqslant 100$	$p \leqslant 125$	$p \leqslant 150$	$p \leqslant 200$
Cumulative frequency					20

[2]

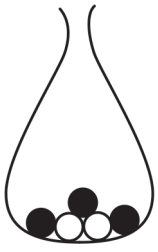
(c) A student is chosen at random.

Find the probability that this student has a pencil case with a mass greater than 150 g.

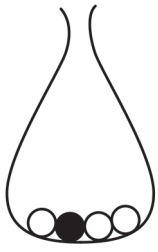
..... [1]

[Total: 7]

21



Bag *A*



Bag *B*

Bag *A* contains 3 black balls and 2 white balls.
Bag *B* contains 1 black ball and 3 white balls.

A ball is taken at random from each bag.

(a) Show that a black ball is more likely to be taken from bag *A* than from bag *B*.

[1]

(b) Find the probability that the two balls have different colours.

..... [3]

[Total: 4]

22 The test scores of 14 students are shown below.

21 21 23 26 25 21 22 20 21 23 23 27 24 21

(a) Find the range, mode, median and mean of the test scores.

Range = ...

Mode = ...

Median = ...

Mean = ... [6]

(b) A student is chosen at random.

Find the probability that this student has a test score of more than 24.

..... [1]

[Total: 7]