



F13-test Recognising Misleading Graphs (Foundation): Test Pack

EDEXCEL 1ST0 · Calculator allowed · about 20 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

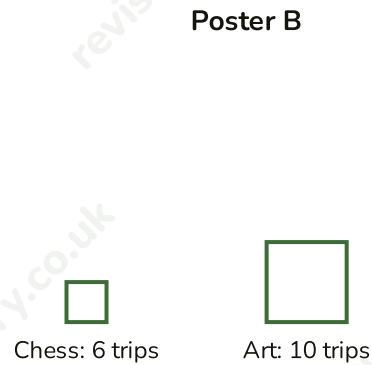
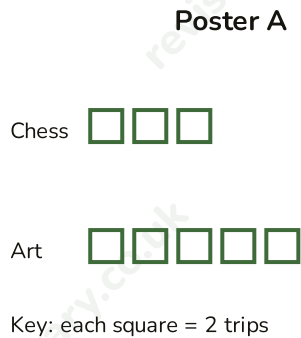
Answer ALL questions. Show all your working.

1 Which of these is the best reason why a bar chart's vertical (frequency) axis should normally start at zero?

- ☐ A) It makes the chart look more colourful
- ☐ B) It means the height of each bar fairly represents its value, so differences between bars are not exaggerated
- ☐ C) It allows more bars to fit on the same page
- ☐ D) It means the axis needs fewer numbers written on it

(Total for Question 1 is 1 mark)

- 2 A school records the number of trips run by two clubs. Poster A shows this using rows of identical icons, where each icon stands for 2 trips. Poster B shows the same data using a single icon per club, but the icon is drawn a different size for each club.



- (a) Using Poster A, write down the number of school trips run by each club. (1)
- (b) State which poster, A or B, gives a fairer impression of the number of trips run by each club. Give a reason for your answer. (2)

(Total for Question 2 is 3 marks)

- 3** A survey of 60 people found their favourite pizza topping: Cheese (30 people), Pepperoni (18 people), Vegetable (12 people). Chart 1 shows this data as a flat (2D) pie chart. Chart 2 shows the same data as a 3D pie chart.

Chart 1 (2D, fair)

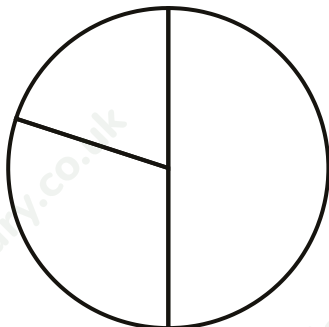
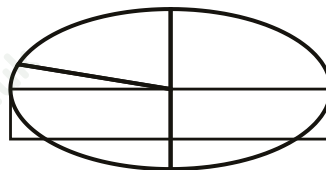


Chart 2 (3D)



Cheese 50% - Pepperoni 30% - Vegetable 20% (both charts)

- (a)** Work out the angle that should be used to represent Cheese in a correctly drawn pie chart. **(2)**
- (b)** Chart 2 shows the same data as a 3D pie chart. State one reason why drawing a pie chart in 3D, like Chart 2, can give a misleading impression, even though the underlying percentages have not changed. **(2)**

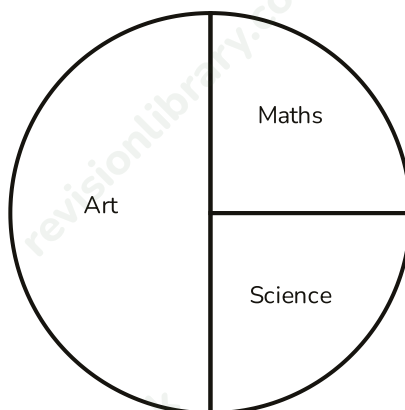
(Total for Question 3 is 4 marks)

- 4 40 students were asked to name their favourite subject.

Subject	Maths	Science	Art
Frequency	16	14	10

A magazine drew a pie chart of this data, using sector angles of 90 degrees for Maths, 90 degrees for Science and 180 degrees for Art.

Magazine's pie chart (40 students)



- (a) Using the frequency table, work out the angle that should be used to represent Maths in a correctly drawn pie chart. (2)
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- (b) Work out the angle that should be used to represent Art in a correctly drawn pie chart, and use this to explain how the magazine's pie chart is misleading. (2)

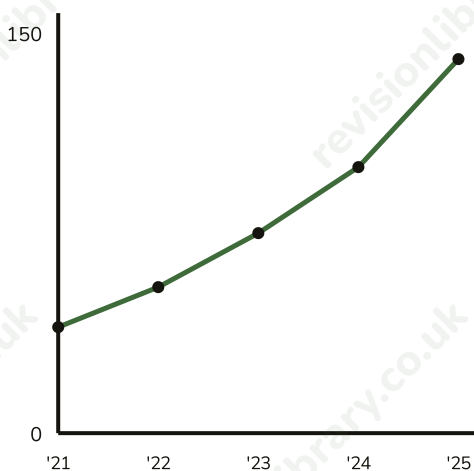
(Total for Question 4 is 4 marks)

- 5 A council records the number of electric car charge points in a county each year.

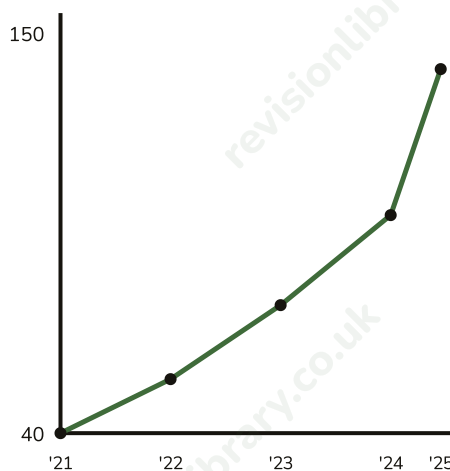
Year	2021	2022	2023	2024	2025
Charge points	40	55	75	100	140

A newspaper is choosing between two graphs of this data to publish. Graph P shows all five years with a vertical axis from 0 to 150 and years equally spaced. Graph Q shows the same five years, but its vertical axis starts at 40, and the gap between 2024 and 2025 is drawn much smaller than the gaps between the earlier years.

Graph P (fair)



Graph Q



- (a) Which graph, Graph P or Graph Q, should the newspaper publish if it wants to give a fair representation of the data? Give one reason. (2)
- (b) Identify two separate features of Graph Q that could mislead a reader, referring to specific axes. (2)
- (c) Work out the actual percentage increase in the number of charge points from 2021 to 2025. (2)

(Total for Question 5 is 6 marks)

Mark scheme · F13-test Recognising Misleading Graphs (Foundation): Test Pack

Question 1

- **B1** B cao
- **Answer: B)** It means the height of each bar fairly represents its value, so differences between bars are not exaggerated

Question 2

- (a) **B1** Chess Club = 6 and Art Club = 10, both cao
- **(a) Answer: Chess Club = 6, Art Club = 10**
- (b) **B1** Poster A
- (b) **B1** valid reason: each icon represents a fixed, equal number of trips, so counting icons directly reflects the true numbers, whereas Poster B changes the size of a single icon, distorting the impression via area
- **(b) Answer: Poster A, because every icon stands for the same fixed number of trips (2), so the totals can be found fairly by counting icons; Poster B instead changes the size of one icon, which exaggerates the visual difference.**

Question 3

- (a) **M1** $30/60 \times 360$, oe
- (a) **A1** 180 (degrees) cao
- **(a) Answer: 180 degrees**
- (b) **B1** identifies that the tilt/perspective makes the sector nearest the front of the chart look bigger than its true percentage
- (b) **B1** explains the added 'depth' or side band gives extra visual size that is not part of the real data, so slices can no longer be fairly compared by eye
- **(b) Answer: Tilting the pie chart and adding a 3D depth band makes the sector at the front look bigger than sectors further back, even when the true percentages are unchanged, so the chart can no longer be judged fairly by eye.**

Question 4

- (a) **M1** $16/40 \times 360$, oe
- (a) **A1** 144 (degrees) cao
- **(a) Answer: 144 degrees**
- (b) **M1** $10/40 \times 360$ (=90 degrees), oe
- (b) **A1** explains the magazine used 180 degrees for Art, double the correct 90 degrees, so Art looks twice as popular as it should - making it look like half of students prefer Art when only a quarter (25%) do
- **(b) Answer: Art should have a 90 degree sector ($10/40 \times 360$), but the magazine drew it as 180 degrees - double the correct size - making it look like half the students prefer Art when really only a quarter do.**

Question 5

- (a) **B1** Graph P
- (a) **B1** valid reason, e.g. its vertical axis starts at zero and its years are equally spaced, so both the heights and the gaps between points are proportional to the real data
- **(a) Answer: Graph P, because its vertical axis starts at 0 and the years are equally spaced, so the shape of the line fairly represents the true year-on-year changes.**
- (b) **B1** the vertical axis does not start at zero (it starts at 40)
- (b) **B1** the horizontal (year) axis intervals are not equal - the 2024-2025 gap is compressed compared with the other years, exaggerating the steepness of the final rise
- **(b) Answer: (1) The vertical axis starts at 40, not 0. (2) The horizontal axis is not evenly spaced - the gap between 2024 and 2025 is drawn much smaller than the gaps between the earlier years, making the final rise look steeper than it really is.**
- (c) **M1** $(140-40)/40 \times 100$, oe
- (c) **A1** 250% cao
- **(c) Answer: 250%**