Useful Maths for Statistical Literacy

3 Part of an Amount

A	A Percentage	of an	Amount
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WITHOUT A CALCULATOR

Examples : a) Work out $\frac{2}{5}$ of \$35

b) Work out 30% of 60 kg.

Working: a) Since $\frac{1}{5}$ of 35 = 7, then $\frac{2}{5}$ of 35 = 2 x 7 = 14

Answer: \$14

b) Since 10% of $60 = \frac{1}{10}$ of 60 = 6then 30% of $60 = 3 \times 6 = 18$

Answer: 18 kg

1	Work	out	WITHOUT	а	calculator.
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a) $\frac{2}{3}$ of 15 kg	
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b)
$$\frac{5}{8}$$
 of \$32

c)
$$\frac{3}{10}$$
 of 500 L

WITH A CALCULATOR

On the calculator 'of' is keyed in as x.

Examples: a) Calculate $\frac{5}{8}$ of 45 kg.

b) Calculate 12% of \$19.75

Working: a) This translates to $\frac{5}{8} \times 45$

Key in : 5 ÷ 8 × 45 =

Answer: 28.13 kg (2 dp)

b) This translates to $\frac{12}{100}$ x 19.75

Key in: 12 ÷ 100 × 19.75 =

Answer: \$2,37

2 Calculate (round to 2 dp when needed).

a)	$\frac{5}{6}$ of 81 kg	
h)	$\frac{3}{1}$ of 51	

c)
$$\frac{2}{3}$$
 of \$65.25

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B Increase or Decrease an Amount

Increase (or raise) means make larger, add on.

Decrease (or reduce) means make smaller, take off.

Examples: a) Decrease 72 kg by $\frac{1}{9}$.

b) Raise \$6.80 by 15%.

Working: a) $\frac{1}{9}$ of 72 = 8

Decrease 72 kg by 8 kg. Answer: 64 kg

b) 15% of $$6.80 = 15 \div 100 \times 6.80 = 1.02$

Increase \$6.80 by \$1.02.

Answer: \$7.82

			_		
1	If possible	use brai	npower. C	Calculators	allowed.

a)	Raise \$45 by	<u>2</u> 9.	
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b)	Decrease 15 L by $\frac{3}{5}$.	
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hardware store. How much is the sale price for an electric drill priced at \$120?

All Prices Reduced by 20% This Week Only

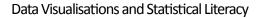
3	At birth a baby weighed 3300 g. In a month her weight increased
	by 22%. How much did the baby weigh aged 1 month?

ļ	Cars decrease in value by 15% each year. How much would
	a car be worth next year if its value now is \$9500.

Statistical Literacy - continued

Data Visualisations and Statistical Literacy

A	Thinking Statistically - continued			
4	What does the advertisement not tell you about people who buy tickets for the lottery.	BE	IN TO	WIN
			ole have nov 100,000 in o Buy No	our lottery
			Buy ito	•
5	More accidents do occur with drivers travelling less than 100 km/h than with drivers travelling more than 100 km/h. Why do you think this is the case?	UP TH	IE SPEE	D LIMIT
		less tha	ents occur with on 100 km/h than lling more than	
		Sign our increase	petition the speed li	mit 120
6	Assuming that going on 'our diet plan' does result in the weight loss shown in the graph, does this support the claim that is in the title?		prove that you e if you're on o	
		Weight (kg) 40 40 40 40 40 40 40 40 40 40 40 40 40		
		0	Before Average Wei	After
			e weight of 100 people started our using our	
7	Do you think that this shows that the total number of males from the school who walk is greater than the total number of females from the school who walk?			
		Our surve fe	y shows that mo emales walk to s	ore males than school
			Do Not Walk	Walk
		Males	10	30
		Females	5	15
		We sa	mpled 60 of the 120 in our school	00 students



15 Making Comparisons

A Comparing Data

There are many situations where graphs and statistics are used to compare two sets of data. When doing this you need to comment on

similarities and differences.

Example: These histograms and table of statistics have been obtained using data collected from 30 Auckland commuters and 30 Wellington commuters.

The data consists of the distance they travel to get to work in the centre

of the cities.

Compare the data distributions.

Possible answer:

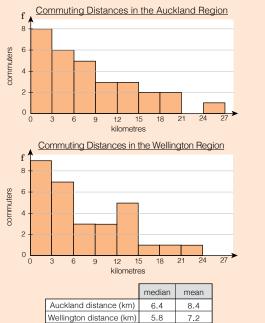
Both graphs are skewed to the right with the first two bars (distances less than 6 km) the highest. This is not surprising as you would expect more people to live close to their work place.

The long tail of both graphs indicates that there a very few people who travel long distances to work.

The graph for Wellington commuters has a shorter second peak at 12-15 km. A possible reason is that Wellington's population has satellite suburb(s) 12-15 km away, while Auckland's population is more evenly spread.

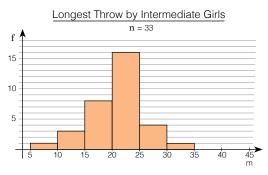
The medians for both sets of data are less than $6.5 \, \mathrm{km}$. This shows that more than 50% of the commuters in both cities travel less than this distance.

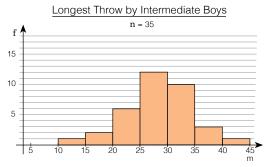
Both means are higher than the medians; this is because of the long tails in both distributions.



1 Compare the data distributions for tennis ball throws for a group of intermediate students. The distances are the longest of three throws for each of 68 students.







	median	mean
Girls' distance (m)	21.7	20.4
Boys' distance (m)	27.4	28.6

25 Scatter Plots 2

A Used Toyota Corollas

Ethan wants to find out whether you can predict the price of a used car by its age or by its odometer reading. He selected a sample of Toyota Corollas for sale on Trade Me. For each car in the sample he wrote down age, odometer reading and price. Then he made these two scatter graphs.

1a)	How many cars were sampled?	Price vs Age of Used Toyota Corollas
0)	Give approximate age, odometer reading and price of the most expensive used Toyota Corolla in the sample.	25 000
c)	Why are scatter graphs appropriate for this investigation?	5 000 0 2 4 6 8 10 12 14 16 18 20
		Age of Car (years) Price vs Odometer Reading of Used Toyota Corollas 25 000
	To predict the price of a used car, would you use age or would you use odometer reading? Justify your answer.	20 000 5 15 000 15 000
		5 000 0 50 000 100 000 150 000 200 000 250 000 300 000 Odometer Reading (kilometres)
	Draw a trend line and estimate a price for a Toyota Corolla that is i) 10 years old with 120,000 km on the clock ii) 3 Select one of the cars that seems good value for money. Give the det	
3	Explain why a single straight line would not be the best trend line for	aither scatter plot. Describe a better type of trend line
J	Explain why a shigle straight line would not be the best trend line for the	sither scatter plot. Describe a better type of trend line.
	4 Estimate: i) the median age, of the used Toyota Corollas in	ii) the median price, iii) the median odometer reading

Interpreting Data

Interpreting Data 1 26

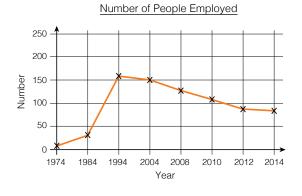
Where We Send Our Products

A Misleading Graphs

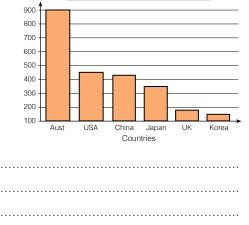
If the rules for drawing graphs are not followed carefully, the graph can be confusing or even misleading.

Check points for graphs:

- Is it the right choice of graph for the type of data?
- Is the title clear?
- In a graph with axes:
 - i) are the axes labelled?
 - ii) do the scales go up in equal steps?
 - iii) is an axis that does not start at zero misleading?
- For pie graphs and strip graphs :
 - i) are the sections or sectors correctly drawn?
 - ii) is there a key for each part?
- Avoid drawing 3D pie graphs and 3D bar graphs as they can be misleading by inflating one category above the others.
- Does the graph support claims that have been made?
- 1 These graphs have been produced by an exporting company. In each case identify any misleading features.
- a) Identify one misleading feature on this graph.

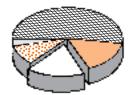


b)	Identify two
	misleading
	features on
	this graph.



	• • • • •	 	 	 	

c)



key	
wages and salaries	54%
production materials	17%
equipment & maintenance	16%
profit	11%
other expenses	2%

i)	Identify two misleading features on this graph.

ii) The company claims that it pays its employees well. Does this graph support the claim? Give statistical reasons for your answer.

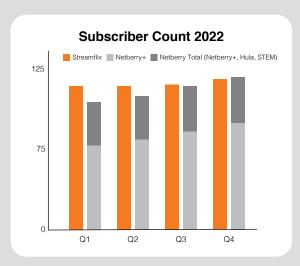
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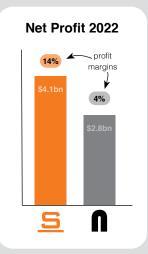


A Investigating Streaming Data

Resource 3

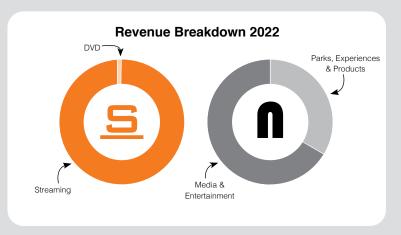
STREAMFLIX vs. Netberry + STATS







Market Captialisation S148.3B S175.1B





Practice Assessments

B	Section B - Investigating Streaming Data
1	It is claimed that Sreamflix creates twice as much internet traffic as Premier Video and Netberry+ put together. Comment on this claim, using the information provided in Resource 2.
2	"If Netberry+ is going to become more profitable than Streamflix, it needs to charge subscribers more". Comment on whether this claim can be supported. Justify your answer using the information from Resource 3. Provide numerical evidence to support your answer where appropriate.

Practice Assessments



A Mobile Mania

Resource 3

AVERAGE SMARTPHONE USAGE

How is the average person using their mobile device on a daily basis.

92%

92%

Internet Browsing

84%

Emailing

76%

App Downloads

69%

Gaming

64%

59%

Navigation

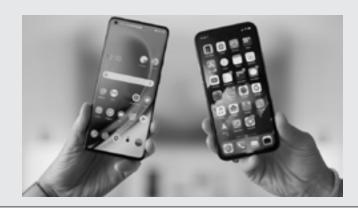
55%

Watching Video

54%

Tweeting

15%



Practice Assessments

A	Section A - Mo	obile Mania	- continued
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3	Resource 5 provides information on the different prices for mobile data across the world Is it reasonable to conclude that Oceania is one of the most expensive continents in the world in which to use mobile phone data? Justify and support your conclusions by providing calculations and referring to the information from Resource 5.