



S23-30min Relative and Expected Frequency: 30-minute Pack

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A newsagent recorded the number of magazines sold in one hour. Of the 60 magazines sold, 15 were sports magazines.
- (a) Calculate the relative frequency that a magazine sold was a sports magazine. (2)
Give your answer as a fraction in its simplest form.
- _____
- (b) The newsagent expects to sell 300 magazines next week. Use the relative frequency from part (a) to estimate how many of these will be sports magazines. (2)
- (c) State one assumption needed for the estimate in part (b) to be reliable. (1)

(Total for Question 1 is 5 marks)

2 For each statement about relative frequency and expected frequency, write down whether it is True or False.

(i) The relative frequency of an outcome can be greater than 1. **(1)**

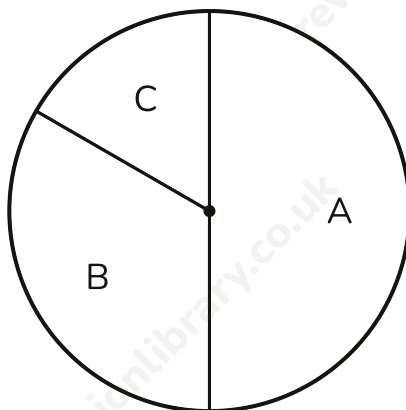
(ii) As the number of trials in an experiment increases, the relative frequency generally gets closer to the true probability. **(1)**

(iii) The expected frequency of an outcome always equals the number of times it actually occurs. **(1)**

(iv) Relative frequency can be used to estimate a probability when the theoretical probability is not known. **(1)**

(Total for Question 2 is 4 marks)

- 3** The spinner shown is divided into 3 unequal sections, A, B and C, based on the angles marked at the centre. The spinner is spun 300 times.



- (a) Write down the probability that the spinner lands on C. Give your answer as a fraction in its simplest form. (2)

.....

- (b) Work out the expected number of times the spinner lands on B in the 300 spins. (2)

.....

- (c) Work out the expected number of times the spinner lands on A or C combined in the 300 spins. (2)

.....

(Total for Question 3 is 6 marks)

- 4** A coin is tossed repeatedly. The table shows the cumulative number of heads recorded after different numbers of tosses.

Number of tosses	10	50	100	500
Number of heads	7	23	52	248

Give each relative frequency correct to 3 decimal places.

- (a)** Calculate the relative frequency of heads after 10 tosses. **(1)**

-
(b) Calculate the relative frequency of heads after 50 tosses. **(1)**

-
(c) Calculate the relative frequency of heads after 100 tosses. **(1)**

-
(d) Calculate the relative frequency of heads after 500 tosses. **(1)**

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(e) Comment on what these relative frequencies suggest about the probability that this coin lands on heads. **(2)**

(Total for Question 4 is 6 marks)

5 A factory tests a random sample of 80 light bulbs taken from a production run of 5000 bulbs. In the sample, 6 of the bulbs are found to be faulty.

(a) Calculate the relative frequency of a bulb in the sample being faulty. Give your answer as a decimal. (2)

.....
(b) Use the relative frequency from part (a) to estimate the number of faulty bulbs in the full production run of 5000 bulbs. (2)

.....
(c) The factory will recall the whole production run if the estimated number of faulty bulbs is more than 300. Using your answer to part (b), state whether the factory should recall the production run, giving a reason. (1)

(Total for Question 5 is 5 marks)

6 At a school fete, a stallholder runs a game. Players pay £2 to play. Each player picks one ball at random from a bag of 50 balls, of which 4 are winning balls. A player who picks a winning ball receives a £10 prize. 250 people play the game during the day.

(a) Work out the probability that a single player picks a winning ball. Give your answer as a fraction in its simplest form. (2)

.....
(b) Work out the expected number of winning picks out of the 250 players. (2)

.....
(c) Work out the total amount taken in entry fees from the 250 players. (1)

.....
(d) Using your answers to parts (b) and (c), work out the stallholder's expected profit for the day. (2)

.....
(Total for Question 6 is 7 marks)

Mark scheme · S23-30min Relative and Expected Frequency: 30-minute Pack

Question 1

- (a) **M1** $15/60$, oe
- (a) **A1** $1/4$ cao
- **(a) Answer: $1/4$**
- (b) **M1** $300 \times 1/4$, oe (or 300×0.25)
- (b) **A1** 75 cao
- **(b) Answer: 75**
- (c) **B1** assumes the proportion of sports magazines sold stays the same next week (or similar valid assumption), oe
- **(c) Answer: The proportion of sports magazines sold stays roughly the same next week as in the original hour.**

Question 2

- (i) **B1** False cao
- **(i) Answer: False**
- (ii) **B1** True cao
- **(ii) Answer: True**
- (iii) **B1** False cao
- **(iii) Answer: False**
- (iv) **B1** True cao
- **(iv) Answer: True**

Question 3

- (a) **M1** $60/360$, oe
- (a) **A1** $1/6$ cao
- **(a) Answer: $1/6$**
- (b) **M1** $300 \times 120/360$, oe (or $300 \times 1/3$)
- (b) **A1** 100 cao
- **(b) Answer: 100**
- (c) **M1** $300 - 100$, oe (or $300 \times (1/2 + 1/6)$)
- (c) **A1** 200 cao
- **(c) Answer: 200**

Question 4

- (a) **B1** 0.700 cao
- **(a) Answer: 0.700**
- (b) **B1** 0.460 cao
- **(b) Answer: 0.460**
- (c) **B1** 0.520 cao
- **(c) Answer: 0.520**
- (d) **B1** 0.496 cao
- **(d) Answer: 0.496**
- (e) **B1** identifies that the relative frequency is settling down / converging towards a value close to 0.5 as the number of tosses increases, oe
- (e) **B1** correct interpretation, e.g. this suggests the coin is fair, with the probability of heads close to 0.5, oe
- **(e) Answer: As the number of tosses increases, the relative frequency gets closer to 0.5 (0.700, 0.460, 0.520, then 0.496), suggesting the coin is fair, with a probability of heads close to 0.5.**

Question 5

- (a) **M1** $6/80$, oe
- (a) **A1** 0.075 cao
- (a) **Answer: 0.075**
- (b) **M1** 5000×0.075 , oe
- (b) **A1** 375 cao
- (b) **Answer: 375**
- (c) **B1** Yes, recall, because the estimated 375 faulty bulbs is greater than the threshold of 300, oe (ft from (b))
- (c) **Answer: Yes, the production run should be recalled, because the estimated 375 faulty bulbs is greater than the recall threshold of 300.**

Question 6

- (a) **M1** $4/50$, oe
- (a) **A1** $2/25$ cao
- (a) **Answer: 2/25**
- (b) **M1** $250 \times 2/25$, oe
- (b) **A1** 20 cao
- (b) **Answer: 20**
- (c) **B1** £500 cao ($250 \times £2$)
- (c) **Answer: £500**
- (d) **M1** $500 - 20 \times 10$, oe
- (d) **A1** £300 cao
- (d) **Answer: £300**