1 Circle the relative frequency that represents 13 successes out of 50 trials.

[1 mark]

$\frac{13}{50} = 0.26$

0.13 26 13 : 50 0.26

(1)

2 250 trains arrived at a station.

The number of trains that were late was recorded after every 50 trains.

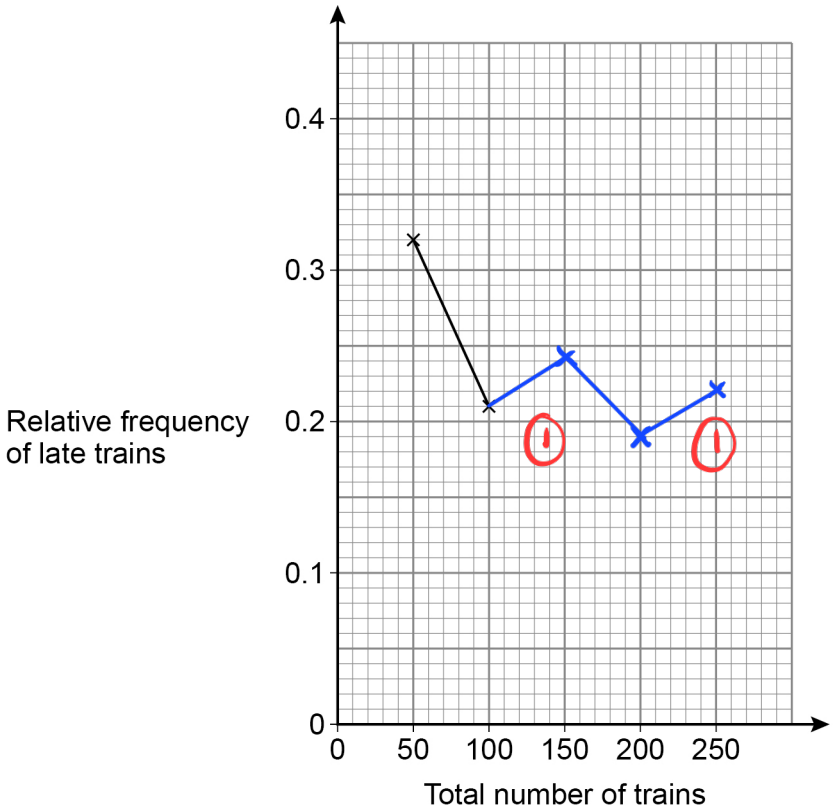
The table shows some information about the results.

Total number of trains	50	100	150	200	250
Total number of late trains	16	21	36	38	55
Relative frequency of late trains	0.32	0.21	0.24	0.19	0.22

(1)

2 (a) Complete the relative frequency graph.

[3 marks]



(1) (1)

2 (b) Write down the best estimate of the probability that a train arriving at the station is late.

[1 mark]

55 ÷ 250 = 0.22

Answer 0.22 (1)

3 Rosie makes phone calls to try to sell broadband.

Today, she made 120 calls.

The table shows the results.

Result of call	Frequency
Not answered	33
Answered but sale not made	81
Answered and sale made	6

3 (a) Write down the relative frequency that a call was **not answered**.

[1 mark]

Answer $\frac{33}{120}$ (1)

3 (b) During the **rest of the week**, Rosie will make 500 calls.

Using the results in the table, how many sales does she expect to make during the **rest of the week**?

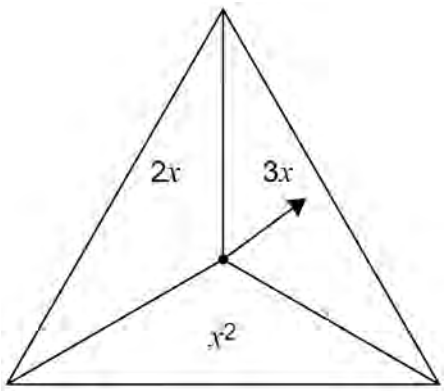
[2 marks]

$\frac{6}{120} \times 500 = 25$ (1) (1)

Answer 25

4 In a game,

- an ordinary fair six-sided dice is rolled
- the fair spinner shown is spun.



The score is the dice number **substituted** into the spinner expression.

4 (a) Complete the table to show all of the possible scores.

[2 marks]

	1	2	3	4	5	6
2x	2	4	6	8	10	12
3x	3	6	9	12	15	18
x^2	1	4	9	16	25	36

(2)

4 (b) A player wins the game if their score is 10 or more.

Work out the probability that they win the game.

[1 mark]

$\frac{8}{18}$

Answer $\frac{8}{18}$ (1)

4 (c) The game is played 711 times.

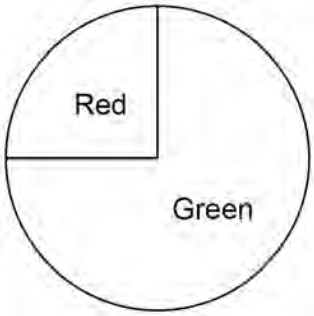
Estimate the number of games that are won.

[2 marks]

$\frac{8}{18} \times 711 = 316$ (1) (1)

Answer 316

5 Here is a **biased** spinner.



5 (a) Ali, Ben and Cary want to know the probability of spinning red on the biased spinner.

They each spin it and count how many times it lands on red and divide by the total number of spins.

Ali says — I spun red the most times

Ben says — I spun the spinner the most times

Cary says — My relative frequency of red is 0.25

Who had the best estimate for the probability of spinning red?

Give a reason for your answer.

[1 mark]

Ben since he spun the most times. (1)

5 (b) Dev spins the spinner 80 times.

He says,

"My relative frequency of red is 0.185"

Give a reason why his relative frequency must be wrong.

[1 mark]

$80 \times 0.185 = 14.8$. The answer is not a whole number. (1)

5 (c) Elena spins the spinner 125 times.

The relative frequency of red is 0.32

Work out how many times the spinner landed on **green**.

[2 marks]

$1 - 0.32 = 0.68$ (1)

$125 \times 0.68 = 85$ (1)

Answer 85

6 Here are the results after 250 spins of a coin.

Heads	128
Tails	122

The coin is spun an extra 50 times.

After all 300 spins, the relative frequency of Heads is 0.49

For the **extra 50 spins**, work out number of Heads : number of Tails

[3 marks]

After 300 spins :

(Heads) $0.49 \times 300 = 147$ (1)

(Tails) $0.51 \times 300 = 153$

For extra 50 spins: (Heads) : $147 - 128 = 19$ (1)

(Tails) : $153 - 122 = 31$

Answer 19 : 31 (1)

7 Jing rolls a fair six-sided dice 72 times.

	1	2	3	4	5	6
Frequency	16	11	10	8	14	13

Is the relative frequency of rolling a 5 greater than the theoretical probability?

Tick a box.

Yes [✓] No [ ]

Give a reason for your answer. **[3 marks]**

Rolling a 5 :

Theoretical probability = $\frac{1}{6} \times 72 = 12$ (1)

Relative frequency = 14 (1)

Yes, greater than theoretical probability.