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mathswariz.uk/worksheets/stats-tables-pie-charts-stem-and-leaf-and-misleading-diagrams/

Two-way tables, pie charts, stem-and-leaf and misleading diagrams

About 85 minutes Calculator allowed 83 marks

Date _____

A Do Now

The first two are what this chapter needs. The rest bring back earlier chapters so nothing is forgotten.

A1 Needed today [2 marks]

In a sale, all prices are reduced by 5%. A coat costs £418 in the sale. What was its price before the sale?

Answer

A2 Needed today [2 marks]

There are 27 people at a concert. $\frac{1}{3}$ of them are adults and $\frac{1}{3}$ of the adults are women. How many women are at the concert?

Answer

A3 From chapter 3 [2 marks]

A basketball player scores with probability 0.6. Digits 0 to 5 mean score and 6 to 9 mean miss. Use these digits to simulate until two scores in a row: 6, 7, 9, 6, 6, 0, 3, 4, 0. How many shots does it take?

Answer

A4 Maths skill [2 marks]

7 numbers have a mean of 23. 6 of the numbers are 23, 29, 25, 22, 12, 15. Find the other number.

Answer

A5 Maths skill [2 marks]

A bag holds 6 red counters and some blue counters. The probability of taking a red counter is $\frac{1}{3}$. How many blue counters are in the bag?

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Mo wants to record the year group (Year 10 or Year 11) and the favourite sport (football, netball, tennis or other) of the students in a club. Design a two-way table he could use.

Hint One variable goes down the side, the other across the top. Add totals.

B1 [2 marks]

A café wants to record, for each customer, the time of day (morning or afternoon) and the drink bought (tea, coffee, juice or other). Design a two-way table the café could use.

EXAMPLE 2

120 people at a gym were asked if they use the pool. 45% of them are men. $\frac{2}{3}$ of the men use the pool. 40 women do not use the pool. What percentage of the people who use the pool are women?

Hint Draw a two-way table: men and women down the side, pool and no pool across.

B2 A cinema sold 250 tickets [4 marks]

for two films. 60% of the tickets were for Film A. $\frac{3}{5}$ of the Film A tickets were for adults. 70 of the Film B tickets were for children. What percentage of the children's tickets were for Film A? Give your answer to 1 decimal place.

Answer

EXAMPLE 3

A pie chart of the 320 members of Club P has a radius of 4 cm. Club Q has 500 members. Work out the radius of a comparative pie chart for Club Q.

Hint The AREA of the circle stands for the total, so the radius goes with the square root.

B3 A pie chart of the 180 [2 marks]

students in Year 9 has a radius of 3 cm. Year 10 has 245 students. Work out the radius of a comparative pie chart for Year 10.

Answer

EXAMPLE 4

Kai drew this stem-and-leaf diagram of 12 test marks. Give two ways to improve it.

Test marks	
1	8 2 5
2	4 0 9 3
3	7 1 6
4	2 0

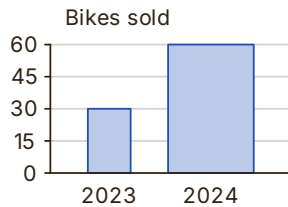
Hint What does 1 | 8 mean? Are the leaves in order?

B4 A council has the ages of [2 marks]

the 2400 people in a village. Mo wants to show them in a stem-and-leaf diagram. Is a stem-and-leaf diagram suitable? Give a reason.

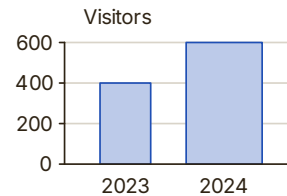
EXAMPLE 5

A shop sold 30 bikes in 2023 and 60 in 2024. In its chart the 2024 bar is twice as tall AND twice as wide. How many times as big does the 2024 bar look? Explain why the chart is misleading.

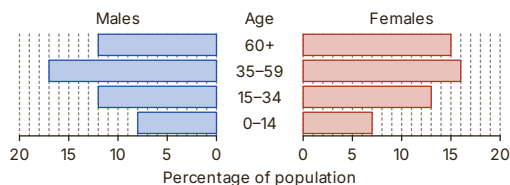


Hint The eye sees the area of the bar.

B5 A museum had 400 visitors in 2023 and 600 in 2024. In its chart the 2024 bar is 1.5 times as tall and 1.5 times as wide. How many times as big does the 2024 bar look? Explain why the chart is misleading.

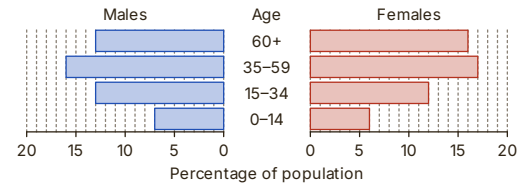
**EXAMPLE 6**

The population pyramid shows the 36 000 people of Town M. (a) What percentage of the people are aged 60 and over? (b) How many people is that?



Hint A pyramid shows percentages of the whole town. Add the male and female bars.

B6 The population pyramid shows the 45 000 people of Town K. How many people in Town K are aged under 35?



Answer

C Practice

Each question asks for something different.

- C1** The table shows how the students in two year groups travel to school. What percentage of the students who take the bus are in Year 11? [2 marks]

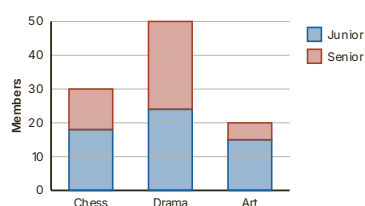
	Walk	Bus	Car	Total
Year 10	44	38	18	100
Year 11	32	57	31	120
Total	76	95	49	220

Answer

- C2** At sixth form P, 84 of the 240 students study a language. At sixth form Q, 99 of the 360 students do. Pia says, "More students study a language at Q, so languages are more popular at Q." Is Pia correct? Show your working. [3 marks]

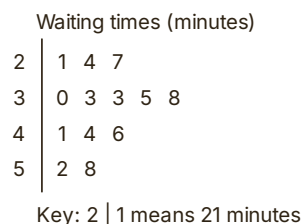
Answer

- C4** The composite bar chart shows the junior and senior members of three clubs. Which club has the greatest percentage of juniors? Show your working. [2 marks]



Answer

- C5** The stem-and-leaf diagram shows the times 13 patients waited at a clinic. Find the median and the range. [2 marks]



Answer

- C6** A choropleth map shades burglaries per 1000 homes in the bands 0 to 2.9, 3 to 5.9, 6 to 8.9 and 9 or more. District G had 399 burglaries in its 57 000 homes. Which band is District G in? [2 marks]

Answer

- C7** A pictogram shows the cars a garage sold in 2023 and 2024, with one car picture for every 20 cars. The pictures in the 2024 row are drawn bigger than those in the 2023 row. Explain why the pictogram is misleading. [2 marks]

- C8** Ana has the times of 25 boys and 25 girls in a race. She wants a diagram that keeps every time and compares the two groups. Which diagram should she draw? Give a reason. [2 marks]

D Exam-style questions

Answer in context, and finish with a conclusion when the question asks a question.

- D1** Amir says, "The bar for people aged 80 and over is longer on Town R's population pyramid than on Town S's, so more people aged 80 and over live in Town R." [3 marks]

Town R has 18 000 people, and 9% of them are aged 80 and over. Town S has 42 000 people, and 5% of them are aged 80 and over. Is Amir correct? Show your working.

- D2** The two-way table shows the activity chosen by the 200 students in Years 12 and 13.

	Gym	Swim	Team sport	Total
Year 12	48	?	33	110
Year 13	?	18	?	90
Total	93	?	60	200

- (a) Work out the four missing values. [2 marks]

Answer

- (b) One of the students who chose the gym is picked at random. Work out the probability that this student is in Year 13. [2 marks]

Answer

- (c) Ian says, "The gym is more popular with Year 12, as more Year 12 students chose it." Use percentages to say whether Ian is correct. [2 marks]

Total for D2: 6 marks

- D3** A travel firm draws comparative pie charts of its customers' holidays. The pie chart for its 480 customers in 2023 has radius 4 cm. The pie chart for 2024 has radius 5 cm.

- (a) Work out the number of customers in 2024. [2 marks]

Answer

- (b)

The beach sector is 105° in 2023 and 96° in 2024. Jo says fewer customers chose a beach holiday in 2024. Is Jo correct? Show your working.

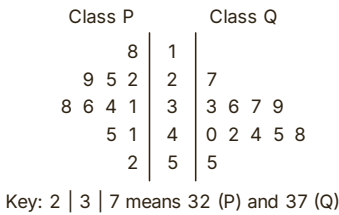
[3 marks]
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Total for D3: 5 marks

- D4

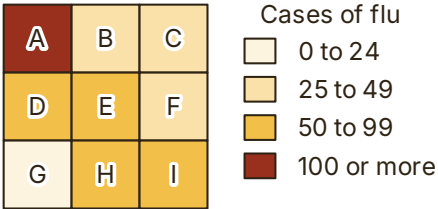
The back-to-back stem-and-leaf diagram shows the test marks of the 11 students in Class P and the 11 in Class Q. Compare the marks of the two classes. Use the median and the interquartile range.

[4 marks]



- D5

The choropleth map shows the number of cases of flu in districts A to I last winter. District A has 60 000 people and District E has 18 000 people.



- (a)

District A had 120 cases and District E had 90 cases. Work out the number of cases per 1000 people in each district.

[2 marks]

Answer _____

- (b)

Kofi says people in District A were the most likely to catch flu, as A is shaded the darkest. Explain why the map does not show this, and how the map should be drawn.

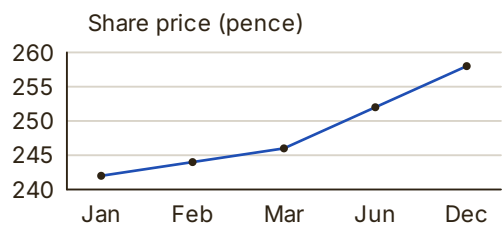
[2 marks]
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Total for D5: 4 marks

D6

The graph shows the price of a share in one year. Give two reasons why the graph is misleading. Use numbers from the graph.

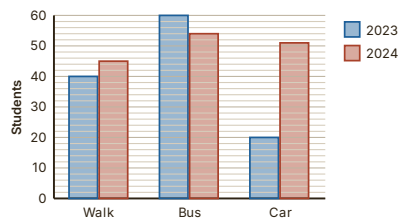
[3 marks]



D7

The bar chart shows how the students at a school travelled to school. There were 120 students in 2023 and 150 in 2024. Lucy says that walking became more popular from 2023 to 2024. Is Lucy correct? Show your working.

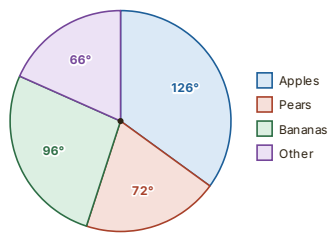
[3 marks]



D8

The pie chart shows the favourite fruit of some people. 18 more people chose apples than chose pears. How many people were asked?

[3 marks]



Answer

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 Comparative pie charts show the customers of Shop P and Shop Q. Shop P's [4 marks]
has radius 6 cm and Shop Q's has radius 9 cm. Shop Q's refund sector is
 40° and stands for 90 customers. Shop P's refund sector is 54° . How many
of Shop P's customers asked for a refund?

Answer

E2 A club has three times as many juniors as seniors. 40% of the juniors and [3 marks]
70% of the seniors swim. 133 members swim. How many members are in the
club?

Answer

E3 A choropleth map shades cases per 1000 people. District X had 63 cases, [3 marks]
which is 3.5 cases per 1000 people. How many more cases would put
District X in the band "6 or more per 1000"?

Answer

F How did it go?

Colour one circle on each line.

	Not yet	Nearly	Yes
I can design, complete and read two-way tables, and compare groups of different sizes with percentages.	☐	☐	☐
I can draw and read pie charts, including comparative pie charts with the right radius.	☐	☐	☐
I can read stem-and-leaf diagrams, population pyramids and choropleth maps in context.	☐	☐	☐
I can say exactly why a diagram misleads and how to fix it.	☐	☐	☐

Extension hints

Use one hint at a time. Cover the ones below it with a sheet of paper.

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- | | | |
|-----------|---------------|--|
| E1 | Hint 1 | Shop Q's 40° stands for 90 customers. Find Shop Q's total. |
| | Hint 2 | The totals are in the ratio of the AREAS: $6^2 : 9^2$. |
| | Hint 3 | Shop Q has 810 customers, so Shop P has $810 \times \frac{36}{81} = 360$. |
-
- | | | |
|-----------|---------------|--|
| E2 | Hint 1 | Call the number of seniors s . How many juniors are there? |
| | Hint 2 | The swimmers are $0.4 \times 3s + 0.7s$. |
| | Hint 3 | $1.9s = 133$. |
-
- | | | |
|-----------|---------------|--|
| E3 | Hint 1 | Use the rate to find how many people live in District X. |
| | Hint 2 | $63 \div 3.5 = 18$ thousand people. |
| | Hint 3 | 6 per 1000 of 18 000 people is 108 cases. |
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