



F13-30min Recognising Misleading Graphs (Foundation): 30-minute Pack

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

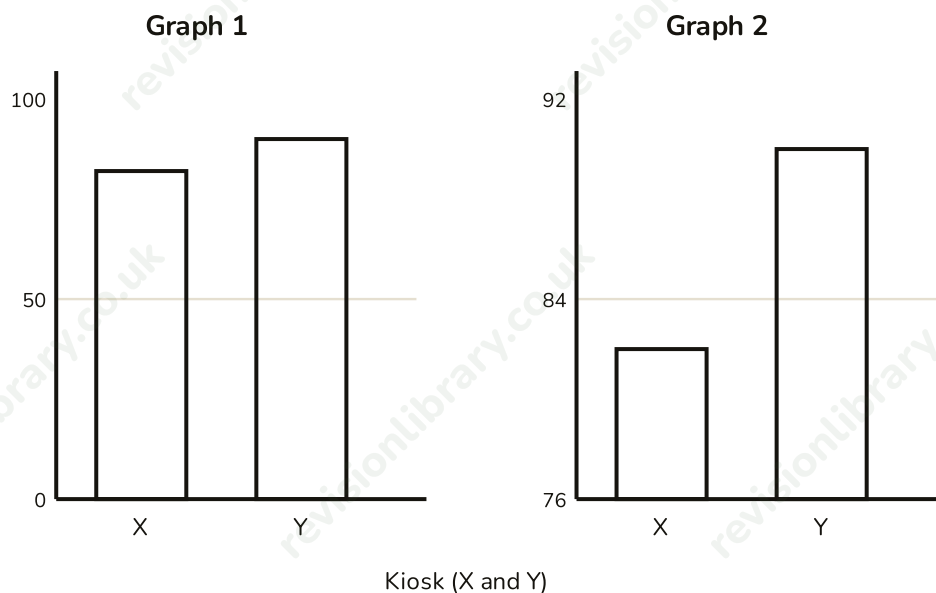
- 1** Two branches of a bakery, on Elm Street and on Oak Street, recorded how many loaves of bread they sold last Saturday. The bar chart shows the results.



- (a) Write down the number of loaves sold at Elm Street. (1)
-
- (b) Write down the number of loaves sold at Oak Street. (1)
-
- (c) Explain why this bar chart could give a misleading impression of the difference in sales between the two bakeries. (2)

(Total for Question 1 is 4 marks)

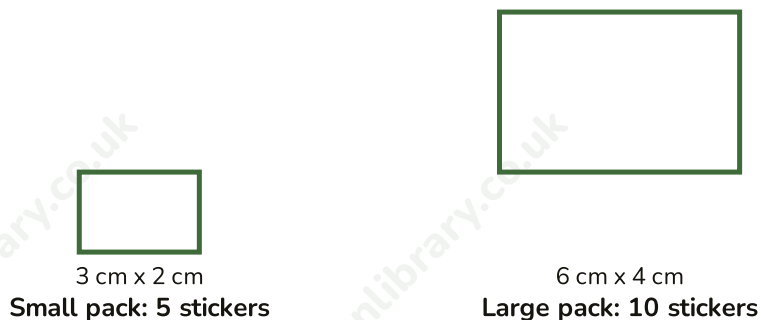
- 2 Two seaside kiosks sold ice creams last weekend. Graph 1 and Graph 2 show exactly the same sales figures, drawn on two different vertical scales.



- (a) Using Graph 1, write down the number of ice creams sold at each kiosk. (1)
-
- (b) Which graph, Graph 1 or Graph 2, gives a fairer impression of how the two kiosks compare? Give a reason for your answer. (2)
- (c) Explain how Graph 2 could mislead someone into thinking Kiosk Y sold far more ice creams than Kiosk X. (2)

(Total for Question 2 is 5 marks)

- 3** A poster advertises two packs of stickers using scaled pictures. The small pack picture is a rectangle 3 cm by 2 cm and is labelled '5 stickers'. The large pack picture is a rectangle 6 cm by 4 cm and is labelled '10 stickers'.



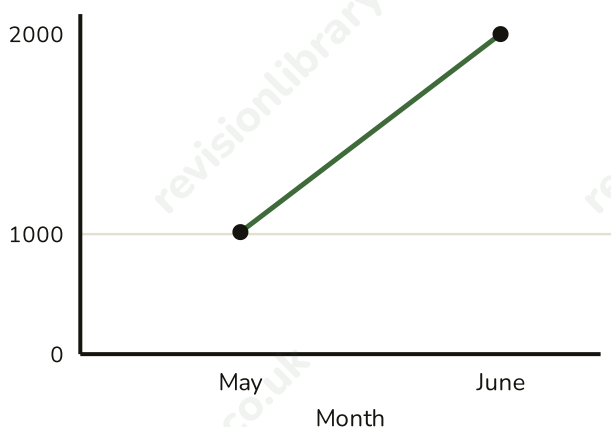
- (a) Write down the ratio of the number of stickers in the small pack to the number in the large pack, in the form 1 : n. (1)
-
- (b) Work out the area of each rectangle used in the picture, and hence write down the ratio of the two areas in the form 1 : n. (2)
-
- (c) Explain why using rectangles scaled like this to represent the number of stickers could give a misleading impression. (2)

(Total for Question 3 is 5 marks)

- 4 A charity records its monthly online donations.

Month	Jan	Feb	Mar	Apr	May	Jun
Donations (£)	1000	1050	980	1020	1010	2000

June's total was unusually high because of a single viral social media campaign. A news article only shows a graph of May and June, under the headline 'Donations have doubled - the charity's strategy is working!'



- (a) Work out the percentage increase in donations from May to June. (2)
-
- (b) Work out the percentage increase in donations from January to May (the period the article's graph does not show). (2)
-
- (c) Explain why a graph that only shows May and June's donations, like the one above, could give a misleading impression of the charity's overall fundraising trend. (2)

(Total for Question 4 is 6 marks)

5 Amir is investigating whether the graphs used in local newspaper articles give readers a fair impression of the data. He plans to look at bar charts printed in newspaper articles over one month.

(a) Plan: Suggest one thing Amir should decide before he starts collecting his sample of newspaper bar charts, and give a reason for your suggestion. **(2)**

(b) Collect: Amir records, for each of his 10 sampled bar charts, whether the vertical axis starts at zero. His results: Yes - 3 charts, No - 7 charts. Write down the fraction of charts in his sample where the axis did not start at zero. **(1)**

.....
(c) Process: Work out this fraction as a percentage. **(2)**

.....
(d) Interpret: Amir concludes 'Most of the newspaper bar charts I sampled could be giving a misleading impression, because their vertical axis doesn't start at zero.' Comment on whether his sample of 10 articles is likely to be enough to draw a reliable general conclusion about ALL newspaper graphs. **(2)**

(Total for Question 5 is 7 marks)

6 A soft drinks company always chooses to publish whichever version of a sales graph makes their new product look most successful, and never publishes any version that does not support this message.

- (a)** Give one example of how the company could exploit the vertical axis to make a small increase in sales look bigger than it really is. (2)
- (b)** Give one example, different from your answer to part (a), of another way a chart could be drawn to exaggerate the company's success. (2)
- (c)** Explain why it is important for readers to check a graph's axes and scales carefully before drawing conclusions from it, rather than just looking at the general shape of the graph. (2)

(Total for Question 6 is 6 marks)

Mark scheme · F13-30min Recognising Misleading Graphs (Foundation): 30-minute Pack

Question 1

- (a) **B1** 46 cao
- (a) **Answer: 46**
- (b) **B1** 50 cao
- (b) **Answer: 50**
- (c) **B1** identifies that the vertical axis starts at 40, not 0 (a truncated/non-zero axis)
- (c) **B1** explains this makes the real difference of 4 loaves look much bigger than it really is, since the Oak Street bar looks much taller even though it is only a small amount more
- (c) **Answer: The vertical axis starts at 40 instead of 0, so the small true difference of 4 loaves (46 compared with 50) is stretched to fill most of the chart, making Oak Street's sales look far higher than Elm Street's.**

Question 2

- (a) **B1** Kiosk X = 82 and Kiosk Y = 90, both cao
- (a) **Answer: Kiosk X = 82, Kiosk Y = 90**
- (b) **B1** Graph 1
- (b) **B1** valid reason: its vertical axis starts at 0, so the bar heights are in proportion to the actual number of ice creams sold
- (b) **Answer: Graph 1, because its vertical axis starts at 0, so the height of each bar is proportional to the true number of ice creams sold.**
- (c) **B1** identifies that Graph 2's vertical axis starts at 76, not 0 (a truncated axis)
- (c) **B1** explains this makes the relatively small difference of 8 ice creams look enormous, since Kiosk Y's bar appears far taller even though the true values (82 and 90) are less than 10% apart
- (c) **Answer: Graph 2's vertical axis starts at 76 instead of 0, so the small 8-ice-cream difference between the kiosks fills almost the whole height of the chart, making it look as though Kiosk Y sold far more than Kiosk X, when really the difference is under 10%.**

Question 3

- (a) **B1** 1 : 2 cao
- (a) **Answer: 1 : 2**
- (b) **M1** $3 \times 2 (=6)$ and $6 \times 4 (=24)$, oe
- (b) **A1** 1 : 4 cao
- (b) **Answer: 1 : 4**
- (c) **B1** identifies that the area ratio (1 : 4) is much bigger than the true sticker ratio (1 : 2)
- (c) **B1** explains the large pack therefore looks four times as big as the small pack, when it really only has twice as many stickers
- (c) **Answer: Doubling both the width and height of the rectangle quadruples its area, so the large pack's picture looks four times bigger than the small pack's, even though it only contains twice as many stickers.**

Question 4

- (a) **M1** $(2000-1010)/1010 \times 100$, oe
- (a) **A1** awrt 98%
- **(a) Answer: 98%**
- (b) **M1** $(1010-1000)/1000 \times 100$, oe
- (b) **A1** 1% cao
- **(b) Answer: 1%**
- (c) **B1** identifies that the full data (Jan to May) shows donations were almost flat, only increasing by about 1% over four months
- (c) **B1** explains the article's graph ignores this and only shows the sudden 98% jump in June, making it look like fundraising is steadily/rapidly growing when really June was a one-off spike
- **(c) Answer: From January to May, donations barely changed (only a 1% rise over four months), so the charity's strategy was not producing steady growth; the article's graph hides this and shows only the 98% jump in June, wrongly suggesting an ongoing, dramatic improvement rather than a single unusual month.**

Question 5

- (a) **B1** valid decision suggested, e.g. which newspapers to include, how many articles to sample, or what counts as a 'bar chart'
- (a) **B1** valid reason linked to getting a fair/representative sample or a workable, consistent definition
- **(a) Answer: e.g. Amir should decide in advance exactly how many newspapers and articles he will look at, so that his sample is a manageable, consistent size and is not chosen to fit whatever result he expects to find.**
- (b) **B1** 7/10 cao
- **(b) Answer: 7/10**
- (c) **M1** $7/10 \times 100$, oe
- (c) **A1** 70% cao
- **(c) Answer: 70%**
- (d) **B1** recognises a sample of only 10 is quite small and may not be representative of all newspapers or all types of chart
- (d) **B1** explains a bigger and more varied sample (e.g. more newspapers, more chart types, over a longer time) would give a more reliable general conclusion
- **(d) Answer: A sample of only 10 charts, likely from a small number of newspapers, is unlikely to be reliable evidence about ALL newspaper graphs; Amir would need a much bigger, more varied sample (more newspapers, more articles, over a longer period) before drawing a general conclusion with confidence.**

Question 6

- (a) **B1** identifies starting the vertical axis at a value above zero (a truncated axis)
- (a) **B1** explains this stretches a small true difference to fill much more of the chart, making it look bigger than it really is
- **(a) Answer: The company could start the vertical axis at a value close to the sales figures, rather than at zero, so that a small real increase fills most of the height of the chart and looks much larger than it truly is.**
- (b) **B1** valid distinct technique named, e.g. scaling a pictogram symbol's height and width together, using a 3D pie chart effect, using inconsistent pie sector sizing, showing only a cherry-picked short time window, using uneven axis intervals, or using a dual axis chosen to make two data sets appear to match
- (b) **B1** brief correct explanation of how the chosen technique exaggerates the impression given
- **(b) Answer: e.g. Showing only a short, cherry-picked time window (such as the single best week of sales) instead of the full year, so a temporary spike looks like a lasting trend of rising success.**
- (c) **B1** explains the shape/pattern alone can look convincing even when the underlying numbers show a much smaller (or different) effect
- (c) **B1** explains that checking axes and scales (e.g. zero start, equal intervals, clear labels) lets the reader judge the true size of any difference or trend, rather than being misled by the visual impression alone
- **(c) Answer: A graph's overall shape can look dramatic even when the real underlying change is small, because that shape depends heavily on choices like where the axis starts and how it is scaled; checking the axes and scales lets a reader work out the true size of a difference or trend, instead of being misled by visual impression alone.**