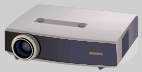


Module 3

Patterns and relationships identify them between varying quantities in the workplace

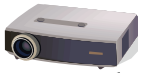


Lecture slide #1-3

At the end of this module, students will be able to:

- Identify and extend patterns for different relationships in the workplace
- Identify and use information from different representations of relationships to solve problems in the workplace
- Translate between different representations of relationships found in the workplace

1. Identify and extend patterns for different relationships in the workplace



Lecture slide #4-7

At the end of this outcome, students will be able to:

- Investigate and extend numerical and geometric patterns and identify trends in data.
- Describe patterns and trends in words and/or through formulae.
- Generate patterns from descriptions of them.

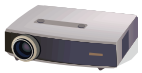
Introduction

- Explain the concept of a pattern being a repeating sequence,
- Distinguish between an arithmetic and a geometric pattern.
- Provide real-world examples where patterns are used.

1.1 Numerical and geometric patterns investigated and extended

1.1.1 Numerical and geometric patterns

- Explain the concept of constant difference and link it to multiplication tables.
- Show how these constant differences can take a formula of the form $y = mx + c$
- Give examples



Lecture slide #8-11

Activity 1 – arithmetic patterns – do it with a friend

This is an individual activity that can be completed in class or for homework

1. A baby weighs on average 3 400 g at birth and increases its birth weight by 650 g per month. Now fill in the table and write a formula for the calculation of the output value which is the weight of the baby.
 - a. Formula: Weight of baby = $0.65x + 3.4$
 - b. Complete the table:

Age of baby (months)	0	1	2	3	4	5	6
Weight of baby (g)	3,4	4,05	4,7	5,35	6	6,65	7,3

2. a. Formula for the cost of face bricks: $y = 3000x$
- b. Complete the table:

Number of face bricks (thousands)	1	2	3	4	5	6	7
Cost of bricks (R)	R3 000	6000	9000	12000	15000	18000	21000

3. Currency conversion: £1 = 14,1916 Rand (ZAR)
 - a. Formula: Value in Rand = Value in pounds \times 14,1916
 - b. Complete the table:

Value in British pounds (£)	1	10	100	1 000	10 000	100 000	1000 000
Amount in Rand	14,1916	141,916	1419,16	14 191,6	141 916	1 419 160	14 191 600



Lecture slide
#12-15



Lecture slide
#16-22

Pattern 2 – geometric patterns

- Explain the concept of geometric patterns.
- Relate this to compound interest, and other examples.

Activity 2 - constant difference patterns and constant ratio patterns

This is an individual activity that students can complete in class or for homework

- Write down five numbers that you think should logically follow on the numbers in the following sets.

a.

12	24	48	96	192	386	768	1536
----	----	----	----	-----	-----	-----	------

b.

350	700	1 050	1400	1750	2100	2450	2800
-----	-----	-------	------	------	------	------	------

c.

4 500	4 750	5 000	5 250	5500	5750	6000	6250
-------	-------	-------	-------	------	------	------	------

d.

33 000	34 650	36 382,5	38 201,63	40 111, 71	42 117, 30	44 223, 16	46 434, 32
--------	--------	-------------	-----------	---------------	---------------	---------------	------------

e.

128	64	32	16	8	4	2	1
-----	----	----	----	---	---	---	---

- Write down what you see as the constant difference or the constant ratio in each of the above sets of numbers.

a. Times 2 constant ratio

b. Plus 350 constant difference

c. Plus 250 constant difference

d. Times 1,05 constant ratio

e. Divide by two constant ratio

- Order the following numbers to form a patterned sequence of numbers from the smallest number first to the biggest number last, i.e ascending order.

a. 0,3358; 0,3433; 0,3458; 0,3383; 0,3483; 0,3508; 0,3408;

0,3358; 0,3383; 0,3408; 0,3433; 0,3458; 0,3483; 0,3508

b. 13 000 thousand; 12,5 million; 0,014 billion; 12 000 000; $1,35 \times 10^7$;

12 000 000; 12,5 million; 13 000 thousand; 0,014 billion; $1,35 \times 10^7$

c. 11H37; 10H52; 11H37; 11H22; 10H37; 11H07;

10h37; 10h52; 11h07; 11h22; 11h37; 44h49

- If a certain bank decides that annual interest will be paid at a compound rate of 10% of the amount deposited, (i.e. $\frac{1}{10}$), calculate the amounts in the bank after one, two, three and four years.

Amount of deposit	Amount after one year	Amount after two years	Amount after three years	Amount after four years	Constant ratio
R3 000	$1,1 \times 3\ 000 =$	$1,1 \times 1,1 \times 3\ 000 =$	$1,1 \times 1,1 \times 1,1 \times 3\ 000 =$	$(1,1)^4 \times 3\ 000 =$	1,1
R7 000	7700	8470	9317	10248,70	1,1
R10 000	11000	12100	13310	14641	1,1
R60 000	66000	72600	79860	87846	1,1

5. A friend tells you that he will lend you money at a simple interest rate of 5% p.a. i.e. 0,05 of the amount per year. Fill in the table:

Loan amount	Cost of loan for one year	Cost of loan for two years	Cost of loan for three years	Constant difference
R700	$0,05 \times 700 \times 1 =$	$0,05 \times 700 \times 2 =$	$0,05 \times 700 \times 3 =$	$0,05 \times 700$
R3 000	$0,05 \times 3000 \times 1 = 150$	300	450	150
R7 000	350	700	1050	350
R10 000	500	1000	1500	500
R60 000	3000	6000	9000	3000

6. Fill in the missing numbers according to the pattern:

a. 17	22	27	$+5 = 32$	37	42	47
b. 125	25	5	$\div 5 = 1$	$\frac{1}{5}$	$\frac{1}{25}$	$\frac{1}{125}$
c. 1,2 million	1,4 million	1,6 million	$+ 0,2 = 1,8$	2,0	2,2	2,4
d. R59 000	R64 900	R71 390	$\times 1,1 = 78529$	86381,90	95020,09	104522,09



Lecture slide #23-30

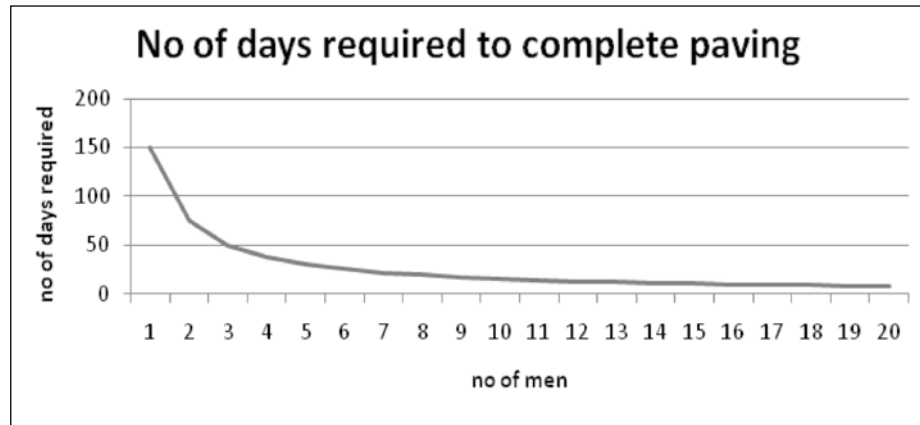
Case study – patterns in Bongani’s working day

Students can complete this activity alone or in groups.

1. Bongani has started a small paving business after doing a road construction learnership. He has to decide how many men are necessary to do the job most efficiently. He estimates that five men will take 30 days to complete a section of pavement with concrete and bricks.
 - a. How many one-man working days are involved?
Each man contributes six working days. In other words, each man does one fifth of the work. One man will take 5×30 days to do the work, i.e. 150 days.
 - b. Will six men take less or more time to complete the job?
Less time.
 - c. Draw up a table of the information with the number of men as input value and the number of days as output value. The one-man working days must remain constant.

no of men	1	2	3	4	5	10	15	20
number of days required	150	75	50	37,5	30	15	10	7,5

- d. Give an equation for the relationship.
 $y = 150 \div x$
- e. Calculate how many days it will take 15 men to complete the job.
10 days
- f. Sketch a graph of the information.
- g. Read from the graph how many men are necessary to complete the job in five days.
30 men will complete the job in 5 days.
- h. Does the graph represent a direct or an inverse proportion?
Inverse proportion



- 2. It is important for Bongani to be in contact with the contractor of the job. Therefore he has to have enough airtime on his cell phone. He buys a R110 pay-as-you-go air-time voucher. He makes his work calls in peak time when calls will cost him R2 for the first minute and thereafter R1 per 30 seconds.
 - a. Give an equation for the calculation of cell phone cost per call:
Cost of call (rands) = 2(no of minutes)
 - b. Draw up a table for Bongani so that he can sketch a graph from which to look up cost of calls for different duration of calls.

Call duration in minutes	1	1,5	2	2,5	3	3,5	5	10
Call cost (R)	R2	3	4	5	6	7	10	20

- c. Draw up a table to show an inverse relationship between duration of call and number of calls possible for the R110.

Call duration in minutes	1	2	5	6	8	10	15	20	25	
Number of calls per R110	55	27	11	8	6	5,5	3	2	2	

3. After two years of hard work Bongani has put together R5 000 and invests it in his bank's money market account at an interest rate of 11,5% compound interest. The money is compounded each month. Complete the table.

Year	1	2	3	4
Amount in the bank	5 000	5606,29	6286,10	7048,34



Lecture slide #31-33

1.1.2 Direct and inverse relationships and trends

- Give examples of direct and inverse relationships and demonstrate the graphs of each.

Trends

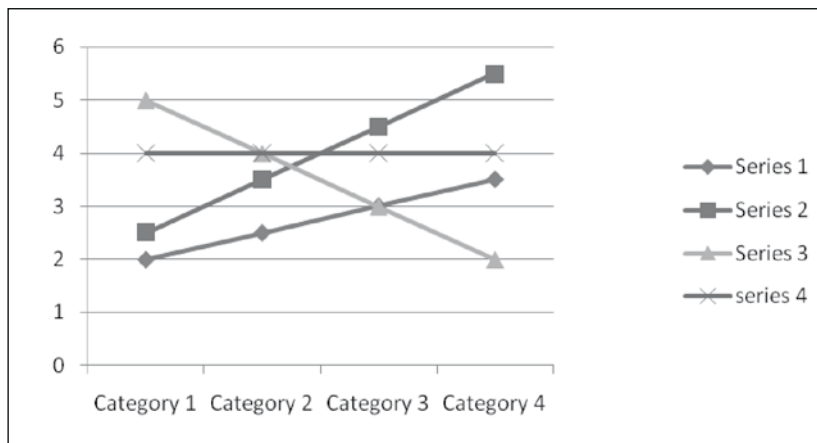
In the following sketch, the graphs show the following trends:

Series 1 – slight positive trend.

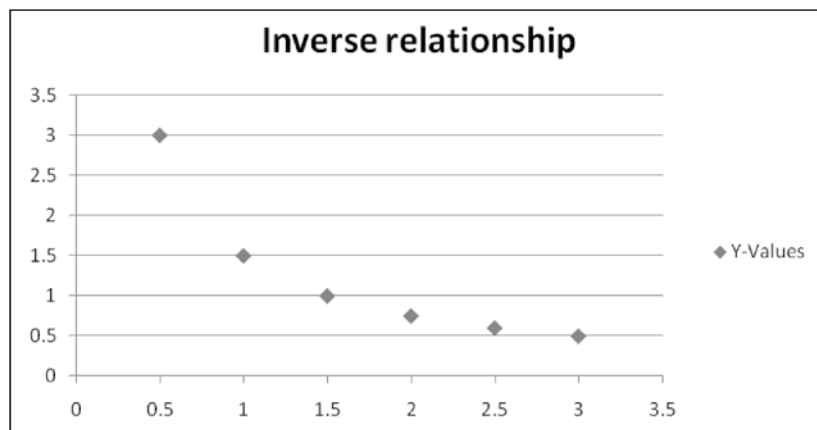
Series 2 – stronger positive trend.

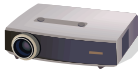
Series 3 – negative trend.

Series 4 – constant trend.



Scattered points showing an inverse relationship with formula $xy = 1,5$:





Lecture slide
#34-47

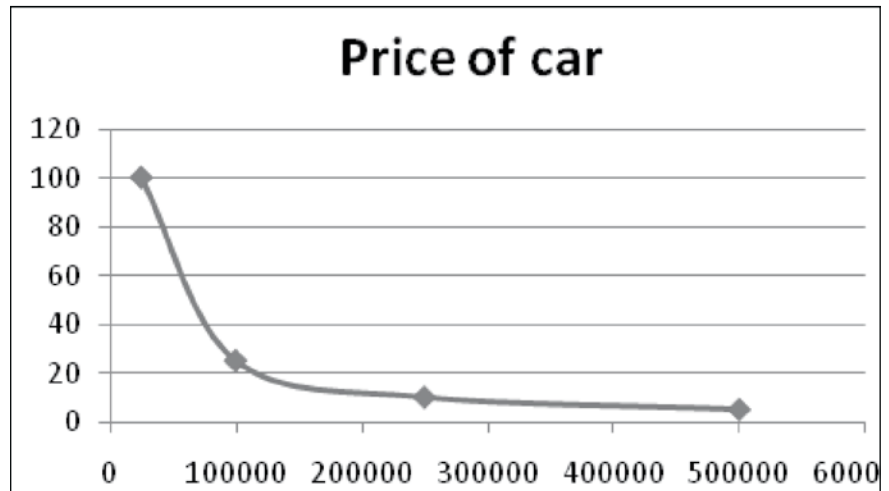
Activity 3

Students can complete this activity in class or for homework.

1. State whether the following tables show a direct or an inverse relationship. Complete the tables.

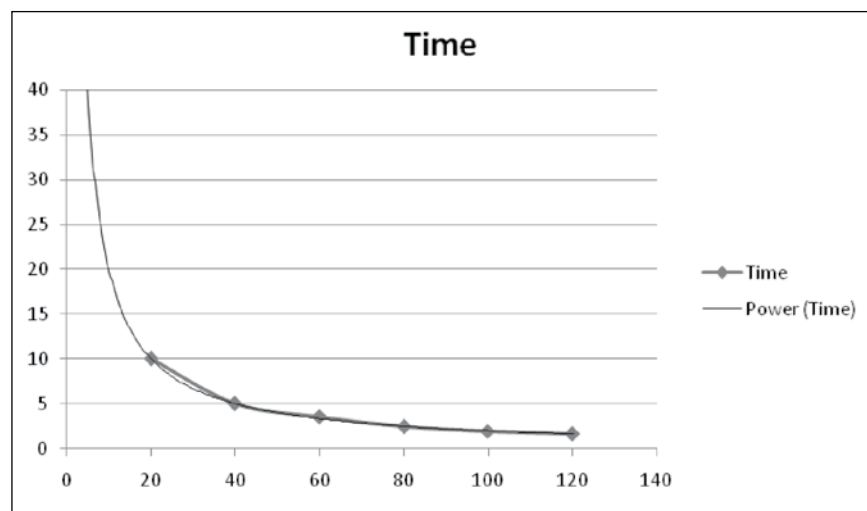
a.

Price of a car (R)	R500 000	R250 000	R100 000	R25 000
Number of the specific car sold per month	5	10	25	100



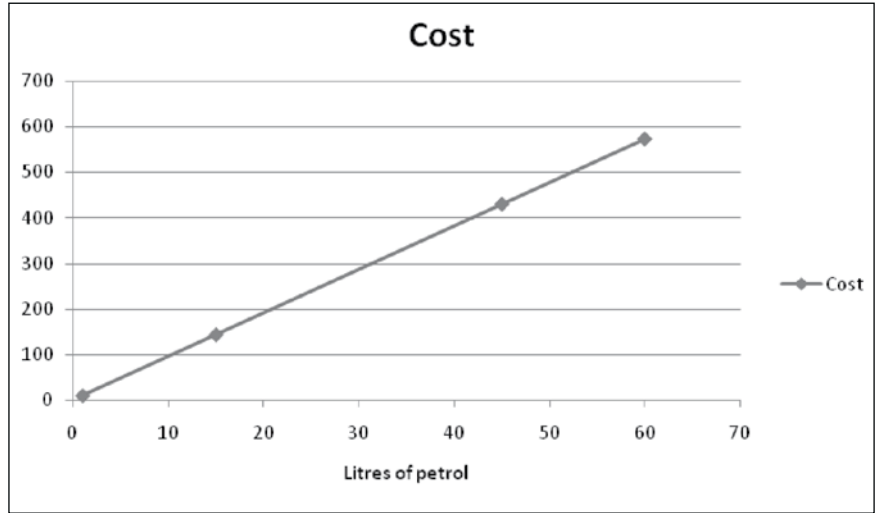
b. Distance travelled = 200 km

Speed (km/h)	20	40	60	80	100	120
Time of journey (h)	10	5	3,5	2,5	2	1,67



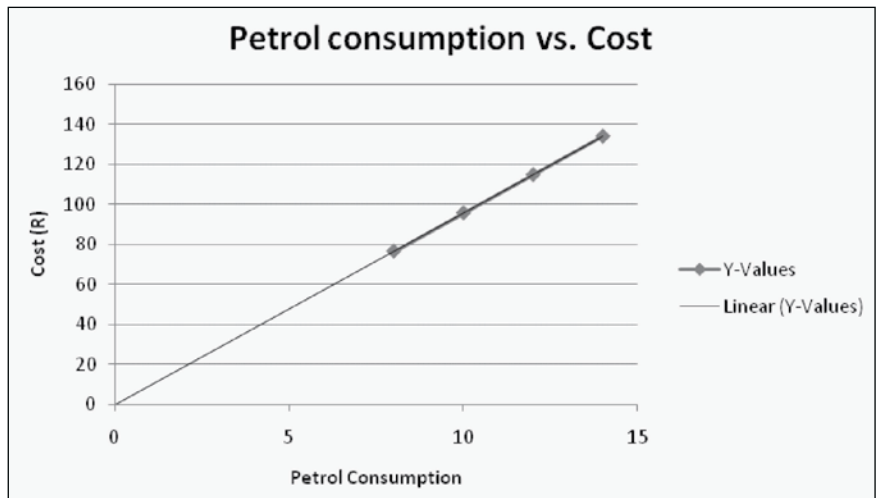
c.

Litres of petrol	1	15	45	60
Total cost (R)	R9,56	143,40	430,20	573,60



d.

Petrol consumption (litres per 100 km)	8	10	12	14
Cost per 100 km	76,48	95,60	114,72	133,84



2. Sketch the above five graphs and write a sentence to describe each graph.

3. Look at the table on cash loans:

Cash loan amounts and the monthly loan repayments

Cash loan amounts		R10 000	R20 000	R30 000
Monthly loan repayments	Within 24 months	R563	R1 087	R1 625
	Within 60 months	R319	R 595	R 888

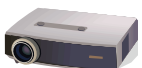
- Is there a constant difference or a constant ratio between the loan repayment amounts for the two different payment options?
Constant ratio of more or less 30% for the 24 month option. However it is higher for the R10 000 loan at 35%.
Calculation : $1087 \times 24 = 26088$; increase is 6088; increase percentage = $6088 \div 20000 = 30,44\%$
- Is there a direct or inverse relationship between the loan repayment amounts for the two different payment options?
The longer the payment time the smaller the monthly payment amount, i.e. an inverse relationship.
- Calculate how much a loan of R30 000 will cost if repaid over 5 years.
It will cost $53280 - 30000 = R23280$.
- Calculate the % increase of the cost of the loan with regard to the loan amount.
 $23280 \div 30000 \times 100 = 77,6\%$

4. Look at the following table on a cash loan of R12 000.

Monthly repayment options dependent on repayment period.

Repayment period	12 months	24 months	36 months
R12 000 loan	R 832	R656	R 491
Actual repayment amount = months times monthly repayment amount	13584	15744	17676
Cost of the loan	1584	3744	5676

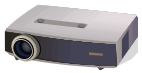
- Is there a positive or negative relationship between the repayment period and the monthly repayment amounts?
Negative: As the months increase the monthly payment amount decreases.
- Complete the table with the actual repayment amount as well as the cost of the loan for the different time periods.
- Is it better to repay within 12 months or within 36 months? Give a reason for your answer.
Within 12 months: the shorter the payment period, the smaller the cost of the loan.



Lecture slide
#48-49

1.1.3 Putting patterns into words and the other way around

- *Demonstrate flow diagrams, formula, word sums and how to convert between them.*
- *Demonstrate formula*
- *Mention and demonstrate the various types of graphs*



Lecture slide #50-54

Activity 4 – independent and dependent variables

For each table in this activity, identify the independent and dependent variables.

1. Complete the flow diagrams and write in words what the flow diagrams mean:

a. Earnings per day of clerks at IT retail shop:

Input value (R) = sale amount				Output value (R) = earnings of clerk
200	× 0,1	+ 250	=	270
500				300
700				320
1200				1110
2400				1230

b. Sammy’s Private Taxi rate:

Distance (km)				Rate (R)
10 km	× 4	+R30	=	70
30 km				150
50 km				230
270 km				1110
300 km				1230

2. Complete the following tables according to the given formula’s or written instructions:

a. $y = 5x - 2$ (Also write this instruction in words.)

Input value (x-value)	1	2	3	4	5	6	7	8	9
Output value (y-value)	3	8	13	18	23	28	33	38	43

b. Complete the operating instructions, give the correct formula and then complete the tables :

Divide the x-value by 5 and add 8 to the answer:

Formula: $y = (x/5) + 8$

x-value	5	15	25	35	45	55	65	75	85
y-value	9	11	13	15	17	19	21	23	25

c. Multiply the x-value by 3 and subtract 2 from the answer.

Formula: $y = 3x - 2$

x-value	3	6	9	12	15	18	21	24	27
y-value	7	16	25	34	43	52	61	70	79

1.1.4 Make representations of the relationships i.e. sketch them



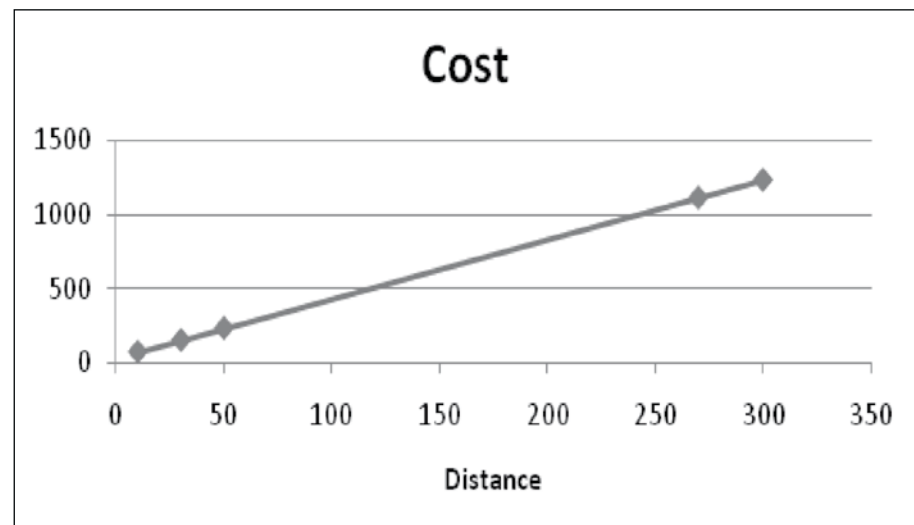
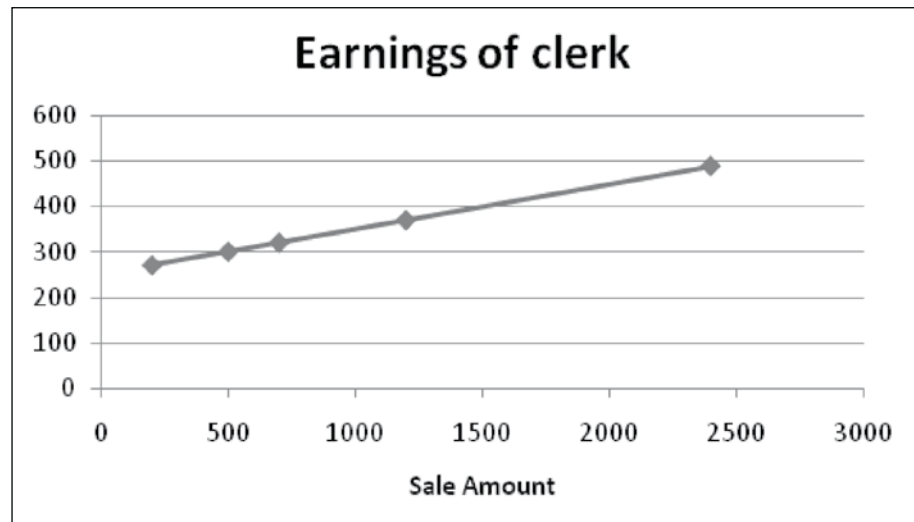
Lecture slide
#55-59

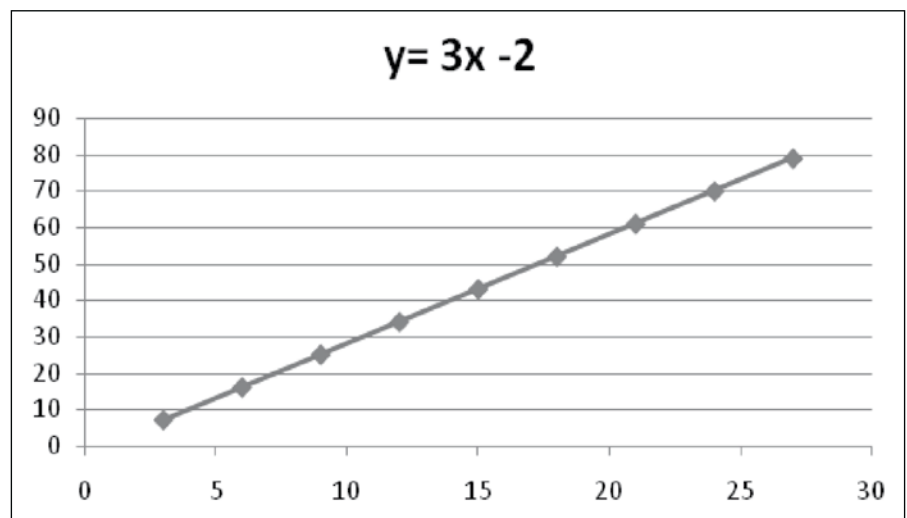
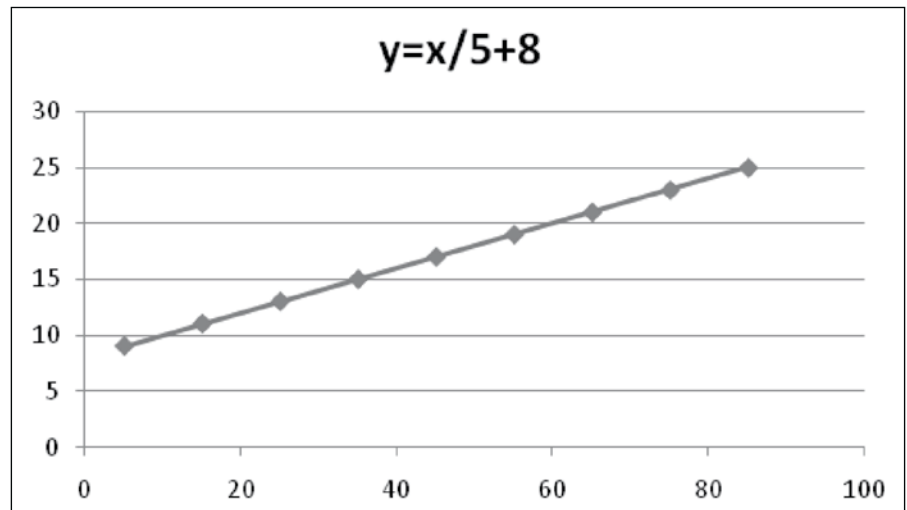
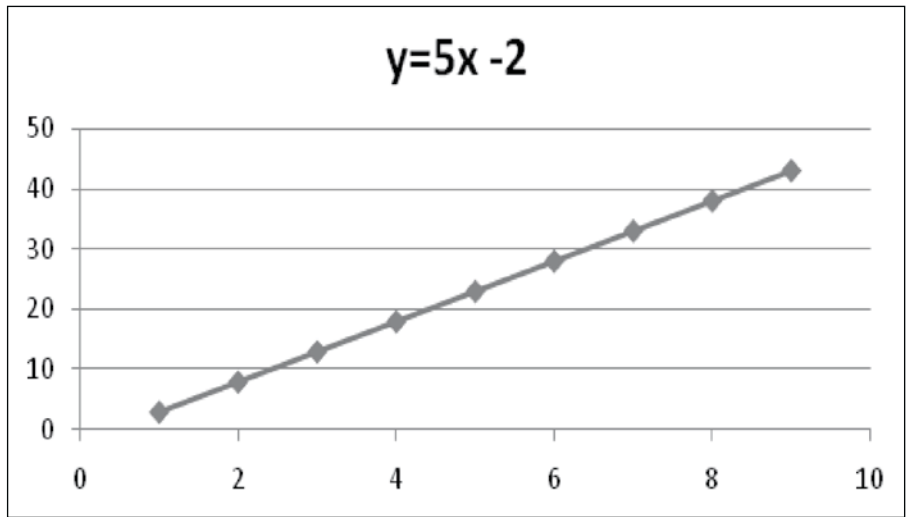
Activity 5

Student's can complete this activity alone or in groups.

Sketch five graphs of the information in Activity 4.

If you have forgotten how to sketch graphs look at section 3.2.





- Explain what a discrete relationship is.
- Explain what a continuous relationship is.
- Explain what a piece-wise linear relationship is.

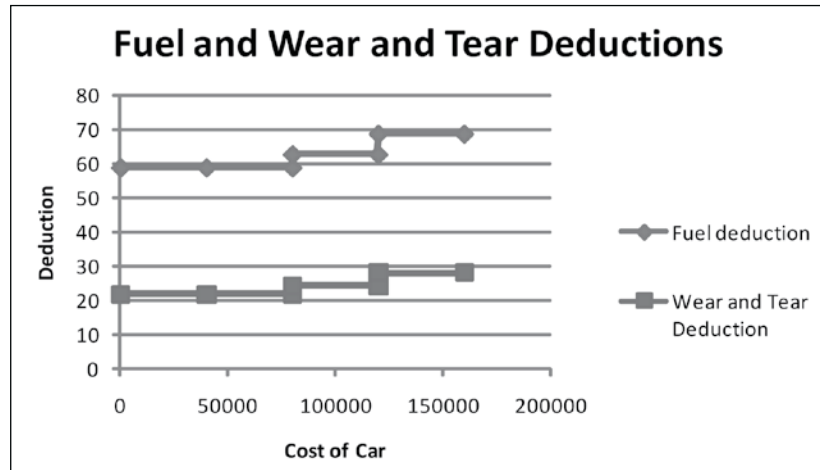


Lecture slide
#61-65

Activity 6 – sketch the relationships. Do it with a friend.

1. Before Bongani started his own business he used to work for a construction business. He worked out of town and had to do a lot of travelling for his work. He was given a travel allowance from his employer for expenses.

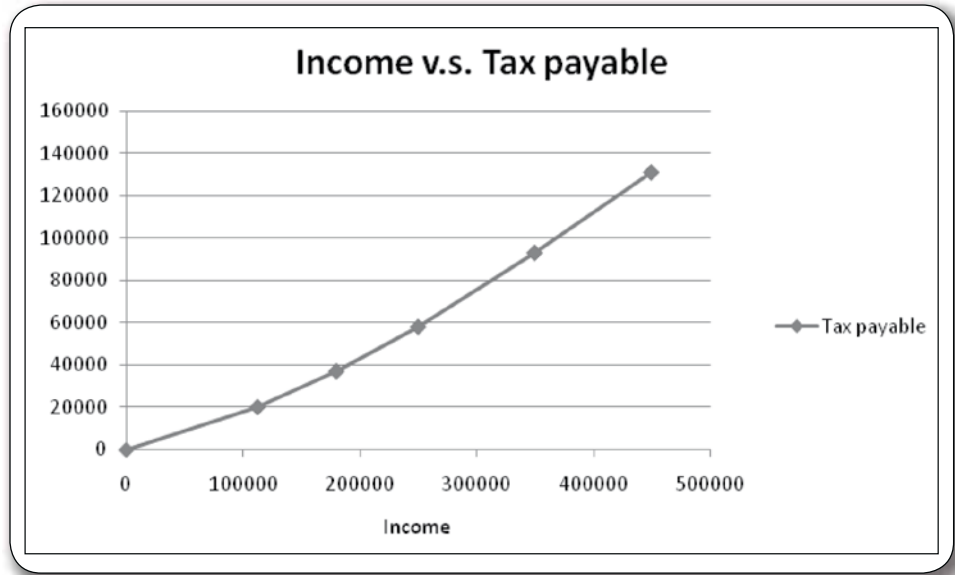
Represent on graph paper the information in this table of car value vs. deductions on fuel cost and wear and tear on the car.



Value of the car (R)	Fixed deduction for car value (R)	Deduction on fuel cost (c)	Deduction on wear and tear (c)
0 - 40 000	14 672	58,6	21,7
40 001 - 80 000	29 106	58,6	21,7
80 001 - 120 000	39 928	62,5	24,2
120 001 - 160 000	50 749	68,6	28,0

2. He also had to pay income tax.
- Represent on graph paper the relationship between individual income tax bracket (independent variable) vs. tax payment. Note that each tax bracket will have its own unique line graph.
 - The tax threshold for people under 65 years of age in 2008 = R43 000. What does this mean?

Taxable income (2008)	Tax rate
<0 - 112 500	18% of the amount
112 501 - 180 000	20 250 + 25% of the amount above 112 500
180 001 - 250 000	37 125 + 30% of the amount above 180 000
250 001 - 350 000	58 125 + 35% of the amount above 250 000
350 001 - 450 000	93 125 + 38% of the amount above 350 000
450 001 and above	131 125 + 40% of the amount above 450 000



Sometimes a plotting of the relationship between two variables does not present with a specific graph line but gives a number of scattered points on the graph grid. A trend line can be fit to such scattered points. (See also “Trends” on page 72 and the trend line that you have to fit in Activity 13.)

Example:

If pulse rate is taken of five twenty-year old men, all five of them will have slightly different pulse rates in beats per minute. This is because they are different people, some of them might smoke, one might be ill, another might be super fit.

A pulse rate against age graph will give a scatter plot i.e. a scattering of points:

The **age (top row), and pulse rate in beats per minute (bottom row)** of a sample of 25 people are given.

10	3	4	5	8	1	16	21	5	2	33	35
85	103	96	101	90	115	69	81	100	105	62	70

Age (top) and pulse rate (bottom row) – continued:

55	50	45	65	57	70	42	75	57	44	63	50	55
72	66	77	78	78	70	62	76	67	68	70	70	72



Lecture slide
#66-69

Assignment

Each student must include the chosen investigation in his/her portfolio of evidence.

Delegate the work, e.g. for question 1:

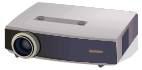
One person in the group can do the research on the internet, a second can organise the information, a third and fourth person can represent and finalise the answers.

Decide within the groups how to delegate the work for numbers 2 and 3.

Do one of the following investigations:

1. Investigate the cost of touring by long distance bus in South Africa.
 - a. In a table compare the prices of two different bus operators for different distances.
Examples of websites: www.eljosa.com or www.citiliner.co.za.
 - b. Represent the comparative information on graph paper.
2. Ask the following people how they calculate the cost of their products:
 - a. Your local taxi operators.
 - b. Your local supermarket.
 - c. A restaurant or fast food outlet in your vicinity.
 - d. Your bank.
 - e. Your cell phone provider.
3. Your cell phone may either be on a contract or might have been bought cash.
 - a. Give the table of your own cell phone contract **or** your own cell phone pay-as-you-go costs.
 - b. Represent this information on a graph and make a few **predictions** about cell phone usage of the group.
4. Take pulse rate of 50 people with ages spread out evenly between 18 and 60 years of age. This is group work – delegate the taking of the pulse rates so that each person only has to take pulse rate of two people.
 - a. Plot the information on a graph.
 - b. Describe the trend of pulse rates.

2. Identify and use information from different representations of relationships to solve problems in the workplace



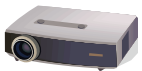
Lecture slide #70

At the end of this outcome, students will be able to:

- Identify and select information from different representations of relationships to solve problems.
- Use and develop formulae with confidence.

2.1 Identify and select information

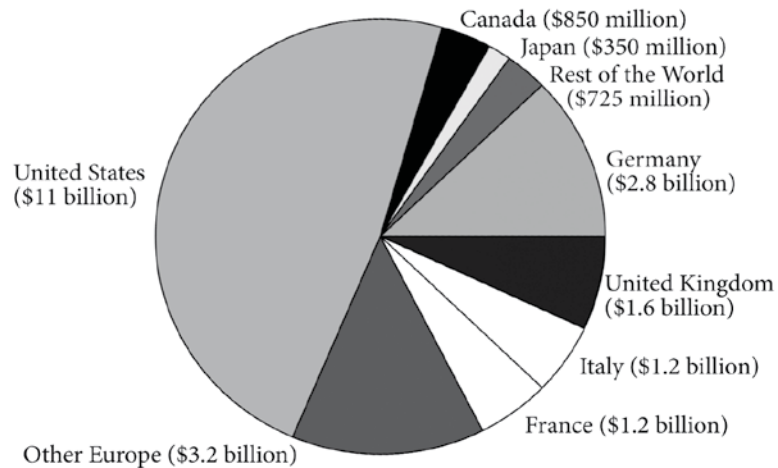
The following instances can all be represented in tables, in graphs or in words: Weight of baby vs. age; cost of ticket vs. distance; cost of petrol vs. volume of petrol; pulse rate vs. age of person; volume of fruit juice container vs. cost of its production; telephone tariffs; water tariffs; electricity tariffs.



Lecture slide #71-79

Activity 7

Students can complete this activity in class or as homework.



Global Sales of Organic Foods, Circa 2002 – Source: IFOAM

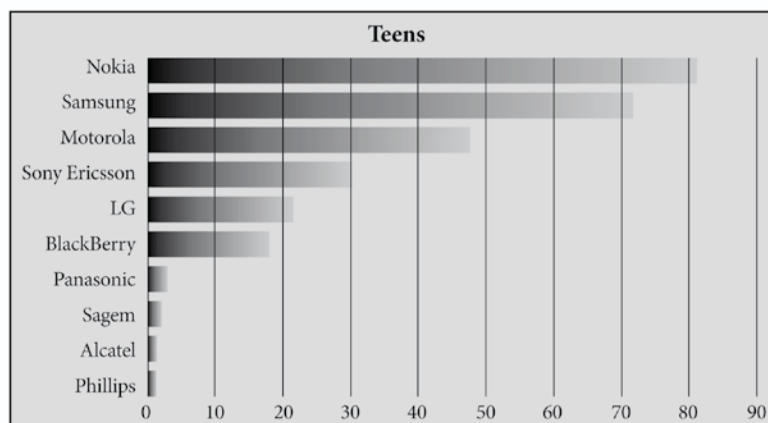
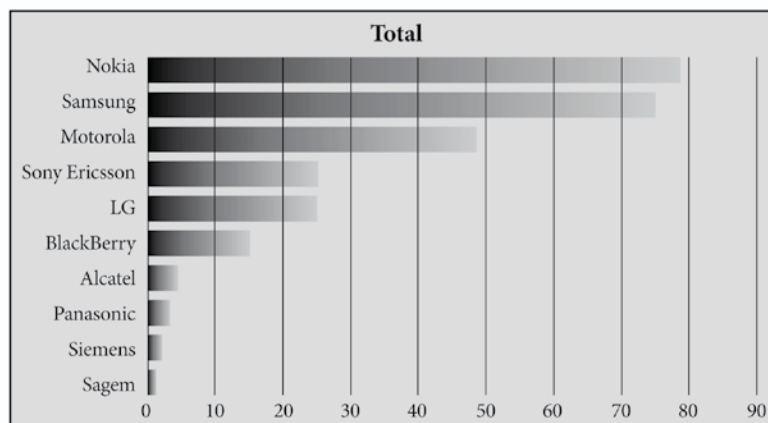
1. Study the pie chart and answer the questions that follow:
 - a. What is the subject of the pie chart?
Global sales of organic foods.
 - b. Which country has the largest global sale of organic foods?
United States of America.
 - c. What does (\$11 bill.) mean? Write the figure out in full.
\$11 000 000 000
 - d. What does (\$725 mill.) mean? Write the figure out in full.
\$725 000 000
 - e. Which country has the smallest sale of organic foods?
Japan.
 - f. How many countries are represented in this pie chart?
Nine.

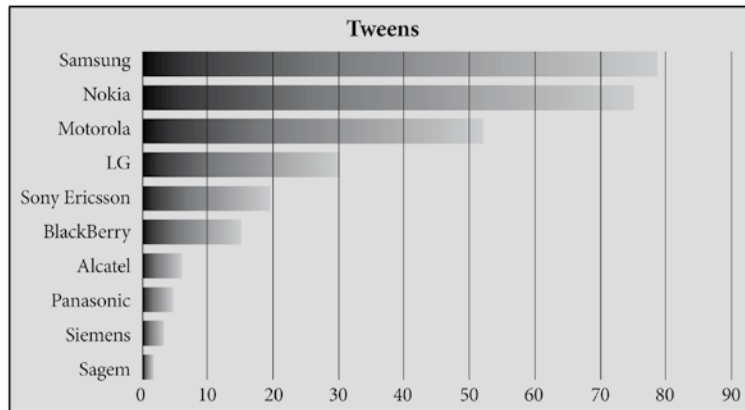
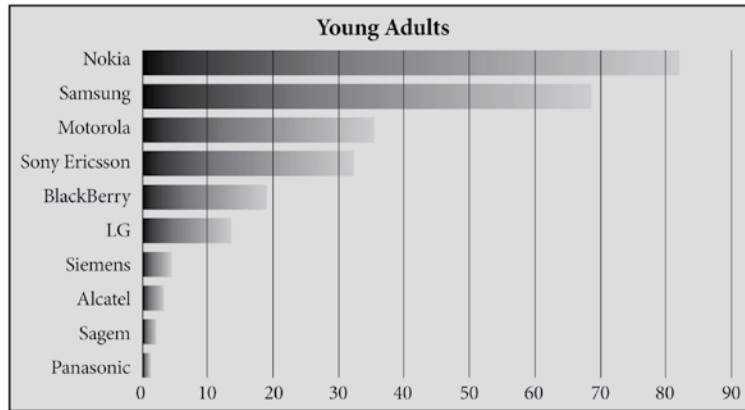
- g. Under which section would you look for African sales of organic food?
Rest of the world.
- h. Why are African countries not represented separately on this pie chart?
Sections too small.

2. Study the bar graphs and answer the questions that follow:

- a. Which cell phone brand is the most popular overall?
Nokia.
- b. Which cell phone brand is the most popular amongst young adults?
Nokia.
- c. Which are the four least popular cell phone brands in the four bar graphs? Have you ever heard of any of them?
Alcatel, Sagem, Panasonic, Siemens.
- d. What do you think is represented on the horizontal axis and why does the newspaper not find it necessary to show this on the sketches?
Percentage and it is not shown because it is very obviously from the axes which runs from zero to 90.
- e. What percentage of tweens gives Samsung the highest rating?
78%

Coollest Cellular Phone Brands





3. Explain in words how the distance grid works. Use three examples from the grid to illustrate your explanation.

	Bloemfontein	Cape Town	Durban	East London	Johannesburg	Port Elizabeth
Bloemfontein	-	1 004	634	584	398	681
Cape Town	1 004	-	1 753	1 079	1 402	769
Durban	634	1 753	-	674	557	984
East London	584	1 079	674	-	982	310
Johannesburg	398	1 402	557	982	-	1 075
Port Elizabeth	691	769	984	310	1 075	-

2.2 Use formulae with confidence



Lecture slide
#71-79

Activity 8 – use logic to solve equations

Solve the following equations by logic:

1. $4t = 24 \rightarrow$ What is the value of “t”?

$$t = 24 \div 4 = 6$$

2. $\frac{x}{1000} = 200 \rightarrow$ What is the value of “x”?

$$\frac{x}{1000} \times 1000 = 200 \times 1000$$

3. $V = (8)(16)(7) \rightarrow$ What does V stand for?

$$Volume = 897 \text{ cubic units}$$

4. $1500 = (3)(5)(h) \rightarrow$ What does the “h” stand for?

$$Height = 1500 \div 15 = 100$$

5. $P = 2(L + b) \rightarrow$ If $P = 48$ and $L = 15$ what is b?

$$48 = 2(15 + b)$$

$$24 = 15 + b$$

$$Breadth = 9 \text{ units}$$

Look at the formula to calculate simple interest in the table below.

a. If it is given that:

- $P = R6\ 000$
- $t = 6$ years
- $r = 12\%$ interest

Then the simple interest can be calculated with the formula:

$$SI =$$

$$\frac{P \cdot t \cdot r}{100}$$

$$SI = (6000)(6)(12) \div 100 = R4320$$

b. If you have to calculate the starting amount (P) and it is given that:

- Simple interest = R4320
- $t = 6$ years
- $r = 12\%$

$$R4320 =$$

$$\frac{P \cdot 6 \cdot 12}{100}$$

You now have to ask: How can I get “P” on its own, i.e. solve for “P”?

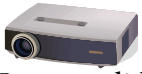
Step 1 – multiply by 100 on both sides of the equation

$$4320 \times 100 = P \cdot 6 \cdot 12$$

Step 2 – divide on both sides by 6.12

$$432000 \div 6.12 = P$$

$$R6000 = P$$



Lecture slide
#81-84

Activity 9 – Solve the unknown variable by calculation

Students can complete this activity in class or as homework.

Table of formulae from different problem contexts:

Formula	Subject of formula	Explanation of the letter symbols
$SI = \frac{P \cdot t \cdot r}{100}$	SI = simple interest	P = principal amount; t = time in years; r = rate of interest
$V = L \cdot b \cdot h$	V = volume of a rectangular right prism.	L = length; b = breadth; h = height
$S = \frac{d}{t}$	S = speed	D = distance; t = time
$C = \frac{5}{9} (F - 32)$	C = degrees Celsius	F = degrees Fahrenheit
$C = 2 \pi r$	C = circumference of a circle	r = radius of the circle; $\pi = 3,14159$
$A = \pi r^2$	A = area of a circle	r = radius of the circle; $\pi = 3,14159$
$A = \pi r^2 + 2 \pi r h$	A = total external area of a cylinder	r = radius of the base of the cylinder; h = height of the cylinder; $\pi = 3,14159$
$P = 2(L + b)$	P = perimeter of a rectangle	L = length of the rectangle; b = breadth of the rectangle

- Select the correct formula from the given table and then calculate the following, using the given substitution values.
 - SI if $P = R3\ 000$; $t = 6$ years and $r = 17\%$.
 $SI = 3060$
 - S if $d = 40$ km and $t = 2,5$ hours.
 $Speed = 16$ km/h
 - Area of a circle if $r = 25$ cm.
 $Area = 1963,49\text{cm}^2$
 - Circumference of a circle if $r = 25$ cm.
 $157,08\text{cm}$
 - V if $L = 10$; $b = 7$ and $h = 25$.
 $Volume = 1750$
 - P if $L = 75$ and $b = 25$.
 $P = 200$ units
 - Degrees C if degrees F = 212.
 $C = 100$ degrees Celsius
- Select the correct formula from the given table to calculate the following by substituting the given values:
 - Calculate the average speed of an aircraft that takes 3 hours to fly 1 800 km.
 $Speed = 600$ km/h
 - Calculate the circumference of a circle with radius 1,5 m.
 $Circumference = 9,42477$ m
 - Convert 76 degrees Fahrenheit to degrees Celsius.
Degrees Celsius = 24,44

- d. What is the total external surface area of a cylinder which has a radius of 25 cm and a height of 35 cm?

$$\text{Total external surface area} = 9424,77\text{cm}^2$$

- e. How many cubic metres of water is there in a swimming pool which is 15 metres long, 5 metres wide and 2 metres deep?

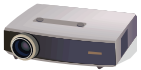
$$\text{Volume} = 150\text{m}^3$$

- f. If you borrow R800 from a friend and he charges you simple interest at a rate of 6% per year, calculate the amount of interest that you have to add to the initial amount when repaying your friend after 5 years.

$$\text{SI} = \text{R } 240$$

- g. What is the length of fencing that a farmer has to buy to fence his farm which is 2 000 m long and 850 m wide?

$$\text{Perimeter} = 5700\text{m}$$



Lecture slide
#85-86

3. Translate between different representations of relationships found in the workplace

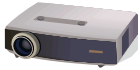
At the end of this outcome, students will be able to:

- Convert representations of relationships from one form to another to reveal features of patterns and relationships.
- Select and develop representations of relationships to solve a problem and/or communicate/illustrate a result.

3.1 Converting representations

Explain to students when to use the various different representations listed below:

- Words
- Tables
- Straight line graphs
- Broken line graphs
- Bar graphs
- Scatter graphs
- Histograms
- Pie charts
- Stem-and-leaf diagrams
- Pictograms



Lecture slide
#87-90

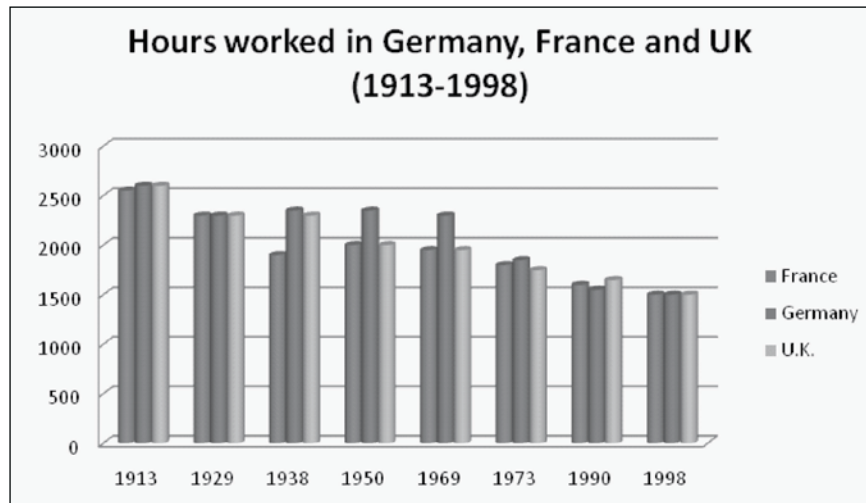
Activity 10

Students should complete this activity in groups in class.

1. From the broken line graphs below, answer the following questions:
 - a. What is the subject of the presentation?
Annual hours worked per person
 - b. What is the variable on the vertical axis?
Hours worked.
 - c. Make a table from the information in the sketch.

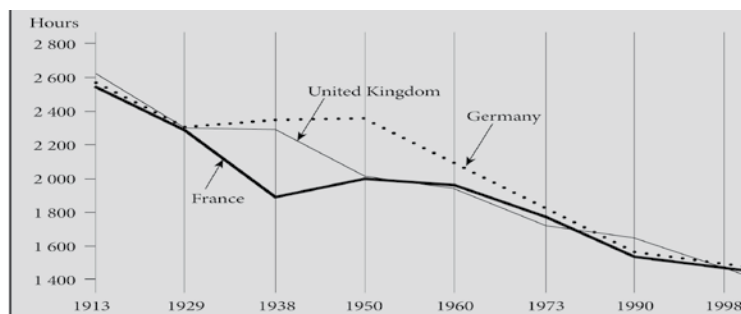
	1913	1929	1938	1959	1960	1973	1990	1998
FR	2550	2300	1900	2000	1950	1800	1550	1500
DE	2600	2300	2350	2350	2300	1850	1550	1500
UK	2600	2300	2300	2000	1950	1750	1650	1500

- d. Make a bar graph from the information in the table.



- e. Why do you think that the line for France suddenly dips in 1938?
War was imminent – no normal work was done then.
- f. Name two mistakes which were made in this representation.
Years on the horizontal axis not evenly spread; No title to the graph.

Annual hours worked per person employed in Major Industrial Countries, Selected Years, 1913 – 1998



Source: P.114 in *State of the World. 2004.*

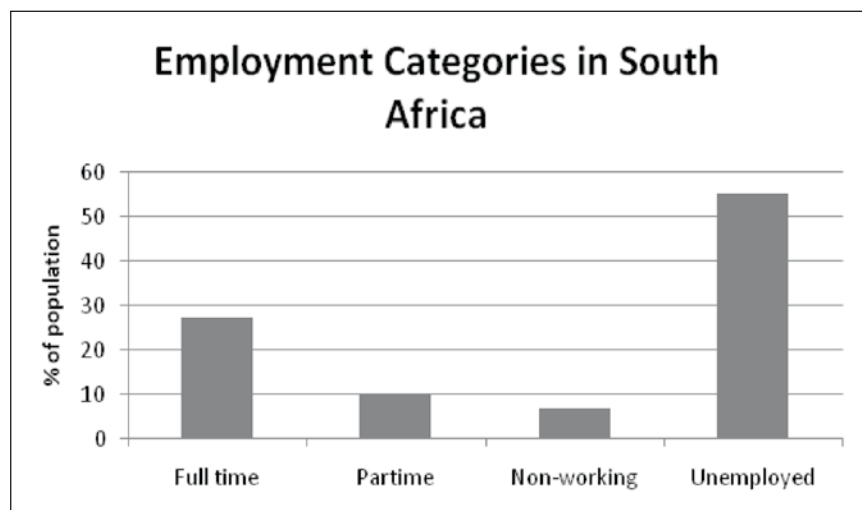
2. In South Africa 9 177 thousand of the adult population (16+) have full-time work, 3 401 thousand work part-time only, 2 362 thousand are non-working housewives, and 18 531 thousand do not have work.

- Calculate the percentage of adults in each category of employment.
- Translate the information into a table.

People in different categories of employment in South Africa

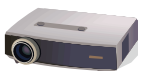
Full-time	9 177 000	27,42%
Part-time	3 401 000	10,16%
Non-working	2 362 000	7,06%
Unemployed	18 531 000	55,36%
Total	33 471 000	100%

- Draw a graph of the information. Decide for yourself whether a line graph or a bar graph would be the better representation.



- Which other representation could be used to represent the data?
Pie chart

3.2 Selection of representations



Lecture slide #91

- Refresh the number line with students
- Explain the Cartesian plane
- Demonstrate how to plot points on the Cartesian Plane
- Demonstrate how to plot a graph from points on the Cartesian Plane
- Describe the essential features of a graph i.e. Title; title on x-axis; title on y-axis; key or legend.

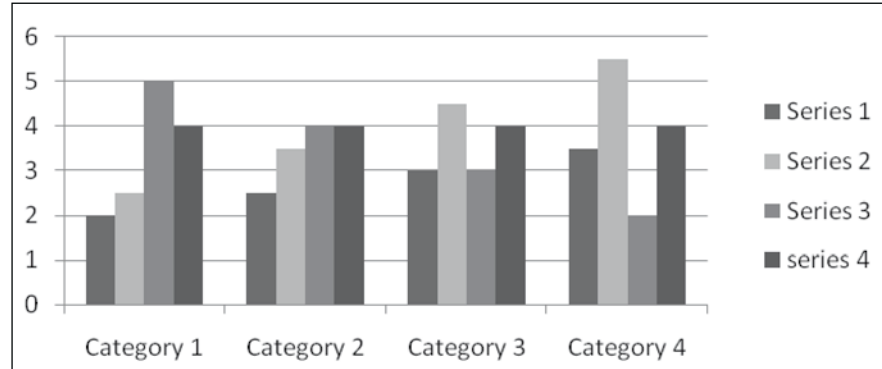


Lecture slide
#94-95

Activity 11

This is a very short activity (5 mins) which students can complete in class.

Study the graph below and describe the trends in the 4 series of data in this compound bar chart.



- Series 1 – Positive or increasing trend
- Series 2 – Positive or increasing trend
- Series 3 – Negative or decreasing trend
- Series 4 – Constant function

Using a graph to find relevant values:

- Explain how to find a value by reading off a graph.



Lecture slide
#96-104

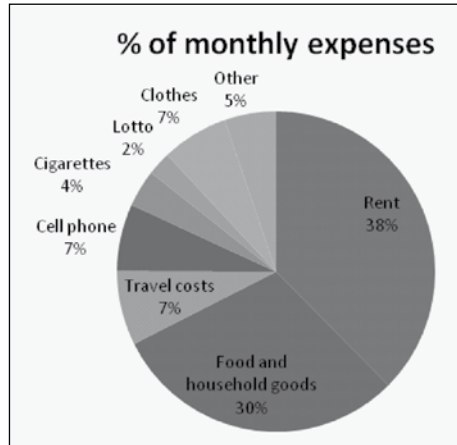
Activity 12 – select the most appropriate representation for data

Students can complete this activity in class or for homework.

1. **Select a representation** for the information in Activity 4 question 1. Then see if you have not already sketched it in Activity 5, if not, sketch it.
Read from the two relevant graphs:
 - a. How much will the clerk earn if the sale amount of the day is R2 000?
R450
 - b. How much was the sale amount if the clerk earns R450 for the day's work?
R2000
 - c. If a passenger travels 80 km in Sammy's taxi, how much is the cost?
R350
 - d. If the passenger in Sammy's taxi has to pay R250 how far did he travel?
55km
2.
 - a. Investigate the following situations and decide on one or two good ways to represent the information.
 - b. Sketch one of these representations.

Bongani's monthly expenses/budget

Rent	R2 500
Food and household goods	R2 000
Travel costs (personal)	R 500
Cell phone (personal)	R 450
Cigarettes	R 250
Lotto	R 160
Clothes	R 450
Other	R 350



3. Basic rule of tips at a coffee shop or restaurant

Total bill between R30 and R100 → Multiply the first digit by two.
That's the tip.

Example:

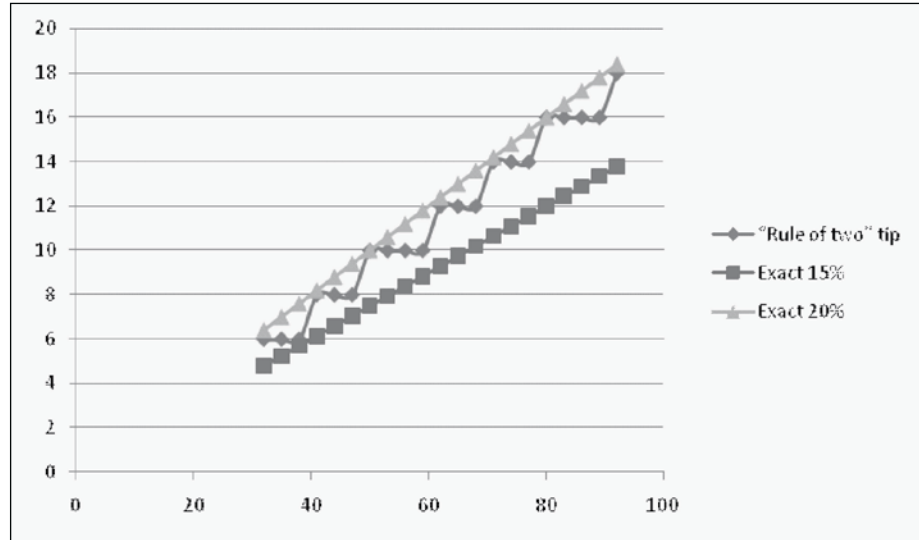
Bill of R56,24 → leave as tip $5 \times 2 = R10$

You will be tipping at an average rate of 16%.

Bill in rand	"Rule of two" tip	Exact 15%	Exact 20%
32	6	4,80	6,40
35	6	5,25	7,00
38	6	5,70	7,60
41	8	6,15	8,20
44	8	6,60	8,80
47	8	7,05	9,40
50	10	7,50	10
53	10	7,95	10,60
56	10	8,40	11,20
59	10	8,85	11,80
62	12	9,30	12,40
65	12	9,75	13,00
68	12	10,20	13,60
71	14	10,65	14,20
74	14	11,10	14,80
77	14	11,55	15,40
80	16	12,00	16,00
83	16	12,45	16,60
86	16	12,90	17,20
89	16	13,35	17,80
92	18	13,80	18,40

Questions

1. Complete the columns for 15% and 20%.



2. Draw three graphs on the same set of axes for the last three columns with regard to the size of the bill.
3. What could you call the graph for the “rule of two” -column?
A step by step function – It remains constant for a while and then steps up.
4. Why would a person want to use this method of tipping?
Quicker and easier.



Summative assessment

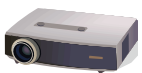
This forms the final revision exercise before the summative assessment test included. Students should complete this alone in silence.

Beverley is personal office assistant for the managing director of a mail order vitamin factory. The business delivers to private persons or retail outlets such as pharmacies and large department stores. Beverley has to calculate the mailing costs of all parcels that leave the factory.

She has been given the following cost tables:

Letter post rates (all prices shown in Rand)

Category	Surface mail	Air mail	Maximum size	Maximum mass
Small letters (per item)	2,50	2,80	120 × 235 mm, max thickness of 5 mm	50 g
Medium letters (per item)	8,40	10,50	176 × 250 mm, max thickness of 10 mm	250 g
Large letters (per item)	13,30	16,30	250 × 353 mm, max thickness of 30 mm	300 g
Small parcels (per 100 g)	7,20	9,20	Length + girth not to exceed 900 mm, nor max length to exceed 600 mm	2 kg
Publishers bags (per kg)	17,50	35,00	Length + girth not to exceed 2 m, max length not to exceed 1,05 m	20 kg (minimum price for 5 kg)
Registration fee	15,00	15,00		
Express fee	17,00	17,00		



Lecture slide #96-104

Large parcel rates (all prices shown in Rand)

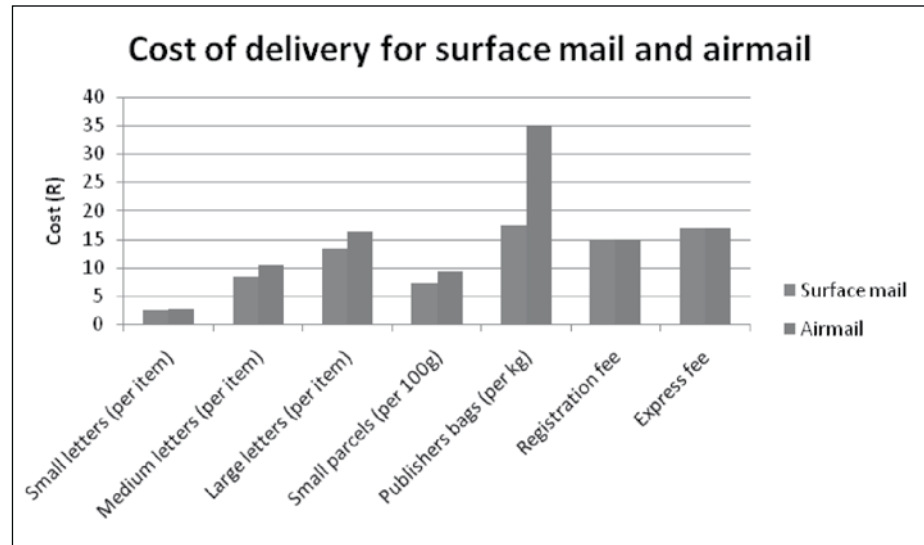
	Surface mail		Air mail	
	Rate per parcel	Plus rate per 100 g or part thereof	Rate per parcel	Plus rate per 100 g or part thereof
Zone A	56,00	0,65	59,00	1,80
Zone B	87,00	1,40	87,00	2,30
Zone C	81,00	2,30	87,00	8,10
Zone D	90,00	1,60	85,00	7,40
Zone E	67,00	2,60	67,00	11,60
Zone F	64,00	1,60	67,00	10,40

Speed services counter to counter or to door – parcels (all prices shown in Rand)

Mass per item	Counter to:	
	Counter (PO)	Door (10:30)
1 kg	34,10	60,10
2 kg	47,70	68,60
3 kg	58,00	84,60
4 kg	72,90	98,50
5 kg	87,00	112,80
6 kg	102,50	128,30
7 kg	118,00	143,80
8 kg	133,50	159,30
9 kg	149,00	174,80
10 kg	164,50	190,30
11 kg	180,00	205,80
12 kg	195,50	221,30
13 kg	211,00	236,80
14 kg	226,50	252,30
15 kg	242,00	267,80
20 kg	319,50	345,30
25 kg	397,00	422,80
30 kg	474,50	500,30

Questions – Beverley’s work load is high and she wants to save time.

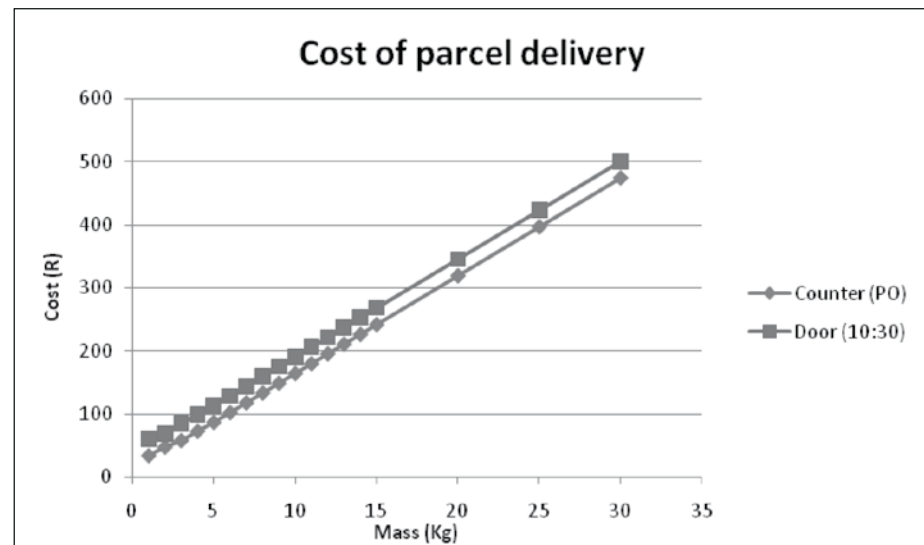
1. Make a compound bar graph of the data in the first table – surface mail and air mail letter rates.



2. Do you think that the bar graph will save her time? Explain your answer.
3. What kind of graph should Beverley draw up for the table on large parcel rates? What use could this graph have for Beverley?

Line graph

4. Draw two graphs on the same set of axes for the speed services table.



5. Do the last two graphs show consistent trends? Explain your answer.
Yes; straight line graphs
6. Can a pie chart be used for any of the supplied information? Explain your answer.
No. At no time is any of the data representing a part of a whole.