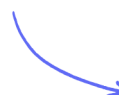


Practice Paper 5 (Probability & Statistics 1)

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Total Marks

/50

- 1 (a) A and B are two events such that $P(A) = 0.35$, $P(B) = 0.25$ and $P(A \cup B) = 0.6$.
State, with a reason, whether A and B are mutually exclusive.

(2 marks)

- (b) C and D are two events such that $P(C) = 0.2$, $P(D) = 0.4$ and $P(C \cap D) = 0.18$.
State, with a reason, whether C and D are independent.

(2 marks)

- 2 (a)** Praewa plays sports every day after school. She is four times more likely to choose football than tennis and three times more likely to choose basketball than tennis. She does not play any other sport.

Show that the probability of Praewa choosing tennis is $\frac{1}{8}$.

(1 mark)

- (b)** Find the probability that Praewa chooses three different sports on the next three days in a row.

(3 marks)

- (c)** On a five day week chosen at random, find the probability that Praewa chooses football every day.

(2 marks)

- 3 (a)** In the town of Wooster, Ohio, it is known that 90% of the residents prefer the locally produced Woostershire brand sauce when preparing a Caesar salad. The other 10% of residents prefer another well-known brand.

30 residents are chosen at random by a pollster. Let the random variable X represent the number of those 30 residents that prefer Woostershire brand sauce.

Suggest a suitable distribution for X and comment on any necessary assumptions.

(2 marks)

- (b)** Find the probability that

- (i) 90% or more of the residents chosen prefer Woostershire brand sauce
- (ii) none of the residents chosen prefer the other well-known brand.

(3 marks)

- (c)** Find

- (i) $E(X)$
- (ii) $\text{Var}(X)$.

(2 marks)

4 (a) The random variable X has the probability function

$$P(X = x) = \begin{cases} 0.23 & x = -1, 4 \\ k & x = 0, 2 \\ 0.13 & x = 1, 3 \\ 0 & \text{otherwise} \end{cases}$$

Find the value of k .

(2 marks)

(b) Construct a table giving the probability distribution of X .

(2 marks)

(c) Find $P(0 \leq X < 3)$.

(1 mark)

5 (a) The random variable $X \sim N(13, 15)$.

Find the value of a , to 3 significant figures, such that:

- (i) $P(X > a) = 0.2$
- (ii) $P(a \leq X \leq 14) = 0.5$
- (iii) $P(13 - a \leq X \leq 13 + a) = 0.9372$

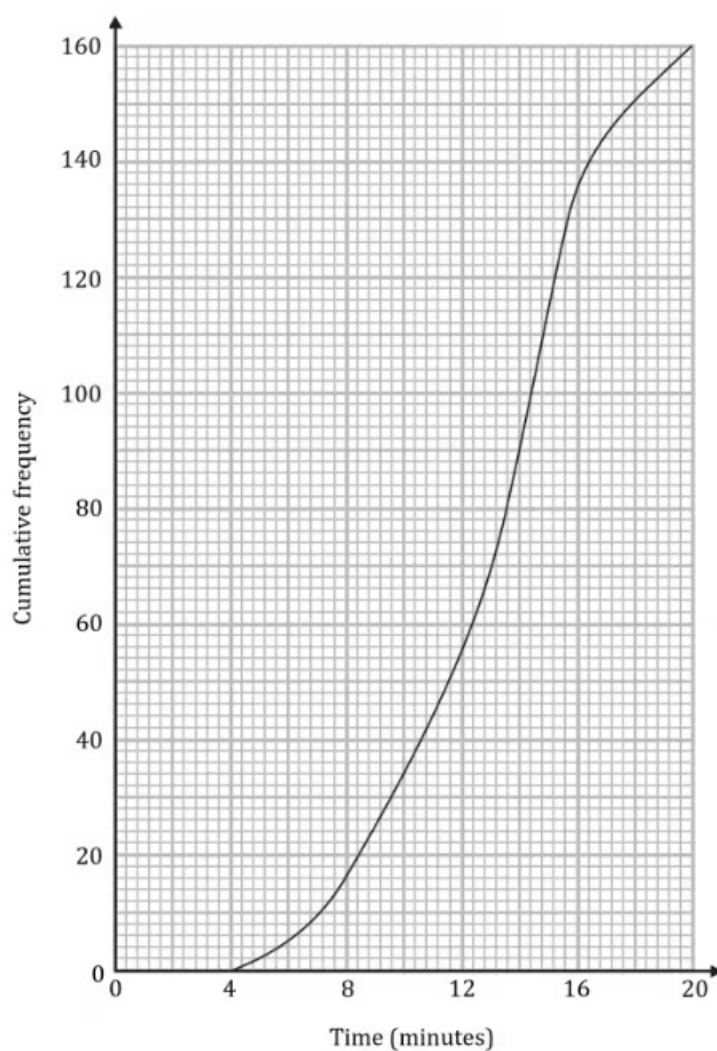
(8 marks)

(b) Explain why there are no values of a such that $P(14 \leq X \leq a) = 0.5$.

(2 marks)

- 6 (a)** The grouped frequency table below contains information about the lengths of time of Susie's calls with her customers. The table was used to draw the cumulative frequency curve also shown below.

Time (t minutes)	$4 < t \leq 8$	$8 < t \leq 12$	$12 < t \leq 16$	$16 < t \leq 20$
Frequency	16	a	b	c



Use the graph to find the values of a , b and c .

(3 marks)

(b) Use the graph to calculate the interquartile range of times for Susie's calls.

(3 marks)

(c) Use the graph to estimate the percentage of customers whose calls lasted longer than 10 minutes.

(2 marks)

7 (a) Nine cards are numbered 1, 2, 2, 3, 5, 5, 5, 6 and 8.

The nine cards are placed randomly in a line. In how many ways can this be done if

- (i) every odd number is separated by an even number
- (ii) all the odd numbers are together?

(4 marks)

(b) Four of the nine cards are chosen at random and placed in a line to make a 4-digit code. Find the number of ways the code can be made if

- (i) there are no repeated digits
- (ii) repeated digits are allowed and both 2s are used within the code.

(6 marks)