Solomon Practice Paper

Statistics S1 – H

Time allowed: 90 **minutes**

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	5	
2	8	
3	9	
4	10	
5	13	
6	13	
7	17	
Total:	75	

How I can achieve better:

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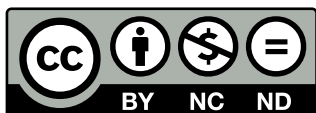
Last updated: July 14, 2025

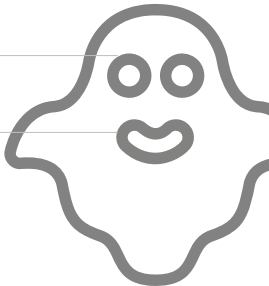1. The discrete random variable X has the following probability distribution.

x	k	$k+4$	$2k$
$\Pr(X = x)$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$

(a) Find and simplify an expression in terms of k for $\mathrm{E}(X)$. [3]

Given that $\mathrm{E}(X) = 9$,

(b) find the value of k. [2]

Total: 5

2. (a) Explain briefly what is meant by a statistical model. [2]

   (b) State, with a reason, whether or not the normal distribution might be suitable for modelling [6]
      each of the following:

      i. The number of children in a family;

      ii. The time taken for a particular employee to cycle to work each day using the same
         route;

      iii. The quarterly electricity bills for a particular house.

Total: 8

3. The probability that Ajita gets up before 6.30 am in the morning is 0.7.

   The probability that she goes for a run in the morning is 0.35.
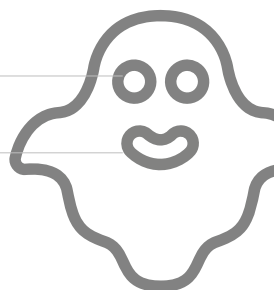
   The probability that Ajita gets up after 6.30 am and does not go for a run is 0.22.

   Let A represent the event that Ajita gets up before 6.30 am and B represent the event that she goes for a run in the morning.

   Find

   (a) $P(A \cup B)$,   [2]

   (b) $P(A \cap B')$,   [2]

   (c) $P(B|A)$.   [3]

   (d) State, with a reason, whether or not events A and B are independent.   [2]

                                                                          Total: 9

4. A company produces jars of English Honey. The weight of the glass jars used is normally distributed with a mean of 122.3 g and a standard deviation of 2.6 g.

   Calculate the probability that a randomly chosen jar will weigh

   (a) less than 127 g, [3]

   (b) less than 121.5 g. [3]

   The weight of honey put into each jar by a machine is normally distributed with a standard deviation of 1.6 g. The machine operator can adjust the mean weight of the honey put into each jar without changing the standard deviation.

   (c) Find, correct to 4 significant figures, the minimum that the mean weight can be set to such that at most 1 in 20 of the jars will contain less than 454 g. [4]
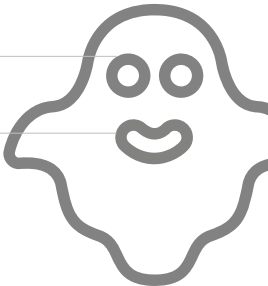
   Total: 10
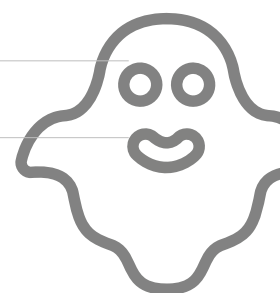
5. The letters of the word DISTRIBUTION are written on separate cards. The cards are then shuffled and the top three are turned over. Let the random variable V be the number of vowels that are turned over.

   (a) Show that $P(V = 1) = \frac{21}{44}$. [3]

   (b) Find the probability distribution of V. [4]

   (c) Find $E(V)$ and $Var(V)$. [6]

   Total: 13

6. A cinema recorded the number of people at each showing of each film during a one–week period. The results are summarised in the table below.

| Number of people	Number of showings
1 – 40	36
41 – 60	20
61 – 80	33
81 – 100	24
101 – 150	36
151 – 200	39
201 – 300	52

   (a) Draw a histogram on graph paper to illustrate these data. [4]

   (b) Calculate estimates of the median and quartiles of these data. [6]

   (c) Use your answers to part (b) to show that the data is positively skewed. [3]

Total: 13

7. A new vaccine is tested over a six-month period in one health authority.
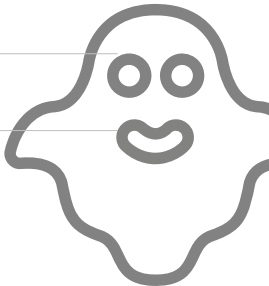
   The table shows the number of new cases of the disease, d, reported in the mth month after the trials began.

m	1	2	3	4	5	6
d	102	69	61	58	52	48

   A doctor suggests that a relationship of the form $d = a + bx$ where $x = \dfrac{1}{m}$ can be used to model the situation.

   (a) Tabulate the values of x corresponding to the given values of d and plot a scatter diagram of d against x.   [5]

   (b) Explain how your scatter diagram supports the suggested model.   [1]

   You may use

   $$\sum x = 2.45, \quad \sum d = 390, \quad \sum x^2 = 1.491, \quad \sum xd = 189.733$$

   (c) Find an equation of the regression line d on x in the form $d = a + bx$.   [7]

   (d) Use your regression line to estimate how many new cases of the disease there will be in the 13th month after the trial began.   [3]

   (e) Comment on the reliability of your answer to part (d).   [1]

   Total: 17