

- Hassan takes systematic samples of 50 of various cereal boxes from the production line and weighs its contents. Each box should contain approximately 300g but anything  $\pm 20\text{g}$  is considered acceptable.

	$0 \leq w < 280$	$280 \leq w < 300$	$300 \leq w < 320$	320 and over
<b>Rice Pops</b>	3	20	21	6
<b>Choco Pops</b>	0	18	25	7
<b>Icy Flake</b>	6	23	21	0
<b>Choco Flakes</b>	7	18	19	6

Carry out a Chi-squared test, at the 5% level of significance, to see if the type of cereal is independent of the weight of its contents.

- It is believed that a person's ear shape is related to their hearing loss. As part of an investigation into this belief a sample of 180 participants took part in a study which looked at the shape of their ear and their hearing loss over the period of 10 years. Ears can be categorised as Round, Square, Rectangular, Crescent or Triangular and a participant's hearing loss was measured as a percentage. The results of the investigation are summarised in the table below.

	Round	Square	Rectangular	Crescent	Triangular
$0 \leq \% < 20$	18	12	7	16	13
$20 \leq \% < 50$	14	16	3	12	15
$50 \leq \% < 80$	10	10	9	8	6
$80 \leq \% \leq 100$	7	2	0	2	0

You may assume that the 180 people represent a random sample.

Test, using the 5% level of significance, whether the shape of a person's ear is independent of their percentage hearing loss after 10 years. (Based on JUNE 12)

- A local doctors surgery has to employ 4 locum doctors over a period of 3 weeks to cover staff who are on annual leave. The administration team from the surgery are concerned with the number of hospital referrals the locums are making and the long-term cost implications these will have on the surgery. Locums A and B were from neighbouring surgeries and over the three weeks, saw 132 patients including 24 hospital referrals and 115 patients including 21 hospital referrals respectively. Locums B and C were from an agency and saw 24 patients, referring 2 to hospital and 39 patients referring 1 to hospital respectively.

Using a  $4 \times 2$  contingency table, test at the 5% level of significance whether the proportion of patients referred to hospital is associated with the locum a patient sees at the surgery.

- A corner shop chain is trialling a selection of new products in some of its stores. It is important that the right types of product are stocked in the right stores to maximise profit. The table below shows the number of three new products that were sold in four stores in different parts of the county on the first day

	Product A	Product B	Product C
<b>City Centre</b>	13	15	19
<b>City Outskirts</b>	6	2	4
<b>Town Centre</b>	19	13	17
<b>Rural Village</b>	2	5	32

Test whether the results of this trial provide significant evidence that the number of products sold is independent of the area in which the store is located.

- An office being redecorated after several years of neglect and the office workers are being given the opportunity to give their opinions on the way in which it is to be decorated. The decorator does not believe that this is a good idea as the office has a lot more female staff than male and therefore he thinks the female staff are more likely to choose more stereotypically feminine colours such as pink and purple. The office manager has narrowed the colour palette down to 5 colours and asks everyone to choose their favourite. His results are shown in the table below

	Pink	Purple	Green	Blue	White
<b>Male</b>	0	2	12	14	17
<b>Female</b>	13	15	16	12	24

Test the decorator's belief at the 5% significance level.