

**Probability and Statistics 1 May June 2024
Guess Paper**

CIE A Level Maths 9709



*This is not endorsed by Cambridge and is purely for practice purposes only.

Questions

1. The following back-to-back stem-and-leaf diagram represents the monthly salaries, in dollars, of the 27 employees at each of two companies, *A* and *B*.

Company A		Company B
5 4 1 1 0	25	4 4 5 6 6 7
9 9 8 7 2 1 0	26	0 1 3 5 5 7 9 9
8 6 4 2 1 0	27	1 3 4 6 6 8 8
6 5 4 2 0	28	0 1 2 2 2
9 8 5	29	
1	30	9

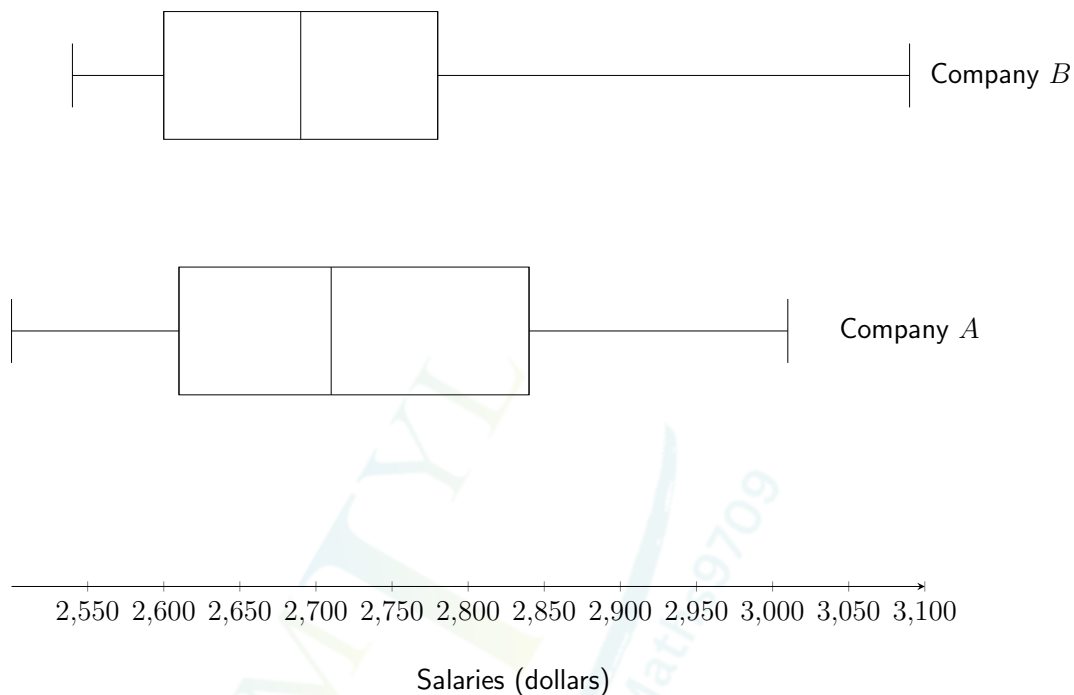
Key: 1|27|6 means \$2710 for company *A* and \$2760 for company *B*

- (a) Find the median and the interquartile range of the monthly salaries of employees in company *A*. [3]
The lower quartile, median and upper quartile for company *B* are \$2600, \$2690 and \$2780 respectively.
- (b) Draw two box-and-whisker plots in a single diagram to represent the information for the salaries of employees at companies *A* and *B*. [3]
- (c) Comment on whether the mean would be a more appropriate measure than the median for comparing the given information for the two companies. [1]
2. Jai and his wife Kaz are having a party. Jai has invited five friends and each friend will bring his wife.
- (a) At the beginning of the party, 12 people will stand in a line for a photograph.
- i. How many different arrangements are there of the 12 people if Jai stands next to Kaz and each friend stands next to his own wife? [3]
 - ii. How many different arrangements are there of the 12 people if Jai and Kaz occupy the two middle positions in the line, with Jai's five friends one on one side and the five wives of the friends on the other side? [2]
- (b) For a competition during the party, the 12 people are divided at random into a group of 5, a group of 4 and a group of 3. Find the probability that Jai and Kaz are in the same group as each other. [5]
3. Tim has two bags of marbles, *A* and *B*
- Bag *A* contains 8 white, 4 red and 3 yellow marbles
- Bag *B* contains 6 white, 7 red and 2 yellow marbles
- Tim also has an ordinary fair 6-sided die. He rolls the die. If he obtains a 1 or 2, he chooses two marbles at random from bag *A*, without replacement. If he obtains a 3, 4, 5 or 6, he chooses two marbles at random from bag *B*, without replacement.
- (a) Find the probability that both marbles are white. [3]
- (b) Find the probability that the two marbles come from bag *B* given that one is white and one is red. [4]

4. A fair 6-sided die has the numbers 1, 2, 2, 3, 3, 3 on its faces. The die is rolled twice. The random variable X denotes the sum of the two numbers obtained.
- (a) Draw up the probability distribution table for X . [3]
 - (b) Find $E(X)$ and $Var(X)$. [3]
5. A children's wildlife magazine is published every Monday. For the next 12 weeks it will include a model animal as a free gift. There are five different models: tiger, leopard, rhinoceros, elephant and buffalo, each with the same probability of being included in the magazine.
- Sahim buys one copy of the magazine every Monday.
- (a) Find the probability that the first time that the free gift is an elephant is before the 6th Monday. [2]
 - (b) Find the probability that Sahim will get more than two leopards in the 12 magazines. [3]
 - (c) Find the probability that after 5 weeks Sahim has exactly one of each animal. [3]
6. The lengths of Western bluebirds are normally distributed with mean 16.5cm and standard deviation 0.6cm. A random sample of 150 of these birds is chosen.
- (a) How many of these 150 birds would you expect to have lengths between 15.4cm and 16.8cm? [4]
The lengths of Eastern bluebirds are normally distributed with mean 18.4cm and standard deviation σ cm. It is known that 72% of Eastern Bluebirds have length greater than 17.1cm.
 - (b) Find the value of σ . [3]
A random sample of 120 Eastern Bluebirds is chosen.
 - (c) Use an approximation to find the probability that fewer than 80 of these 120 bluebirds have length greater than 17.1cm. [5]

Answers

1. (a) $q_2 = 2710$, $IQR = 230$
 (b) B : 2540 2600 2690 2780 3090
 A : 2500 2610 2710 2840 3010



2. (a) i. 46 080
 ii. 57 600
 (b) $\frac{19}{66}$, 0.288
 3. (a) $\frac{58}{315}$, 0.184
 (b) $\frac{168}{232}$, $\frac{21}{29}$, 0.724
 4. (a)

x	2	3	4	5	6
$P(X = x)$	$\frac{1}{36}$	$\frac{4}{36}$	$\frac{10}{36}$	$\frac{12}{36}$	$\frac{9}{36}$

- (b) $E(X) = \frac{168}{36}$, $\frac{14}{3}$, 4.67
 $Var(x) = \frac{10}{9}$, 1.11, $\frac{1440}{1296}$
 5. (a) 0.672
 (b) 0.442
 (c) 0.0384, $\frac{64}{625}$
 6. (a) 98, 99
 (b) $\sigma = 2.23$
 (c) 0.0804