

# INSTITUTE AND FACULTY OF ACTUARIES

## EXAMINATION

November 2016

### Subject CA3 – Communications

#### Paper 1

*Time allowed: 1 hour 30 minutes + 15 minutes reading time*

#### **INSTRUCTIONS TO THE CANDIDATE**

1. *You have 15 minutes before the start of the examination in which to read the question. You are strongly encouraged to use this time for reading only, but notes may be made. You then have 1 hour 30 minutes to complete the paper.*
2. *The work you submit MUST be saved in Microsoft Word 2007 format, e.g. using the docx file extension. You may only upload one document and you must not embed files in the document.*
3. *Copies of the Formulae and Tables, Core Reading for subjects CT1–CT8 inclusive and CA1 will be available electronically during the exam. These documents are for use during the exam period only and not for general use. No other material can be referred to.*
4. *In addition to this paper you should have available your own electronic calculator from the approved list, <https://www.actuaries.org.uk/studying/prepare-your-exams/authorised-calculators>.*
5. *You are not permitted to use the internet to help you during the exam.*
6. *You are required to work through the exam assignment without assistance from another person. You are reminded that by undertaking this exam you are bound by the Institute and Faculty of Actuaries' Examinations Rules and Regulations. By submitting your files you are confirming that all the material is entirely your own work and you wish this to be taken into account for this assessment. Only the first submissions will be accepted.*
7. *Save your work regularly. Saving your work is your responsibility so failure to do so will not be a significant mitigating circumstance. Do NOT log off the application until you receive confirmation of receipt from the Online Education Team.*
8. *At the end of the examination, save your completed assignment and follow the upload instructions that have been provided. Once the exam is over all related material and notes made during the examination must be destroyed.*
9. *If you encounter any difficulties please email [online\\_exams@actuaries.org.uk](mailto:online_exams@actuaries.org.uk) or telephone the Online Education Team on +44 (0)1865 268255.*
10. *Professional behaviour is mandatory and no material relating to the exam may be disclosed or discussed with others, nor used in a further attempt at the exam. Failure to comply with this will be deemed to be a breach of the examination regulations and may result in disciplinary action.*

**PLEASE NOTE THAT THE CONTENT OF THIS PAPER IS CONFIDENTIAL AND STUDENTS ARE NOT TO DISCUSS OR REVEAL THE CONTENTS UNDER ANY CIRCUMSTANCES.**

You are a junior actuary working in the data analytics department of World Beverages Limited (WB) which sells a variety of teas and coffees. The fastest growing area of WB sales is in “coffee capsules”, which are individual servings of coffee that can only be used in a specific coffee machine manufactured and sold by WB. The marketing team is keen to develop this market and has proposed three possible promotions to be offered **with the sale of new coffee machines**.

**Proposal 1 – “\$75 off the cost of coffee capsules”**

- The \$75 is made up of three \$25 vouchers to spend on coffee capsule orders.
- Vouchers must be used within a year of purchase of the new machine.
- Only one \$25 voucher can be used per order of coffee capsules.

**Proposal 2 – “Includes 200 free coffee capsules”**

- The 200 free capsules comprise 5 of each of the 40 varieties of coffee capsule.
- There is no choice of coffee capsules included and no cash alternative.

**Proposal 3 – “Buy One Get One Free on a new machine”**

- Customers receive two new machines for the price of one.
- There is no cash alternative.
- Coffee machines are available in a selection of colours. Customers would have a choice of colour from the machines in stock and would not need to have two machines in the same colour.

The head of marketing has telephoned your manager to say that he believes that Proposal 3 will be the most attractive offer, because it is a well known incentive in the market and consumers are familiar with this sort of offer. However, he is concerned that Buy One Get One Free offers (referred to as BOGOF’s) have received some bad press recently (customers being enticed by the offer but end up with something that they don’t want and won’t use). He is also concerned that such a promotion is not consistent with WB’s company objectives of being an environmentally friendly company.

Your manager has asked you to draft a memo for the head of marketing to provide a preliminary analysis of the three proposals, in particular addressing his concerns about the BOGOF proposal. He has suggested that you:

- *Summarise the results of the research that the analytics team have carried out on the three categories of customer and their buying habits.*
- *Illustrate, for each category, the typical spend for one year, with appropriate commentary; and*
- *Evaluate each of the marketing team’s proposals under the following criteria:*
  - *the value of the proposal to the customer; and*
  - *whether the proposal meets WB’s environmentally friendly non wastage policy.*

The head of marketing has been impressed by memos in the past that have included tables and charts so please use these where appropriate.

Your manager has asked you to be clear on any findings from your analysis.

One of the actuarial students in your team has provided you with the following background information together with some mathematical analysis:

## **Background information**

### **WB machine**

- The cost of a WB machine that uses WB coffee capsules is \$200.
- WB only manufactures one model of coffee capsule machine but in a variety of colours. Seven colours are available white, cream, red (metallic finish), black, green (metallic finish), midnight blue and silver (metallic finish).
- Machines do not require servicing or maintenance and usually need replacing after 5,500 coffee capsules have been used.
- Machine failure is sudden with no warning that a machine is reaching the end of its lifetime.

### **Coffee capsules**

- Coffee capsules can only be ordered online.
- The minimum order for a purchase of coffee capsules is 200 capsules.
- All coffee capsules cost \$0.30 each.
- There are 40 different types of coffee capsule available. These include both caffeinated and decaffeinated coffee plus coffee in different strengths and from different regions around the world.
- It is recognized that customers have different tastes in coffee which is why 40 different types are necessary to cater for all customers tastes.
- WB produces some introductory coffee packs which include 5 different coffee capsules of a similar taste and strength. This is in recognition that individual customers have specific tastes and any one customer usually only likes up to 12.5% of the WB coffee capsule range.

### **WB environmental policy**

- WB sees itself as a very environmentally friendly company, and has a stated policy of being against wastage. Producing high quality fresh coffee capsules so that customers just use what they need is seen by WB as being in line with this policy.
- Customers are encouraged to recycle coffee capsules. Used coffee capsules are collected when a delivery of new coffee capsules is made. Collection bags for this purpose are provided with each order of capsules.

### **Research**

- Research carried out by the analytics team at WB has identified three main different categories of customer for WB coffee machines and capsules as follows:
  - “Low” users are typically single person households, who use an average of 2 coffee capsules a day.
  - “Medium” users are two person households (couples or families with younger children). Typically they use between 2 and 10 capsules a day, averaging about 5 capsules.
  - “High” users are multi person households (often families with older children who also consume coffee), small offices or business users. Typically they use more than 10 capsules a day, averaging about 15 capsules a day.
- Purchasing details of all customers are held online so that customers can duplicate an order of capsules based on their last 5 orders if they wish.
- Although the research carried out by the analytics team is ongoing sufficient data has been collected to ensure a high level of certainty on the results gathered to date.

### **Analysis of estimated new customer spend**

The following figures show the estimated year 1 spend for a new customer for each of the three types of coffee users, based on the average coffee usage for that customer type. The assumptions used in these calculations are outlined below.

#### **“Low” users**

- Cost of annual spend on coffee capsules =  $2 \times 365 \times 0.30 = \$219.00$ .
- Cost of new machine = \$200.00.
- Total cost in year 1 =  $219.00 + 200.00 = \$419.00$ .
- Proportion of machine's lifetime used in one year =  $2 \times 365 / 5,500 = 13.273\%$ .

#### **“Medium” users**

- Cost of annual spend on coffee capsules =  $5 \times 365 \times 0.30 = \$547.50$ .
- Cost of new machine = \$200.00.
- Total cost in year 1 =  $547.50 + 200.00 = \$747.50$ .
- Proportion of machine's lifetime used in one year =  $5 \times 365 / 5,500 = 33.182\%$ .

#### **“High” users**

- Cost of annual spend on coffee capsules =  $15 \times 365 \times 0.30 = \$1,642.50$ .
- Cost of new machine = \$200.00.
- Total cost in year 1 =  $1,642.50 + 200.00 = \$1,842.50$ .
- Proportion of machine's lifetime used in one year =  $15 \times 365 / 5,500 = 99.545\%$ .

#### **Assumptions**

- 365 days in a year.
- Coffee capsules cost \$0.30 each and this cost remains unchanged over the full year.
- No discount on coffee capsules for high volume users.
- “Low” and “Medium” users order the minimum number of 200 coffee capsules when they make an order.
- New machine costs \$200.00.
- Machine lifespan is 5,500 capsules.
- All users are aware of the lifespan of the machine.

**Note: all figures, assumptions and statements are correct for the purpose of this question. You are not expected to come up with alternative proposals, consider the value to customers of reselling the offers or giving to someone else, comment on the cost to WB of providing the offer etc.**

**Draft a response to the marketing manager of World Beverages Limited in approximately 600 words.**

**END OF PAPER**