

Mathematical Literacy

CLASS TEXT & STUDY GUIDE

Susan Nicol, *et al.*

GRADE

12

CAPS

3-in-1



THE
ANSWER
SERIES *Your Key to Exam Success*



Grade 12 **Maths Literacy** 3-in-1 CAPS

CLASS TEXT & STUDY GUIDE

This Gr 12 Maths Literacy 3-in-1 study guide has been developed with meticulous focus and care. It is a highly recommended, stand-alone guide to guarantee success, caters for a wide spectrum of learners and stimulates interest and enjoyment of the curriculum content.

This book is all you need in order to prepare for the final Maths Literacy exam.

Key features:

- Easy-to-understand, step-by-step approach
- Comprehensive notes and worked examples for all 7 topics
- Exercises and 'Test your Understandings' for each topic
- Detailed answers with explanations and handy hints

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THIS CLASS TEXT & STUDY GUIDE INCLUDES

- 1 Notes and Worked Examples
- 2 Questions per Topic
- 3 Detailed Answers

E-book
available 



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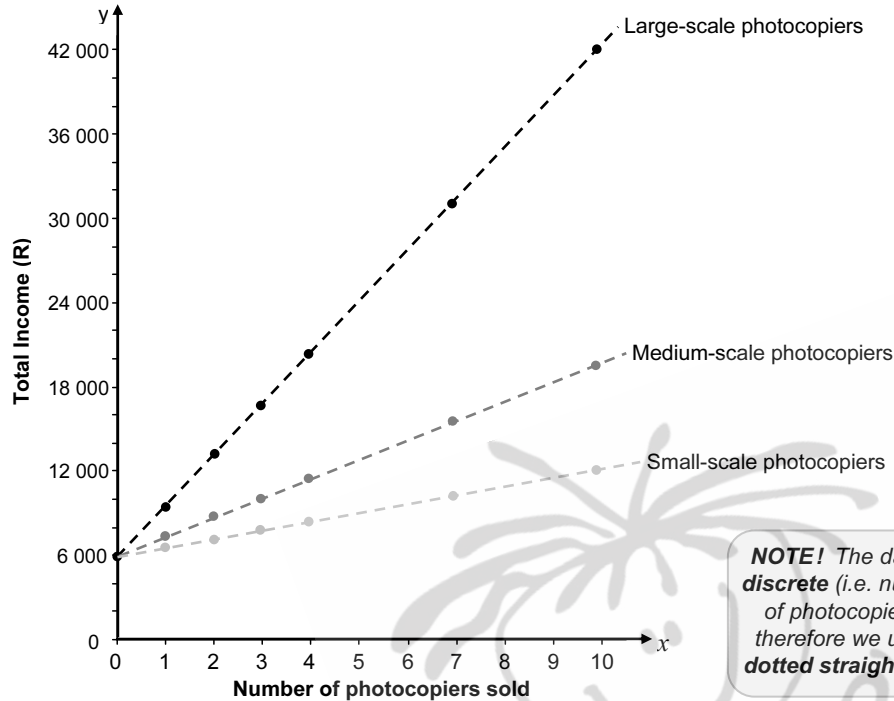
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IAN'S TOTAL INCOME ON PHOTOCOPIER SALES



NOTE! The data is **discrete** (i.e. number of photocopiers), therefore we use a **dotted straight line**.



EXAMPLE 2 of a linear relationship NOT in direct proportion:

Sipho makes diningroom tables, chairs and cushions for a living. He has certain fixed and variable expenses to consider when pricing his goods.

Each table he makes costs him R1 200, plus an extra R800 in variable costs per table.

Each chair costs him R650, plus an extra R450 per chair.
Each cushion costs him R400, plus an extra R150 per cushion.



5 Determining the type of relationship from a graph

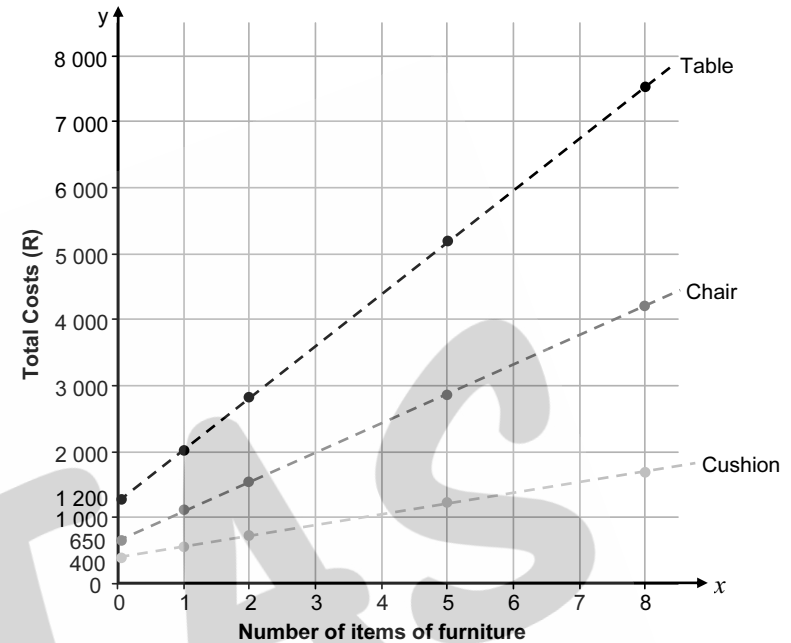


A linear graph that is not in direct proportion will be an increasing straight line graph that starts at a point somewhere along the y-axis (but *not* at the origin).

In the example of Sipho's costs of making diningroom furniture the following graph would be given:



SIPHO'S COSTS TO MAKE DININGROOM FURNITURE



NOTE! The starting points of each graph represent the fixed costs of making the item of furniture.

i.e. Table → R1 200; Chair → R650; Cushion → R400



6 Determining the formula from a graph



- Once it has been established that the type of graph is a linear relationship that is not in direct proportion, the following general formula can be used:

$$\text{dependent variable} = (\text{constant difference} \times \text{independent variable}) + \text{starting value}$$



Therefore, Sipho's costs of making diningroom furniture can be represented by the following formulae:



▪ Diningroom tables

- the dependent variable is 'Total costs'
- the independent variable is 'Number of items of furniture/tables'
- the starting value is R1 200 (i.e. the point on the y-axis)
- the constant difference can be determined in one of two ways:

2.4 How much income does Jim receive per painting job?

$$\text{Income} = R6\ 000 \div 5 \text{ jobs} = R1\ 200$$

2.5 How many painting jobs must Jim complete in order to:

2.5.1 break-even?

4 jobs

2.5.2 make a profit?

5 jobs



Break-even is the point of intersection of the 2 graphs.

2.6 Estimate the profit that Jim will make on 8 painting jobs.

$$\begin{aligned} \text{Profit} &= \text{income} - \text{expenses} \\ &= R9\ 600 - R7\ 600 \\ &= R2\ 000 \end{aligned}$$

Test Your Understanding



Answers on page A14

1. Amir wants to start a small business offering tour packages for the Rugby World Cup.

1.1 Amir lists the following monthly expenses:

Telephone and fax:	R20 (per tour package)
Equipment:	R3 450
Stationery:	R50 (per tour package)
Staff:	R1 000 (per tour package sold)
Rent:	R4 000
Travel agency fees:	R780 (per tour package sold)



1.1.1 Calculate Amir's total fixed costs.

1.1.2 Calculate Amir's total variable costs per tour package.

1.1.3 Write an equation for Amir's total costs.

1.1.4 Study the table given below. Write down the question number and missing values.

Number of tour packages	0	1	5	20
Total costs	a	b	c	d

1.2 Amir plans to sell the tour packages for R6 500 each.

1.2.1 Write an equation for Amir's total income.

1.2.2 Study the table given below and write down the question number and missing values.

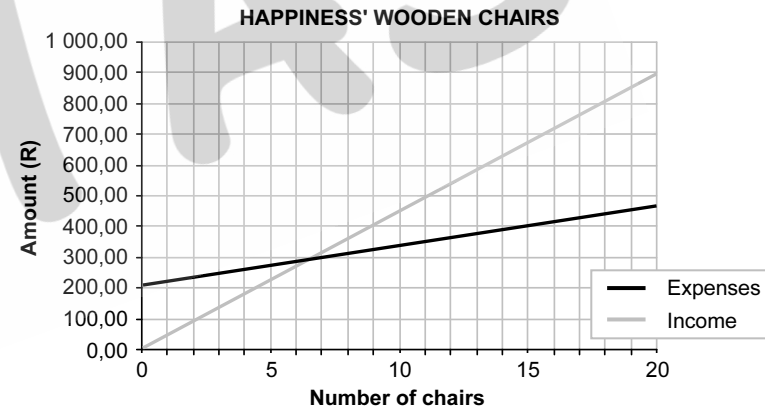
Number of tour packages	0	1	5	20
Total income	a	b	c	d

1.3.1 Use the information from your tables in Questions 1.1.4 and 1.2.2 to draw graphs of Amir's income and costs on the same set of axes. Label the break-even point.

1.3.2 Use your graph from Question 1.3.1 to determine how many tour packages Amir must sell a month in order to break even.

1.3.3 Use your graph from Question 1.3.1 to determine the approximate profit Amir will make if he sells 6 tour packages.

2. Happiness makes wooden chairs for a living. The graph below shows his income and expenses for a month.



2.1 Use the graphs to answer the following questions.

2.1.1 Estimate how much Happiness pays in fixed expenses.

2.1.2 Give TWO examples of fixed expenses that Happiness might have.

2.2 How much does Happiness sell his chairs for?

2.3 How many chairs does Happiness need to sell in order to break even?

2.4 How much income will Happiness receive if he sells 12 chairs?

2.5 How much profit will Happiness make if he sells 15 chairs?

2.6 Which graph(s) would be affected if Happiness increased the selling price of his chair? Explain your choice.

∴ Total estimated cost (R):
 Multiple currency = unit currency × rate
 Rand ≈ £600 × 20
 ≈ R12 000

unit currency : multiple currency
 £ : R
 with exchange rate ≈ 20

2. Now calculate the difference in the estimated total cost of Neil's holiday in London, to the actual costs.
- Tube Travel Costs = 3 three-day tube travel cards × £21,20 = £63,60
 - Back Packers Costs = 8 nights × £28,30 = £226,40
 - Meal Costs = 18 meals × £8,50 = £153
 - Madame Tussauds = £21,50
 - London Eye = £18,10
 - Thames River Cruise = £19,00
 - West End Theatre Show = £57,00



∴ Total actual cost (£) = £63,60 + £226,40 + £153 + £21,50 + £18,10
 + £19 + £57,00
 = £558,60

∴ Total actual cost (R):
 Multiple currency = unit currency × rate
 Rands = £558,60 × 17,56
 = R9 809,02

∴ Difference in Estimated and Actual Cost
 = R12 000 - R9 809,02
 = R2 190,98

Test Your Understanding

Answers on page A19

1. Convert DZD 110,35 (Algerian dinar) to rand, if R1 : DZD 9,48
2. The table alongside shows au pairs' salaries in 3 countries.

1 month = 4 weeks



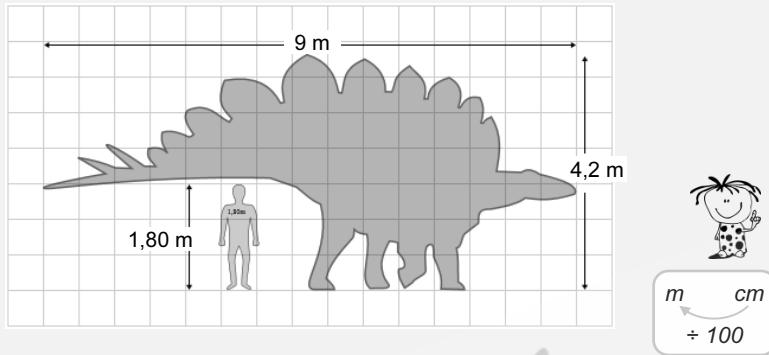
AU PAIRS' SALARIES IN THREE COUNTRIES			
Country	Salary	Exchange Rates	
		United Kingdom	£55 per week
USA	US\$140 per week	Rand/US Dollar (R/US\$)	7,42
Netherlands	€340 per month	Rand/Euro (R/€)	9,86

- 2.1 You want to work as an au pair. Which country will pay you the best salary per week? Show weekly income in rand to justify your answer.
 - 2.2 Which is the strongest currency to the rand? Give a reason for your answer.
 - 2.3 If you were living in South Africa; which country would it be best to import goods from? Give a reason for your answer.
3. A South African couple visited Botswana and Zambia. The table below shows the exchange rate between the currencies of the two countries and the South African Rand (ZAR):

SOUTH AFRICAN RAND TO FOREIGN CURRENCY
R1,00 (ZAR) = 0,95 Botswana pula (BWP)
R1,00 (ZAR) = 681,07 Zambian kwacha (ZMK)

- 3.1 The couple budgeted to pay R20,00 per person for lunch. How much is this amount in Botswana pula?
 - 3.2 The accommodation in Zambia cost 360 286 ZMK per couple per day. They paid a deposit of 1 021 605 ZMK to secure their accommodation. Dinner costs 85 134 ZMK per person and they both had dinner at the hotel restaurant four times.
 Calculate the total amount they will pay in rand at the end of their ten-day (9 nights) stay at the hotel in Zambia.
 - 3.3 Is the Botswana Pula or the Zambian kwacha stronger against the rand?
4. Amy would like to import a sewing machine and accessories from Britain. She is quoted the following:
 Over-locker Sewing Machine: £510,99
 Needles: £9,50 for a pack of 5
 Thread: £4,85 per bobbin
- 4.1 Estimate the total cost in rand; if Amy buys the over-locker sewing machine; 10 packs of needles and 50 bobbins of thread; given the exchange rate of £1 : R18,42
 - 4.2 If Amy budgeted R15 000 for the sewing machine and accessories, would she be able to afford to import it? Show all accurate calculations.

- 2.1 Determine the scale factor used to illustrate the difference in size between a dinosaur and a man, assuming 1 block = 1 cm.



Actual length of dinosaur = 9 m

$$\begin{aligned} \text{Map length of dinosaur} &= 15 \text{ blocks} \times 1 \text{ cm} \\ &= 15 \text{ cm} \\ &= 0,15 \text{ m} \\ \therefore \text{Scale of map (length of dinosaur)} &= \frac{\text{map length}}{\text{actual length}} \\ &= \frac{0,15 \text{ m}}{9 \text{ m}} \\ &= \frac{1}{60} \end{aligned}$$

OR

$$\begin{aligned} \text{Actual height of dinosaur} &= 4,2 \text{ m} \\ \text{Map height of dinosaur} &= 7 \text{ blocks} \times 1 \text{ cm} \\ &= 7 \text{ cm} \\ &= 0,07 \text{ m} \\ \therefore \text{Scale of map (height of dinosaur)} &= \frac{\text{map height}}{\text{actual height}} \\ &= \frac{0,07 \text{ m}}{4,2 \text{ m}} \\ &= \frac{1}{60} \end{aligned}$$

OR

$$\begin{aligned} \text{Actual height of man} &= 1,8 \text{ m} \\ \text{Map height of man} &= 3 \text{ blocks} \times 1 \text{ cm} \\ &= 3 \text{ cm} \\ &= 0,03 \text{ m} \\ \therefore \text{Scale of map (height of man)} &= \frac{\text{map height}}{\text{actual height}} \\ &= \frac{0,03 \text{ m}}{1,8 \text{ m}} \\ &= \frac{1}{60} \end{aligned}$$

\therefore Scale is 1 : 60



REMEMBER!

Only do **one** calculation, as it is assumed that all drawings used the same scale factor.

- 2.2 How many times larger is the dinosaur in comparison to the man, in terms of its height?

$$\text{Number of times larger} = \frac{\text{actual height of dinosaur}}{\text{actual height of man}} = \frac{4,2 \text{ m}}{1,8 \text{ m}} = 2,33 \text{ times}$$

EXERCISE 1

Answers on page A32

1. If a house plan is drawn using the scale 1 : 50; determine the missing plan and actual dimensions in the table below:

Feature	Measurement on the plan (cm)	Actual measurement (metres)
Height of the roof	A	1,5 m
Height of the doors	4 cm	B
Width of the doors	C	0,8 m
Height of big windows	2,4 cm	D

2. The blue crane is South Africa's national bird. It appears to scale on the 5c coin. They grow to about 1,2 m in height. The height of the blue crane on the 5c coin is 15 mm. What is the scale of the blue crane on the coin to the actual height of the blue crane?
3. Jaydon, Nathi and Trevor (3 friends from Somerset West) want to go away for a couple of days once they have written their matric examinations. They have two options: they can either stay in Nathi's parents' house in Arniston, or they can rent a house in Hermanus (which is closer). Below is a map of the Helderberg and Overberg region:

HELDERBERG & OVERBERG REGION



[source : <http://www.stayinsa.co.za/themaps/Overberg1>]

Worked Examples



The table below shows the number of beneficiaries of the Government's Social Grants for 2013/14:

	2013/14
State Old Age Grant	1 265
State Old Age Grant, over 75s	1 285
War Veterans Grant	1 285
Disability Grant	1 265
Foster Care Grant	800
Care Dependency Grant	1 265
Child Support Grant	295

1. Calculate the size of the sector representing the number of beneficiaries of the foster care grant.

Total number of beneficiaries

$$= 1\,265 + 1\,285 + 1\,285 + 1\,265 + 800 + 1\,265 + 295$$

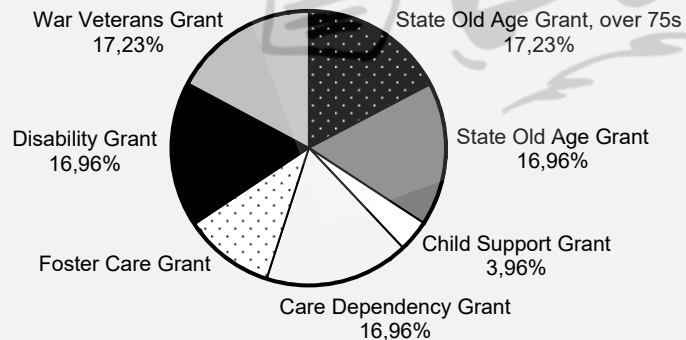
$$= 7\,460$$

$$\therefore \text{Size of sector} = \frac{\text{fraction of whole} \times 360^\circ}{\text{total number of beneficiaries}} \times 360^\circ$$

$$= \frac{800}{7\,460} \times 360^\circ$$

$$= 38,61^\circ$$

2. The pie chart of the Social Grants Beneficiaries for 2013/14 is given below:



- 2.1 Which grant has the smallest number of beneficiaries?
Child Support Grant

- 2.2 Calculate how many children benefit from the child support grant, if there are a total of 7 460 beneficiaries for all the social grants.

$$\text{Number of children benefitting} = \frac{3,96}{100} \times 7\,460$$

$$= 295,42 \approx 295 \text{ children}$$

*Discrete data
∴ round down!*



- 2.3 Determine the percentage allocated to the Foster Care Grant.

$$\text{Foster Care Grant} = 100 - 17,23 - 16,96 - 3,96 - 16,96 - 16,96 - 17,23$$

$$= 10,7\%$$

2 SINGLE, MULTIPLE AND STACKED BAR GRAPHS

- A bar graph shows the **frequency** of each data value, by means of **bars**.
- It is used for **discrete categorical data**.
- Single bar graphs** represent **one data value per category**.
- Compound bar graphs** include multiple and stacked bar graphs.
- Multiple bar graphs: two or more data values per category** are compared and represented by **bars next to each other** (see Question 2 on p. 209).
- Stacked bar graphs: two or more data values per category** are compared and represented by **bars being stacked on top** of each other. Stacked bar graphs indicate the **cumulative totals** per category.
- The **spaces** between the bars indicate the **discrete nature** of the data.
- The bars are **equally spaced** and are of the same width.
- The **height** of each bar represents the **frequency** of each category.
- There is usually a space at both the start and end of the graph.
- Categories** are plotted on the **x-axis**; while the **frequency** is plotted on the **y-axis**.



*Bars are usually vertical
but can also be horizontal.*

3. During the season the netball team scored the following number of goals in their matches.

11 13 14 15 16 17 18 19 21 58

- 3.1 The team goes through to the play-offs and the coach tries to determine what the team's chances are of winning. She decides to calculate their average match score by finding the mean. What impression does the value of the mean give in terms of their chances of winning the play-offs?

$$\begin{aligned} \text{Mean} &= \frac{202}{10} \\ &= 20,2 \\ &\approx 20 \text{ goals} \end{aligned}$$

$$\text{Mean} = \frac{\text{sum of all values in data set}}{\text{total number of values in data set}}$$



REMEMBER! Round down for discrete data.

Since the mean of 20 goals is very high, it would give the impression that the team's chances of winning the play-offs is good.

- 3.2 Which measure of central tendency would be a better indicator of the team's chances of winning the play-offs? Give a reason for your answer.

Median, as it is not affected by outliers (i.e. 58).

- 3.3 Which data value would you choose to tell your opponents, in order to make them fearful of your team's netball ability?

I would tell them that the team scored 58 goals.

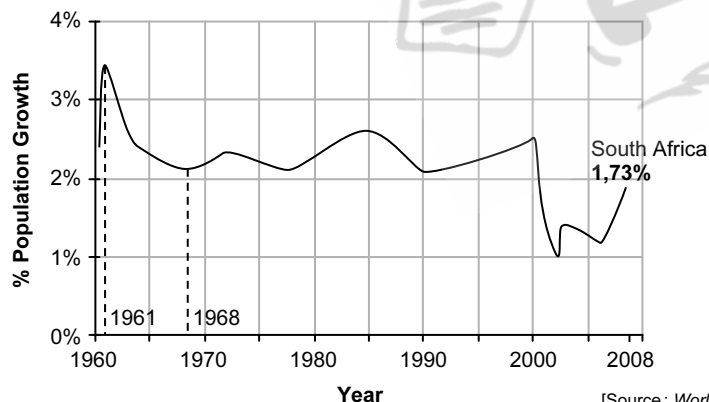
Test Your Understanding



Answers on page A42

1. The following graph shows the population growth in South Africa from 1960 to 2008.

POPULATION GROWTH IN SOUTH AFRICA FROM 1960 TO 2008



[Source: World Bank, World Development Indicators - Last updated July 26, 2010]

- 1.1 Explain the population trend between 1961 and 1968, as shown on the graph.

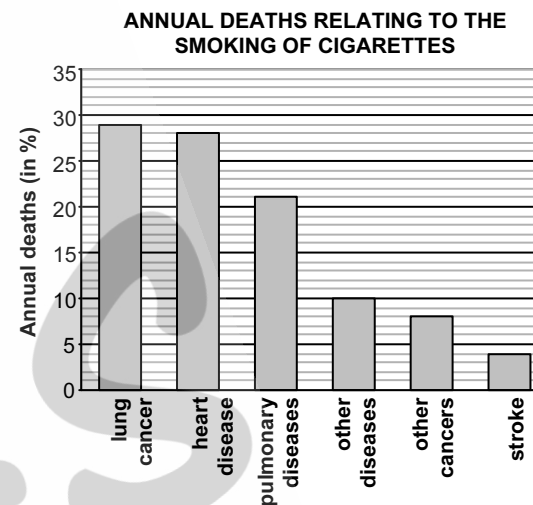
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- 1.2 If the population was approximately 44 000 000 in 2008, calculate the total population figure for 2009 after a 1,73% increase.
- 1.3 Why do you think there was a decrease in the population growth rate from 2000 to 2002?

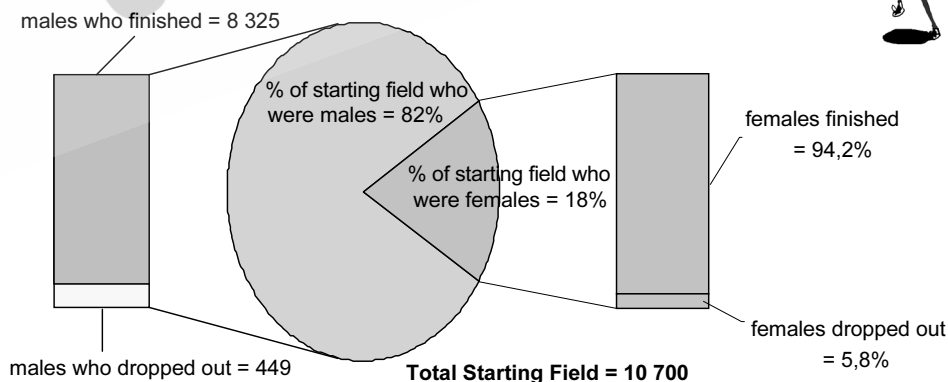
2. The manager at ABC Cigs used the graph alongside to try to convince Timothy to accept the position at the tobacco company. The manager stated:

'The graphs clearly show that there is an annual decline in the number of deaths relating to the smoking of cigarettes.'

Criticise the manager's statement with at least TWO justifications.



3. The graph below shows the percentage of males and females who started the Comrades Marathon and the number and/or percentage of males and females who finished the race.



- 3.1 How many men started this Comrades Marathon?
- 3.2 How many females started the Comrades Marathon?
- 3.3 How many of the females who started the marathon, finished it?
- 3.4 Did a higher percentage of male or female runners drop out of this Comrades Marathon? Explain your answer and show all working out.



5.1 8 class intervals

Class intervals = categories
e.g. $0 < d \leq 20$; $20 < d \leq 30$; etc.



5.2 Total = $1 + 7 + 40 + 67 + 75 + 48 + 10 + 2$
= 250

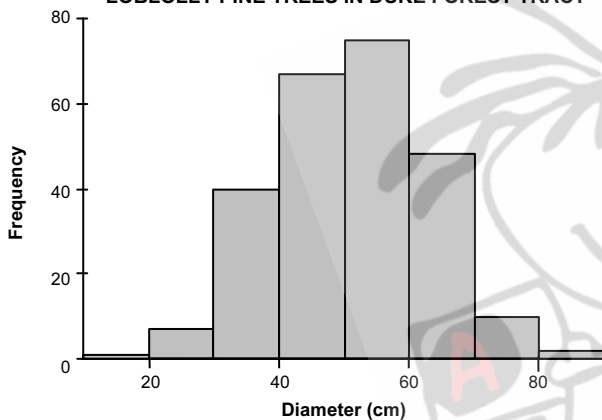
Modal class is the class interval that occurs most frequently.

5.3 Modal class: $50 < d \leq 60$

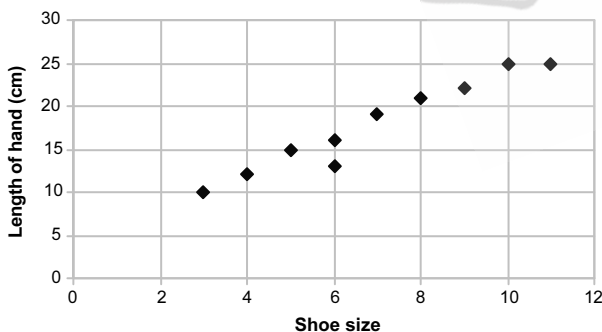


5.4 Continuous, numerical data

5.5 HISTOGRAM OF DIAMETERS OF LOBLOLLY PINE TREES IN DUKE FOREST TRACT



6.1 SCATTER PLOT OF SHOE SIZES VS LENGTH OF HANDS



6.2 Yes, there is a strong positive linear correlation.

UNIT 6:

Interpreting and analysing data

Test Your Understanding



1.1 The % population growth decreased from approximately 3,4% in 1961 to approximately 2,2% in 1968.

1.2 Increase = $\frac{1,73}{100} \times 44\,000\,000$
= 761 200

∴ Total population for 2009 = $44\,000\,000 + 761\,200$
= 44 761 200

OR Total population for 2009 = 101,73% of the population in 2008
= $\frac{101,73}{100} \times 44\,000\,000$
= 44 761 200

$101,73\% = 100\% + 1,73\%$



1.3 Possible reasons could include:

- ▶ There could possibly have been famine, disease, drought, civil unrest or war in developing countries that could have decreased population growth.
- ▶ The generation of women who were of child-bearing age may have decided not to have children; or decided to have fewer children than the previous generation; and/or decided to focus on their careers and rather have children later in life.

2. ▶ He has split the causes of smoking-related deaths into categories and there is no value to determine the actual number of deaths from smoking.

▶ He cleverly arranged the bars from biggest to smallest (tallest to shortest) causing the reader to think that there is a decrease in deaths.

▶ There are no figures relating to actual smoking-related deaths. The percentages indicate the part each cause forms of all smoking-related deaths.

3.1 Males who started = $8\,325 + 449$
= 8 774

3.2 Females who started = total starters - male starters
= $10\,700 - 8\,774$
= 1 926

3.3 No. of females who finished = 94,2% of 1 926
= 1 814,29
= 1 814 females

3.4 % of males who dropped out

= $\frac{449}{8\,774} \times 100\%$
= 5,1%

∴ A marginally higher percentage of females dropped out of the race - i.e. 5,8% compared to 5,1%.

MODULE 7

UNIT 1:

Expressions of probability

Test Your Understanding



1. $\frac{9}{11}$; 90% ; 0,87 ; $\frac{7}{8}$; 0,25 ; 80%
= 81,82% ; 90% ; 87% ; 87,5% ; 25% ; 80%

∴ Most probable (likely) to most improbable (unlikely)

= 90% ; 87,5% ; 87% ; 81,82% ; 80% ; 25%

= 90% ; $\frac{7}{8}$; 0,87 ; $\frac{9}{11}$; 80% ; 0,25

Always remember to answer the question using the original values

given (e.g. $\frac{9}{11}$) and not the equivalent values that you worked out (e.g. 81,82%).

