Numeracy & Statistics (Interpreting & Analysing Information)

Main Aim(s) of the Unit:
The aims of this unit are to equip students the necessary skills to interpret information, carry out calculation and interpret the results of that information and later, to equip students with some of the analytical skills that are relevant to the study of Business Studies as a whole.

Main Topics of Study:
Using a Calculator:
- Approximations
- Estimation
- Degrees of Accuracy
- The Keys of a Calculator
- Standard Form

Fractions:
- Types of Fraction
- Equivalent Fractions
- Operations Involving Fractions
- The Conversion Between Fractions & Decimal Fractions

Ratio and Proportion:
- Ratio
- Division in a Given Ratio
- Direct Proportion
- Scale Diagrams & Models

Measurement:
- Metric and Imperial Units
- Conversion Between Metric & Imperial Units

Percentages:
- Percentages
- Finding a Percentage of an Amount
- Increasing & Decreasing an Amount by a Given Percentage
- Expressing One Quantity as a Percentage of Another

Wages & Salaries:
- Basic Pay
- Overtime Rates
- Commission
- Piecework
- Deductions from Pay

Travel:
- Foreign Currency
- Time
- Timetables

Sampling, Surveys,

Questionnaires:
- Surveys
- Censuses
- Samples
- Sampling Methods
- Bias
- Questionnaires
- Pilot Surveys
- Hypothesis Testing

Classification & Tabulation of Data:
- Tabulation
- Classification of Data
- Tally Charts
- Frequency Tables

Statistics on Display:
- Pictorial Representation of Data
- Pictograms
- Bar Charts
- Pie Charts
- Line Graphs
- Frequency Polygons
- Drawing Inferences from Diagrams
Averages & Range:
- The Arithmetic Mean
- The Mode
- The Median
- The Use of Mean, Mode & Median
- The Mean & Median of a Frequency Distribution
- Range

Cumulative Frequency:
- The Cumulative Frequency Curve (or Ogive)
- The Median
- The Interquartile Range
- Percentiles

Probability:
- Introduction
- Probability From Theory and Experiment
- Simple Probabilities
- Simple Laws of Addition
- Possibility Space
- Networks & Decision

Trees:
- Networks
- Decision Trees

Algebra:
- The Basics of Algebra
- Indices
- Brackets
- Common Factors
- Equations
- Harder Equations
- Trial & Improvement
- Flow Diagrams
- Sequences
- Formulae

Graphs:
- Graphs & Curves
- The Interpretation of Graphs
- Graph Plotting
- Conversion Graphs
- Cartesian Coordinates
- Straight Line Graphs
- Gradients & Intercepts

Geometrical Shapes:
- Lines & Angles
- Polygons
- Circles & Angles
- Tessellations
- 2D
- Representation of 3D Objects

Mensuration:
- Perimeters of Polygons
- Area
- The Circumference and Area of a Circle
- Volume
- Time & Travel

Graphs:
- Distance-Time Graphs with Straight Lines
- Distance-Time Graphs with Curves
- Velocity-Time Graphs
- Growth & Decay

Further Algebra:
- Simultaneous Equations
- Inequalities
- Removing Brackets
- Rearranging Formulae
Learning Outcomes for the Unit
At the end of this Unit, students will be able to:
1. Identify appropriate types of quantitative information and their sources.
2. Rationalise and structure that information.
3. Use and analyse information that is presented in numerical form in an appropriate method to extract all relevant trends, patterns and points of importance.
4. Present the results and data informative and attractive manners including in diagrammatic form to clients, partners and business colleagues.

Learning and teaching methods/strategies used to enable the achievement of learning outcomes:
Learning takes place on a number of levels through lectures, class discussion including problem review and analysis. Formal lectures provide a foundation of information on which the student builds through directed learning and self managed learning outside of the class. The students are actively encouraged to form study groups to discuss course material which fosters a greater depth learning experience.

Assessment methods which enable student to demonstrate the learning outcomes for the Unit:
3 Hour Examination 100%

Indicative Reading for this Unit:
Main Text:
Application of Number - B Gaulter & L Buchanan (Oxford University Press)
Business Essentials - Business Maths: Study Text, BPP Learning Media

Guideline for Teaching and Learning Time (10 hrs per credit)
50 hours Lectures / Seminars / Tutorials / Workshops
Tutorial support includes feedback on assignments and may vary by college according to local needs and wishes.

50 hours Directed learning
Advance reading and preparation / Class preparation / Background reading / Group study / Portfolio / Diary etc

100 hours Self managed learning
Working through the course text and completing assignments as required will take up the bulk of the learning time. In addition students are expected to engage with the tutor and other students and to undertake further reading using the web and/or libraries.
MARCH 2011
INTERPRETING & ANALYSING INFORMATION (NUMERACY & STATISTICS)

Instructions to candidates:
a) Time allowed: Three hours (plus an extra ten minutes’ reading time at the start – do not write anything during this time)
b) Answer ALL questions in Part A and any THREE questions in Part B
c) Part A carries 40% of the marks and Part B carries 60% of the marks
d) Marks for each question are shown in [ ]

PART A
1. Calculate the metric or imperial equivalent as appropriate for EACH of the items below:
   a) 4¾ gallons
   b) 36.75 kilometres
   c) 7¼ inches
   d) 33.3 metres
   e) 17 pounds [1 each ]

2. ‘Your Choice’ offer a 10% discount on all holidays booked before 30 November in the year previous to travel. How much will a family of 2 adults and 3 children aged 7, 10 and 15 pay for a holiday whose advertised price is £275 each with a 35% reduction for children under 14 years of age? [5]

3. Sindy works at Parrots, a famous department store. The basic hourly rate paid to sales staff is £5.75 per hour. During one week, Sally worked a basic 40 hours and in addition, on Sunday, worked for 8 hours at double time. Calculate Sally’s gross pay for this week. [4]

4. KH Plc make 1256 televisions per week. The number of LCD, LED and plasma models is in the ratio of 8 : 7 : 3.
   a) How many plasma televisions are made?
   b) How many of the televisions are LED models? [2 each]

5. Joel is setting up in business selling mobile phones and has £65,000 to invest in capital. He has already spent 60% on buildings and a further 21% on fixtures and fittings. Calculate how much he has left to spend on his stock of mobile phones. [4]

6. Nora catches a train from Coventry to London Euston at 15.45. The journey takes 2 hours 10 minutes. Nora must then catch a London Underground train, which leaves at 40 minutes past the hour and takes approximately 23 minutes to reach her destination at Swiss Cottage. At what time does Nora arrive at Swiss Cottage? [3]

7. Jenny is the assistant manager of a retail clothing shop. She receives a basic salary of £19,750 per year and is also paid commission which averages £175 per week. Her tax allowance is £6475 for the tax year 2010/2011.
   a) Calculate her gross pay for the year. [3]
   b) If the basic rate of tax is 20%, how much tax does she pay in this tax year? [4]
   c) Calculate her net pay for the year. [2]

8. ‘Bud-Jet’, a budget airline, is considering whether it would be profitable to arrange flights between Eastleigh, a local airport, and Alicante, Spain. Construct three questions for a questionnaire designed to discover if there is demand for such a proposal and whether it is profitable. [6]

PART B
9. The cost of employing a member of staff at D&T DIY Superstore is not solely the wage the employee receives. In addition, D&T must pay National Insurance contributions, employer’s pension contributions, uniform costs, together with additional costs associated with payroll, etc. For an employee earning £18,750 per year and assuming one year as 52 weeks, calculate the following:
   a) National Insurance costs which are levied at the rate of 11% on all earnings in excess of £97 per week [4]
   b) Pension contributions which would be 6.5% of the employee’s wage before NI contributions [3]
   c) Additional costs which would be £18 per week. [3]
   d) Total annual costs of employing this member of staff, using your findings in a), b) and c) and the cost of uniform at £120 [2]
   e) Show a breakdown of the costs as a pie chart. [8]

10. Hardy Fabrications produces rectangular steel plates which measure 280 cm by 112 cm. The plates are marked with a line along each side, 2 cm in from the edge. Rivet holes are then drilled 8 cm apart along this line. It takes an operative 15 seconds to drill each hole for the rivets.
    a) Calculate:
        i the perimeter of the plate [3]
        ii the length of the line marked out for the rivets [3]
        iii how many rivets are needed for each plate [4]
        iv the area of the plate in square metres [3]
As a result of modifications required by a customer, rivets are now required 10 cm apart, resulting in double the amount of time needed to drill the plates.

b) Calculate:
   i  the new number of rivets needed for each plate [3]
   ii the amount of time taken to drill the holes for the new number of rivets [4]

11. Mia invested £5,100 in a Building Society Cash ISA account (i.e. a tax-exempt individual savings account). The account attracts an interest rate of 2.70% per annum.
   a) Assuming that there is no change of rate, draw a table to show the amount of money in the account at the end of each year, for a ten-year period. [4]
   b) Draw a curve to illustrate the growth of this investment. [6]
   c) If no money is withdrawn, how much is in the account after:
      i  2½ years [2 each]
      ii 7 years [2 each]
   d) Calculate the cumulative rate of growth after:
      i  4½ years [3 each]
      ii 10 years

12. The money markets influence the spot and forward rates for currency exchange on a daily basis. In the case of someone owning property in Europe, transferring money into a foreign bank account at the rate applicable at the time of transfer is important. On a particular day the sterling rate of exchange for Euros are:
   Closing market rate: 1.1875 – 1.1880
   Previous market rate: 1.1736 – 1.1891
   Tom visited his bank on the day before to transfer £11,000 sterling into his German bank account.
   a) What is the maximum number of Euros he can expect to be credited to his account in Germany? [5]
   b) What is the least number of Euros which would have been credited? [5]
   c) Express the difference between these two figures in a) and b) as a percentage difference between the two rates. [5]
   d) If the bank charges £35 to make a transfer, what is the true range of exchange rates that will apply? [5]
**Instructions to candidates:**
a) Time allowed: Three hours (plus an extra ten minutes’ reading time at the start – do not write anything during this time)
b) Answer ALL questions in Part A and any THREE questions in Part B
c) Part A carries 40% of the marks and Part B carries 60% of the marks. Marks for each question are shown in [ ]
d) Non-programmable calculators are permitted in this examination

**PART A**
1. A sheet of PVCu plastic of thickness 3 cm measures 1 m by 70 cm and weighs 35.6 kg. Find the density of plastic in grams per cubic centimetre.

2. For EACH population below, state whether the variable given is discrete or continuous:
   a) The number of employees in BP
   b) The number of applicants for driving licences
   c) The time taken to complete a tax return
   d) The number of Christmas shoppers visiting the local shopping centre

3. During their Spring Sale Promotion, Field’s, a well-known store, offer \( \frac{1}{3} \) off all items for sale and for two days only, they offer a further \( \frac{1}{4} \) off all sale items. What fraction is deducted in total during the two-day promotion?

4. Dimsung make 1218 television sets. The number of LCD, plasma and LED models is in the ratio of 4 : 11 : 6.
   a) How many portable television sets are made?
   b) How many of the televisions are LCD models?

5. A firm offers a discount of 5% of an invoice if it is paid on time and a further discount of \( \frac{1}{40} \) of the invoice for early payment within 10 days. Calculate the fraction of the invoice that is deducted for early payment.

6. Gavin has an interview in London at 1.45 p.m. The train journey from his local station takes 2\frac{3}{4} hours. He allows a further 20 minutes to walk from the station to his destination. In case of delays, he allows an extra 25 minutes’ travelling time. At what time should Gavin leave for his local station, assuming that trains are timetabled to leave at 20 minutes past the hour?

7. Christine works as a sales adviser for a local computer games shop. She receives a basic salary of £20,250 per year and is also paid commission which averages £95 per week. Her tax allowance is £6475 for the tax year 2010/2011.
   a) Calculate her gross pay for the year.
   b) If the basic rate of tax is 20%, how much tax does she pay in this tax year?
   c) Calculate her net pay for the year.

8. Keith works at a local distribution warehouse. His basic hourly rate is £6.75 per hour. During the Christmas period, Keith worked a basic 40 hours and in addition, on Boxing Day, worked for 11 hours at triple time. Calculate Keith’s total wages for the week, including the overtime worked on Boxing Day.

**PART B**
9. A petrol station sold 55,000 gallons of unleaded petrol in one week. The three types of fuel sold by the petrol station were in the proportion of:
   Super unleaded petrol 23%
   Unleaded petrol 48%
   Diesel 29%
   a) Calculate the total sales of fuel in that week.
   b) Draw a pie chart which shows the sales of the above types of fuel.
   c) How much unleaded petrol was sold?
   d) How much diesel was sold?

10. Downer Projects are an international import-export company dealing in manufactured products. The majority of their business is with India and they are very aware of how fluctuations in exchange rates can influence the profitability of their business with countries such as India. They need to convert £ Sterling to Indian Rupees and vice versa.
   a) Draw a conversion graph given that the conversion rate is £1 = 72.50 Rupees.
   b) Use your graph to convert:
       i) 61,000 Rupees to £ Sterling
       ii) £1150 to Rupees
   c) The exchange rate changed to £1 = 68.75 Rupees following the publication of India’s annual growth figures. Draw a further conversion graph for this new rate.
   d) Use your graph to convert:
       i) £2450 to Rupees
11. Royston bought an antique armchair for £1250. He expects its value to increase by 7% per year.
   a) Draw a graph to show his estimate of the expected value up to 10 years. [10]
   b) Find:
      i) the value which Royston expects the antique armchair to be worth after 4 years [2]
      ii) the rate of increase in the armchair’s value after 3 years [3]
      iii) the value of the armchair after 9 years [2]
      iv) the rate of increase in the armchair’s value after 8 years [3]

12. The Wayne Valley Country Park has a circular tramway track around the perimeter of the park. Visitors can travel in the carriages to various stations on the track. A family boards a carriage at one station and gets off at a station which is halfway round the perimeter having travelled a distance of 3.6 km.
   a) How far would they have to walk between the two stations if they could walk straight across the park? [5]
   b) Calculate the area of the country park. [4]
   c) If there are six stations spaced equally around the perimeter, how far would the family have to walk between each station? [3]
   d) If the tramway were moved so that the track ran 0.4 km outside the existing circumference, calculate:
      i) the new circumference [5]
      ii) the distance between each station on this new track [3]
INTERPRETING & ANALYSING INFORMATION (NUMERACY & STATISTICS)

Instructions to candidates:

a) Time allowed: Three hours (plus an extra ten minutes’ reading time at the start – do not write anything during this time)

b) Answer ALL questions in Part A and any THREE questions in Part B

c) Part A carries 40% of the marks and Part B carries 60% of the marks

d) Marks for each question are shown in [ ]

PART A

1. Find the distance covered:
   a) by a lorry travelling at 70 km/h for 2.4 hours
   b) by an aircraft travelling at 575 mph for 4 hours 35 minutes [2 each]

2. For EACH population below, state whether the variable given is discrete or continuous:
   a) The lengths of pipes coming off a factory production line
   b) The number of employees’ cars parked in a firm’s car park for a normal workday
   c) The time taken to complete a job by each employee of a firm [2 each]

3. ‘Happy Holidays’ offer a 5% discount off all holidays booked up to 3 months in advance. How much will a family of 2 adults and 3 children aged 8, 12 and 14 pay for a holiday whose advertised price is £375 each with a 50% reduction for children under 14 years of age? [4]

4. Brilliant makes 2552 television sets. The number of LED, LCD and plasma models is in the ratio of 4:15:3.
   a) How many LED television sets are made?
   b) How many of the televisions are LCD models? [2 each]

5. AB Plastics Ltd offer a discount of 5% off an invoice if it is paid on time and a further discount of 1/30 of the invoice for early payment within 10 days. Calculate the fraction of the invoice that is deducted for early payment. [4]

6. A ferry from Dover to Calais departs at 2235. The crossing takes 1½ hours and French time is 1 hour ahead. At what time does the boat dock in France, French time?
   a) A ferry from Dover to Calais departs at 2235. The crossing takes 1½ hours and French time is 1 hour ahead. At what time does the boat dock in France, French time? [2]
   b) The same ferry leaves Calais for Dover at 0700. At what time does it arrive in England, British time? [2]

7. Amy works as a customer adviser for a local photographic shop. She receives a basic salary of £19,750 per year and is also paid commission which averages £125 per week. Her tax allowance is £7475 for the tax year 2011/2012.
   a) Calculate her gross pay for the year. [3]
   b) If the basic rate of tax is 20%, how much tax does she pay in this tax year? [4]
   c) Calculate her net pay for the year. [2]

8. The number of bicycles produced by Dirty Rabbit Cycles over a six-month period was as below:

<table>
<thead>
<tr>
<th>MONTH</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO. OF BICYCLES</td>
<td>1200</td>
<td>1600</td>
<td>2000</td>
<td>2300</td>
<td>2400</td>
<td>2500</td>
</tr>
</tbody>
</table>

   a) Illustrate the above table as a line graph. [3]
   b) Calculate the mean number of bicycles produced. [2]

PART B

9. The cross-section of an underground transport tunnel approximates to a circle. The roadway is positioned such that it divides the circumference of this circle in the ratio 1:3. The tunnel has a diameter of 45 metres and is 65 kilometres long. Calculate:
   a) the length of steel support girders maintaining the shape of the tunnel above the roadway
   b) the area of steel casing used in the construction of the tunnel walls
   c) the total length of girder material used, given that steel support girders are placed every seven metres along the length of the tunnel
   d) the volume of the seabed removed during the course of construction [5 each]

10. John purchased gold jewellery with a value of £1200 as a long-term investment. He expects the value to increase by an average of 12% per year.
    a) Draw a graph to show his estimate of the gold’s expected value up to 10 years. [10]
    b) Find:
        i) the value which John expects the gold to be worth after 4 years [2]
        ii) the rate of increase of the gold value after 7 years [3]
        iii) the value of the gold after 10 years [2]
        iv) the rate of increase in the value of the gold after 10 years [3]
11. When Tesburys, a large retailer, wish to sell products in large quantities, they drop the prices to increase the sales significantly, whilst undercutting their competition.

a) Plot the points \((x, y)\) given in the table below:

<table>
<thead>
<tr>
<th>Price per unit (x) (pence)</th>
<th>20</th>
<th>15</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand per week (y) (in thousands)</td>
<td>9</td>
<td>14</td>
<td>19</td>
</tr>
</tbody>
</table>

b) Draw a line to fit the points.

c) Find an equation for your line.

d) At 5 pence per item, the demand was actually 23,000. Comment on this result.

12. Bryony went on holiday to Greece. Drinks and goods on the plane are available in £ sterling or euros. The airline rate is quoted as \(€1.21 = £1.00\). The market rate on the day of the flight is \(€1.17 = £1.00\) and on the day after Bryony arrives back in the UK, \(€1.14 = £1.00\).

a) If a bottle of spirit on the plane is priced at £11.50 and Jenny wants to pay in euros, calculate:

i) the cost in euros

ii) the amount in £ sterling the airline will receive for euros

iii) the extra percentage profit made by the airline if you pay in euros

b) If Bryony buys a bottle of wine at a total cost of £5.50 on the plane:

i) find the cost in euros

ii) calculate the amount in £ sterling Jenny would receive for this amount of euros, if she decided to pay for the bottle in £ Sterling and exchanged her euros the day after her return home.

iii) how much does Bryony save in £ sterling by NOT paying in euros
Instructions to candidates:

a) Time allowed: Three hours (plus an extra ten minutes’ reading time at the start – do not write anything during this time)

b) Answer ALL questions in Part A and any THREE questions in Part B

c) Part A carries 40% of the marks and Part B carries 60% of the marks

d) Marks for each question are shown in [ ]

PART A

1. Berrys, an electrical superstore, reduced the price of LCD televisions from £499.99 to £399.99. Calculate the percentage reduction in price to three decimal places. [3]

2. Three years ago, a retailer sold Star Wars toys for £19.99 each. At the end of the first year, he increased the price by 6% and at the end of the second year by a further 5%. At the end of the third year, the selling price was £23.80. Assuming that the cost to the retailer has not changed at £9.99 each, calculate the percentage profit made over the three years. [3]

3. Katie, John and Sheila are in a lottery syndicate and recently won £800,000 between them. They are considering how to share out the winnings and have made the following suggestions. Calculate whether a), b) or c) is more beneficial for Katie.

   a) 3 : 2 : 5
   b) 5 : 3 : 2
   c) 3 : 1 : 1

   [5]

4. Solve the following:

   a) Rearrange $x = (4y - 25)^2$, to get an expression for $y$ in terms of $x$. [3]
   b) Rearrange $2(y - 5) - 5(x^2 + 4) = 0$, to get an expression for $x$ in terms of $y$. [3]

5. IAS Engineering manufactures castings. The total cost for each casting is £80 and the variable cost per unit is £6.

   a) Calculate an expression for total cost $(c)$ in terms of $q$, the quantity produced. [3]
   b) Use your answer in a) to determine the total cost if 150 units are produced. [3]
   c) Prepare a graph of the expression for total cost. [5]
   d) Use your graph to determine the total cost if 100 units are produced. [3]

6. The income for Acme Bank in 2009, 2010 and 2011 is as below:

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest income</td>
<td>4595</td>
<td>2895</td>
<td>2175</td>
</tr>
<tr>
<td>Commission income</td>
<td>875</td>
<td>915</td>
<td>925</td>
</tr>
<tr>
<td>Other income</td>
<td>68</td>
<td>63</td>
<td>76</td>
</tr>
</tbody>
</table>

   Using the above data, complete the following:

   a) A simple bar chart, showing income on the vertical axis and the year on the horizontal axis [4]
   b) A multiple bar chart, coded to show Interest income, Commission income and Other income [5]

PART B

7. The quantities of castings produced by Brett’s Ltd during the year ended 31 December 2010 and the related costs are as below:

<table>
<thead>
<tr>
<th>Month</th>
<th>Production 000s</th>
<th>Factory costs £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>7</td>
<td>45</td>
</tr>
<tr>
<td>February</td>
<td>10</td>
<td>59</td>
</tr>
<tr>
<td>March</td>
<td>13</td>
<td>75</td>
</tr>
<tr>
<td>April</td>
<td>14</td>
<td>80</td>
</tr>
<tr>
<td>May</td>
<td>11</td>
<td>65</td>
</tr>
<tr>
<td>June</td>
<td>7</td>
<td>46</td>
</tr>
<tr>
<td>July</td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>August</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>September</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>October</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>November</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>December</td>
<td>5</td>
<td>35</td>
</tr>
</tbody>
</table>

   Assume that the costs remained stable throughout the year.

   a) Draw a scatter diagram related to the data provided above and plot on it the line of best fit. [10]
   b) Calculate the expected factory cost if 12,000 castings were produced in a particular month. [5]
      i) [5]
   ii) Estimate Brett’s monthly fixed costs. [5]
The table below shows the distribution of salaries of employees in Cabot Ltd.

<table>
<thead>
<tr>
<th>SALARY RANGE (£)</th>
<th>NO. OF EMPLOYEES</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000–9999</td>
<td>156</td>
</tr>
<tr>
<td>10000–14999</td>
<td>134</td>
</tr>
<tr>
<td>15000–19999</td>
<td>92</td>
</tr>
<tr>
<td>20000–24999</td>
<td>49</td>
</tr>
<tr>
<td>25000–29999</td>
<td>27</td>
</tr>
<tr>
<td>30000–34999</td>
<td>18</td>
</tr>
<tr>
<td>35000+</td>
<td>15</td>
</tr>
</tbody>
</table>

8. a) Make the necessary calculations and draw a cumulative frequency. [8]
b) Calculate the number of managers, given that senior managers’ salaries are £30,000 and above, middle managers’ salaries are greater than £20,000. [2]
c) Calculate the ratio of senior managers to middle managers. [3]
d) Calculate the percentage of the workforce who are not senior or middle managers (i.e. other employees). [2]
e) What is the probability of approaching any employee and finding that they are a manager? [5]

9. The specification for the width of a widget is a minimum of 42 mm and a maximum of 46.2 mm. A normally distributed batch of widgets is produced with a mean of 45 mm and a variance of 4 mm. With the aid of normal distribution diagrams, calculate:
   a) the percentage of parts that are too small
   b) the percentage of parts that are too large [10 each]

10. Burrows Enterprises is an exporter of garden furniture and storage units. The majority of its business is with EU countries and the company is very aware of how fluctuations in exchange rates can influence the profitability of their business with countries within so called Euroland, i.e. EU member states which have adopted the euro. They need to convert £ Sterling to euros and vice versa.
   a) Draw a conversion graph given that the conversion rate is £1 = €1.146. [6]
b) Use your graph to convert:
    i) €45 to £ Sterling
    ii) £19.99 to euros [2 each]
c) The exchange rate changed to £1 = €1.35 following the publication of the UK’s inflation figures. Draw a further conversion graph for this new rate. [6]
d) Use your graph to convert:
    i) £29.99 to euro
    ii) €55 to £ Sterling [2 each]
DECEMBER 2011

INTERPRETING & ANALYSING INFORMATION (NUMERACY & STATISTICS)

Instructions to candidates:

a) Time allowed: Three hours (plus an extra ten minutes' reading time at the start – do not write anything during this time)
b) Answer ALL questions in Part A and any THREE questions in Part B
c) Part A carries 40% of the marks and Part B carries 60% of the marks
d) Marks for each question are shown in [ ]

PART A

1. There are 30 cars for sale in the showroom of Brown’s motors, 17 of which are metallic silver. Calculate what proportion of the cars (to three decimal places) are not metallic silver. [3]

2. Adrian sells mountain bikes. The selling price three years ago was £99.99 and since then he has increased the selling price by 5%, 6% and 7% respectively at the end of each year. The cost price of £39.99 has not changed. Calculate the cumulative percentage profit he has made over the three years. [3]

3. Mark and Dawn invested money in a business partnership, Mark invested £10,000 and Dawn invested £4,000. The profits were divided in the same ratio as their investment.
   a) At the end of the first year, the profits were £17,375. How much did they each receive? [2 each]
   b) At the end of the second year, Mark’s share of the profits was £13,325. How much was the total profit? [3]
   c) After two years, Dawn increased her investment to £8,000. At the end of the year, her share of profits was £9,450. How much did Mark receive? [3]

4. Solve the following simultaneous equations using algebra:
   a) $6x + 3y = 45$
   b) $x + 4y = 24$ [3 each]

5. Sheldrake Assemblies produce electric motors. The total cost for each motor is £90 and the variable cost per unit is £7.
   a) Calculate an expression for total costs (c) in terms of q, the quantity produced. [3]
   b) Use your answer in a) to determine the total costs if 170 motors are produced. [3]
   c) Prepare a graph of the expression for total costs. [5]
   d) Use your graph to determine the total cost if 100 motors are produced. [3]

6. The quantities of grommets produced by Apex Ltd during the year ended 31 December 2010 and the related costs are as follows:


<table>
<thead>
<tr>
<th>Month</th>
<th>Production thousands</th>
<th>Factory costs £000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>7</td>
<td>45</td>
</tr>
<tr>
<td>February</td>
<td>10</td>
<td>59</td>
</tr>
<tr>
<td>March</td>
<td>13</td>
<td>75</td>
</tr>
<tr>
<td>April</td>
<td>14</td>
<td>80</td>
</tr>
<tr>
<td>May</td>
<td>11</td>
<td>65</td>
</tr>
<tr>
<td>June</td>
<td>7</td>
<td>46</td>
</tr>
<tr>
<td>July</td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>August</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>September</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>October</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>November</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>December</td>
<td>5</td>
<td>35</td>
</tr>
</tbody>
</table>

   a) Draw a scatter diagram related to the data provided above. [4 each]
   b) Plot on it the line of best fit.

PART B

7. Gadgets Ltd manufacture and sell bicycle bells. The selling price of the bells is £6 per unit and estimates of demand and variable costs of sales are as follows:


<table>
<thead>
<tr>
<th>Probability</th>
<th>Demand units</th>
<th>Probability per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>5,000</td>
<td>0.1</td>
</tr>
<tr>
<td>0.6</td>
<td>6,000</td>
<td>0.3</td>
</tr>
<tr>
<td>0.1</td>
<td>8,000</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable cost per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.00</td>
</tr>
<tr>
<td>3.50</td>
</tr>
<tr>
<td>4.00</td>
</tr>
<tr>
<td>4.50</td>
</tr>
</tbody>
</table>

The unit variable costs do not depend on the volume of sales.
Fixed costs will be £10,000.
Calculate:

a) Expected value of demand [5]
8. Burrows Enterprises manufactures solar energy products in China and imports them to the UK. A large proportion is then sold in the EU. The company is very aware of how fluctuations in exchange rates can influence the profitability of their business, especially in such changeable economic conditions in the eurozone. They need to convert Chinese Yuan to £ Sterling and £ Sterling to euros.

a) Draw a conversion graph between Chinese Yuan and £ Sterling, given that the conversion rate is £1 = 10.50 Yuan.

b) Use your graph to convert 23,900 Yuan to £ Sterling.

c) Draw a further conversion graph for £ Sterling to euros, given that the conversion rate is £1 = €1.15.

d) Use your graph to convert £3,250 to euros.

e) 12 solar energy units were returned from the EU to the UK. Assuming the same exchange rate, calculate the cost in euros, given that the units were exported and sold originally at £50.00 per unit.

9. The salaries of employees in a manufacturing company are normally distributed, with a mean of £14,000 and a standard deviation of £2,700.

a) Calculate the proportion of employees who earn less than £12,000.

b) Calculate the proportion of employees who earn between £11,000 and £19,000.

10. Stonehouse Enterprises recently purchased a new machine for their production facility. The value of the machine is to be depreciated by the reducing balance method and the value of the machine is given below:

<table>
<thead>
<tr>
<th>Time (years)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value (£)</td>
<td>10000</td>
<td>8000</td>
<td>6400</td>
<td>5120</td>
<td>4096</td>
<td>3277</td>
</tr>
</tbody>
</table>

a) Draw a graph of value V against time t.

b) Calculate the value of the machine after 2½ years.

c) Calculate the rate of depreciation after:
   i) 1 year
   ii) 3 years
   iii) 5 years