PROBABILITY

Pearson Edexcel - Tuesday 21 May 2019 - Paper 1 (Non-Calculator) Foundation Tier

1.

22 There are only blue cubes, red cubes and yellow cubes in a box.

The table shows the probability of taking at random a blue cube from the box.

Colour	blue	red	yellow
Probability	0.2		

The number of red cubes in the box is the same as the number of yellow cubes in the box.

(a) Complete the table.

(2)

There are 12 blue cubes in the box.

(b) Work out the total number of cubes in the box.

(2)

(Total for Question 22 is 4 marks)

2.

16 Four biased coins, A, B, C and D are thrown.

The probability that each coin will land on Heads is shown in the table.

Coin	Probability
A	0.33
B	0.033
C	$\frac{1}{3}$
D	30%

(a) (i) Which coin is least likely to land on Heads?

....

(1)

(ii) Which coin is most likely to land on Heads?

....

(1)

Julie says,

> "The probability that coin C will land on Heads is the same as the probability that coin C will land on Tails."

(b) Is she correct?
Give a reason for your answer.

....

....

....

(1)

Coin B is going to be thrown 4000 times.

(c) Work out an estimate for the number of times coin B will land on Heads.

....

(2)

(Total for Question 16 is 5 marks)

Pearson Edexcel - Tuesday 12 June 2018 - Paper 3 (Calculator) Foundation Tier

3.

24 There are some counters in a bag.
The counters are red or white or blue or yellow.

Bob is going to take at random a counter from the bag.

The table shows each of the probabilities that the counter will be blue or will be yellow.

Colour	red	white	blue	yellow
Probability			0.45	0.25

There are 18 blue counters in the bag.

The probability that the counter Bob takes will be red is twice the probability that the counter will be white.

(a) Work out the number of red counters in the bag.

A marble is going to be taken at random from a box of marbles.
The probability that the marble will be silver is 0.5

There must be an even number of marbles in the box.

(b) Explain why.

....

....

(1)

(Total for Question 24 is 5 marks)

4.

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)

5.

26 When a drawing pin is dropped it can land point down or point up.

Lucy, Mel and Tom each dropped the drawing pin a number of times.

The table shows the number of times the drawing pin landed point down and the number of times the drawing pin landed point up for each person.

	Lucy	**Mel**	**Tom**
point down	31	53	16
point up	14	27	9

Rachael is going to drop the drawing pin once.

(a) Whose results will give the best estimate for the probability that the drawing pin will land point up?
Give a reason for your answer.

....

....

(1)

Stuart is going to drop the drawing pin twice.

(b) Use all the results in the table to work out an estimate for the probability that the drawing pin will land point up the first time and point down the second time.

....

(2)

(Total for Question 26 is 3 marks)

Pearson Edexcel – Specimen 2 - Paper 1 (Non-Calculator) Foundation Tier

6.

21 David has designed a game.
He uses a fair 6-sided dice and a fair 5-sided spinner.
The dice is numbered 1 to 6
The spinner is numbered 1 to 5

Each player rolls the dice once and spins the spinner once.
A player can win £5 or win £2

Win £5	**Win £2**
roll a 5 **and** spin a 5	roll a 1 **or** spin a 1 **or** both

David expects 30 people will play his game.
Each person will pay David £1 to play the game.

(a) Work out how much profit David can expect to make.

£...

(4)

(b) Give a reason why David's actual profit may be different to the profit he expects to make.

....

....

(1)

(Total for Question 21 is 5 marks)

7.

19 There are only blue counters, green counters, red counters and yellow counters in a bag.
George is going to take at random a counter from the bag.

The table shows each of the probabilities that George will take a blue counter or a green counter or a yellow counter.

Colour	blue	green	red	yellow
Probability	0.5	0.2		0.25

(a) Work out the probability that George will take a red counter.

....

(1)

There are 120 counters in the bag.

(b) Work out the number of green counters in the bag.

....

(2)

(Total for Question 19 is 3 marks)

8.

22 There are only red counters, blue counters, green counters and yellow counters in a bag.

The table shows the probabilities of picking at random a red counter and picking at random a yellow counter.

Colour	red	blue	green	yellow
Probability	0.24			0.32

The probability of picking a blue counter is the same as the probability of picking a green counter.

Complete the table.

(Total for Question 22 is 2 marks)

9.

25 Four friends each throw a biased coin a number of times.
The table shows the number of heads and the number of tails each friend got.

	Ben	Helen	Paul	Sharif
heads	34	66	80	120
tails	8	12	40	40

The coin is to be thrown one more time.

(a) Which of the four friends' results will give the best estimate for the probability that the coin will land heads?
Justify your answer.

....

....

....

(1)

Paul says,

"With this coin you are twice as likely to get heads as to get tails."

(b) Is Paul correct?
Justify your answer.

....

....

....

(2)

The coin is to be thrown twice.

(c) Use all the results in the table to work out an estimate for the probability that the coin will land heads both times.

....

(2)

(Total for Question 25 is 5 marks)

10.

19 One morning Kai records the colour of the cars passing his house.
He then works out the relative frequency of each colour.
Some of his results are shown in this table.

Colour	Silver	Red	Green	Black	Other
Relative frequency		0.16	0.10	0.24	0.32

The following morning, Kai is going to record the colour of the first 200 cars to pass his house.

Work out an estimate for the total number of cars, coloured silver or red, that he should expect to see.

.... [4]

11.

9 Mia has knitted 3 left-hand gloves: 1 blue, 1 green, and 1 red.
She has knitted 2 right-hand gloves: 1 green and 1 red.

She chooses a left-hand glove and a right-hand glove at random to make a pair of gloves.

Mia says

I have a probability of $\frac{2}{3}$ of choosing a pair of gloves of the same colour as there is a red pair and a green pair and there are three colours.

Is she correct?
Show how you decide.

Mia is .... because ....

.... **[3]**

12.

7   Jenny has a five-sided **biased** spinner.
    The sectors are coloured red, blue, green, yellow and white.
    She spins the spinner 100 times.

    The table shows the number of times the spinner lands on each colour.

Colour	Frequency
Red	28
Blue	38
Green	6
Yellow	0
White	28
Total	100

    Jenny uses her data to estimate the probability of the spinner landing on each colour.

    (a) Write down Jenny's estimate for the probability of landing on red.

                                             (a) .... [1]

    (b) Jenny then writes in some of the colours on this probability scale.

    Impossible   Unlikely   Evens   Likely   Certain

    0   1
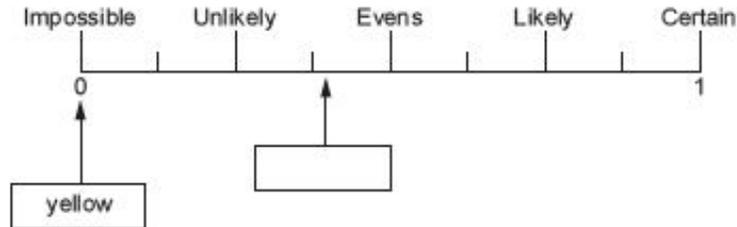
    yellow

    (i)   Write the correct colour in the box.   [1]

    (ii) Explain why Jenny's estimate for the probability of landing on yellow cannot be the actual
          probability.

          ....

          ....

          .... [1]

13.

21 Jacob, Amelie and Reuben each roll a fair six-sided dice.
What is the probability that all three roll a number less than 3?

Give your answer as a fraction in its simplest form.

.... **[3]**

14.

8 Darren has these 20 crayons in a box:

- 8 blue
- 4 red
- 5 black
- 3 green.

(a) He chooses a crayon at random from the box.
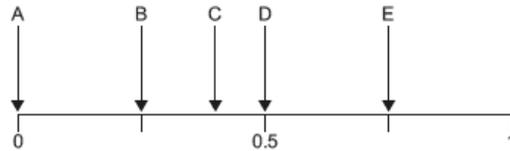
Which arrow shows the probability that this crayon is

(i) blue,

(a)(i) Arrow .... [1]

(ii) yellow,

(ii) Arrow .... [1]

(iii) **not** black.

(iii) Arrow .... [1]

(b) Darren buys 16 more crayons that are either blue or red.
He puts these in the box with the 20 crayons he already has.

He now picks a crayon at random from the box.
The probability that he picks a **blue** crayon is evens.

How many **red** crayons did he buy?

(b) .... [3]

15.

19 (a) This spinner has two grey sections, two white sections and one black section.
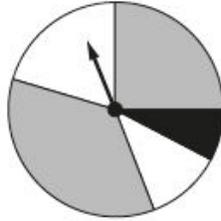
Vlad says

The probability of the spinner landing on black is $\frac{1}{5}$.

Explain why Vlad is not correct.

....

....

.... [1]

(b) The graph shows the cost of a litre of petrol for the last six months of 2017.
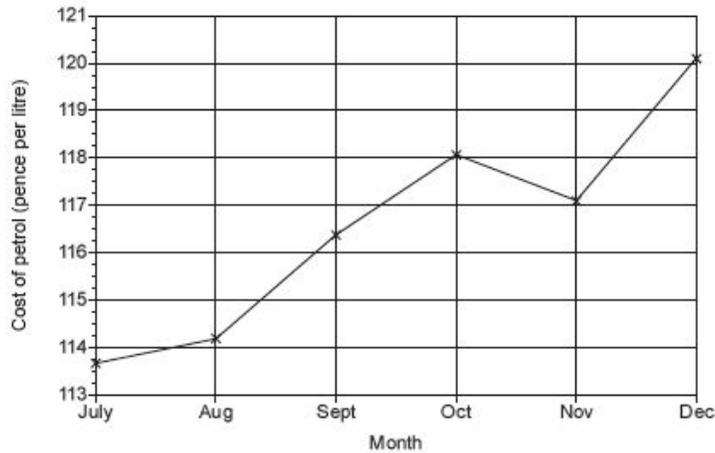
Explain why this graph is misleading.

....

....

.... [1]

16.

20 Sophie is organising a raffle.

- Each raffle ticket costs 50p.
- She sells 400 tickets.
- The probability that a ticket, chosen at random, wins a prize is 0.1.
- Each winning ticket receives a prize worth £3.

Sophie says

I expect the raffle to make over £100 profit.

Show that Sophie is wrong.

....

.... **[4]**

17.

21 A bag contains some counters.

- There are 300 counters in the bag.
- There are only red, white and blue counters in the bag.
- The probability of picking a blue counter is $\frac{23}{50}$.
- The ratio of red counters to white counters is 2 : 1.

Calculate the number of red counters in the bag.

.... **[4]**

18.

16 Finn has two bags of counters.
He takes a counter at random from each bag.

The probability that he takes a red counter from the first bag is 0.3.
The probability that he takes a red counter from the second bag is 0.4.

What is the probability that he takes **at least** one red counter?

.... [4]

19.

18 The table shows the relative frequencies of the results for a football team after a number of games.

Result of game	won	lost	drew
Relative frequency	0.2	0.45	

(a) Complete the table. [2]

(b) The team lost 10 more games than they won.

How many games did the team play altogether?

(b) .... [3]

20.

7 There are **20 coins** in a pot.
The coins are 1p, 2p, 5p and 10p.

A coin is taken at random from the pot.

- The probability that it is a 1p coin is $\dfrac{3}{10}$.

- The probability that it is a 2p coin is $\dfrac{2}{5}$.

The total value of the coins in the pot is 57 pence.

Work out how many of each type of coin there are in the pot.

1p .... , 2p .... , 5p .... , 10p .... **[4]**

21.

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]**

(b) The Venn diagram shows the number of students who passed their examination in French (F)
and those who passed their examination in Mathematics (M).
The number of students who did not pass either examination is *b*.
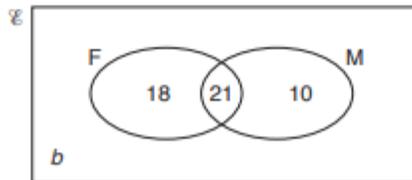
(i) Find the value of *b* if the total number of students is 55.

(b)(i) *b* = ... **[1]**

One of the 55 students is selected at random.

What is the probability that this student

(ii) passed both French and Mathematics,

(ii) .... **[1]**

(iii) passed exactly one of these two subjects?

(iii) .... **[1]**

22.

20 **(a)** This is a fair 5-sided spinner.
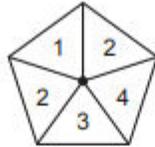
Ciara spins the spinner twice and records the product of the two scores.

(i) Complete the table.

First spin

x	1	2	2	3	4
1	1				
2			4		
2					
3					
4				12	

Second spin

[2]

(ii) Find the probability that the product is a multiple of 3.

(a)(ii) .... [2]

(b) Ciara makes a different fair 5-sided spinner.
She spins the spinner twice and records the product of the two scores.

Ciara says

The probability that the product is negative is 0.48.

Write numbers on the spinner below so that Ciara's statement is correct.
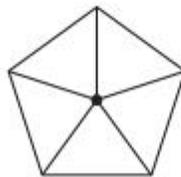
[3]

23.

4   An unbiased spinner is shown below.
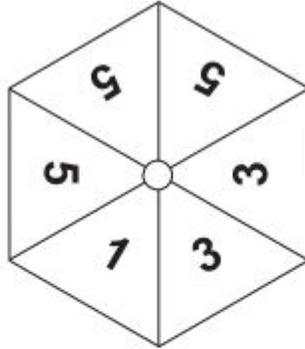
(a)   Write a number to make each sentence true.

    (i)   It is **evens** that the spinner will land on number ....   **[1]**

    (ii)   There is a probability of $\frac{1}{6}$ that the spinner will land on number ....   **[1]**

    (iii)   It is **impossible** that the spinner will land on number ....   **[1]**

(b)   The spinner below has the following properties.

- There are eight equal sections, each showing one number.
- There are three different numbers on the spinner.
- The probability of the spinner landing on an even number is greater than the probability of it landing on an odd number.
- It is more likely that the spinner will land on a 6 than either of the other numbers.

Complete the spinner to show one possible arrangement of numbers.
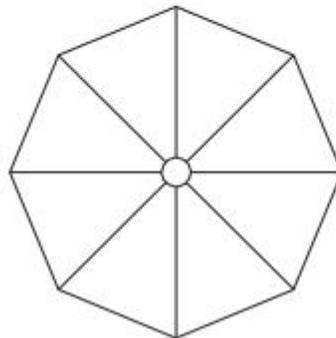
[3]

24.

21 Louise travels to work and home again by train.
The probability that her train to work is late is 0.7.
The probability that her train home is late is 0.4.

What is the probability that **at least** one of her trains is late?

.... **[4]**

25.

2   A tin contains four different types of sweet.
A sweet is taken from the tin at random.
The table below shows some of the probabilities of taking each type of sweet.

Sweet	Toffee	Fudge	Jelly	Mint
Probability	0.4	0.2		0.3

(a) Complete the table. [2]

(b) What is the probability that a toffee or a mint is taken from the tin?

(b) .... [2]

26.

10   In a game, a fair spinner has five equal sections as shown.
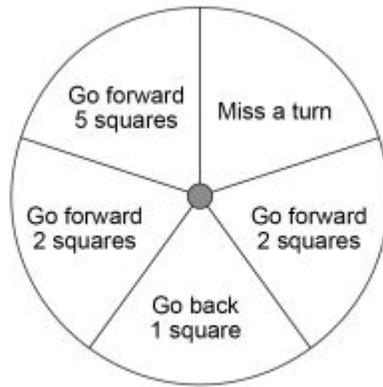
10 (a)   Chloe spins the spinner.

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

[1 mark]

Answer _____

10 (b)   The spinner lands on 'Go back 1 square' three times in a row.
Jamal is next to spin.

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

[1 mark]

Answer _____

10 (c) In one game there are 85 spins.

How many of these spins are expected to be 'Go forward 2 squares'?

[2 marks]

_____

_____

_____

_____

Answer _____

27.

27 A coin is thrown 50 times.
It lands on heads 31 times.

27 (a) Write down the relative frequency it lands on heads.

[1 mark]

Answer _____

27 (b) Raj says,

"The coin is biased towards heads."

Use the data to give a reason why he might be correct.

[1 mark]

_____

_____

_____

28.

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.

Write down the probability that he chooses the correct number.

[1 mark]

Answer _____

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

She chooses a different odd number at random.

What is the probability that she chooses the correct number?

[1 mark]

Answer _____

29.

25 There are 720 boys and 700 girls in a school.

The probability that a boy chosen at random studies French is $\frac{2}{3}$

The probability that a girl chosen at random studies French is $\frac{3}{5}$

25 (a) Work out the number of students in the school who study French.

[3 marks]

Answer _____

25 (b) Work out the probability that a student chosen at random from the whole school does **not** study French.

[2 marks]

Answer _____

30.

23 A coin is rolled onto a grid of squares.

It lands randomly on the grid.

To win, the coin must land completely within one of the squares.

Meera and John each roll the coin a number of times and record their results.

	Number of wins	Number of losses
Meera	6	44
John	28	72

23 (a) Work out **two** different estimates for the probability of winning.

[2 marks]

_____

_____

_____

Answer _____ and _____

23 (b) Which of your estimates is the better estimate for the probability of winning?

Give a reason for your answer.

[1 mark]

Answer _____

Reason _____

_____

_____

31.

27 A bag contains counters that are red, blue, green or yellow.

	red	blue	green	yellow
Number of counters	9	$3x$	$x-5$	$2x$

A counter is chosen at random.

The probability it is **red** is $\dfrac{9}{100}$

Work out the probability it is green.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

Answer _____