Grade 12 Education Supplement 2010

MEC for Education, Mrs Reginah Mhaule

Media Statement on Catch-Up Programmes Monday, 23 August 2010

"The ongoing strike is impacting negatively on our programmes to improve learner performance in the province. Today we remain with 38 school days before the start of the Grade 12 Examinations.This development demands that we think creatively and outside our confines. As we speak learners are unable to access classes given the nature and conduct of the strike.

It is for this reason that I take this opportunity to make a clarion call to all the churches and formations such as the Council of Churches, Moral Regeneration Movement to open their doors at this time. To be specific, we request the church and other organizations and concerned formations to encourage parents to:

- Have regular discussions with children about school matters.
- Cultivate a healthy, open and cooperative relationship with their children.
- Create a home environment conducive to study.
- Motivate their children to study and supervise them regularly.
- Advise children to form study groups.
- Open the churches for learners to study in groups.

I have written to the leadership of these organizations including the National Association of School Governing Bodies (NASGB) and the Federation of Governing Bodies of South Africa (FEDSAS) in this regard. It is also important for parents to be aware of the Catch Up Programmes that the Department has developed to help learners with their studies. The Catch Up Programme includes:

- Radio Support Programme
- Dial a Tutor Programme
- Spring Classes for Grade 12 Learners
- Newspaper Supplements

Radio Support Programme

SABC in collaboration with the Department of Education is broadcasting daily lessons as follows:

- Ligwalagwala FM 14h30 - 15h00
- Ikwekwezi FM 15h10 - 16h00

This programme is extended to the following community Radio Stations as of today from 14H30 to 15H30 three times a week and will run until the end of November 2010:

- Moutse Community Radio
- Kangala Community Radio
- Bushbuckridge Community Radio
- Middelburg Community Radio and
- Barberton Community Radio

Dial a Tutor Programme

This programme assists learners who may experience challenges while studying at home. Learners can dial the Departmental Toll Free line 0800 203 116 from 18H00 to 20H00 from Monday to Thursday to be linked with an expert Curriculum Specialist who will provide guidance on the spot. The Department is working hard to ensure that we improve the access rate and to ensure that learners who call using cell phones can get the service free of charge.

Newspaper Supplements

The Department has developed Learner Supplements which will be inserted in the following publications starting this week:

- The Lowvelder
- Mpumalanga News
- Witbank News
- Middelburg Observer
- Highvelder
- Corridor Gazette
- Barbeton Times
- Steelburger
- Daller
- Standerton Advertiser
- Highveld Ridge and
- Ziwaphi

Additional supplements will this week be posted to strategic institutions such as:

- The Churches
- The Constituency Offices
- Thusong Centers
- Community Libraries and
- Direct to learners in deep rural areas

This is to ensure that more learners are able to benefit from this information.

Spring Classes

After the strike the Department will conduct Saturday and Spring Classes for Grade 12 learners from 27 September to 01 October 2010. This will add impetus in our quest to cover the lost time and to improve learner performance.

Previous question papers

Parents and learners are also urged to download the 2008/09 Grade 12 previous question papers and memoranda from the Departmental website; www.mpumalanga.gov.za/education

The Grade 12 Examinations will start on the 25 October to the 03 December 2010.

Thank You."

MRS REGINAH MHAULE
MEC FOR EDUCATION

GOAL
EDUCATION
FOR ALL

Accounting

PROJECTED INCOME STATEMENT
WHAT IS A PROJECTED INCOME STATEMENT?
It is an income statement which shows how much profit the business expects to make in a specific time in future. The amounts shown in it should be accurate and be for the specified period. It should show the actual income which is expected to be earned and the costs expected to incur to run the business. It is prepared exactly in the same way as other income statements **except** that it is for a **specific period in future.**

PURPOSE
It is done to show how much profit / loss made each month. Management can rely on the outcome of the statement to rectify changes if need be.

PROCEDURE WHEN PREPARING THE FORECAST INCOME STATEMENT
➤ Use the actual income statement as the starting point.
➤ Divide the amounts by 12 in order to determine the monthly average.
➤ Thereafter make adjustments for the following as required:
  • Anticipated sales for the forecast period.
  • Changes in cost of sales, especially if affected by the mark-up policy.
  • Increase / decrease in expenses as stipulated.
  • Increase / decrease in incomes as stipulated.
  REMEMBER: The prepared statement should reflect monthly amounts.

EXAMPLE OF A GRADE 12 QUESTION

1. J. James applied for a loan at a bank in order to start a business, James Furnishers. The bank asked him to submit a Projected Income Statement for the business for the six months ending 31 December 2010. He supplied you with the information set out below, obtained through market research, and asked you to prepare the Projected Income Statement. (41)

2. Which **TWO** expense items will influence the profit the most? Make suggestions to Mr James as to how these expenses can be limited. (8)

INFORMATION
1. The total turnover of the furniture stores, in the town that Mr James wants to start his business in, is R9, 5 million per annum. Mr James estimates that his business can take 15% of the market.

2. The business plans to work with a mark-up of 100%. However, in order to attract customers, Mr James plans to sell 20% of his stock for the period at a discount. The discounted selling price of this stock will be calculated by using a mark-up of 50%.

3. Advertising expenses should be 3% of total turnover (excluding the discount) for the period.

4. The business will rent a building at R12 000 per month.

5. The business will employ the following personnel:
  • A manager (not the owner) at R7 000 per month
  • Two salespersons at a basic salary of R2 500 per month each plus a commission of 4,8% on sales
  • An administration clerk at R3 500 per month

6. Other sundry expenses are estimated to be R4 500 per month for the period.

7. Mr James applied for a loan of R200 000 that he must repay over a period of 10 years, and he must pay interest on the loan at a rate of 12% per annum.

8. The business will have a policy that depreciation on their fixed assets will be written off at a rate of 15% per annum. It is estimated that the value of the fixed assets will amount to R150 000.

Solution

1.	James Furnishers		
Projected Income Statement for the six months ended 31 December 2010			
		Notes	
Sales			✓ 676 875
Cost of sales			✓✓✓ ✓ (356 250)
Gross profit			(✓) 320 625
Operating expenses			(✓) (257 115)
Advertisements (712 500 × 3%)			✓✓✓ 21 375
Rent (12 000 × 6)			✓✓ 72 000
Salaries [(7 000 × 6) + (2 500 × 2 × 6) + (3 500 × 6)]			✓✓✓ ✓ 93 000
Commission paid (676 875 × 4, 8%)			✓✓✓ 32 490
Depreciation (150 000 × 15% × $^6/_{12}$)			✓✓ 11 250
Sundry expenses (4 500 × 6)			✓✓ 27 000
Projected operating expenses			(✓) 63 510
Interest expense (200 000 × 12% × $^6/_{12}$)			✓✓✓ (12 000)
Net profit for the year			(✓) 51 510

Calculations: Sales and Cost of sales
Turnover: R9 500 000 × 15% = R1 425 000 per annum ✓✓
Turnover for 6 months: 1 425 000 / 2 = R712 500 ✓✓
Cost of sales for 6 months = R712 500 × 100 / 200 = R356 250 ✓✓
Calculation of 6 months: 20% of sales @ 50% mark-up: 356 250 × 20% × 150% = 106 875 ✓✓✓
80% of sales @ 100% mark-up: 356 250 × 80% × 2 = 570 000 ✓✓✓
Total sales for the 6 months = 106 875 + 570 000 = 676 875 ✓

2.	Which TWO expense items will influence the profit the most? Make suggestions to Mr James as to how these expenses can be limited.
	Rent ✓✓ – Negotiate for a lower rental / buy own Land and buildings ✓✓
	Salaries ✓✓ – Mr James can manage the business himself / he could appoint only one salesperson and do the job of
	the other one himself, etc. ✓✓

TOPIC: CONTEXT AND SUMMARY OF THE PORTER'S FIVE FORCES MODEL IN TERMS OF FORMULATION OF BUSINESS STRATEGIES (LO1AS5)

CONTEXT OF THE SPECIFIC BUSINESS ENVIRONMENT IN WHICH THE PORTER'S FIVE FORCES MODEL IS RELEVANT

> **The Industry Environment**
> A group of competing businesses producing the same or similar products or are close substitutes for one another is known as an **industry**.
>
> An industry environmental analysis can only be done if an evaluation of the existing situation and status of an business within an industry is revealed.

A business needs to know:

- ➢ **Within which** industry does it compete?
- ➢ **What** is the structure of that industry?
- ➢ **What** are the major determinants of competition?
- ➢ **Which** business is regarded as competitors?

Questions that need to be asked by the business? Why, What, How to get KNOWLEDGE OF THE COMPETITION!!

- In which way does my business offer similar products than my competitor?
- If the same what makes my product better, more attractive than that of my competitor?
- In which way does my industry offer different products from my competitor?

To determine the above the following answer need to be found:

- ➢ Which businesses have the same type of goals as our business?
- ➢ Within which industry are these businesses competing?
- ➢ What are the key ingredients for success in these industries?

Industry structure can be defined and is dependent on the characteristics that give the industry its distinctive character. It can be identified by examining four variables, namely:
- **Concentration.** The extent to which industry sales are dominated by only a few businesses.
- **Economies of scale.** The savings that companies achieve within an industry due to increased volume production/sales.
- **Product differentiation**. The extent to which customers perceive goods and services offered by organisations in an industry as different form one another.
- **Barriers to entry**. The obstacles that an organization must overcome in order to enter an industry.

TEST YOURSELF ON MICHAEL PORTER'S FIVE FORCES MODEL

Question 1.

What are the four (4) elements of the market environment?

Answer:
- Suppliers
- Distributors or intermediaries.
- Customers
- Competitors

4 x 2 = (8)

Question 2.

Identify the five forces stressed by Michael Porter when doing industry analysis?(10)

Answer:
The
- threats posed by new entrants.
- bargaining power of suppliers.
- bargaining power of buyers.
- threat of product substitutes.
- intensity of rivalry among competitors.

5 x 2 = (10)

PORTER'S FIVE FORCES: A MODEL FOR INDUSTRY ANALYSIS

Michael Porter provides a model that portrays an industry as being influenced by five forces which can be used by a business manager seeking to develop an edge over rival firms, or develop strategies to combat negative influences/changes on levels of profitability due to these five forces.
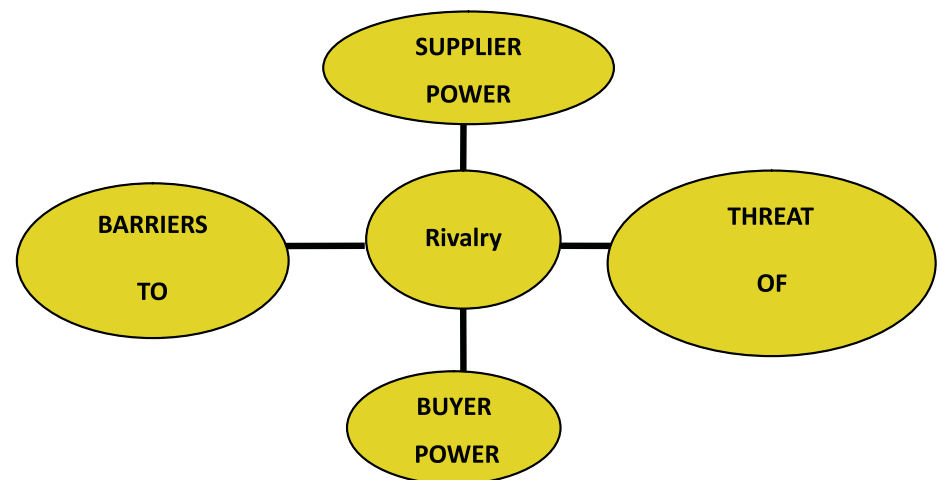
FIVE FORCES IDENTIFIED BY MICHAEL PORTER THAT CAN INFLUENCE THE:

- ➢ **INTENSITY OF COMPETITION** BETWEEN INDUSTRIES AND
- ➢ **PROFIT POTENTIAL** OF INDUSTRIES

ARE:

- ➢ Rivalry among competing organisations
- ➢ Barriers to entry
- ➢ Bargaining power of suppliers
- ➢ Bargaining power of buyers
- ➢ Threat of substitute products

DIAGRAM OF PORTER'S 5 FORCES

Physical Science

Worked Example 1: Projectile motion

Question: A ball is thrown upwards with an initial velocity of 10 m·s^{-1}.
1. Determine the maximum height reached above the thrower's hand.
2. Determine the time it takes the ball to reach its maximum height.

Answer:
Step 1 : Identify what is required and what is given
- We are required to determine the maximum height reached by the ball and how long it takes to reach this height.
- We are given the initial velocity v_i = 10m·s^{-1} and the acceleration due to gravity g = 9,8 m·s^{-2}.

Step 2 : Determine how to approach the problem
- Choose down as positive.
- We know that at the maximum height the velocity of the ball is 0 m·s^{-1}. We therefore have the following:

   • v_i = −10m ?s^{-1} (it is negative because we chose upwards as positive)
   • v_f = 0m ?s^{-1}
   • g = +9,8m?s^{-2}

Step 3 : Identify the appropriate equation to determine the height.
We can use:
$$v \qquad v \qquad g \quad x$$
to solve for the height.

Step 4 : Substitute the values in and find the height.
$$v \qquad v \qquad g \quad x$$
$(0)^2 = (−10)^2 + (2)(9,8)(\Delta x)$
$−100 = 19,6\_x$
$\Delta x = 5,102...m$

The value for the displacement will be negative because the displacement is upwards and we have chosen downward as positive (and upward as negative). The height will be a positive number, h = 5.10m.

Step 5 : Identify the appropriate equation to determine the time.
We can use:
$$v \qquad v \qquad gt$$
to solve for the time.

Step 6 : Substitute the values in and find the time.
$$v \qquad v \qquad gt$$
$0 = −10 + 9,8t$
$10 = 9,8t$
$t = 1,02...s$

Step 7 : Write the final answer.
The ball reaches a maximum height of 5,10 m.
The ball takes 1,02 s to reach the top.

Together Educating the Nation

PRODUCTION AND MARKETING OF FOOD, CLOTHING AND SOFT FURNISHING PRODUCTS:

RUNNING A SUSTAINABLE BUSINESS

A busines owner must do the following to ensure that she/he manages a sustainable and profitable business:

- Ensure that the product meets customers' needs or wants.
- Keep costs as low as possible without sacrifising quality.
- Make sure customers enjoy all of their contact with the business and not just the product or service itself.
- Plan time, finances, labour and stock. In fact every aspect of the business must be planned methodically and the plan should be adhered to as much as possible.
- Draw up cash budgets. Make sure to compare the budgeted figures with the actual figures and take corrective action where necessary.
- Keep up to date with the latest techniques and technology. Use the relevant SETA for staff training and business advice.
- Mke sure you know who your competitors are and have a competitive advantage over them.
- Ensure that an acceptable profit is being made.

CALCULATIONS

Calculating the production cost, unit price, selling price and profit.

In a retail business, the cost price is the amount of money that is paid for the product. The owner adds a mark -up (either a specific amount of money or a percentage) to calculate the selling price. In other words, selling price = cost price + mark-up. In a production business, the cost price takes a bit more effort to calculate. Refer back to your Grade 10 and 11 notes to revise how to calculate the cost of ingredients and products.

PRODUCTION COSTS

The following cover production costs:

- Cost of materials and packaging
- Wages or direct labour costs
- Cleaning and administration costs
- Transport and delivery costs
- Rent, water and electricity costs
- Faulty or damaged products cost
- Factory overheads and
- Additional expenses and costs – business overheads e.g. cost of maintaining and replacing equipment (cash, instalment or hire purchase, lease)

SELLING PRICE AND PROFIT

To be successful in business you need to make a large e nough profit, therefore, you must determine how much you need to charge for a product to cover your expenses and make extra money that you can put in the bank.

EXERSISES AND ANSWERS

FOOD PRODUCTION

1. (a) Calculate the production cost of 10 batches of bran muffins if your ingredients cost R50, 00 per batch, and your preparation time was 15 minutes and baking time 30 min. Your municipality charges R1, 20 per unit and your labour is R7, 50 per hour.

   (b) Calculate your selling price if you charged 50% profit

ANSWERS

(a) Production cost (labour + electricity + unit price/cost)

   Labour = 45 min x 10 batches (preparation) = 450 min

   $\frac{450}{60}$ x R7, 50 = R56, 25

   Electricity = 30 min x 10 + 5 min oven warming = 305 min

   $\frac{3000}{1000}$ x $\frac{305}{60}$ = 15, 25 Kw/h (electricity consumption)

   15, 25 Kw/h x R1, 20 = R18, 30

   Cost for 10 batches = 50 x 10 = R500

   Production cost = Cost for 10 batches = R500

   + Labour   = R56, 25

   + Electricity   = R18, 30

                      R574, 55 (for 1 day)

   1 batch = (R574, 55/10) = R57, 45 (cost price)

(b) Calculate your selling price if you charged 50% profit

   Selling price = $\frac{R57, 45 \times (100 + 50)}{100}$ = R86, 17 (1 batche)

1. Calculate your monthly sales and the expected profit per month.

(a) Monthly sales = (86, 17 x 10 batches) = R861, 70 x 30 days

= R25 851, 00

(b) Calculate the expected profit per month.

Production cost = R574, 55 X 30 days = R17 236, 50

Profit = R25 851, 00 (selling price) – R17 236, 50 (production cost)

= R8614,50

2. **Draw a flowchart** of the production line taking into consideration the:

   - Input
   - Process
   - Output

ANSWERS

FLOWCHAT FOR THE PRODUCTION OF BRAN MUFFINS

Aspects of the production system		Quality control
Unput	Raw material Ingredients	Fresh, good, quality, clean, relevant to product
Process	Collect utensils Collect ingredients Prepare and bake Package	Measure correctly, oven temp. correctly set, should reach required temp, regular checks, package appropriate to the product.
Output	Serve/display/dispatch/ store	Maintan freshness, shape, se rve in appropriate container/clean/standard of hygien maintained

EXERSISES AND ANSWERS

CLOTHING/SOFT FURNISHING PRODUCTION

1. (a) Calculate the production cost of 10 pillowslips if your fabric and other notions cost R50, 00 per pillowslip , and your preparation time was 15 minutes and sewing time 30 min. Your municipality charges R1, 20 per unit and your labour is R7, 50 per hour.

   (b) Calculate your selling price if you charged 50% profit

ANSWERS

(a) Production cost (labour + electricity + unit price/cost)

   Labour = 45 min x 10 pillowslips (preparation) = 450 min

   $\frac{450}{60}$ x R7, 50 = R56, 25

   Electricity = 30 min x 10 = 300 min

   $\frac{90}{1000}$ x $\frac{300}{60}$ = 0, 45 Kw/h (electricity consumption)

   0, 45 Kw/h x R1, 20 = R0, 54

   Cost of 10 pillowslips = 50 x 10 = R500

   Production cost = Cost of 10 pillowslips = R500

                      + Labour   = R56, 25

                      + Electricity   = R0, 54

                                         = R556, 79 (for 1 day)

   1 pillowslip = (R556, 79/10) = R55, 67 (cost price)

(b) Calculate your selling price if you charged 50% profit

   Selling price = $\frac{R55, 67 \times (100 + 50)}{100}$ = R83, 50 (1 pillowslip)

2. Calculate your monthly sales and the expected profit per month.

(a) **Monthly sales** = (83, 50 x 10 pillowslips) = R835, 00 x 30 days

= R25 050, 00

(b) Calculate the expected profit per month.

Production cost = R556, 79 X 30 days = R16 703, 70

Profit = R25 050, 00 (selling price) – R16 703, 70 (production cost)

= R8346, 30

3. Draw a flowchart of the production line taking into consideration the:

   a. Input
   b. Process
   c. Output

FLOWCHAT FOR THE PRODUCTION OF PILLOWSLIPS

Aspects of the production system		Quality control
Unput	Raw materials	
Process	Cutting Fabric is cut with the aid of a marker, made into bundles and sent to the machinist.	Random checks are done on the cut bundles to ensure that the machinist receive good quality fabrics.
	Joining Zip in back panel Narrow hem on one side of frill Apply frill to the front panel Join front and back panels	Supervisor does random checks at various stages to ensure that standard is maintained.
	Finishing Turn, check and clean pillow slips	Finisher does final check and throws out product with flaws.
Output	Dispatch/storing Products are dispatched to the cusoemer immediately or stored until needed	

MPUMALANGA
A Pioneering Spirit
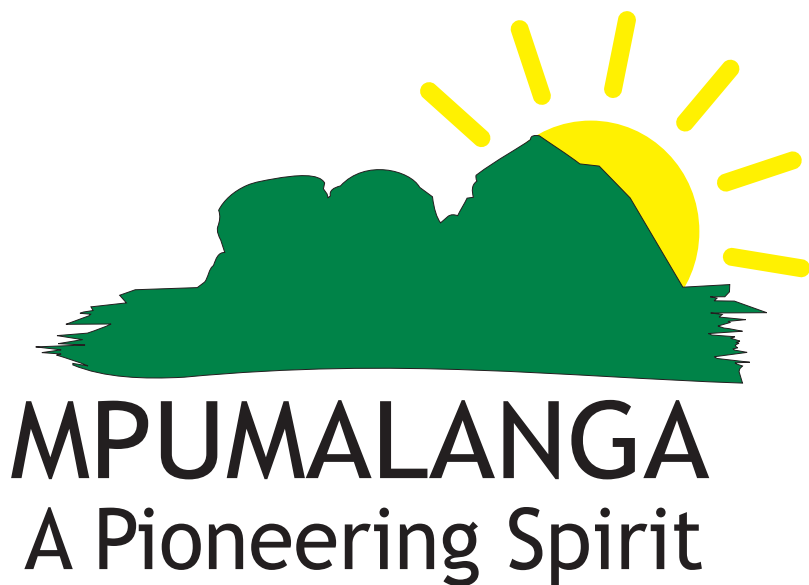
Topic: Calculating Income Tax

What is Income Tax?
How do I calculate it?

Income tax is the tax you pay based on your income or the money that you earn. This income tax is calculated not only on sa laries but also on investments. Income tax is levied as a percentage of your income. So, the more money you earn the higher the tax you pay. The highest percentage of that tax a person is currently required to pay is 40%.

The amount of income tax that you pay changes from year to year, and every year at the beginning of the financial year (i.e. March) the Minister of finance announces *the income tax brackets* for the year during his budget speech

Below is an example of income tax questions for grade 12 learners.
QUESTION 1

This is an extract from the information that was provided to taxpayers who earned a salary in 2006. The information explains how to work out how much tax you have to pay on your income. Note that there are six different 'tax brackets' w here different tax rates are applied.

Tax rates applicable to individuals	
Where the taxable income:	
is not more than R80 000	18% of each R1 of the taxable income
is more than R80 000 but not more than R130 000	R14 400 plus 25% of the amount by which the taxable income is more than R80 000
is more than R130 000 but not more than R180 000	R26 900 plus 30% of the amount by which the taxable income is more than R130 000
is more than R180 000 but not more than R230 000	R41 900 plus 35% of the amount by which the taxable income is more than R180 000
is more than R230 000 but not more than R300 000	R59 400 plus 38% of the amount by which the taxable income is more than R230 000
is more than R300 000	R86 000 plus 40% of the amount by which the taxable income is more than R300 000

Tax rebates	
Rebates: primary rebate is R6 300	65 years and older: R4 500

The following example illustrates the calculation of the tax payable and the application of the rebates.

Your taxable income is:	R167 025,00
Tax on R130 000,00	R26 900,00
Plus 30% of R37 025,00 (R167 025,00 – R130 000,00)	R11 107,50
Total payable before the rebate	R38 007,50
Less applicable rebate (under 65 years)	R6 300,00
Final amount of tax to be paid	R31 707,50

1.1   Explain how the amount of R14 400 near the top of the right -hand column of the table is calculated. (3)

1.2   Write out an example similar to the one provided that explains how a person under 65 years, who earns an annual salary of R215 000, would use the information provided to calculate the tax that they have to pay. (7)

1.3   In the form of an expression, write out the calculation for the total tax to be paid on an annual salary of R215 000. (3)

1.4   Some people might find it easier to read off the value of the tax the y have to pay from a graph. Draw a graph that shows the tax that has to be paid by a person under 65 years on the vertical axis and the possible values for the salary (ranging from R60 000 to R400   000) on the horizontal axis. Given that the tax payable is calculated differently for different 'tax brackets', you will expect your graph to have different sections with different slopes. Label the points on the graph to show the values of the tax at the endpoints of all the tax brackets, as well as for salaries of R60 000 and R400 000. (12)
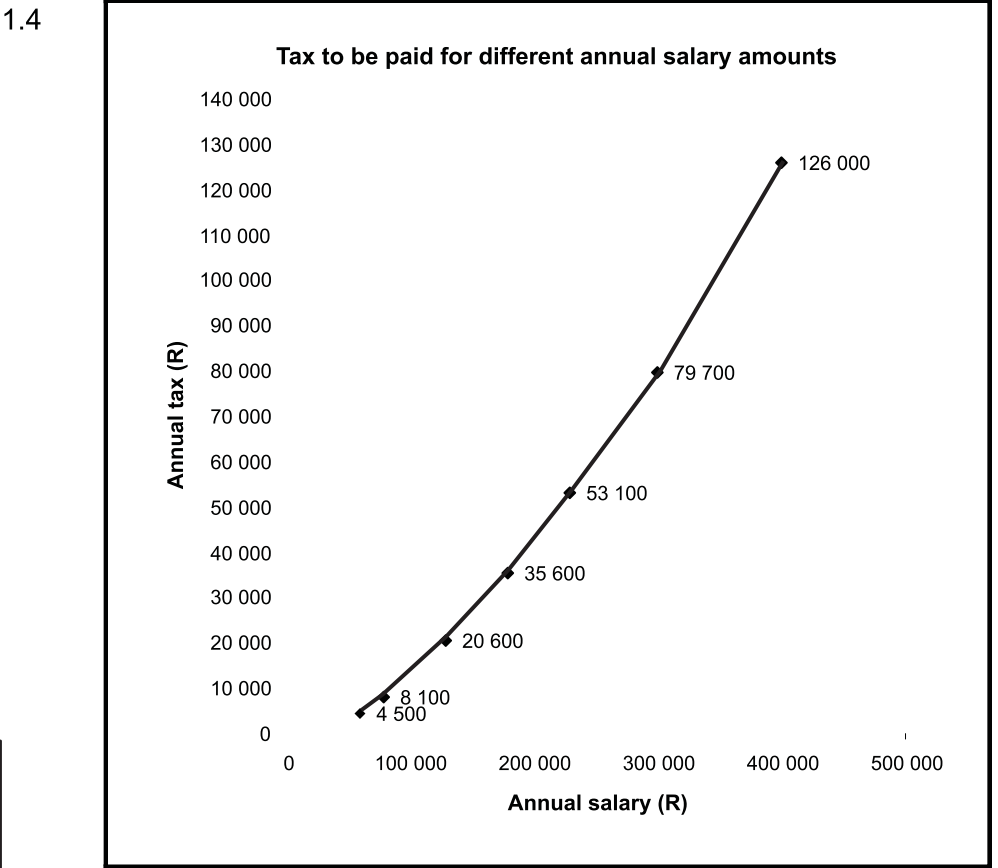**[25]**

MEMORANDUM
QUESTION 1

1.1   The R14 400 is the tax that is paid on the first R80 000 of the salary. ✓ This money is taxed at a rate of 18%. ✓ 18% of R80 000 = R80 000 × 0,18 = R14 400 ✓ (3)

1.2

Your taxable income is:	R215 000,00
Tax on R180 000,00 ✓	R41 900,00 ✓
Plus 35% ✓ of R35 000,00 ✓ (R215 000,00 – R180 000,00)	R12 250,00 ✓
Total payable before the rebate	R54 150,00 ✓
Less applicable rebate (under 65 years)	R6 300,00
Final amount of tax to be paid	R47 850,00 ✓

(7)

1.3

al tax = R41 400 + [0,35 × (R215 000 – R180 000)] – R6 300 ✓✓✓ Total (3)

1.4

- Suitable title ✓
- Linear scale numbered correctly on horizontal axis (½)
- Linear scale numbered correctly on vertical axis (½)
- Label for horizontal axis with units ✓
- Label for vertical axis with units ✓
- Seven correct tax values for the labelled points ✓✓✓ (½)
- Seven correctly plotted points ✓✓✓ (½) (credit if incorrectly calculated values are plotted correctly)
- Straight lines joining points (not curve). ✓ (12)

[25]

Tax to be paid for different annual salary amounts

Mathematical Literacy
(continue)

CALCULATING FUTURE VALUE

In the case of a once-off investment we calculate the future value of the investment using the well known formula $A = P(1 + i)^n$. However in most cases we do not make a single investment, but invest (or save) a certain amount at regular intervals. This kind of saving is called an ANNUITY.

In an ordinary annuity you make a monthly payment at the end of each month, and the interest is also calculated at the end of each month. We use the following formula for the FUTURE VALUE of an ordinary annuity. $FV = \dfrac{x \quad i}{i}$

EXAMPLE

You decide to save R100 per month for a period of 5 years at an interest rate of 12% p.a. compounded monthly. What will your investment be worth at the end of the 5 years?

$$\dfrac{x \quad i}{i} = \dfrac{100[(1 \quad \frac{0,12}{12})\ ]}{\frac{0,12}{12}} \approx R18166,97$$

CALCULATING PRESENT VALUE

Unfortunately in real life people do not always have money to invest, but often have to borrow money. Although it is always best to save and pay cash for an item, sometimes the amount is too big to be able to pay for it in one payment. For example, most people cannot afford to pay cash to buy a house and banks therefore offer home loans. The person must pay a deposit and then sign an agreement in which they promise to pay regular monthly payments until it is paid off. This kind of loan is called an amortised loan. We notice that we are talking of regular monthly payments, and this is very similar to an annuity. The main difference is the total amount that must be repaid must include the interest that is added to the amount of the loan. This initial loan amount is called the PRESENT VALUE of the loan.

The formula for the present value of an amortised loan is $PV = \dfrac{x \quad i}{i}$

EXAMPLE

Calculate the present value of an amortised loan if the monthly repayments are R1200 to be paid over 5years, and the bank charges interest at the rate of 15% p.a. compounded monthly.

$$PV = \dfrac{x \quad i}{i} = \dfrac{1200[1 \quad (1 \quad \frac{0,15}{12})\ ]}{0,0125} \approx R50441,51$$

NOMINAL AND EFFECTIVE INTEREST RATES

A nominal interest rate is when the stated period of the loan (or investment) and the compounding period differ. When the stated period and compounding period are the same it is called the effective rate. The formula used to calculate the either rate is $E =$

$$\underline{\quad\quad} \qquad 1$$

FINANCIAL MATHEMATICS PRACTICE QUESTIONS

1.1 You buy a car for R140 000 and pay a deposit of 15%. The balance is paid using a bank loan. Interest is charged at 13,5% pa compounded monthly over 5 years.

1.1.1 Determine the monthly repayments. (7)

ANSWERS TO QUESTIONS ON FINANCIAL MATHEMATICS

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1.1.1 Balance = 85% of R140 000 = R119 000 $i = \dfrac{0,135}{12} = 0,01125$; $n = 5 \times 12 = 60$ $P = \dfrac{x(1-(1+i)^{-n})}{i}$ $119000 = \dfrac{x(1-(1+0,01125)^{-60})}{0,01125}$ $x = \dfrac{119000}{43,459....} = R2738,17$ 1.1.2 $A = P(1 + i)^n$ $= 119\ 000(1 + 0,01125)^{36}$ $= 178\ 014,02$ $F = \dfrac{x\ [(1+i)^n - 1]}{i}$ $= \dfrac{2738,17\ [(1 + 0,01125)^{36} - 1]}{0,01125}$ $= R120\ 702,46$ Balance $= A - F$ $= R178\ 014,02 - R120\ 702,46$ $= R57\ 311,56$ 1.2 $(1 + \frac{i_n}{m})^m = (1 + i_e)$ $\therefore (1 + \frac{i_n}{4})^4 = (1 + 0,01125)$ $\therefore (1 + \frac{i_n}{4}) = \sqrt[4]{1,01125}$ $\dfrac{i_n}{4} = \sqrt[4]{1,01125} - 1$ $i_n = (\sqrt[4]{1,01125} - 1)4$ $= 0,1172$ $\therefore$ interest rate is 11,72%	2.1 $A = P(1 - i)^n$ $= 5\ 200\ 000\ (1 - 0,125)^6$ $= R2\ 333\ 735,66$ 2.2 $A = P(1 + i)^n$ $= 5\ 200\ 000\ (1 + 0,075)^6$ $= R8\ 025\ 167,93$ 2.3 R8 025 167,93 − R2 333 735,66 $= R5\ 691\ 432,27$ 2.4 $F = \dfrac{x[(1 + i)^n - 1]}{i}$ $5691432,27 = \dfrac{x[(1 + 0,0075)^{72} - 1]}{0,0075}$ $= \dfrac{x[(1,0075)^{72} - 1]}{0,0075}$ $= x(95,007)$ $\therefore x = \dfrac{5691432,27}{95,007}$ $= R59\ 905,38$ 3.2.1 $P = \dfrac{x\ [1 - (1 + i)^{-n}]}{i}$ $650\ 000 = \dfrac{x\ [1 - (1 + \frac{0,1125}{12})^{-180}]}{\frac{0,1125}{12}}$ $650\ 000 = x(86,7795.....)$ $\therefore x = R7\ 490,24$

3.1 R10 000 |——————|——————|——————|——————| T_0 $\quad T_3 \quad\quad T_5$ T_{12}	3.2.2 R7 490,24 × 180 = R1 348 243,19 3.2.3 $A = P(1 + i)^n$ $= 650\ 000\ (1 + 0,062)^{15}$ $= R1\ 602\ 437,53$

	0,09	0,065	0,1
i	12	365	
n	36	730	7

Life Sciences

1.1 Colour-blindness is a sex-linked genetic disorder. The diagram below shows a family tree where the disorder is prevalent.

Key:
○ Female
◍ Female carrier
● Colourblind ♀
□ Male
■ Colourblind ♂
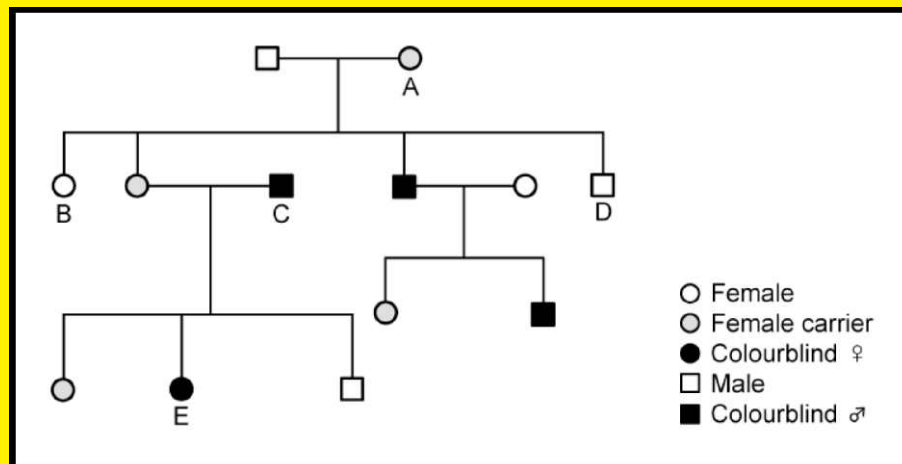
1.1.1 What is meant by the term 'sex-linked' genetic disorder? (1)

1.1.2 Why is colour-blindness found predominantly in males? (2)

1.1.3 If the symbol K represents the dominant gene which gives a person the ability to see colour, write down the genotypes of individual A, B, C, D and E. (5)

1.1.4 If a male is colour-blind, will his daughters be carriers for the disorder? Explain your answer. (2)

[10]

MDOE   1   *LIFE SCIENCE*   *EXAMINATION TOPICS*

ANSWERS.

1.1.1 The defective gene is carried on the X chromosome. ✓ (1)

1.1.2 Y chromosome is shorter than the X chromosome ✓ so there is no corresponding gene allele to mask the recessive gene. ✓ (2)

1.1.3 A – Kk ✓
B – KK ✓
C – k ✓
D – K ✓
E – kk ✓ (5)

4.1.4 Yes, ✓ the X sperm cell that fertilises the egg carries the recessive gene for colour-blindness. ✓ (2)
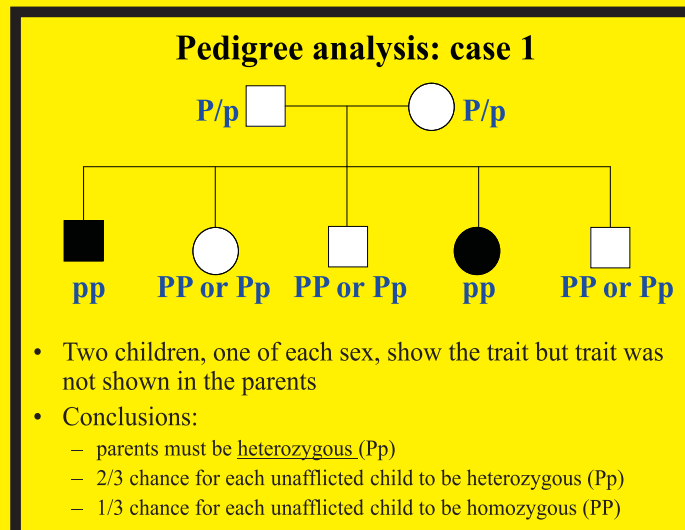
1. Why human pedigree analysis is important?

It can be useful in determining who is a carrier (heterozygote) for a genetic disease, such as:

Autosomal recessive disorders: Albinism: (inability to produce melanin); Cystic Fibrosis(recessive disorder on chromosome causes build up of heavy mucous in lungs) Sickle-Celled Anemia(abnormal hemoglobin alters RBC shape and lowers the oxygen carrying capacity of blood)

Autosomal Dominant Disorders: Huntington's disease(adults lose muscle control, convulsions, nervous degeneration causes death, found on chromosome 4, thus Hh or HH will get the disea se); Polydactyly (dominant disorder tha t causes extra fingers and toes)

2. Discuss the following Pedigree analysis

Pedigree analysis: case 1

P/p □ ── ○ P/p

pp   PP or Pp   PP or Pp   pp   PP or Pp

- Two children, one of each sex, show the trait but trait was not shown in the parents
- Conclusions:
  - parents must be heterozygous (Pp)
  - 2/3 chance for each unafflicted child to be heterozygous (Pp)
  - 1/3 chance for each unafflicted child to be homozygous (PP)

1. The Universal Time Coordinate is also known as _____ and _____
2. The 180 degree longitude is also known as_____
3. The equator divide the earth into _____ and _____ hemispheres
4. The 0 degree longitude divide the earth into _____ and _____ hemispheres
5. The _____line of longitude has been adopted as standard time according to which all time on earth is determined
6. The Earth rotate around its own axis from _____ to _____
7. Time is based on the lines of _____
8. One rotation takes _____
9. One revolution takes _____
10. Earth is divided into _____ time zones
11. The distance in degrees between one time zone and the next is _____
12. What is the time difference between one time zone and the next? _____
13. South Africa's time zone is _____ or _____
14. Time in the west is _____ time in the east
15. Using DST allows a country to _____ one hour of daylight.
16. Universal time was also known as _____
17. When moving across the IDL from west to east, you will _____ one day
18. _____ is the same on both sides of the IDL but the _____ is different
19. All travel itineraries that include flight departure and arrival times reflect the _____ time
20. DST always applies in _____

TIME ZONE CALCULATIONS

It is 09:00 in South Africa. What will the time and day is in New York

STEP 1: Identify the time zones of the countries in question
1. Use the time zone map to identify the time zones
   South Africa = +2; New York is = -5

HINT!!!!!

2. Use the coordinates to identify the time zones
   Divide the coordinates by 15˚
   South Africa = 30˚E = 30/15 = 2
   New York = 75˚W = 75/15 = 5

HINT!!!!!

Step 2: Determine the time difference between the two countries
SOLUTION
Use the time zone map: Put a finger on the Time zone for SA (+2) and move until you reach the time zone for New York (-5), as your finger move you count the number of time zones that you cross.
1. Draw a number line to represent all the time zones and count the timelines from one country to the next.

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<------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----->
      -6    -5    -4    -3    -2    -1    0    1     2     3     4     5     6
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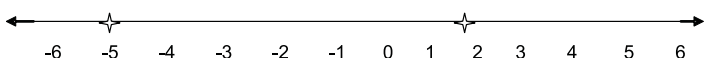
2. Use this simple rule of the signs (+ / -) to determine the time difference:
   If the signs are the same (both plus (+) or both minus (-) you **SUBTRACT** the smaller number from the biggest one i.e. South Africa + 2, and Bangkok +7, Time difference will be 05hours. If they are one plus (+) and the other one minus (-) you **ADD** the time zones together i.e.
   South Africa = +2
   New York = - 5
   Time difference = 7 hours

Step 3: Determine the direction of travel to see if you should add the time difference or subtract the time difference, to determine actual time

HINT!!!!!! !!

Always start from the known country (SA) to the unknown country (New York)
If you move forward / to the right/east from known to unknown, you will **ADD** the time difference
If you move backward / to left/west from known to unknown, you will **SUBTRACT** the time difference
If you move from SA (known) to New York (unknown), you are travelling backwards/ to the left therefore you will subtract the time.
1. On Time zone Map: finger on +2 and move to -5 , at every time zone that you cross you subtract one hour.
2. On 24 hr clock: Start at known time and move backwards while counting 7 hrs
3. Mathematically: Subtract 7 from 9 to determine actual time.

SOLUTION
   South Africa = +2
   New York = - 5
   Time difference = 7 hours
(Known time – time difference = actual time)
09:00 – 7hrs = 02:00   It will be 02:00 on the same day

ACTIVITY 1
   A. Determine the time difference between the following countries:
      South Africa and:
   1. Moscow _____
   2. Beijing _____
   3. Melbourne _____
   4. Rio de Janeiro _____
   5. Vancouver _____
   6. Perth _____
   7. Tokyo _____
   8. Adelaide _____
   9. Paris _____
   10. Tehran _____

   B. Indicate the time zone for countries along the following lines of longitude
      1. 120˚W _____
      2. 135 E _____
      3. 60˚E _____
      4. 75˚ W _____
      5. 75˚ E _____

TEST YOUR KNOWLEDGE TIME ZONES MEMORANDUM

1. The Universal Time Coordinate is also known as 0˚**longitude/ prime meridian/ Greenwich meridian**

2. The 180 degree longitude is also known as **International Date Line (IDL)**

3. The equator divides the earth into **northern and southern** hemispheres

4. The 0 degree longitude divides the earth into eastern **and western** Hemispheres

5. The **0˚line** of longitude has been adopted as standard time according to which all time on earth is determined

6. The Earth rotate around its own axis from **west to east (anti clockwise)**

7. Time is based on the lines of **longitude**

8. The duration of one rotation is **24 hours**

9. The duration of one revolution is 364¼ **days**

10. Earth is divided into **24** time zones

11. The distance in degrees between one time zone and the next is **15**

12. What is the time difference between one time zone and the next? **1 hour**

13. South Africa's time zone is + 2 or 30˚E

14. Time in the west is behind time in the east

15. Using DST allows a country to **gain** one hour of daylight.

16. Universal time was also known as **GMT (Greenwich Mean Time)**

17. When moving across the IDL from west to east, you will **gain** one day

18. **Time** is the same on both sides of the IDL but the **dates** is different

19. All travel itineraries that include flight departure and arrival times reflect the **local** time

20. DST applies in **summer**

TIME ZONES CALCULATIONS MEMO

ACTIVITY 1

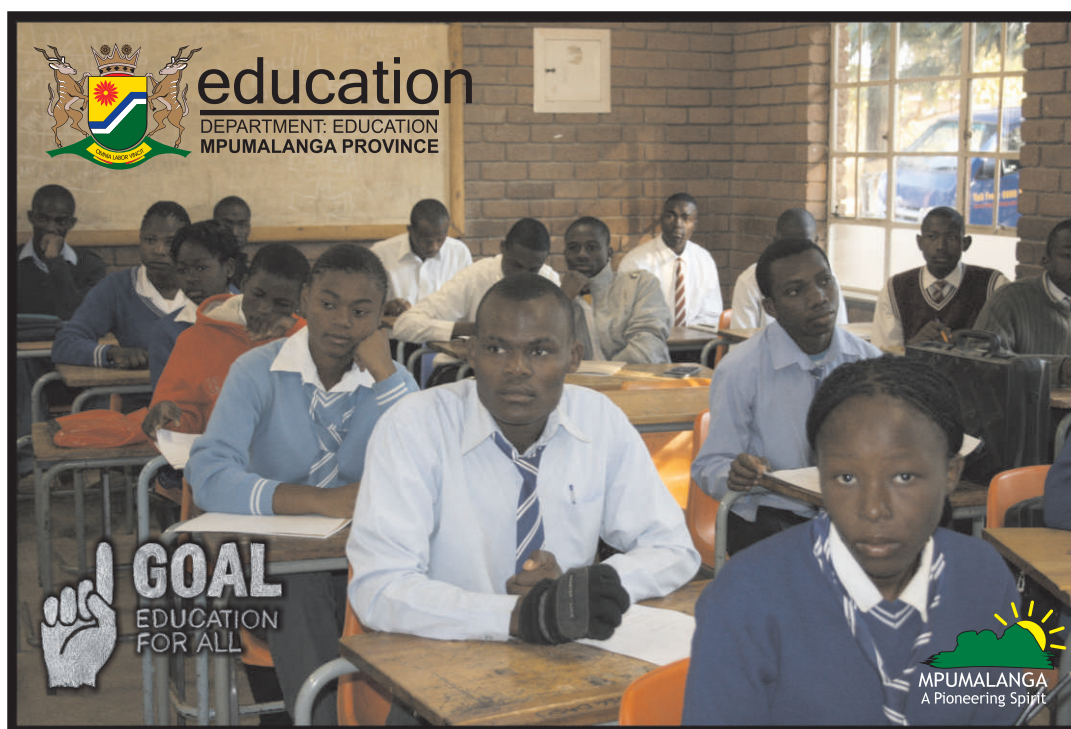   A. Determine the time difference between the following cities:
      South Africa and:
1. Moscow	=	1
2. Beijing	=	6
3. Melbourne	=	8
4. Rio de Janeiro	=	5
5. Vancouver	=	10
6. Perth	=	6
7. Tokyo	=	7
8. Adelaide	=	7.5
9. Paris	=	1
10. Tehran	=	1.5

B. Indicate the time zone for countries along the following lines of longitude
   1. 120˚W **-** 8
   2. 135 E   + 9
   3. 60˚E + 4
   4. 75˚ W - 5
   5. 75˚ E + 5

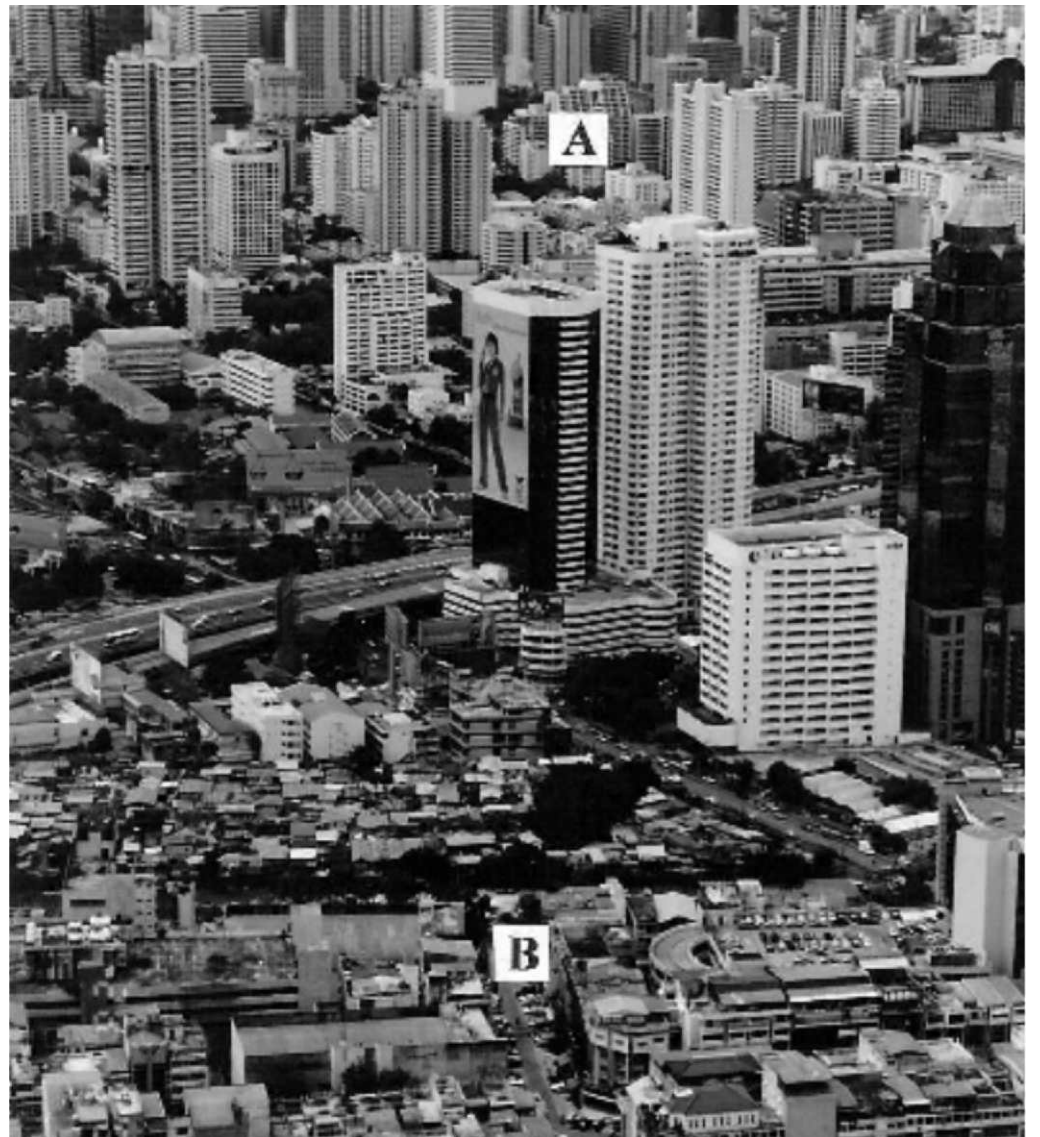# Geography

1.2   Refer to the diagrams below and answer the following questions.

1.2.1   Name the settlement pattern clearly depicted in both diagrams. (1x2) (2)

1.2.2   Would you classify this settlement as rural or urban? Provide **TWO** pieces of evidence to support your answer. 2+(2x2) (6)

1.2.3   Describe **THREE** changes that have been implemented to improve and modernise the traditional farming so that the community can increase its productivity. (3x2) (6)
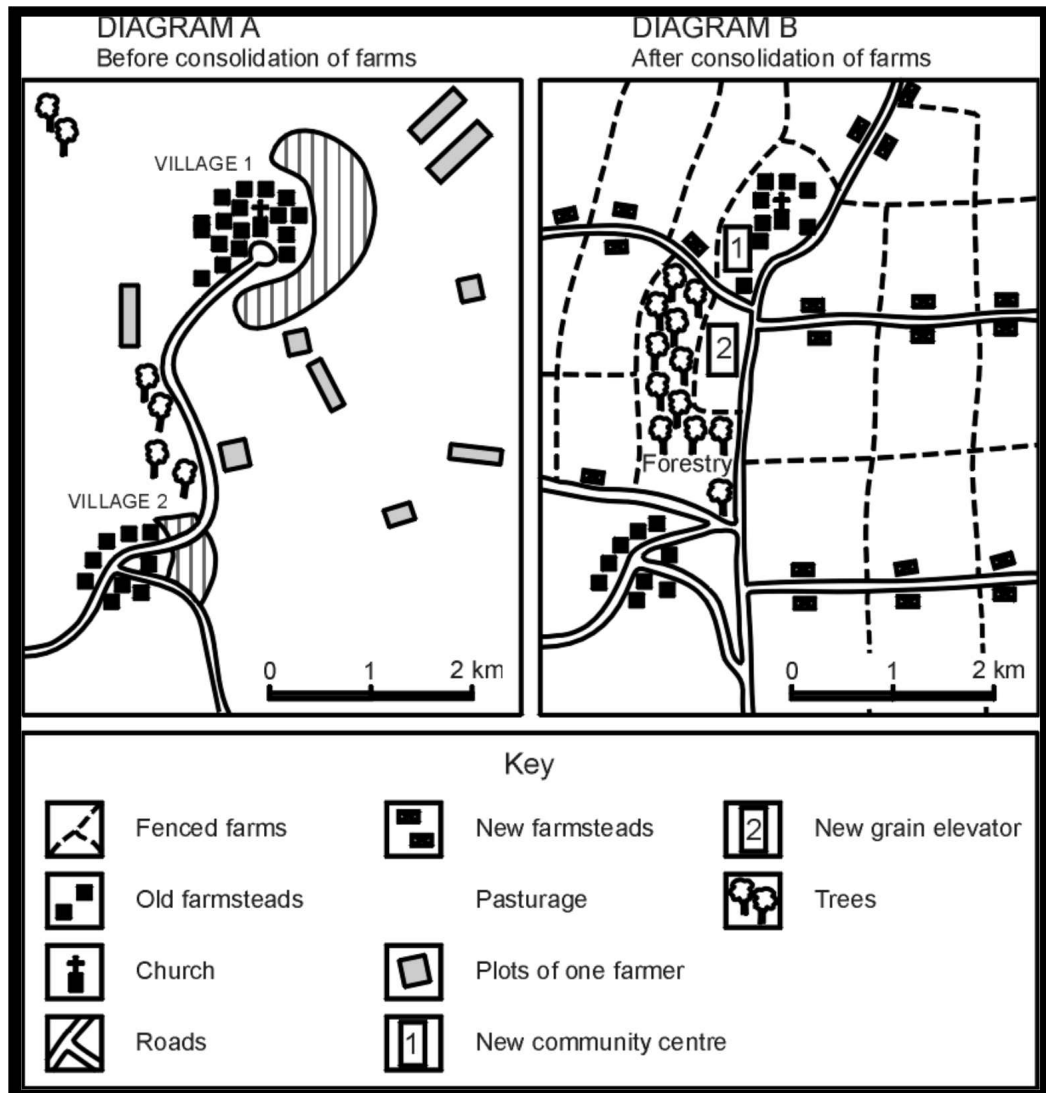
2.1   Carefully study this picture of an urban settlement.

2.1.1   Name the urban land use zones labelled A and B. (2x2) (4)

2.1.2   List **FOUR** functions occurring in zone A. (4x1) (4)

2.1.3   Explain why most buildings are 'skyscrapers' (tall buildings) in zone A. (2x2) (4)

2.1.4   Predict the impact that expanding urban settlements, such as the one shown in the picture above, will have on surrounding rural settlements. (3x2)

DIAGRAM A
Before consolidation of farms

DIAGRAM B
After consolidation of farms

VILLAGE 1

VILLAGE 2

Forestry

0   1   2 km   0   1   2 km

Key

Fenced farms   New farmsteads   2 New grain elevator

Old farmsteads   Pasturage   Trees

Church   Plots of one farmer

Roads   1 New community centre