

P21- Introducing Probability

OCR

- 10 (a) A bag contains only green counters and black counters in the ratio 2 : 7.
There are 45 counters in the bag.

How many counters are black?

(a) [2]

- (b) A different bag contains only red counters, blue counters and yellow counters in the ratio
4 : 6 : 11.

There are 54 blue counters.

- (i) How many counters are red?

(b)(i) [2]

- (ii) A counter is taken at random from the bag.

What is the probability that it is yellow?

(ii) [1]

- 10 (a) A bag contains only green counters and black counters in the ratio 2 : 7.
There are 45 counters in the bag.

How many counters are black?

$45 = 9 \text{ parts}$
 $5 = 1 \text{ part}$

$G : B$
 $2 : 7$

\swarrow $\searrow \times 5$
 10 35

(a) 35 [2]

- (b) A different bag contains only red counters, blue counters and yellow counters in the ratio 4 : 6 : 11.

There are 54 blue counters.

- (i) How many counters are red?

$R : B : Y$
 $4 : 6 : 11$

$54 = 6 \text{ parts}$
 $9 = 1 \text{ part}$

$\times 9$
 $4 \times 9 = 36$ ✓

(b)(i) 36 [2]

- (ii) A counter is taken at random from the bag.

What is the probability that it is yellow?

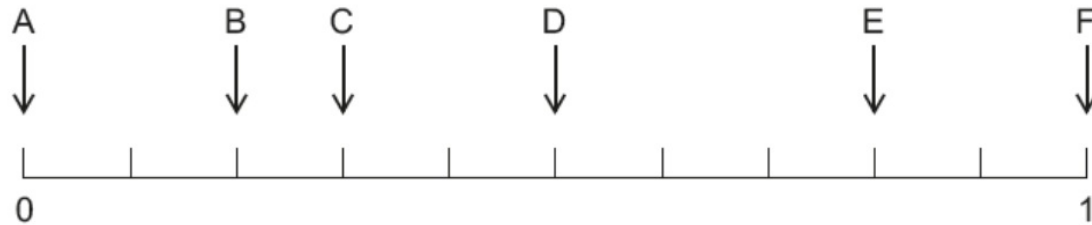
$\frac{11}{21}$

$21 \dots 4+6+11$

(ii) [1]

4 Robert has a bag containing ten sweets.
4 are red, 3 are green, 2 are yellow and 1 is orange.
Robert takes a sweet from the bag without looking.

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(a) Which arrow shows the probability he takes a sweet which is

(i) green,

(a)(i) [1]

(ii) blue?

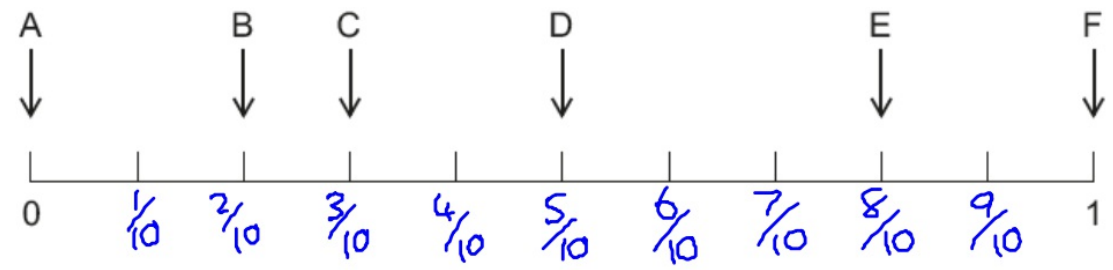
(ii) [1]

(b) Work out the probability that Robert takes a sweet that is **not** orange.

4 Robert has a bag containing ten sweets.
4 are red, 3 are green, 2 are yellow and 1 is orange.
Robert takes a sweet from the bag without looking.

3

10



(a) Which arrow shows the probability he takes a sweet which is

(i) green,

$\frac{3}{10}$

(a)(i) C [1]

(ii) blue?

$\frac{0}{10}$

(ii) A [1]

(b) Work out the probability that Robert takes a sweet that is **not** orange.

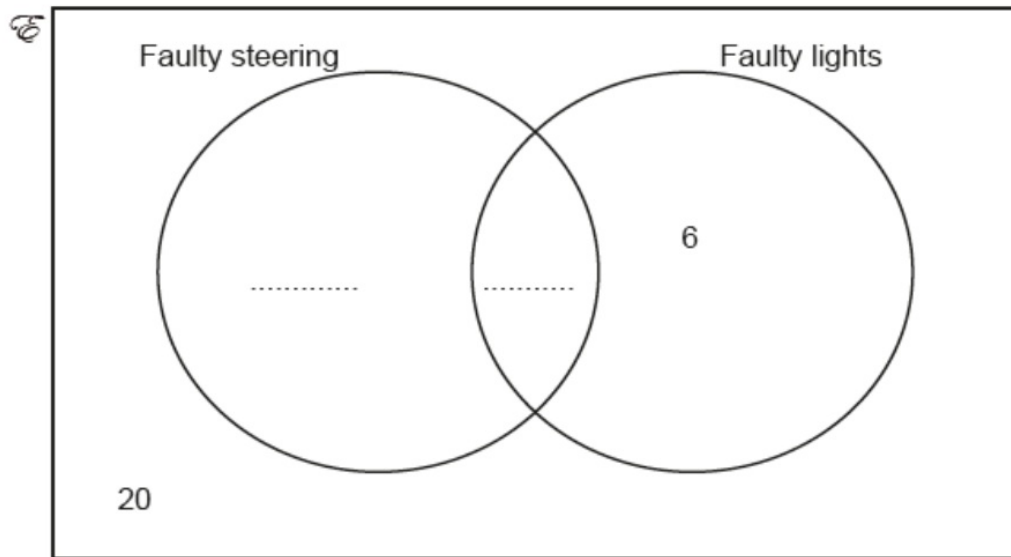
$\frac{9}{10}$ 0.9 ✓

17 A mechanic tested the steering and lights of 50 cars.

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- 20 cars did not have a fault.
- 6 cars had **only** faulty lights.
- 8 cars had both faults.

(a) Using this information, complete the Venn diagram below.



[2]

(b) A car is chosen at random from the cars that had faulty lights.

What is the probability that this car also had faulty steering?

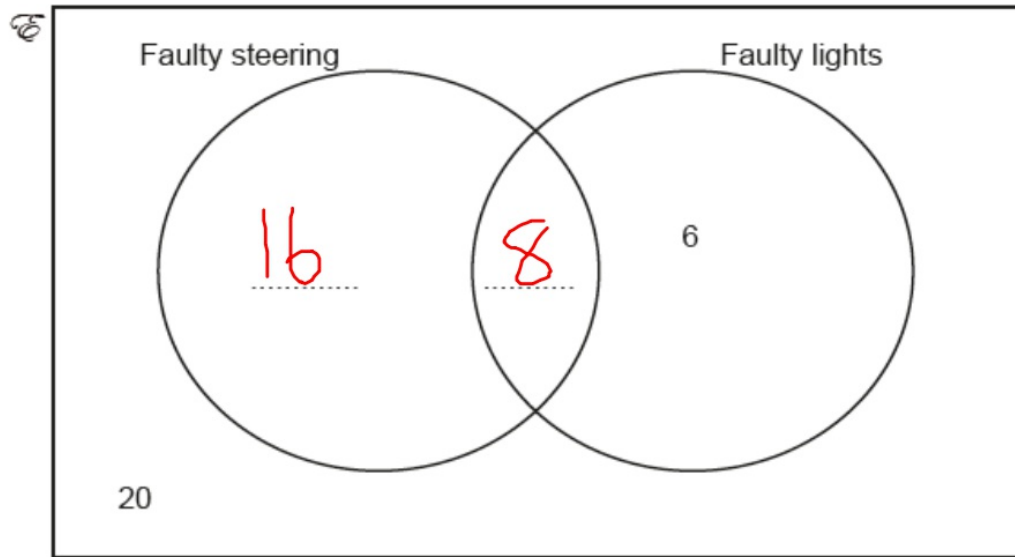
(b) [2]

17 A mechanic tested the steering and lights of 50 cars.

Created by W Neill

- 20 cars did not have a fault.
- 6 cars had **only** faulty lights.
- 8 cars had both faults.

(a) Using this information, complete the Venn diagram below.



= 50

[2]

(b) A car is chosen at random from the cars that had faulty lights.

What is the probability that this car also had faulty steering?

$$\frac{8}{14}$$

(b) [2]

- 6 (a)** Henry puts eight counters into a bag.
Each counter has a different whole number on it between 1 and 8.
He picks a counter at random from the bag and the number is noted.

Choose from the words in the box to complete each sentence.

likely impossible certain evens unlikely
--

- (i) It is that he picks a number less than 9. **[1]**
- (ii) It is that he picks an odd number. **[1]**

- 6 (a) Henry puts eight counters into a bag.
Each counter has a different whole number on it between 1 and 8.
He picks a counter at random from the bag and the number is noted.

Choose from the words in the box to complete each sentence.

likely impossible certain **evens** unlikely

- (i) It is *certain* that he picks a number less than 9. [1]
- (ii) It is *evens* that he picks an odd number. [1]

1 2 3 4 5 6 7 8

$$\frac{4}{8} = \frac{1}{2}$$

- 7 (a) Frances has three cards: Ace (A), King (K) and Queen (Q).
She shuffles these cards and deals them one at a time.

N49

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- (i) List all the different orders in which she can deal the cards.
One possible order is already shown in the table.
You may not need to use all the rows.

First card	Second card	Third card
A	K	Q

- (ii) Find the probability that, in the three cards Frances deals, the King (K) is dealt **immediately** after the Queen (Q).

P21

[2]

- 7 (a) Frances has three cards: Ace (A), King (K) and Queen (Q).
 She shuffles these cards and deals them one at a time.

Created by W Neill

- (i) List all the different orders in which she can deal the cards.
 One possible order is already shown in the table.
 You may not need to use all the rows.

First card	Second card	Third card
A	K	Q
A	Q	K
K	A	Q
K	Q	A
Q	A	K
Q	K	A

Q → K

- (ii) Find the probability that, in the three cards Frances deals, the King (K) is dealt immediately after the Queen (Q).

P21

$$\frac{2}{6} = \frac{1}{3} \checkmark$$

[2]

Edexcel

10 There are only 9 counters in a bag.

There are

2 red counters

3 green counters

4 blue counters

Lethna takes at random a counter from the bag.

(a) Write down the probability that she takes

(i) a blue counter,

.....
(1)

(ii) a white counter.

.....
(1)

10 There are only 9 counters in a bag.

There are

2 red counters

3 green counters

4 blue counters

Lethna takes at random a counter from the bag.

(a) Write down the probability that she takes

(i) a blue counter,

$$\frac{4}{9}$$

.....

(1)

(ii) a white counter.

$$0 \text{ or } \frac{0}{9}$$

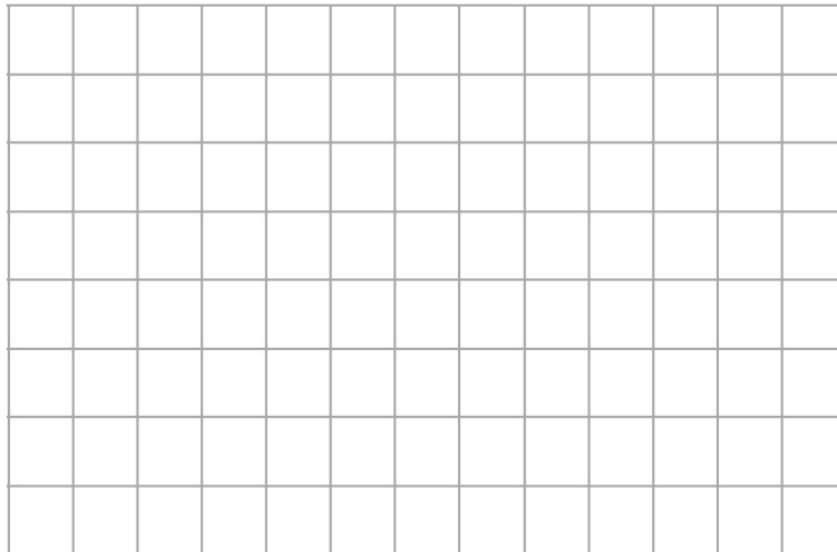
.....

(1)

13 The table shows information about the favourite instrument played by each of 24 students.

Instrument	Number of boys	Number of girls
guitar	6	2
violin	2	5
keyboard	3	2
recorder	1	3

(a) On the grid below, draw a suitable diagram to show this information.



(4)

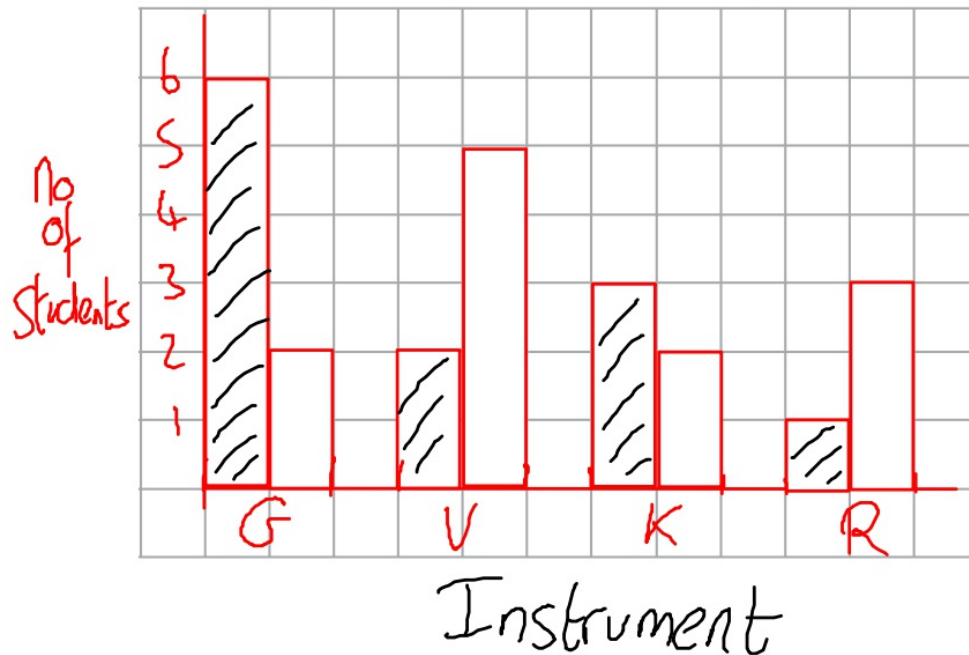
One of the students is chosen at random.



(b) What is the probability that this student's favourite instrument is **not** the recorder?

13 The table shows information about the favourite instrument played by each of 24 students.

Instrument	Number of boys	Number of girls
guitar	6	2
violin	2	5
keyboard	3	2
recorder	1	3

(a) On the grid below, draw a suitable diagram to show this information.



 = Boys
 = Girls

$$\frac{20}{24} \checkmark \quad (4)$$

One of the students is chosen at random.

(b) What is the probability that this student's favourite instrument is **not** the recorder?

7 Here is a list of 10 numbers.

1 3 3 5 5 7 8 8 8 12

(a) Work out the range.

P2

.....
(1)

(b) Find the mode.

P2

.....
(1)

One of the 10 numbers is picked at random.

(c) Write down the probability that this number is 7

P21

.....
(1)

7 Here is a list of 10 numbers.

1 3 3 5 5 7 8 8 8 12

(a) Work out the range.

P2

$$12 - 1 =$$

$$\frac{11}{(1)}$$

(b) Find the mode.

P2

$$\frac{8}{(1)}$$

One of the 10 numbers is picked at random.

(c) Write down the probability that this number is 7

P21

$$\frac{1}{10} \quad (1)$$

Video created by W Neill

12 There are only 7 blue pens, 4 green pens and 6 red pens in a box.

One pen is taken at random from the box.

Write down the probability that this pen is blue.

.....
(Total for Question 12 is 2 marks)

Video created by W Neill

12 There are only 7 blue pens, 4 green pens and 6 red pens in a box.

One pen is taken at random from the box.

Write down the probability that this pen is blue.

$$7 + 4 + 6$$

$$\frac{7}{17} \checkmark$$

(Total for Question 12 is 2 marks)

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19 There are only blue cubes, yellow cubes and green cubes in a bag.

There are

twice as many blue cubes as yellow cubes
and four times as many green cubes as blue cubes.

Hannah takes at random a cube from the bag.

Work out the probability that Hannah takes a yellow cube.

.....
(Total for Question 19 is 3 marks)

19 There are only blue cubes, yellow cubes and green cubes in a bag.

There are

twice as many blue cubes as yellow cubes
and four times as many green cubes as blue cubes.

Hannah takes at random a cube from the bag.

Work out the probability that Hannah takes a yellow cube.

<u>Atch</u> <u>number</u>	B	Y	G	
	8	4	32	$\frac{4}{44} = \frac{1}{11}$
	16	8	64	$\frac{1}{11}$
			$\frac{8}{88}$

(Total for Question 19 is 3 marks)

There are 12 counters in a bag.

3 of the counters are red.

1 of the counters is blue.

2 of the counters are yellow.

The rest of the counters are green.

Caitlin takes at random a counter from the bag.

(c) Show that the probability that this counter is yellow or green is $\frac{2}{3}$

P21

There are 12 counters in a bag.

3 of the counters are red.

1 of the counters is blue.

2 of the counters are yellow.

The rest of the counters are green.

Caitlin takes at random a counter from the bag.

(c) Show that the probability that this counter is yellow or green is $\frac{2}{3}$

P21

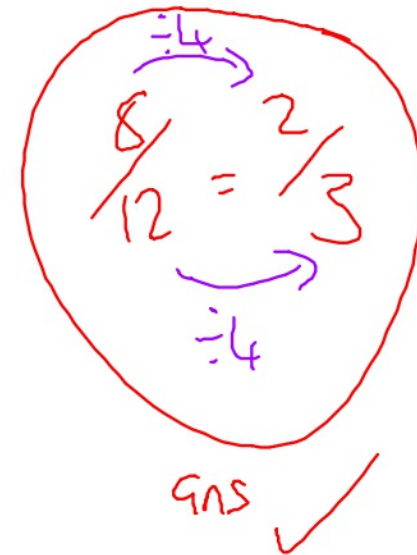
Red	Blue	Yellow	Green
$\frac{3}{12}$	$\frac{1}{12}$	$\frac{2}{12}$	$\frac{6}{12}$

Yellow or Green

$$\frac{2}{12}$$

$$\frac{6}{12}$$

$$= \frac{8}{12}$$



(3)

13 A scout group has a raffle to raise money for charity.

p21 There is 1 prize to be won in the raffle.

Laura buys 12 raffle tickets.

A total of 350 raffle tickets are sold.

Find the probability that Laura does **not** win the prize.

.....
(Total for Question 13 is 2 marks)

13 A scout group has a raffle to raise money for charity.
p21 There is 1 prize to be won in the raffle.

Laura buys 12 raffle tickets.
A total of 350 raffle tickets are sold.

Find the probability that Laura does **not** win the prize.

$$\text{wins} = \frac{12}{350}$$

$$\text{doesn't win} = \frac{338}{350}$$

$$\frac{338}{350} \checkmark$$

(Total for Question 13 is 2 marks)

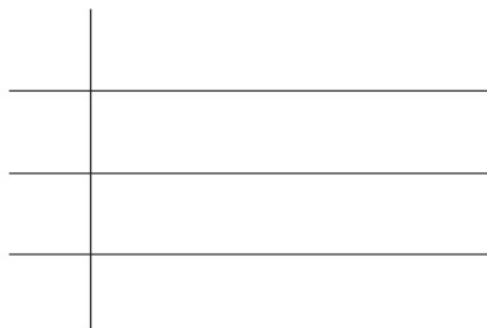
14 Here are the marks 20 students got in a French test.

Video created by W Neill

76 82 84 69 80 64 70 81 75 91
87 67 80 70 94 76 81 69 71 77

(a) Show this information in a stem and leaf diagram.

P16



One of these students is going to be chosen at random.

The pass mark in the French test is 71

Omar writes,

The probability that this student failed the French test is $\frac{1}{4}$

Omar is wrong.

(b) Explain why.

P21

.....
(2)

14 Here are the marks 20 students got in a French test.

Video created by W Neill

76 82 84 69 80 64 70 81 75 91
87 67 80 70 94 76 81 69 71 77

(a) Show this information in a stem and leaf diagram.

P16

6	4 7 9 9
7	0 0 1 5 6 6 7
8	0 0 1 1 2 4 7
9	1 4

key
6|4 = 64 marks

One of these students is going to be chosen at random.

The pass mark in the French test is 71

Omar writes,

The probability that this student failed the French test is $\frac{1}{4}$

failed = $\frac{6}{20}$

$\frac{6}{20} \neq \frac{5}{20}$

Omar is wrong.

(b) Explain why.

P21

$\frac{1}{4} = \frac{5}{20}$ Omar is wrong

12 There are 49 counters in a bag.

P21 20 of the counters are red.
The rest of the counters are blue.

One of the counters is taken at random.

Find the probability that the counter is blue.

.....
(Total for Question 12 is 2 marks)

12 There are 49 counters in a bag.

P21 20 of the counters are red.
The rest of the counters are blue.

One of the counters is taken at random.

Find the probability that the counter is blue.

$$\begin{array}{r} 20 \text{ red} \\ 29 \text{ blue} \\ \hline 49 \end{array}$$

$$\begin{array}{r} 29 \\ \hline 49 \end{array}$$

(Total for Question 12 is 2 marks)

14 Victoria throws an ordinary fair 6-sided dice once.

She says,

“The probability of getting a 3 is half the probability of getting a 6”

(a) Is Victoria correct?

You must explain your answer.

P21

(1)

14 Victoria throws an ordinary fair 6-sided dice once.

She says,

“The probability of getting a 3 is half the probability of getting a 6”

(a) Is Victoria correct?

You must explain your answer.

P21

No, it is equal chance of getting a 3 or 6.

Both are $\frac{1}{6}$

(1)

Andy throws the dice twice.

He says,

“The probability of getting a 6 on both throws is $\frac{2}{6}$ ”

(b) Is Andy correct?

You must explain your answer.

P21

(1)

Andy throws the dice twice.
He says,

“The probability of getting a 6 on both throws is $\frac{2}{6}$ ”

and = X

or = +

(b) Is Andy correct?

You must explain your answer.

P21

get 6 and get 6

$\frac{1}{6}$

X

$\frac{1}{6}$

= $\frac{1}{36}$

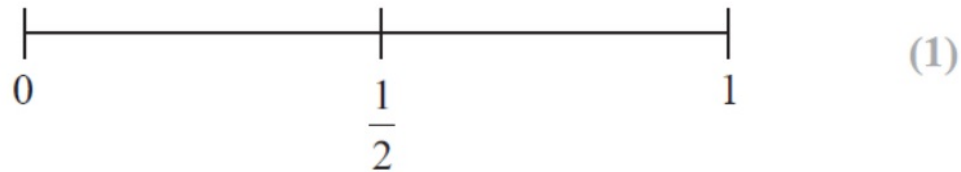
(1)

not $\frac{2}{6}$

6 An ordinary fair dice is thrown once.

(a) On the probability scale below, mark with a cross (\times) the probability that the dice lands on an odd number.

P22



(b) Write down the probability that the dice lands on a number greater than 4

P21

.....
(1)

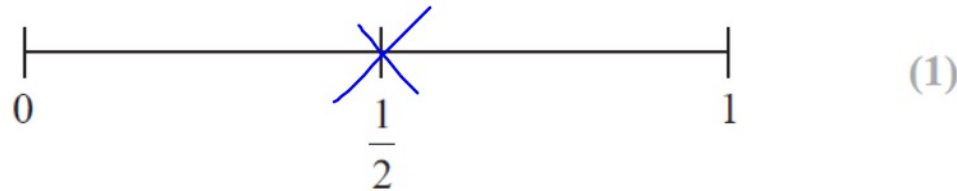
6 An ordinary fair dice is thrown once.

1 2 3 4 5 6

(a) On the probability scale below, mark with a cross (×) the probability that the dice lands on an odd number.

P22

$$\frac{3}{6} = \frac{1}{2}$$



(b) Write down the probability that the dice lands on a number greater than 4

P21

$$\frac{2}{6}$$

(1)

AQA

14 A number is picked at random from the first four **prime** numbers.
 A number is picked at random from the first four **square** numbers.
 The two numbers are added to get a score.

14 (a) Complete the table.

[4 marks]

N17
N19

		Square numbers			
+		1	4	9	
Prime numbers	2				
	3			12	
	7				

14 (b) What is the probability that the score is a **prime** number?

[1 mark]

P21

Answer _____

14 A number is picked at random from the first four **prime** numbers.
 A number is picked at random from the first four **square** numbers.
 The two numbers are added to get a score.

14 (a) Complete the table.

[4 marks]

N17
 N19

		Square numbers			
		1x1	2x2	3x3	4x4
Prime numbers	+	1	4	9	16
	2	3	6	11	18
	3	4	7	12	19
	5	6	9	14	21
	7	8	11	16	23

14 (b) What is the probability that the score is a **prime** number?

[1 mark]

P21

Answer

$$\frac{6}{16} = \frac{3}{8} \checkmark$$

- 20 A code has 4 digits.
Each digit is a number from 0 to 9
Digits may be repeated.

The code starts 5 4 1

5	4	1	
---	---	---	--

- 20 (a) Joe chooses a number at random for the last digit.

p21 Write down the probability that he chooses the correct number.

[1 mark]

Answer _____

A code has 4 digits.

Each digit is a number from 0 to 9

Digits may be repeated.

0 1 2 3 4 5 6 7 8 9

The code starts 5 4 1

5	4	1	
---	---	---	--

(a) Joe chooses a number at random for the last digit.

p21 Write down the probability that he chooses the correct number.

[1 mark]

Answer

$$\frac{1}{10}$$

Video created by W Neill

A code has 4 digits.

Each digit is a number from 0 to 9

Digits may be repeated.

The code starts 5 4 1

5	4	1	
---	---	---	--

20 (b) Amy knows the last digit is odd but **not** 7

P21

She chooses a different odd number at random.

What is the probability that she chooses the correct number?

[1 mark]

Answer _____

A code has 4 digits.

Each digit is a number from 0 to 9

Digits may be repeated.

The code starts 5 4 1

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0 1 2 3 4 5 6 7 8 9

5	4	1	
---	---	---	--

(b) Amy knows the last digit is odd but not 7

P21

She chooses a different odd number at random.

What is the probability that she chooses the correct number?

[1 mark]

Answer _____

$\frac{1}{4}$

9 In a game, three stars are hidden at random.

Each star is behind a different square on this board.

A B C D E

1					
2					
3					
4					
5					

9 (a) A square is chosen at random. [1 mark]

P21 What is the probability that there is a star behind it?

Answer _____

9 In a game, three stars are hidden at random.

Each star is behind a different square on this board.

	A	B	C	D	E
1					
2					
3					
4					
5					

9 (a) A square is chosen at random. [1 mark]
P21 What is the probability that there is a star behind it?

Answer $\frac{3}{25}$ ✓

30 The four candidates in an election were A, B, C and D.
The pie chart shows the proportion of votes for each candidate.

A16

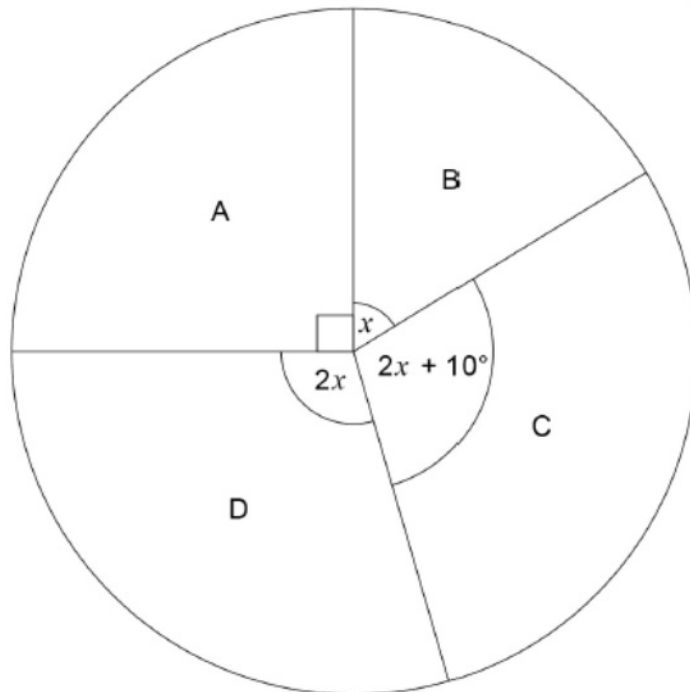
P21

Work out the probability that a person who voted, chosen at random, voted for C.

[4 marks]

Proportion of votes

Not drawn accurately



Answer _____

30 The four candidates in an election were A, B, C and D.
The pie chart shows the proportion of votes for each candidate.

A16
P21

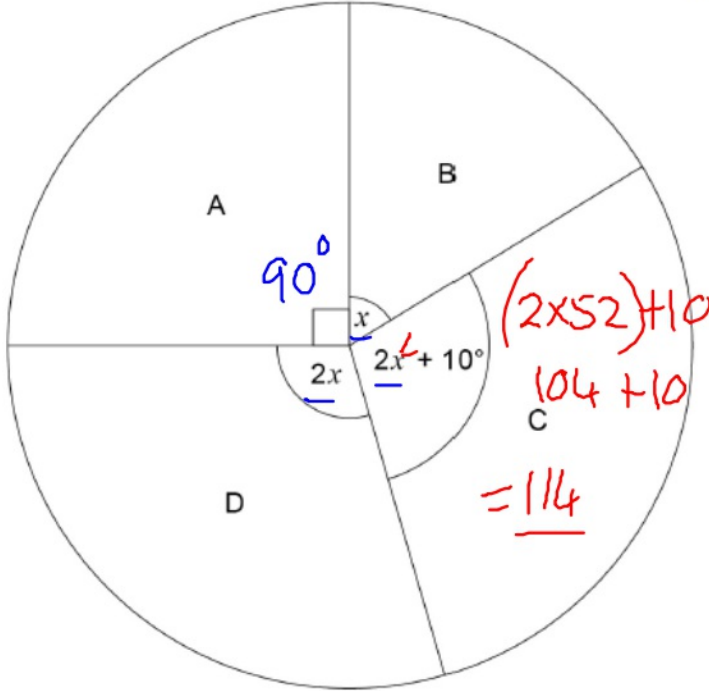
Work out the probability that a person who voted, chosen at random, voted for C.

[4 marks]

fraction

Proportion of votes

Not drawn accurately



$$\begin{array}{r} 052 \\ 5 \overline{) 260} \end{array}$$

$$5x + 100 = 360^\circ$$

$$5x = 260^\circ$$

$$x = \frac{260}{5} = 52^\circ$$

$$\frac{114}{360} \checkmark$$

Answer

2 A fair ordinary dice is thrown once.

P21 Circle the probability of getting a 2 or a 3

[1 mark]

$$\frac{1}{6}$$

$$\frac{2}{6}$$

$$\frac{3}{6}$$

$$\frac{5}{6}$$

2 A fair ordinary dice is thrown once.

P21 Circle the probability of getting a 2 or a 3

1 (2 3) 4 5 6
2/6

[1 mark]

$$\frac{1}{6}$$

$$\frac{2}{6}$$

$$\frac{3}{6}$$

$$\frac{5}{6}$$

9 A music app has a shuffle play function.
This means that songs are played in a random order **without repeat**.

9 (a) Ruth puts 10 songs on shuffle play.
One of them is her favourite song.

P21

Write down the probability that her favourite song plays first.

[1 mark]

Answer _____

9 A music app has a shuffle play function.
This means that songs are played in a random order **without repeat**.

9 (a) Ruth puts 10 songs on shuffle play.
One of them is her favourite song.

P21

Write down the probability that her favourite song plays first.

[1 mark]

Answer

$$\frac{1}{10}$$

11 A fair dice has six sides, numbered 1 to 6
After it is rolled, five of the numbers can be seen.

11 (a) Write down the probability that one of these five numbers is 2

[1 mark]

P21

Answer _____

11 (b) Work out the **greatest** possible sum of the five numbers.

[2 marks]

Answer _____

11 A fair dice has six sides, numbered 1 to 6
After it is rolled, five of the numbers can be seen.

11 (a) Write down the probability that one of these five numbers is 2

[1 mark]

P21

Answer

$$\frac{5}{6}$$

11 (b) Work out the **greatest** possible sum of the five numbers.

[2 marks]

1 will not
be seen

$$2 + 3 + 4 + 5 + 6$$

Answer

$$20 \checkmark$$

21 Here are five number cards.

N49
P21



Two of the five cards are picked at random.

Work out the probability that the total of the two numbers is **more than 30**

[3 marks]

Answer _____

21

Here are five number cards.

Video created by W Neill

N49

P21



Two of the five cards are picked at random.

Work out the probability that the total of the two numbers is **more than 30**

[3 marks]

$$17 + 12$$

$$17 + 23$$

$$17 + 15$$

$$17 + 16$$

$$12 + 23$$

$$12 + 15$$

$$12 + 16$$

$$23 + 15$$

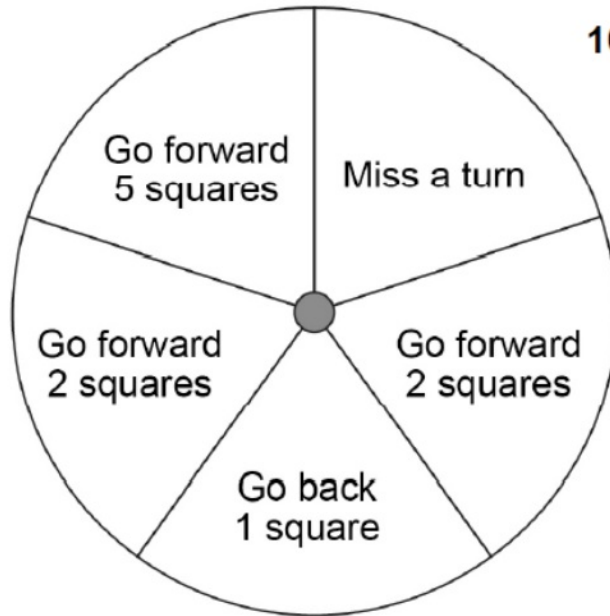
$$23 + 16$$

$$15 + 16$$

$$\frac{7}{10}$$

Answer _____

10 In a game, a fair spinner has five equal sections as shown.



10 (a) Chloe spins the spinner.

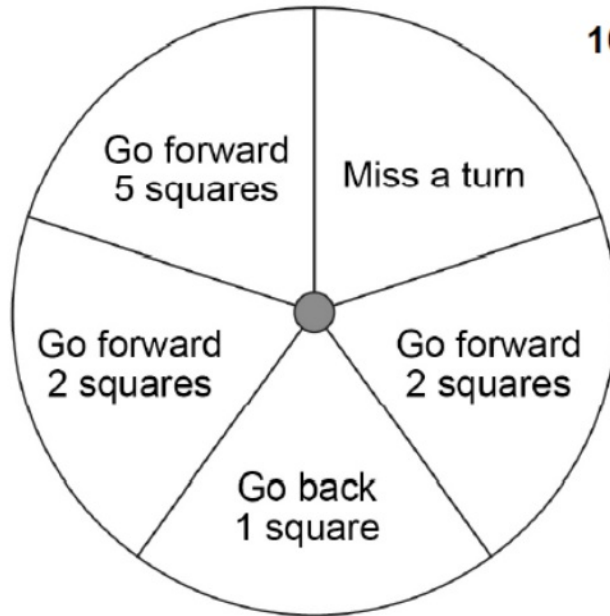
P21

Write down the probability that she gets 'Miss a turn'.

[1 mark]

Answer _____

10 In a game, a fair spinner has five equal sections as shown.



10 (a) Chloe spins the spinner.

P21

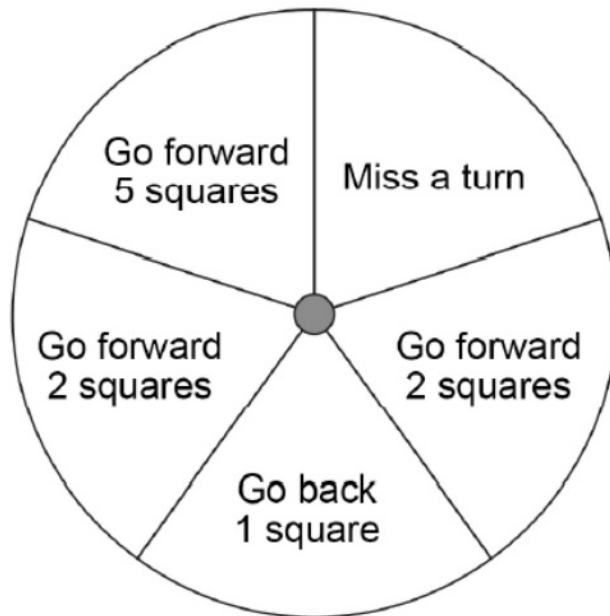
Write down the probability that she gets 'Miss a turn'.

[1 mark]

Answer

$\frac{1}{5}$

10 In a game, a fair spinner has five equal sections as shown.



10 (b) The spinner lands on 'Go back 1 square' three times in a row.

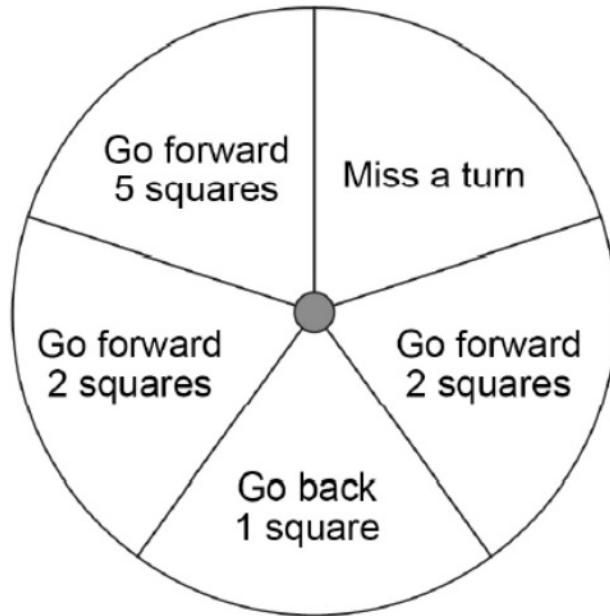
Jamal is next to spin.

P21

Write down the probability that he gets 'Go back 1 square'. [1 mark]

Answer _____

10 In a game, a fair spinner has five equal sections as shown.



10 (b) The spinner lands on 'Go back 1 square' three times in a row.

Jamal is next to spin.

P21

Write down the probability that he gets 'Go back 1 square'. [1 mark]

Answer _____

$\frac{1}{5}$