

GCSE MATHEMATICS

Aligned to Pearson Edexcel GCSE Mathematics (1MA1)

FOUNDATION TIER

STATISTICS

PRACTICE BOOK

Modules 41–48 | 360 original questions

Formula guides, full worked answers and marking guidance

FREE WEBSITE EDITION

Student name: _____

Target grade: _____ Start date: _____ Completion: _____

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MODULE 41-48 / S1, S2, S4-S6

Unit 6 Contents and Study Plan

8 MODULES | 360 ORIGINAL QUESTIONS

Name: _____ Date: _____ Score: ____ / ____

Complete Core Skills, Exam Practice, Grade 4-5 Challenge and same-topic retrieval in every module. Formula and method guides, full worked answers and marking guidance are collected at the back.

MODULE	TOPIC	SPECIFICATION	SCORE
41	Sampling, Populations and Data Collection	S1, S5	__ / __
42	Frequency Tables, Pictograms and Two-Way Tables	S2, S4	__ / __
43	Bar Charts, Comparative Charts and Time Series	S2	__ / __
44	Pie Charts and Proportional Representation	S2	__ / __
45	Mean, Median, Mode and Range	S4	__ / __
46	Frequency Distributions and Grouped Averages	S4, S5	__ / __
47	Stem-and-Leaf Diagrams and Comparing Distributions	S2, S4, S5	__ / __
48	Scatter Graphs, Correlation and Mixed Statistics	S2, S5, S6	__ / __

Assessment information can change. For the current paper format, calculator rules, timing, marks and qualification details, consult the official Pearson Edexcel GCSE Mathematics (1MA1) specification on the Pearson Qualifications website.

MODULE 01-08 / S1, S2, S4-S6

Specification Coverage Map

INDEPENDENTLY AUTHORED PRACTICE

Name: _____ Date: _____ Score: ____ / ____

This independently authored Foundation Tier practice book is organised around the skills represented by Pearson Edexcel GCSE Mathematics (1MA1) content references S1, S2, S4-S6. The reference identifies specification alignment only; the questions, data, diagrams and worked solutions in this book are independently created.

Pearson Edexcel is referenced only to identify the qualification for which this resource is intended. This publication does not reproduce Pearson Edexcel question papers, mark schemes, examiner reports, sample assessment materials or specification text.

For the official and most recent specification, assessment structure and Pearson Edexcel materials, use the Pearson Qualifications website directly. Do not rely on this independent resource as the authoritative source of qualification rules.

Practice emphasis: Data collection and representation, averages, spread, charts, tables, scatter graphs and interpretation of statistical information. The exercises are designed as independent GCSE Mathematics practice rather than replicas of Pearson Edexcel examination questions.

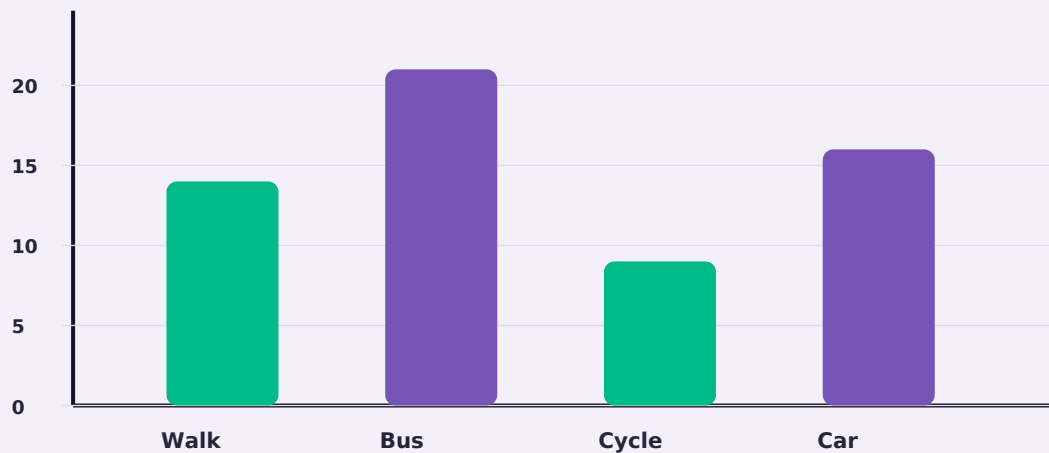
S1	Samples, populations, bias and reliable data collection
S2	Frequency tables, charts, diagrams and time-series data
S4-S5	Averages, spread, grouped data and comparison
S6	Scatter graphs, correlation and lines of best fit

MODULE 41-43 / S1, S2

Statistics Visual Reference: Tables and Bar Charts

FREQUENCY | COMPARISON | AXIS SCALES

CATEGORICAL FREQUENCY AND BAR HEIGHT



Read the vertical-axis scale before comparing category frequencies.

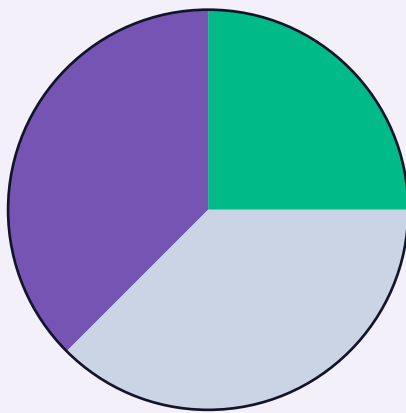
TWO-WAY TABLE: CHECK BOTH MARGINS

Group	Bus	Walk
Boys	12	18
Girls	15	20
Total	27	38

MODULE 44, 47 / S2, S4

Statistics Visual Reference: Pie Charts and Stem-and-Leaf

SECTOR ANGLES | ORDERED DATA

PIE CHART: TOTAL = 360°


$$\text{Angle} = \text{frequency} \div \text{total} \times 360^\circ$$
STEM-AND-LEAF: ORDER MATTERS
Key: 2 | 4 = 24

1	2 5 8
2	1 4 4 9
3	0 3 7

Leaves are written in ascending order.

FROM SECTOR ANGLE TO FREQUENCY
Frequency = sector angle $\div$ 360° $\times$ total frequency
Example: a 90° sector in a survey of 80 people represents 20 people.
Median: locate the middle ordered item. Range: largest – smallest.

MODULE 45-46 / S4, S5

Statistics Visual Reference: Averages and Grouped Data

WEIGHTED MEAN | MIDPOINTS | SPREAD

GROUPED FREQUENCY TABLE

Class	Frequency f	Midpoint x	$f \times x$
0-10	2	5	10
10-20	4	15	60
20-30	6	25	150
Total	12	—	220

Estimated mean = $\Sigma fx \div \Sigma f = 220 \div 12 = 18.3$ (1 d.p.)

MEASURES TO COMPARE

Mean: total $\div$ number of items. **Median:** middle ordered value.

Mode: most common value. **Range:** maximum – minimum.

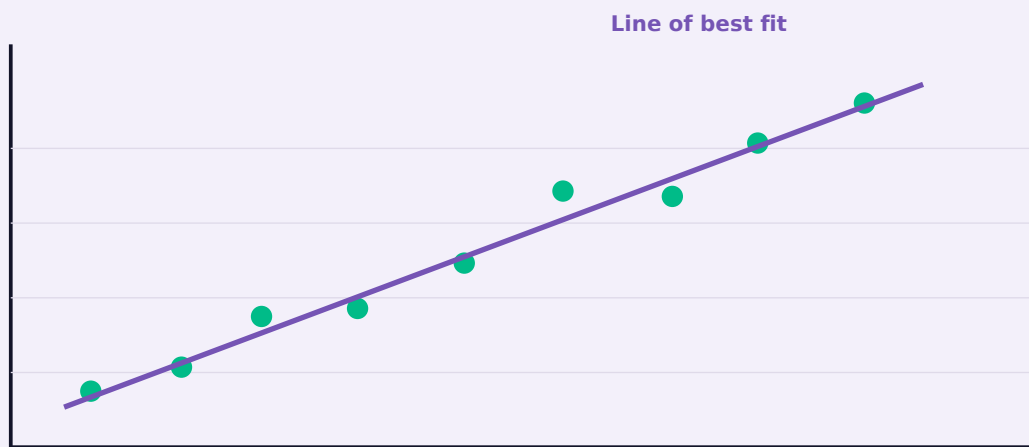
A smaller range normally indicates more consistent observations.

MODULE 43, 48 / S2, S6

Statistics Visual Reference: Scatter and Time-Series Graphs

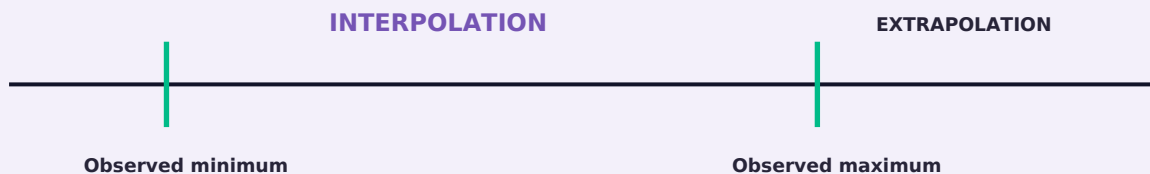
CORRELATION | BEST FIT | TRENDS

POSITIVE CORRELATION AND A LINE OF BEST FIT



The upward trend shows positive correlation; it does not prove causation.

INTERPOLATION AND EXTRAPOLATION



Predictions outside the observed data are less reliable.

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A school has 400 pupils. A random sample of 40 includes 12 bus users. Estimate how many pupils use the bus. [3 marks]

2. A population has 60 Year 7, 80 Year 8 and 100 Year 9 pupils. A stratified sample of 24 is taken. How many Year 8 pupils are needed? [3 marks]

3. To estimate the views of all local residents, a researcher surveys only lunchtime library visitors. Explain why the sample may be biased. [2 marks]

4. A researcher selects every 5th name from a list after starting at position 2. Name the sampling method. [1 mark]

5. For a population of 120, compare a random sample of 12 with a random sample of 48. Which is generally more reliable, and why? [2 marks]

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A school has 500 pupils. A random sample of 50 includes 14 bus users. Estimate how many pupils use the bus. [3 marks]

7. A population has 75 Year 7, 100 Year 8 and 125 Year 9 pupils. A stratified sample of 30 is taken. How many Year 8 pupils are needed? [3 marks]

8. To estimate the views of all local residents, a researcher surveys only members of the school football team. Explain why the sample may be biased. [2 marks]

9. A researcher selects every 6th name from a list after starting at position 3. Name the sampling method. [1 mark]

10. For a population of 140, compare a random sample of 14 with a random sample of 52. Which is generally more reliable, and why? [2 marks]

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. A school has 600 pupils. A random sample of 60 includes 16 bus users. Estimate how many pupils use the bus. [3 marks]

12. A population has 90 Year 7, 120 Year 8 and 150 Year 9 pupils. A stratified sample of 36 is taken. How many Year 8 pupils are needed? [3 marks]

13. To estimate the views of all local residents, a researcher surveys only customers entering one expensive shop. Explain why the sample may be biased. [2 marks]

14. A researcher selects every 7th name from a list after starting at position 4. Name the sampling method. [1 mark]

15. For a population of 160, compare a random sample of 16 with a random sample of 56. Which is generally more reliable, and why? [2 marks]

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A school has 700 pupils. A random sample of 70 includes 18 bus users. Estimate how many pupils use the bus. [3 marks]

17. A population has 105 Year 7, 140 Year 8 and 175 Year 9 pupils. A stratified sample of 42 is taken. How many Year 8 pupils are needed? [3 marks]

18. To estimate the views of all local residents, a researcher surveys only people waiting at one bus stop. Explain why the sample may be biased. [2 marks]

19. A researcher selects every 8th name from a list after starting at position 2. Name the sampling method. [1 mark]

20. For a population of 180, compare a random sample of 18 with a random sample of 60. Which is generally more reliable, and why? [2 marks]

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. A school has 800 pupils. A random sample of 80 includes 20 bus users. Estimate how many pupils use the bus. [3 marks]

22. A population has 120 Year 7, 160 Year 8 and 200 Year 9 pupils. A stratified sample of 48 is taken. How many Year 8 pupils are needed? [3 marks]

23. To estimate the views of all local residents, a researcher surveys only pupils attending an optional art club. Explain why the sample may be biased. [2 marks]

24. A researcher selects every 9th name from a list after starting at position 3. Name the sampling method. [1 mark]

25. For a population of 200, compare a random sample of 20 with a random sample of 64. Which is generally more reliable, and why? [2 marks]

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A school has 900 pupils. A random sample of 90 includes 22 bus users. Estimate how many pupils use the bus. [3 marks]

27. A population has 135 Year 7, 180 Year 8 and 225 Year 9 pupils. A stratified sample of 54 is taken. How many Year 8 pupils are needed? [3 marks]

28. To estimate the views of all local residents, a researcher surveys only shoppers arriving before 9 am. Explain why the sample may be biased. [2 marks]

29. A researcher selects every 10th name from a list after starting at position 4. Name the sampling method. [1 mark]

30. For a population of 220, compare a random sample of 22 with a random sample of 68. Which is generally more reliable, and why? [2 marks]

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A school has 1000 pupils. A random sample of 100 includes 24 bus users. Estimate how many pupils use the bus. [3 marks]

32. A population has 150 Year 7, 200 Year 8 and 250 Year 9 pupils. A stratified sample of 60 is taken. How many Year 8 pupils are needed? [3 marks]

33. To estimate the views of all local residents, a researcher surveys only followers of one social-media account. Explain why the sample may be biased. [2 marks]

34. A researcher selects every 11th name from a list after starting at position 2. Name the sampling method. [1 mark]

35. For a population of 240, compare a random sample of 24 with a random sample of 72. Which is generally more reliable, and why? [2 marks]

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A school has 1100 pupils. A random sample of 110 includes 26 bus users. Estimate how many pupils use the bus. [3 marks]

37. A population has 165 Year 7, 220 Year 8 and 275 Year 9 pupils. A stratified sample of 66 is taken. How many Year 8 pupils are needed? [3 marks]

38. To estimate the views of all local residents, a researcher surveys only users of a single gym. Explain why the sample may be biased. [2 marks]

39. A researcher selects every 12th name from a list after starting at position 3. Name the sampling method. [1 mark]

40. For a population of 260, compare a random sample of 26 with a random sample of 76. Which is generally more reliable, and why? [2 marks]

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. A school has 1200 pupils. A random sample of 120 includes 28 bus users. Estimate how many pupils use the bus. [3 marks]

42. A population has 180 Year 7, 240 Year 8 and 300 Year 9 pupils. A stratified sample of 72 is taken. How many Year 8 pupils are needed? [3 marks]

43. To estimate the views of all local residents, a researcher surveys only passengers on one train. Explain why the sample may be biased. [2 marks]

44. A researcher selects every 13th name from a list after starting at position 4. Name the sampling method. [1 mark]

45. For a population of 280, compare a random sample of 28 with a random sample of 80. Which is generally more reliable, and why? [2 marks]

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A frequency table shows apple 8, banana 12 and cherry 6. Find the total frequency. [1 mark]

2. A two-way table has 24 boys and 26 girls. 9 boys and 11 girls travel by bus; the others walk. How many pupils walk? [3 marks]

3. On a pictogram, one complete symbol represents 4 people. A category has 3 complete symbols and one half symbol. How many people is this? [2 marks]

4. A frequency table lists red 7, blue 13 and green 9. State the modal category. [1 mark]

5. Of 60 survey responses, 24 are Yes. Write the fraction answering Yes in simplest form. [2 marks]

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A frequency table shows apple 9, banana 14 and cherry 7. Find the total frequency. [1 mark]

7. A two-way table has 26 boys and 29 girls. 10 boys and 12 girls travel by bus; the others walk. How many pupils walk? [3 marks]

8. On a pictogram, one complete symbol represents 6 people. A category has 4 complete symbols and one half symbol. How many people is this? [2 marks]

9. A frequency table lists red 8, blue 15 and green 10. State the modal category. [1 mark]

10. Of 70 survey responses, 28 are Yes. Write the fraction answering Yes in simplest form. [2 marks]

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. A frequency table shows apple 10, banana 16 and cherry 8. Find the total frequency. [1 mark]

12. A two-way table has 28 boys and 32 girls. 11 boys and 13 girls travel by bus; the others walk. How many pupils walk? [3 marks]

13. On a pictogram, one complete symbol represents 8 people. A category has 5 complete symbols and one half symbol. How many people is this? [2 marks]

14. A frequency table lists red 9, blue 17 and green 11. State the modal category. [1 mark]

15. Of 80 survey responses, 32 are Yes. Write the fraction answering Yes in simplest form. [2 marks]

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A frequency table shows apple 11, banana 18 and cherry 9. Find the total frequency. [1 mark]

17. A two-way table has 30 boys and 35 girls. 12 boys and 14 girls travel by bus; the others walk. How many pupils walk? [3 marks]

18. On a pictogram, one complete symbol represents 10 people. A category has 6 complete symbols and one half symbol. How many people is this? [2 marks]

19. A frequency table lists red 10, blue 19 and green 12. State the modal category. [1 mark]

20. Of 90 survey responses, 36 are Yes. Write the fraction answering Yes in simplest form. [2 marks]

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. A frequency table shows apple 12, banana 20 and cherry 10. Find the total frequency. [1 mark]

22. A two-way table has 32 boys and 38 girls. 13 boys and 15 girls travel by bus; the others walk. How many pupils walk? [3 marks]

23. On a pictogram, one complete symbol represents 12 people. A category has 3 complete symbols and one half symbol. How many people is this? [2 marks]

24. A frequency table lists red 11, blue 21 and green 13. State the modal category. [1 mark]

25. Of 100 survey responses, 40 are Yes. Write the fraction answering Yes in simplest form. [2 marks]

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A frequency table shows apple 13, banana 22 and cherry 11. Find the total frequency. [1 mark]

27. A two-way table has 34 boys and 41 girls. 14 boys and 16 girls travel by bus; the others walk. How many pupils walk? [3 marks]

28. On a pictogram, one complete symbol represents 14 people. A category has 4 complete symbols and one half symbol. How many people is this? [2 marks]

29. A frequency table lists red 12, blue 23 and green 14. State the modal category. [1 mark]

30. Of 110 survey responses, 44 are Yes. Write the fraction answering Yes in simplest form. [2 marks]

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A frequency table shows apple 14, banana 24 and cherry 12. Find the total frequency. [1 mark]

32. A two-way table has 36 boys and 44 girls. 15 boys and 17 girls travel by bus; the others walk. How many pupils walk? [3 marks]

33. On a pictogram, one complete symbol represents 16 people. A category has 5 complete symbols and one half symbol. How many people is this? [2 marks]

34. A frequency table lists red 13, blue 25 and green 15. State the modal category. [1 mark]

35. Of 120 survey responses, 48 are Yes. Write the fraction answering Yes in simplest form. [2 marks]

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A frequency table shows apple 15, banana 26 and cherry 13. Find the total frequency. [1 mark]

37. A two-way table has 38 boys and 47 girls. 16 boys and 18 girls travel by bus; the others walk. How many pupils walk? [3 marks]

38. On a pictogram, one complete symbol represents 18 people. A category has 6 complete symbols and one half symbol. How many people is this? [2 marks]

39. A frequency table lists red 14, blue 27 and green 16. State the modal category. [1 mark]

40. Of 130 survey responses, 52 are Yes. Write the fraction answering Yes in simplest form. [2 marks]

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. A frequency table shows apple 16, banana 28 and cherry 14. Find the total frequency. [1 mark]

42. A two-way table has 40 boys and 50 girls. 17 boys and 19 girls travel by bus; the others walk. How many pupils walk? [3 marks]

43. On a pictogram, one complete symbol represents 20 people. A category has 3 complete symbols and one half symbol. How many people is this? [2 marks]

44. A frequency table lists red 15, blue 29 and green 17. State the modal category. [1 mark]

45. Of 140 survey responses, 56 are Yes. Write the fraction answering Yes in simplest form. [2 marks]

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A bar chart shows 35 tickets sold on Monday and 48 on Tuesday. How many more were sold on Tuesday? [1 mark]

2. A dual bar chart shows 18 boys and 24 girls chose cycling. What percentage of these cyclists are girls? Give your answer to 1 decimal place. [3 marks]

3. A time-series graph rises from 80 visitors in January to 100 in April. Calculate the percentage increase, to 1 decimal place. [3 marks]

4. A time series gives January, February, March and April values of 12, 18, 15 and 23. Describe the overall trend. [2 marks]

5. A bar chart compares values 40 and 46, but its vertical axis starts at 39. Explain why the chart may be misleading. [2 marks]

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A bar chart shows 39 tickets sold on Monday and 53 on Tuesday. How many more were sold on Tuesday? [1 mark]

7. A dual bar chart shows 20 boys and 27 girls chose cycling. What percentage of these cyclists are girls? Give your answer to 1 decimal place. [3 marks]

8. A time-series graph rises from 90 visitors in January to 115 in April. Calculate the percentage increase, to 1 decimal place. [3 marks]

9. A time series gives January, February, March and April values of 13, 19, 17 and 25. Describe the overall trend. [2 marks]

10. A bar chart compares values 43 and 49, but its vertical axis starts at 42. Explain why the chart may be misleading. [2 marks]

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. A bar chart shows 43 tickets sold on Monday and 58 on Tuesday. How many more were sold on Tuesday? [1 mark]

12. A dual bar chart shows 22 boys and 30 girls chose cycling. What percentage of these cyclists are girls? Give your answer to 1 decimal place. [3 marks]

13. A time-series graph rises from 100 visitors in January to 130 in April. Calculate the percentage increase, to 1 decimal place. [3 marks]

14. A time series gives January, February, March and April values of 14, 20, 19 and 27. Describe the overall trend. [2 marks]

15. A bar chart compares values 46 and 52, but its vertical axis starts at 45. Explain why the chart may be misleading. [2 marks]

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A bar chart shows 47 tickets sold on Monday and 63 on Tuesday. How many more were sold on Tuesday? [1 mark]

17. A dual bar chart shows 24 boys and 33 girls chose cycling. What percentage of these cyclists are girls? Give your answer to 1 decimal place. [3 marks]

18. A time-series graph rises from 110 visitors in January to 145 in April. Calculate the percentage increase, to 1 decimal place. [3 marks]

19. A time series gives January, February, March and April values of 15, 21, 21 and 29. Describe the overall trend. [2 marks]

20. A bar chart compares values 49 and 55, but its vertical axis starts at 48. Explain why the chart may be misleading. [2 marks]

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. A bar chart shows 51 tickets sold on Monday and 68 on Tuesday. How many more were sold on Tuesday? [1 mark]

22. A dual bar chart shows 26 boys and 36 girls chose cycling. What percentage of these cyclists are girls? Give your answer to 1 decimal place. [3 marks]

23. A time-series graph rises from 120 visitors in January to 160 in April. Calculate the percentage increase, to 1 decimal place. [3 marks]

24. A time series gives January, February, March and April values of 16, 22, 23 and 31. Describe the overall trend. [2 marks]

25. A bar chart compares values 52 and 58, but its vertical axis starts at 51. Explain why the chart may be misleading. [2 marks]

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A bar chart shows 55 tickets sold on Monday and 73 on Tuesday. How many more were sold on Tuesday? [1 mark]

27. A dual bar chart shows 28 boys and 39 girls chose cycling. What percentage of these cyclists are girls? Give your answer to 1 decimal place. [3 marks]

28. A time-series graph rises from 130 visitors in January to 175 in April. Calculate the percentage increase, to 1 decimal place. [3 marks]

29. A time series gives January, February, March and April values of 17, 23, 25 and 33. Describe the overall trend. [2 marks]

30. Construct a bar chart for categories A, B and C with frequencies 13, 17 and 16. State a suitable vertical-axis scale. [3 marks]

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A bar chart shows 59 tickets sold on Monday and 78 on Tuesday. How many more were sold on Tuesday? [1 mark]

32. A dual bar chart shows 30 boys and 42 girls chose cycling. What percentage of these cyclists are girls? Give your answer to 1 decimal place. [3 marks]

33. A time-series graph rises from 140 visitors in January to 190 in April. Calculate the percentage increase, to 1 decimal place. [3 marks]

34. A time series gives January, February, March and April values of 18, 24, 27 and 35. Describe the overall trend. [2 marks]

35. Construct a bar chart for categories A, B and C with frequencies 14, 18 and 18. State a suitable vertical-axis scale. [3 marks]

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A bar chart shows 63 tickets sold on Monday and 83 on Tuesday. How many more were sold on Tuesday? [1 mark]

37. A dual bar chart shows 32 boys and 45 girls chose cycling. What percentage of these cyclists are girls? Give your answer to 1 decimal place. [3 marks]

38. A time-series graph rises from 150 visitors in January to 205 in April. Calculate the percentage increase, to 1 decimal place. [3 marks]

39. A time series gives January, February, March and April values of 19, 25, 29 and 37. Describe the overall trend. [2 marks]

40. Construct a bar chart for categories A, B and C with frequencies 15, 19 and 20. State a suitable vertical-axis scale. [3 marks]

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. A bar chart shows 67 tickets sold on Monday and 88 on Tuesday. How many more were sold on Tuesday? [1 mark]

42. A dual bar chart shows 34 boys and 48 girls chose cycling. What percentage of these cyclists are girls? Give your answer to 1 decimal place. [3 marks]

43. A time-series graph rises from 160 visitors in January to 220 in April. Calculate the percentage increase, to 1 decimal place. [3 marks]

44. A time series gives January, February, March and April values of 20, 26, 31 and 39. Describe the overall trend. [2 marks]

45. Construct a bar chart for categories A, B and C with frequencies 16, 20 and 22. State a suitable vertical-axis scale. [3 marks]

MODULE 44 / S2

Pie Charts and Proportional Representation

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A survey of 36 people records 9 choosing music. Calculate the angle of the music sector on a pie chart. [2 marks]

2. A pie chart represents 36 people. The sports sector has angle 90° . How many people chose sport? [2 marks]

3. A pie-chart sector has angle 36° . What percentage of the whole does it represent? [2 marks]

4. A pie chart has three sectors. Two are 55° and 95° . Find the angle of the third sector. [1 mark]

5. On the same pie chart, category A has angle 60° and category B has angle 120° . How many times as large is category B? Give an exact fraction. [2 marks]

MODULE 44 / S2

Pie Charts and Proportional Representation

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A survey of 40 people records 10 choosing music. Calculate the angle of the music sector on a pie chart. [2 marks]

7. A pie chart represents 40 people. The sports sector has angle 180° . How many people chose sport? [2 marks]

8. A pie-chart sector has angle 72° . What percentage of the whole does it represent? [2 marks]

9. A pie chart has three sectors. Two are 60° and 100° . Find the angle of the third sector. [1 mark]

10. On the same pie chart, category A has angle 70° and category B has angle 130° . How many times as large is category B? Give an exact fraction. [2 marks]

MODULE 44 / S2

Pie Charts and Proportional Representation

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. A survey of 45 people records 15 choosing music. Calculate the angle of the music sector on a pie chart. [2 marks]

12. A pie chart represents 45 people. The sports sector has angle 120° . How many people chose sport? [2 marks]

13. A pie-chart sector has angle 90° . What percentage of the whole does it represent? [2 marks]

14. A pie chart has three sectors. Two are 65° and 105° . Find the angle of the third sector. [1 mark]

15. On the same pie chart, category A has angle 80° and category B has angle 140° . How many times as large is category B? Give an exact fraction. [2 marks]

MODULE 44 / S2

Pie Charts and Proportional Representation

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A survey of 60 people records 20 choosing music. Calculate the angle of the music sector on a pie chart. [2 marks]

17. A pie chart represents 60 people. The sports sector has angle 60° . How many people chose sport? [2 marks]

18. A pie-chart sector has angle 108° . What percentage of the whole does it represent? [2 marks]

19. A pie chart has three sectors. Two are 70° and 110° . Find the angle of the third sector. [1 mark]

20. On the same pie chart, category A has angle 90° and category B has angle 150° . How many times as large is category B? Give an exact fraction. [2 marks]

MODULE 44 / S2

Pie Charts and Proportional Representation

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. A survey of 72 people records 18 choosing music. Calculate the angle of the music sector on a pie chart. [2 marks]

22. A pie chart represents 72 people. The sports sector has angle 90° . How many people chose sport? [2 marks]

23. A pie-chart sector has angle 126° . What percentage of the whole does it represent? [2 marks]

24. A pie chart has three sectors. Two are 75° and 115° . Find the angle of the third sector. [1 mark]

25. On the same pie chart, category A has angle 100° and category B has angle 160° . How many times as large is category B? Give an exact fraction. [2 marks]

MODULE 44 / S2

Pie Charts and Proportional Representation

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A survey of 90 people records 30 choosing music. Calculate the angle of the music sector on a pie chart. [2 marks]

27. A pie chart represents 90 people. The sports sector has angle 120° . How many people chose sport? [2 marks]

28. A pie-chart sector has angle 144° . What percentage of the whole does it represent? [2 marks]

29. A pie chart has three sectors. Two are 80° and 120° . Find the angle of the third sector. [1 mark]

30. Construct a pie chart for frequencies 10, 12 and 18 out of 40. Calculate the three sector angles first. [4 marks]

MODULE 44 / S2

Pie Charts and Proportional Representation

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A survey of 120 people records 40 choosing music. Calculate the angle of the music sector on a pie chart. [2 marks]

32. A pie chart represents 120 people. The sports sector has angle 90° . How many people chose sport? [2 marks]

33. A pie-chart sector has angle 180° . What percentage of the whole does it represent? [2 marks]

34. A pie chart has three sectors. Two are 85° and 125° . Find the angle of the third sector. [1 mark]

35. Construct a pie chart for frequencies 10, 13 and 17 out of 40. Calculate the three sector angles first. [4 marks]

MODULE 44 / S2

Pie Charts and Proportional Representation

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A survey of 180 people records 45 choosing music. Calculate the angle of the music sector on a pie chart. [2 marks]

37. A pie chart represents 180 people. The sports sector has angle 72° . How many people chose sport? [2 marks]

38. A pie-chart sector has angle 216° . What percentage of the whole does it represent? [2 marks]

39. A pie chart has three sectors. Two are 90° and 130° . Find the angle of the third sector. [1 mark]

40. Construct a pie chart for frequencies 10, 14 and 16 out of 40. Calculate the three sector angles first. [4 marks]

MODULE 44 / S2

Pie Charts and Proportional Representation

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. A survey of 360 people records 120 choosing music. Calculate the angle of the music sector on a pie chart. [2 marks]

42. A pie chart represents 360 people. The sports sector has angle 180° . How many people chose sport? [2 marks]

43. A pie-chart sector has angle 270° . What percentage of the whole does it represent? [2 marks]

44. A pie chart has three sectors. Two are 95° and 135° . Find the angle of the third sector. [1 mark]

45. Construct a pie chart for frequencies 10, 15 and 15 out of 40. Calculate the three sector angles first. [4 marks]

MODULE 45 / S4

Mean, Median, Mode and Range

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. Calculate the mean of 5, 7, 9, 11, 13. [2 marks]

2. Find the median of 19, 8, 25, 14, 11. [2 marks]

3. Find the median of these four values: 6, 12, 8, 18. [2 marks]

4. For the data 3, 7, 3, 10, 12, find the mode and the range. [2 marks]

5. Five numbers have mean 12. Four numbers are 8, 11, 14, 15. Find the missing number. [3 marks]

MODULE 45 / S4

Mean, Median, Mode and Range

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. Calculate the mean of 6, 8, 10, 12, 14. [2 marks]

7. Find the median of 20, 9, 26, 15, 12. [2 marks]

8. Find the median of these four values: 7, 13, 9, 19. [2 marks]

9. For the data 4, 8, 4, 11, 13, find the mode and the range. [2 marks]

10. Five numbers have mean 13. Four numbers are 9, 12, 15, 16. Find the missing number. [3 marks]

MODULE 45 / S4

Mean, Median, Mode and Range

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. Calculate the mean of 7, 9, 11, 13, 15. [2 marks]

12. Find the median of 21, 10, 27, 16, 13. [2 marks]

13. Find the median of these four values: 8, 14, 10, 20. [2 marks]

14. For the data 5, 9, 5, 12, 14, find the mode and the range. [2 marks]

15. Five numbers have mean 14. Four numbers are 10, 13, 16, 17. Find the missing number. [3 marks]

MODULE 45 / S4

Mean, Median, Mode and Range

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Calculate the mean of 8, 10, 12, 14, 16. [2 marks]

17. Find the median of 22, 11, 28, 17, 14. [2 marks]

18. Find the median of these four values: 9, 15, 11, 21. [2 marks]

19. For the data 6, 10, 6, 13, 15, find the mode and the range. [2 marks]

20. Five numbers have mean 15. Four numbers are 11, 14, 17, 18. Find the missing number. [3 marks]

MODULE 45 / S4

Mean, Median, Mode and Range

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Calculate the mean of 9, 11, 13, 15, 17. [2 marks]

22. Find the median of 23, 12, 29, 18, 15. [2 marks]

23. Find the median of these four values: 10, 16, 12, 22. [2 marks]

24. For the data 7, 11, 7, 14, 16, find the mode and the range. [2 marks]

25. Five numbers have mean 16. Four numbers are 12, 15, 18, 19. Find the missing number. [3 marks]

MODULE 45 / S4

Mean, Median, Mode and Range

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. Calculate the mean of 10, 12, 14, 16, 18. [2 marks]

27. Find the median of 24, 13, 30, 19, 16. [2 marks]

28. Find the median of these four values: 11, 17, 13, 23. [2 marks]

29. For the data 8, 12, 8, 15, 17, find the mode and the range. [2 marks]

30. Five numbers have mean 17. Four numbers are 13, 16, 19, 20. Find the missing number. [3 marks]

MODULE 45 / S4

Mean, Median, Mode and Range

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. Calculate the mean of 11, 13, 15, 17, 19. [2 marks]

32. Find the median of 25, 14, 31, 20, 17. [2 marks]

33. Find the median of these four values: 12, 18, 14, 24. [2 marks]

34. For the data 9, 13, 9, 16, 18, find the mode and the range. [2 marks]

35. Five numbers have mean 18. Four numbers are 14, 17, 20, 21. Find the missing number. [3 marks]

MODULE 45 / S4

Mean, Median, Mode and Range

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. Calculate the mean of 12, 14, 16, 18, 20. [2 marks]

37. Find the median of 26, 15, 32, 21, 18. [2 marks]

38. Find the median of these four values: 13, 19, 15, 25. [2 marks]

39. For the data 10, 14, 10, 17, 19, find the mode and the range. [2 marks]

40. Five numbers have mean 19. Four numbers are 15, 18, 21, 22. Find the missing number. [3 marks]

MODULE 45 / S4

Mean, Median, Mode and Range

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Calculate the mean of 13, 15, 17, 19, 21. [2 marks]

42. Find the median of 27, 16, 33, 22, 19. [2 marks]

43. Find the median of these four values: 14, 20, 16, 26. [2 marks]

44. For the data 11, 15, 11, 18, 20, find the mode and the range. [2 marks]

45. Five numbers have mean 20. Four numbers are 16, 19, 22, 23. Find the missing number. [3 marks]

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. Values 1, 2 and 4 have frequencies 2, 3 and 5. Calculate the mean. Give your answer to 2 decimal places. [3 marks]

2. Grouped classes 0-10, 10-20 and 20-30 have frequencies 2, 4 and 6. Estimate the mean to 1 decimal place. [4 marks]

3. A grouped frequency table has class interval $20 < x \leq 40$. Find its class midpoint. [1 mark]

4. The classes 0-5, 5-10 and 10-15 have frequencies 4, 12 and 7. State the modal class. [1 mark]

5. A grouped table has four class frequencies 3, 5, 7 and 4. How many observations are represented altogether? [1 mark]

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. Values 2, 3 and 5 have frequencies 2, 4 and 5. Calculate the mean. Give your answer to 2 decimal places. [3 marks]

7. Grouped classes 0-10, 10-20 and 20-30 have frequencies 3, 5 and 7. Estimate the mean to 1 decimal place. [4 marks]

8. A grouped frequency table has class interval $25 < x \leq 45$. Find its class midpoint. [1 mark]

9. The classes 0-5, 5-10 and 10-15 have frequencies 5, 14 and 8. State the modal class. [1 mark]

10. A grouped table has four class frequencies 4, 7, 8 and 5. How many observations are represented altogether? [1 mark]

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. Values 3, 4 and 6 have frequencies 2, 5 and 5. Calculate the mean. Give your answer to 2 decimal places. [3 marks]

12. Grouped classes 0-10, 10-20 and 20-30 have frequencies 4, 6 and 8. Estimate the mean to 1 decimal place. [4 marks]

13. A grouped frequency table has class interval $30 < x \leq 50$. Find its class midpoint. [1 mark]

14. The classes 0-5, 5-10 and 10-15 have frequencies 6, 16 and 9. State the modal class. [1 mark]

15. A grouped table has four class frequencies 5, 9, 9 and 6. How many observations are represented altogether? [1 mark]

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Values 4, 5 and 7 have frequencies 2, 3 and 5. Calculate the mean. Give your answer to 2 decimal places. [3 marks]

17. Grouped classes 0–10, 10–20 and 20–30 have frequencies 2, 7 and 6. Estimate the mean to 1 decimal place. [4 marks]

18. A grouped frequency table has class interval $35 < x \leq 55$. Find its class midpoint. [1 mark]

19. The classes 0–5, 5–10 and 10–15 have frequencies 7, 18 and 10. State the modal class. [1 mark]

20. A grouped table has four class frequencies 6, 11, 10 and 7. How many observations are represented altogether? [1 mark]

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Values 5, 6 and 8 have frequencies 2, 4 and 5. Calculate the mean. Give your answer to 2 decimal places. [3 marks]

22. Grouped classes 0–10, 10–20 and 20–30 have frequencies 3, 4 and 7. Estimate the mean to 1 decimal place. [4 marks]

23. A grouped frequency table has class interval $40 < x \leq 60$. Find its class midpoint. [1 mark]

24. The classes 0–5, 5–10 and 10–15 have frequencies 8, 20 and 11. State the modal class. [1 mark]

25. A grouped table has four class frequencies 7, 13, 11 and 8. How many observations are represented altogether? [1 mark]

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. Values 6, 7 and 9 have frequencies 2, 5 and 5. Calculate the mean. Give your answer to 2 decimal places. [3 marks]

27. Grouped classes 0–10, 10–20 and 20–30 have frequencies 4, 5 and 8. Estimate the mean to 1 decimal place. [4 marks]

28. A grouped frequency table has class interval $45 < x \leq 65$. Find its class midpoint. [1 mark]

29. The classes 0–5, 5–10 and 10–15 have frequencies 9, 22 and 12. State the modal class. [1 mark]

30. A grouped table has four class frequencies 8, 15, 12 and 9. How many observations are represented altogether? [1 mark]

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. Values 7, 8 and 10 have frequencies 2, 3 and 5. Calculate the mean. Give your answer to 2 decimal places. [3 marks]

32. Grouped classes 0-10, 10-20 and 20-30 have frequencies 2, 6 and 6. Estimate the mean to 1 decimal place. [4 marks]

33. A grouped frequency table has class interval $50 < x \leq 70$. Find its class midpoint. [1 mark]

34. The classes 0-5, 5-10 and 10-15 have frequencies 10, 24 and 13. State the modal class. [1 mark]

35. A grouped table has four class frequencies 9, 17, 13 and 10. How many observations are represented altogether? [1 mark]

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. Values 8, 9 and 11 have frequencies 2, 4 and 5. Calculate the mean. Give your answer to 2 decimal places. [3 marks]

37. Grouped classes 0-10, 10-20 and 20-30 have frequencies 3, 7 and 7. Estimate the mean to 1 decimal place. [4 marks]

38. A grouped frequency table has class interval $55 < x \leq 75$. Find its class midpoint. [1 mark]

39. The classes 0-5, 5-10 and 10-15 have frequencies 11, 26 and 14. State the modal class. [1 mark]

40. A grouped table has four class frequencies 10, 19, 14 and 11. How many observations are represented altogether? [1 mark]

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Values 9, 10 and 12 have frequencies 2, 5 and 5. Calculate the mean. Give your answer to 2 decimal places. [3 marks]

42. Grouped classes 0-10, 10-20 and 20-30 have frequencies 4, 4 and 8. Estimate the mean to 1 decimal place. [4 marks]

43. A grouped frequency table has class interval $60 < x \leq 80$. Find its class midpoint. [1 mark]

44. The classes 0-5, 5-10 and 10-15 have frequencies 12, 28 and 15. State the modal class. [1 mark]

45. A grouped table has four class frequencies 11, 21, 15 and 12. How many observations are represented altogether? [1 mark]

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. On a stem-and-leaf diagram the key is $4 \mid 7 = 47$. What value is represented by $2 \mid 3$? [1 mark]

2. An ordered stem-and-leaf diagram represents 12, 15, 18, 22, 27, 31, 35. Find the median and range. [3 marks]

3. Group A has mean 24 and range 9; group B has mean 28 and range 15. Compare the typical result and consistency. [3 marks]

4. The data are 14, 16, 17, 19 and 80. Identify the outlier and explain its likely effect on the mean. [2 marks]

5. For journey times, sample A has range 8 and sample B has range 14. Which sample is more consistent? [2 marks]

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. On a stem-and-leaf diagram the key is $4 \mid 7 = 47$. What value is represented by $3 \mid 4$? [1 mark]

7. An ordered stem-and-leaf diagram represents 13, 16, 19, 23, 28, 32, 36. Find the median and range. [3 marks]

8. Group A has mean 25 and range 10; group B has mean 29 and range 16. Compare the typical result and consistency. [3 marks]

9. The data are 15, 17, 18, 20 and 84. Identify the outlier and explain its likely effect on the mean. [2 marks]

10. For test scores, sample A has range 9 and sample B has range 15. Which sample is more consistent? [2 marks]

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. On a stem-and-leaf diagram the key is $4 | 7 = 47$. What value is represented by $4 | 5$? [1 mark]

12. An ordered stem-and-leaf diagram represents 14, 17, 20, 24, 29, 33, 37. Find the median and range. [3 marks]

13. Group A has mean 26 and range 11; group B has mean 30 and range 17. Compare the typical result and consistency. [3 marks]

14. The data are 16, 18, 19, 21 and 88. Identify the outlier and explain its likely effect on the mean. [2 marks]

15. For daily temperatures, sample A has range 10 and sample B has range 16. Which sample is more consistent? [2 marks]

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. On a stem-and-leaf diagram the key is $4 \mid 7 = 47$. What value is represented by $5 \mid 6$? [1 mark]

17. An ordered stem-and-leaf diagram represents 15, 18, 21, 25, 30, 34, 38. Find the median and range. [3 marks]

18. Group A has mean 27 and range 9; group B has mean 31 and range 18. Compare the typical result and consistency. [3 marks]

19. The data are 17, 19, 20, 22 and 92. Identify the outlier and explain its likely effect on the mean. [2 marks]

20. For production times, sample A has range 11 and sample B has range 17. Which sample is more consistent? [2 marks]

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. On a stem-and-leaf diagram the key is $4 \mid 7 = 47$. What value is represented by $2 \mid 7$? [1 mark]

22. An ordered stem-and-leaf diagram represents 16, 19, 22, 26, 31, 35, 39. Find the median and range. [3 marks]

23. Group A has mean 28 and range 10; group B has mean 32 and range 15. Compare the typical result and consistency. [3 marks]

24. The data are 18, 20, 21, 23 and 96. Identify the outlier and explain its likely effect on the mean. [2 marks]

25. For running times, sample A has range 12 and sample B has range 18. Which sample is more consistent? [2 marks]

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. On a stem-and-leaf diagram the key is $4 \mid 7 = 47$. What value is represented by $3 \mid 8$? [1 mark]

27. An ordered stem-and-leaf diagram represents 17, 20, 23, 27, 32, 36, 40. Find the median and range. [3 marks]

28. Group A has mean 29 and range 11; group B has mean 33 and range 16. Compare the typical result and consistency. [3 marks]

29. The data are 19, 21, 22, 24 and 100. Identify the outlier and explain its likely effect on the mean. [2 marks]

30. Construct an ordered stem-and-leaf diagram for 26, 28, 28, 32, 35. Include a key. [3 marks]

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. On a stem-and-leaf diagram the key is $4 | 7 = 47$. What value is represented by $4 | 9$? [1 mark]

32. An ordered stem-and-leaf diagram represents 18, 21, 24, 28, 33, 37, 41. Find the median and range. [3 marks]

33. Group A has mean 30 and range 9; group B has mean 34 and range 17. Compare the typical result and consistency. [3 marks]

34. The data are 20, 22, 23, 25 and 104. Identify the outlier and explain its likely effect on the mean. [2 marks]

35. Construct an ordered stem-and-leaf diagram for 27, 29, 29, 33, 36. Include a key. [3 marks]

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. On a stem-and-leaf diagram the key is $4 \mid 7 = 47$. What value is represented by $5 \mid 0$? [1 mark]

37. An ordered stem-and-leaf diagram represents 19, 22, 25, 29, 34, 38, 42. Find the median and range. [3 marks]

38. Group A has mean 31 and range 10; group B has mean 35 and range 18. Compare the typical result and consistency. [3 marks]

39. The data are 21, 23, 24, 26 and 108. Identify the outlier and explain its likely effect on the mean. [2 marks]

40. Construct an ordered stem-and-leaf diagram for 28, 30, 30, 34, 37. Include a key. [3 marks]

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. On a stem-and-leaf diagram the key is $4 \mid 7 = 47$. What value is represented by $2 \mid 1$? [1 mark]

42. An ordered stem-and-leaf diagram represents 20, 23, 26, 30, 35, 39, 43. Find the median and range. [3 marks]

43. Group A has mean 32 and range 11; group B has mean 36 and range 15. Compare the typical result and consistency. [3 marks]

44. The data are 22, 24, 25, 27 and 112. Identify the outlier and explain its likely effect on the mean. [2 marks]

45. Construct an ordered stem-and-leaf diagram for 29, 31, 31, 35, 38. Include a key. [3 marks]

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A scatter graph shows that as hours revised increase, test score generally increase. Describe the correlation. [1 mark]

2. A line of best fit is $y = 2x + 10$. Estimate y when $x = 6$. [2 marks]

3. A scatter graph uses x -values from 5 to 20. Classify predictions at $x=10$ and $x=35$ as interpolation or extrapolation. [2 marks]

4. A study finds correlation between ice-cream sales and sunburn cases. Does this alone prove that one causes the other? Explain. [2 marks]

5. A line of best fit passes through (3, 30) and (7, 22). State whether the correlation is positive or negative. [2 marks]

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A scatter graph shows that as advertising spend increase, sales generally increase. Describe the correlation. [1 mark]

7. A line of best fit is $y = 3x + 12$. Estimate y when $x = 7$. [2 marks]

8. A scatter graph uses x -values from 6 to 22. Classify predictions at $x=11$ and $x=38$ as interpolation or extrapolation. [2 marks]

9. A study finds correlation between shoe size and reading level in children. Does this alone prove that one causes the other? Explain. [2 marks]

10. A line of best fit passes through (4, 29) and (8, 21). State whether the correlation is positive or negative. [2 marks]

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. A scatter graph shows that as practice time increase, performance score generally increase. Describe the correlation. [1 mark]

12. A line of best fit is $y = 4x + 14$. Estimate y when $x = 8$. [2 marks]

13. A scatter graph uses x -values from 7 to 24. Classify predictions at $x=12$ and $x=41$ as interpolation or extrapolation. [2 marks]

14. A study finds correlation between umbrella sales and road accidents. Does this alone prove that one causes the other? Explain. [2 marks]

15. A line of best fit passes through (5, 28) and (9, 20). State whether the correlation is positive or negative. [2 marks]

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A scatter graph shows that as house size increase, house price generally increase. Describe the correlation. [1 mark]

17. A line of best fit is $y = 2x + 16$. Estimate y when $x = 9$. [2 marks]

18. A scatter graph uses x -values from 8 to 26. Classify predictions at $x=13$ and $x=44$ as interpolation or extrapolation. [2 marks]

19. A study finds correlation between revision time and exam marks. Does this alone prove that one causes the other? Explain. [2 marks]

20. A line of best fit passes through (6, 27) and (10, 19). State whether the correlation is positive or negative. [2 marks]

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. A scatter graph shows that as sunshine hours increase, ice-cream sales generally increase. Describe the correlation. [1 mark]

22. A line of best fit is $y = 3x + 18$. Estimate y when $x = 10$. [2 marks]

23. A scatter graph uses x -values from 9 to 28. Classify predictions at $x=14$ and $x=47$ as interpolation or extrapolation. [2 marks]

24. A study finds correlation between number of firefighters and damage at a fire. Does this alone prove that one causes the other? Explain. [2 marks]

25. A line of best fit passes through (7, 26) and (11, 18). State whether the correlation is positive or negative. [2 marks]

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A scatter graph shows that as training sessions increase, fitness score generally increase. Describe the correlation. [1 mark]

27. A line of best fit is $y = 4x + 20$. Estimate y when $x = 11$. [2 marks]

28. A scatter graph uses x -values from 10 to 30. Classify predictions at $x=15$ and $x=50$ as interpolation or extrapolation. [2 marks]

29. A study finds correlation between gym attendance and fitness score. Does this alone prove that one causes the other? Explain. [2 marks]

30. Plot the points [(1, 8), (2, 10), (3, 11), (4, 14), (5, 15)] on a scatter graph and draw a sensible line of best fit. Describe the correlation. [3 marks]

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A scatter graph shows that as distance travelled increase, fuel used generally increase. Describe the correlation. [1 mark]

32. A line of best fit is $y = 2x + 22$. Estimate y when $x = 12$. [2 marks]

33. A scatter graph uses x -values from 11 to 32. Classify predictions at $x=16$ and $x=53$ as interpolation or extrapolation. [2 marks]

34. A study finds correlation between coffee sales and commuter numbers. Does this alone prove that one causes the other? Explain. [2 marks]

35. Plot the points [(1, 9), (2, 11), (3, 12), (4, 15), (5, 16)] on a scatter graph and draw a sensible line of best fit. Describe the correlation. [3 marks]

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A scatter graph shows that as number of guests increase, event cost generally increase. Describe the correlation. [1 mark]

37. A line of best fit is $y = 3x + 24$. Estimate y when $x = 13$. [2 marks]

38. A scatter graph uses x -values from 12 to 34. Classify predictions at $x=17$ and $x=56$ as interpolation or extrapolation. [2 marks]

39. A study finds correlation between sunglasses sales and temperature. Does this alone prove that one causes the other? Explain. [2 marks]

40. Plot the points [(1, 10), (2, 12), (3, 13), (4, 16), (5, 17)] on a scatter graph and draw a sensible line of best fit. Describe the correlation. [3 marks]

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. A scatter graph shows that as working hours increase, weekly pay generally increase. Describe the correlation. [1 mark]

42. A line of best fit is $y = 4x + 26$. Estimate y when $x = 14$. [2 marks]

43. A scatter graph uses x -values from 13 to 36. Classify predictions at $x=18$ and $x=59$ as interpolation or extrapolation. [2 marks]

44. A study finds correlation between sleep time and concentration score. Does this alone prove that one causes the other? Explain. [2 marks]

45. Plot the points [(1, 11), (2, 13), (3, 14), (4, 17), (5, 18)] on a scatter graph and draw a sensible line of best fit. Describe the correlation. [3 marks]

MODULE 41-42 / S1, S2, S4-S6

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 41 | Sampling, Populations and Data Collection | S1, S5

- A population is the complete group; a sample is the selected part used to estimate its properties.
- Stratified allocation = $\text{subgroup population} \div \text{total population} \times \text{sample size}$.
- Estimated population frequency = $\text{sample proportion} \times \text{population size}$.
- Random, representative samples reduce bias; larger unbiased samples are usually more reliable.

WORKED CHECK

To estimate the views of all local residents, a researcher surveys only pupils attending an optional art club. Explain why the sample may be biased.

Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits.

MODULE 42 | Frequency Tables, Pictograms and Two-Way Tables | S2, S4

- Total frequency is found by adding the frequencies of every category.
- Pictogram frequency = $\text{number of symbols} \times \text{key}$; a half-symbol represents half the key.
- In a two-way table, row and column categories add to their marginal totals.
- Modal category means the category with the greatest frequency.

WORKED CHECK

On a pictogram, one complete symbol represents 12 people. A category has 3 complete symbols and one half symbol. How many people is this?

3 complete symbols represent 36; half a symbol represents 6. Total = 42.

MODULE 43-44 / S1, S2, S4-S6

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 43 | Bar Charts, Comparative Charts and Time Series | S2

- Read the axis scale before interpreting bar heights or plotted time-series values.
- Difference = larger frequency – smaller frequency; percentage change = $\text{change} \div \text{original} \times 100$.
- Dual bar charts compare corresponding categories using a common scale.
- A time series tracks change over time; distinguish an overall trend from short-term fluctuation.

WORKED CHECK

A time-series graph rises from 120 visitors in January to 160 in April. Calculate the percentage increase, to 1 decimal place.

Increase = $160 - 120 = 40$; percentage increase = $(40/120) \times 100 = 33.3\%$.

MODULE 44 | Pie Charts and Proportional Representation | S2

- A complete pie chart represents 360° and 100% of the data.
- Sector angle = $\text{category frequency} \div \text{total frequency} \times 360^\circ$.
- Category frequency = $\text{sector angle} \div 360^\circ \times \text{total frequency}$.
- Sector percentage = $\text{sector angle} \div 360^\circ \times 100$; compare sectors using their angles.

WORKED CHECK

A pie-chart sector has angle 126° . What percentage of the whole does it represent?

Percentage = $(126/360) \times 100 = 35\%$.

MODULE 45-46 / S1, S2, S4-S6

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 45 | Mean, Median, Mode and Range | S4

- Mean = sum of all values $\div$ number of values.
- For ordered data, the median is the middle value, or the mean of the two middle values.
- Mode is the most frequent value; range = maximum value – minimum value.
- Missing value = required total – sum of known values; required total = mean $\times$ frequency.

WORKED CHECK**Find the median of these four values: 10, 16, 12, 22.**Ordered values: 10, 12, 16, 22. Median = $(12+16) \div 2 = 14$.**MODULE 46 | Frequency Distributions and Grouped Averages | S4, S5**

- For a frequency table, mean = $\Sigma(f \times x) \div \Sigma f$.
- For grouped data, class midpoint = (lower boundary + upper boundary) $\div 2$.
- Estimated grouped mean = $\Sigma(f \times \text{midpoint}) \div \Sigma f$; it is an estimate, not an exact mean.
- The modal class has the largest frequency; total frequency is the sum of all class frequencies.

WORKED CHECK**A grouped frequency table has class interval $40 < x \leq 60$. Find its class midpoint.**Class midpoint = (lower boundary + upper boundary) $\div 2 = (40+60) \div 2 = 50$.

MODULE 47-48 / S1, S2, S4-S6

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 47 | Stem-and-Leaf Diagrams and Comparing Distributions | S2, S4, S5

- Read the stem-and-leaf key first; stems usually show tens and leaves show units.
- Order the data before finding the median; range = largest observation – smallest observation.
- Compare distributions using a measure of average and a measure of spread in context.
- A smaller range indicates greater consistency; an extreme outlier can strongly affect the mean.

WORKED CHECK

Group A has mean 28 and range 10; group B has mean 32 and range 15. Compare the typical result and consistency.

B has the higher mean ($32 > 28$); A has the smaller range ($10 < 15$), so its results are less spread out.

MODULE 48 | Scatter Graphs, Correlation and Mixed Statistics | S2, S5, S6

- Positive correlation rises left to right; negative correlation falls; no correlation has no clear trend.
- A line of best fit represents the overall trend and supports approximate predictions.
- Interpolation is within the observed data range; extrapolation is outside it and is less reliable.
- Correlation does not prove causation; consider outliers, third variables and sampling limitations.

WORKED CHECK

A scatter graph uses x-values from 9 to 28. Classify predictions at $x=14$ and $x=47$ as interpolation or extrapolation.

14 is within the observed range 9–28, so it is interpolation; 47 lies outside, so it is extrapolation.

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

- | | | |
|-----------|---|-----------|
| 01 | Answer: 120
Sample proportion = $12/40$; estimated population total = $(12/40) \times 400 = 120$. | 3m |
| 02 | Answer: 8
Population total = 240. Year 8 allocation = $(80/240) \times 24 = 8$. | 3m |
| 03 | Answer: The group may not represent all local residents
Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits. | 2m |
| 04 | Answer: Systematic sampling
A fixed interval of 5 is used throughout the list, so this is systematic sampling. | 1m |
| 05 | Answer: The sample of 48
Both samples are random, but 48 provides more information and usually reduces the effect of chance variation. | 2m |
| 06 | Answer: 140
Sample proportion = $14/50$; estimated population total = $(14/50) \times 500 = 140$. | 3m |
| 07 | Answer: 10
Population total = 300. Year 8 allocation = $(100/300) \times 30 = 10$. | 3m |
| 08 | Answer: The group may not represent all local residents
Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits. | 2m |
| 09 | Answer: Systematic sampling
A fixed interval of 6 is used throughout the list, so this is systematic sampling. | 1m |
| 10 | Answer: The sample of 52
Both samples are random, but 52 provides more information and usually reduces the effect of chance variation. | 2m |
| 11 | Answer: 160
Sample proportion = $16/60$; estimated population total = $(16/60) \times 600 = 160$. | 3m |
| 12 | Answer: 12
Population total = 360. Year 8 allocation = $(120/360) \times 36 = 12$. | 3m |
| 13 | Answer: The group may not represent all local residents
Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits. | 2m |
| 14 | Answer: Systematic sampling
A fixed interval of 7 is used throughout the list, so this is systematic sampling. | 1m |
| 15 | Answer: The sample of 56
Both samples are random, but 56 provides more information and usually reduces the effect of chance variation. | 2m |

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: 180 3m

Sample proportion = $18/70$; estimated population total = $(18/70) \times 700 = 180$.

17 Answer: 14 3m

Population total = 420. Year 8 allocation = $(140/420) \times 42 = 14$.

18 Answer: The group may not represent all local residents 2m

Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits.

19 Answer: Systematic sampling 1m

A fixed interval of 8 is used throughout the list, so this is systematic sampling.

20 Answer: The sample of 60 2m

Both samples are random, but 60 provides more information and usually reduces the effect of chance variation.

21 Answer: 200 3m

Sample proportion = $20/80$; estimated population total = $(20/80) \times 800 = 200$.

22 Answer: 16 3m

Population total = 480. Year 8 allocation = $(160/480) \times 48 = 16$.

23 Answer: The group may not represent all local residents 2m

Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits.

24 Answer: Systematic sampling 1m

A fixed interval of 9 is used throughout the list, so this is systematic sampling.

25 Answer: The sample of 64 2m

Both samples are random, but 64 provides more information and usually reduces the effect of chance variation.

26 Answer: 220 3m

Sample proportion = $22/90$; estimated population total = $(22/90) \times 900 = 220$.

27 Answer: 18 3m

Population total = 540. Year 8 allocation = $(180/540) \times 54 = 18$.

28 Answer: The group may not represent all local residents 2m

Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits.

29 Answer: Systematic sampling 1m

A fixed interval of 10 is used throughout the list, so this is systematic sampling.

30 Answer: The sample of 68 2m

Both samples are random, but 68 provides more information and usually reduces the effect of chance variation.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 41 / S1, S5

Sampling, Populations and Data Collection

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: 240 3m

Sample proportion = $24/100$; estimated population total = $(24/100) \times 1000 = 240$.

32 Answer: 20 3m

Population total = 600. Year 8 allocation = $(200/600) \times 60 = 20$.

33 Answer: The group may not represent all local residents 2m

Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits.

34 Answer: Systematic sampling 1m

A fixed interval of 11 is used throughout the list, so this is systematic sampling.

35 Answer: The sample of 72 2m

Both samples are random, but 72 provides more information and usually reduces the effect of chance variation.

36 Answer: 260 3m

Sample proportion = $26/110$; estimated population total = $(26/110) \times 1100 = 260$.

37 Answer: 22 3m

Population total = 660. Year 8 allocation = $(220/660) \times 66 = 22$.

38 Answer: The group may not represent all local residents 2m

Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits.

39 Answer: Systematic sampling 1m

A fixed interval of 12 is used throughout the list, so this is systematic sampling.

40 Answer: The sample of 76 2m

Both samples are random, but 76 provides more information and usually reduces the effect of chance variation.

41 Answer: 280 3m

Sample proportion = $28/120$; estimated population total = $(28/120) \times 1200 = 280$.

42 Answer: 24 3m

Population total = 720. Year 8 allocation = $(240/720) \times 72 = 24$.

43 Answer: The group may not represent all local residents 2m

Sampling only one selected subgroup excludes other residents and may over-represent particular ages, interests or habits.

44 Answer: Systematic sampling 1m

A fixed interval of 13 is used throughout the list, so this is systematic sampling.

45 Answer: The sample of 80 2m

Both samples are random, but 80 provides more information and usually reduces the effect of chance variation.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

- | | | |
|-----------|--|-----------|
| 01 | Answer: 26
Add all category frequencies: $8+12+6=26$. | 1m |
| 02 | Answer: 30
Total pupils=50; bus users=20; walkers= $50-20=30$. | 3m |
| 03 | Answer: 14
3 complete symbols represent 12; half a symbol represents 2. Total = 14. | 2m |
| 04 | Answer: Blue
The mode is the category with greatest frequency: blue occurs 13 times. | 1m |
| 05 | Answer: 2/5
Fraction answering Yes = $24/60 = 2/5$. | 2m |
| 06 | Answer: 30
Add all category frequencies: $9+14+7=30$. | 1m |
| 07 | Answer: 33
Total pupils=55; bus users=22; walkers= $55-22=33$. | 3m |
| 08 | Answer: 27
4 complete symbols represent 24; half a symbol represents 3. Total = 27. | 2m |
| 09 | Answer: Blue
The mode is the category with greatest frequency: blue occurs 15 times. | 1m |
| 10 | Answer: 2/5
Fraction answering Yes = $28/70 = 2/5$. | 2m |
| 11 | Answer: 34
Add all category frequencies: $10+16+8=34$. | 1m |
| 12 | Answer: 36
Total pupils=60; bus users=24; walkers= $60-24=36$. | 3m |
| 13 | Answer: 44
5 complete symbols represent 40; half a symbol represents 4. Total = 44. | 2m |
| 14 | Answer: Blue
The mode is the category with greatest frequency: blue occurs 17 times. | 1m |
| 15 | Answer: 2/5
Fraction answering Yes = $32/80 = 2/5$. | 2m |

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: 38 1m

Add all category frequencies: $11+18+9=38$.

17 Answer: 39 3m

Total pupils=65; bus users=26; walkers= $65-26=39$.

18 Answer: 65 2m

6 complete symbols represent 60; half a symbol represents 5. Total = 65.

19 Answer: Blue 1m

The mode is the category with greatest frequency: blue occurs 19 times.

20 Answer: 2/5 2m

Fraction answering Yes = $36/90 = 2/5$.

21 Answer: 42 1m

Add all category frequencies: $12+20+10=42$.

22 Answer: 42 3m

Total pupils=70; bus users=28; walkers= $70-28=42$.

23 Answer: 42 2m

3 complete symbols represent 36; half a symbol represents 6. Total = 42.

24 Answer: Blue 1m

The mode is the category with greatest frequency: blue occurs 21 times.

25 Answer: 2/5 2m

Fraction answering Yes = $40/100 = 2/5$.

26 Answer: 46 1m

Add all category frequencies: $13+22+11=46$.

27 Answer: 45 3m

Total pupils=75; bus users=30; walkers= $75-30=45$.

28 Answer: 63 2m

4 complete symbols represent 56; half a symbol represents 7. Total = 63.

29 Answer: Blue 1m

The mode is the category with greatest frequency: blue occurs 23 times.

30 Answer: 2/5 2m

Fraction answering Yes = $44/110 = 2/5$.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 42 / S2, S4

Frequency Tables, Pictograms and Two-Way Tables

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

- | | | |
|-----------|--|-----------|
| 31 | Answer: 50
Add all category frequencies: $14+24+12=50$. | 1m |
| 32 | Answer: 48
Total pupils=80; bus users=32; walkers= $80-32=48$. | 3m |
| 33 | Answer: 88
5 complete symbols represent 80; half a symbol represents 8. Total = 88. | 2m |
| 34 | Answer: Blue
The mode is the category with greatest frequency: blue occurs 25 times. | 1m |
| 35 | Answer: 2/5
Fraction answering Yes = $48/120 = 2/5$. | 2m |
| 36 | Answer: 54
Add all category frequencies: $15+26+13=54$. | 1m |
| 37 | Answer: 51
Total pupils=85; bus users=34; walkers= $85-34=51$. | 3m |
| 38 | Answer: 117
6 complete symbols represent 108; half a symbol represents 9. Total = 117. | 2m |
| 39 | Answer: Blue
The mode is the category with greatest frequency: blue occurs 27 times. | 1m |
| 40 | Answer: 2/5
Fraction answering Yes = $52/130 = 2/5$. | 2m |
| 41 | Answer: 58
Add all category frequencies: $16+28+14=58$. | 1m |
| 42 | Answer: 54
Total pupils=90; bus users=36; walkers= $90-36=54$. | 3m |
| 43 | Answer: 70
3 complete symbols represent 60; half a symbol represents 10. Total = 70. | 2m |
| 44 | Answer: Blue
The mode is the category with greatest frequency: blue occurs 29 times. | 1m |
| 45 | Answer: 2/5
Fraction answering Yes = $56/140 = 2/5$. | 2m |

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 43 / 52

Bar Charts, Comparative Charts and Time Series

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: 13 1m

Difference = Tuesday – Monday = $48 - 35 = 13$.

02 Answer: 57.1% 3m

Total cyclists = 42; percentage girls = $(24/42) \times 100 = 57.1\%$.

03 Answer: 25.0% 3m

Increase = $100 - 80 = 20$; percentage increase = $(20/80) \times 100 = 25.0\%$.

04 Answer: An overall upward trend 2m

The final value, 23, exceeds the first value, 12; although values can fluctuate, the overall trend is upward.

05 Answer: The truncated vertical axis exaggerates the difference 2m

Starting near 40 rather than at zero makes the difference of only 6 appear disproportionately large.

06 Answer: 14 1m

Difference = Tuesday – Monday = $53 - 39 = 14$.

07 Answer: 57.4% 3m

Total cyclists = 47; percentage girls = $(27/47) \times 100 = 57.4\%$.

08 Answer: 27.8% 3m

Increase = $115 - 90 = 25$; percentage increase = $(25/90) \times 100 = 27.8\%$.

09 Answer: An overall upward trend 2m

The final value, 25, exceeds the first value, 13; although values can fluctuate, the overall trend is upward.

10 Answer: The truncated vertical axis exaggerates the difference 2m

Starting near 43 rather than at zero makes the difference of only 6 appear disproportionately large.

11 Answer: 15 1m

Difference = Tuesday – Monday = $58 - 43 = 15$.

12 Answer: 57.7% 3m

Total cyclists = 52; percentage girls = $(30/52) \times 100 = 57.7\%$.

13 Answer: 30.0% 3m

Increase = $130 - 100 = 30$; percentage increase = $(30/100) \times 100 = 30.0\%$.

14 Answer: An overall upward trend 2m

The final value, 27, exceeds the first value, 14; although values can fluctuate, the overall trend is upward.

15 Answer: The truncated vertical axis exaggerates the difference 2m

Starting near 46 rather than at zero makes the difference of only 6 appear disproportionately large.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 43 / S2

Bar Charts, Comparative Charts and Time Series

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: 16 1m

Difference = Tuesday – Monday = $63 - 47 = 16$.

17 Answer: 57.9% 3m

Total cyclists = 57; percentage girls = $(33/57) \times 100 = 57.9\%$.

18 Answer: 31.8% 3m

Increase = $145 - 110 = 35$; percentage increase = $(35/110) \times 100 = 31.8\%$.

19 Answer: An overall upward trend 2m

The final value, 29, exceeds the first value, 15; although values can fluctuate, the overall trend is upward.

20 Answer: The truncated vertical axis exaggerates the difference 2m

Starting near 49 rather than at zero makes the difference of only 6 appear disproportionately large.

21 Answer: 17 1m

Difference = Tuesday – Monday = $68 - 51 = 17$.

22 Answer: 58.1% 3m

Total cyclists = 62; percentage girls = $(36/62) \times 100 = 58.1\%$.

23 Answer: 33.3% 3m

Increase = $160 - 120 = 40$; percentage increase = $(40/120) \times 100 = 33.3\%$.

24 Answer: An overall upward trend 2m

The final value, 31, exceeds the first value, 16; although values can fluctuate, the overall trend is upward.

25 Answer: The truncated vertical axis exaggerates the difference 2m

Starting near 52 rather than at zero makes the difference of only 6 appear disproportionately large.

26 Answer: 18 1m

Difference = Tuesday – Monday = $73 - 55 = 18$.

27 Answer: 58.2% 3m

Total cyclists = 67; percentage girls = $(39/67) \times 100 = 58.2\%$.

28 Answer: 34.6% 3m

Increase = $175 - 130 = 45$; percentage increase = $(45/130) \times 100 = 34.6\%$.

29 Answer: An overall upward trend 2m

The final value, 33, exceeds the first value, 17; although values can fluctuate, the overall trend is upward.

30 Answer: Three separate equal-width bars; a scale from 0 in equal intervals 3m

Draw labelled category and frequency axes. Use equal-width separated bars at heights 13, 17 and 16, with a consistent scale beginning at 0.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 43 / 52

Bar Charts, Comparative Charts and Time Series

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: 19 1m

Difference = Tuesday – Monday = $78 - 59 = 19$.

32 Answer: 58.3% 3m

Total cyclists = 72; percentage girls = $(42/72) \times 100 = 58.3\%$.

33 Answer: 35.7% 3m

Increase = $190 - 140 = 50$; percentage increase = $(50/140) \times 100 = 35.7\%$.

34 Answer: An overall upward trend 2m

The final value, 35, exceeds the first value, 18; although values can fluctuate, the overall trend is upward.

35 Answer: Three separate equal-width bars; a scale from 0 in equal intervals 3m

Draw labelled category and frequency axes. Use equal-width separated bars at heights 14, 18 and 18, with a consistent scale beginning at 0.

36 Answer: 20 1m

Difference = Tuesday – Monday = $83 - 63 = 20$.

37 Answer: 58.4% 3m

Total cyclists = 77; percentage girls = $(45/77) \times 100 = 58.4\%$.

38 Answer: 36.7% 3m

Increase = $205 - 150 = 55$; percentage increase = $(55/150) \times 100 = 36.7\%$.

39 Answer: An overall upward trend 2m

The final value, 37, exceeds the first value, 19; although values can fluctuate, the overall trend is upward.

40 Answer: Three separate equal-width bars; a scale from 0 in equal intervals 3m

Draw labelled category and frequency axes. Use equal-width separated bars at heights 15, 19 and 20, with a consistent scale beginning at 0.

41 Answer: 21 1m

Difference = Tuesday – Monday = $88 - 67 = 21$.

42 Answer: 58.5% 3m

Total cyclists = 82; percentage girls = $(48/82) \times 100 = 58.5\%$.

43 Answer: 37.5% 3m

Increase = $220 - 160 = 60$; percentage increase = $(60/160) \times 100 = 37.5\%$.

44 Answer: An overall upward trend 2m

The final value, 39, exceeds the first value, 20; although values can fluctuate, the overall trend is upward.

45 Answer: Three separate equal-width bars; a scale from 0 in equal intervals 3m

Draw labelled category and frequency axes. Use equal-width separated bars at heights 16, 20 and 22, with a consistent scale beginning at 0.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 44 / S2

Pie Charts and Proportional Representation

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: 90° 2m

Sector angle = $(\text{frequency}/\text{total}) \times 360^\circ = (9/36) \times 360^\circ = 90^\circ$.

02 Answer: 9 2m

Frequency = $(\text{sector angle}/360^\circ) \times \text{total} = (90/360) \times 36 = 9$.

03 Answer: 10% 2m

Percentage = $(36/360) \times 100 = 10\%$.

04 Answer: 210° 1m

Angles around the centre sum to 360°: $360^\circ - 55^\circ - 95^\circ = 210^\circ$.

05 Answer: 2 2m

Frequencies are proportional to sector angles, so $B/A = 120/60 = 2$.

06 Answer: 90° 2m

Sector angle = $(\text{frequency}/\text{total}) \times 360^\circ = (10/40) \times 360^\circ = 90^\circ$.

07 Answer: 20 2m

Frequency = $(\text{sector angle}/360^\circ) \times \text{total} = (180/360) \times 40 = 20$.

08 Answer: 20% 2m

Percentage = $(72/360) \times 100 = 20\%$.

09 Answer: 200° 1m

Angles around the centre sum to 360°: $360^\circ - 60^\circ - 100^\circ = 200^\circ$.

10 Answer: 13/7 2m

Frequencies are proportional to sector angles, so $B/A = 130/70 = 13/7$.

11 Answer: 120° 2m

Sector angle = $(\text{frequency}/\text{total}) \times 360^\circ = (15/45) \times 360^\circ = 120^\circ$.

12 Answer: 15 2m

Frequency = $(\text{sector angle}/360^\circ) \times \text{total} = (120/360) \times 45 = 15$.

13 Answer: 25% 2m

Percentage = $(90/360) \times 100 = 25\%$.

14 Answer: 190° 1m

Angles around the centre sum to 360°: $360^\circ - 65^\circ - 105^\circ = 190^\circ$.

15 Answer: 7/4 2m

Frequencies are proportional to sector angles, so $B/A = 140/80 = 7/4$.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 44 / S2

Pie Charts and Proportional Representation

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: 120° 2m

Sector angle = (frequency/total) $\times$ 360° = (20/60) $\times$ 360° = 120°.

17 Answer: 10 2m

Frequency = (sector angle/360°) $\times$ total = (60/360) $\times$ 60 = 10.

18 Answer: 30% 2m

Percentage = (108/360) $\times$ 100 = 30%.

19 Answer: 180° 1m

Angles around the centre sum to 360°: 360° – 70° – 110° = 180°.

20 Answer: 5/3 2m

Frequencies are proportional to sector angles, so B/A = 150/90 = 5/3.

21 Answer: 90° 2m

Sector angle = (frequency/total) $\times$ 360° = (18/72) $\times$ 360° = 90°.

22 Answer: 18 2m

Frequency = (sector angle/360°) $\times$ total = (90/360) $\times$ 72 = 18.

23 Answer: 35% 2m

Percentage = (126/360) $\times$ 100 = 35%.

24 Answer: 170° 1m

Angles around the centre sum to 360°: 360° – 75° – 115° = 170°.

25 Answer: 8/5 2m

Frequencies are proportional to sector angles, so B/A = 160/100 = 8/5.

26 Answer: 120° 2m

Sector angle = (frequency/total) $\times$ 360° = (30/90) $\times$ 360° = 120°.

27 Answer: 30 2m

Frequency = (sector angle/360°) $\times$ total = (120/360) $\times$ 90 = 30.

28 Answer: 40% 2m

Percentage = (144/360) $\times$ 100 = 40%.

29 Answer: 160° 1m

Angles around the centre sum to 360°: 360° – 80° – 120° = 160°.

30 Answer: 90°, 108°, 162° 4m

Each item represents 360 $\div$ 4 = 9°. Sector angles are 10 $\times$ 9 = 90°, 12 $\times$ 9 = 108° and 18 $\times$ 9 = 162°; draw and label the sectors.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 44 / S2

Pie Charts and Proportional Representation

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: 120° 2m
Sector angle = $(\text{frequency}/\text{total}) \times 360^\circ = (40/120) \times 360^\circ = 120^\circ$.

32 Answer: 30 2m
Frequency = $(\text{sector angle}/360^\circ) \times \text{total} = (90/360) \times 120 = 30$.

33 Answer: 50% 2m
Percentage = $(180/360) \times 100 = 50\%$.

34 Answer: 150° 1m
Angles around the centre sum to 360°: $360^\circ - 85^\circ - 125^\circ = 150^\circ$.

35 Answer: 90°, 117°, 153° 4m
Each item represents $360 \div 40 = 9^\circ$. Sector angles are $10 \times 9 = 90^\circ$, $13 \times 9 = 117^\circ$ and $17 \times 9 = 153^\circ$; draw and label the sectors.

36 Answer: 90° 2m
Sector angle = $(\text{frequency}/\text{total}) \times 360^\circ = (45/180) \times 360^\circ = 90^\circ$.

37 Answer: 36 2m
Frequency = $(\text{sector angle}/360^\circ) \times \text{total} = (72/360) \times 180 = 36$.

38 Answer: 60% 2m
Percentage = $(216/360) \times 100 = 60\%$.

39 Answer: 140° 1m
Angles around the centre sum to 360°: $360^\circ - 90^\circ - 130^\circ = 140^\circ$.

40 Answer: 90°, 126°, 144° 4m
Each item represents $360 \div 40 = 9^\circ$. Sector angles are $10 \times 9 = 90^\circ$, $14 \times 9 = 126^\circ$ and $16 \times 9 = 144^\circ$; draw and label the sectors.

41 Answer: 120° 2m
Sector angle = $(\text{frequency}/\text{total}) \times 360^\circ = (120/360) \times 360^\circ = 120^\circ$.

42 Answer: 180 2m
Frequency = $(\text{sector angle}/360^\circ) \times \text{total} = (180/360) \times 360 = 180$.

43 Answer: 75% 2m
Percentage = $(270/360) \times 100 = 75\%$.

44 Answer: 130° 1m
Angles around the centre sum to 360°: $360^\circ - 95^\circ - 135^\circ = 130^\circ$.

45 Answer: 90°, 135°, 135° 4m
Each item represents $360 \div 40 = 9^\circ$. Sector angles are $10 \times 9 = 90^\circ$, $15 \times 9 = 135^\circ$ and $15 \times 9 = 135^\circ$; draw and label the sectors.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 45 / 54

Mean, Median, Mode and Range

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: 9 2m

Mean = total $\div$ number of values = $45 \div 5 = 9$.

02 Answer: 14 2m

Put the data in order: 8, 11, 14, 19, 25. The middle value is 14.

03 Answer: 10 2m

Ordered values: 6, 8, 12, 18. Median = $(8+12) \div 2 = 10$.

04 Answer: Mode 3; range 9 2m

The mode is the most frequent value, 3; range = maximum – minimum = $12-3=9$.

05 Answer: 12 3m

Total of five numbers = $5 \times 12 = 60$; known total = 48; missing value = $60-48=12$.

06 Answer: 10 2m

Mean = total $\div$ number of values = $50 \div 5 = 10$.

07 Answer: 15 2m

Put the data in order: 9, 12, 15, 20, 26. The middle value is 15.

08 Answer: 11 2m

Ordered values: 7, 9, 13, 19. Median = $(9+13) \div 2 = 11$.

09 Answer: Mode 4; range 9 2m

The mode is the most frequent value, 4; range = maximum – minimum = $13-4=9$.

10 Answer: 13 3m

Total of five numbers = $5 \times 13 = 65$; known total = 52; missing value = $65-52=13$.

11 Answer: 11 2m

Mean = total $\div$ number of values = $55 \div 5 = 11$.

12 Answer: 16 2m

Put the data in order: 10, 13, 16, 21, 27. The middle value is 16.

13 Answer: 12 2m

Ordered values: 8, 10, 14, 20. Median = $(10+14) \div 2 = 12$.

14 Answer: Mode 5; range 9 2m

The mode is the most frequent value, 5; range = maximum – minimum = $14-5=9$.

15 Answer: 14 3m

Total of five numbers = $5 \times 14 = 70$; known total = 56; missing value = $70-56=14$.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 45 / 54

Mean, Median, Mode and Range

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: 12 2m

Mean = total $\div$ number of values = $60 \div 5 = 12$.

17 Answer: 17 2m

Put the data in order: 11, 14, 17, 22, 28. The middle value is 17.

18 Answer: 13 2m

Ordered values: 9, 11, 15, 21. Median = $(11+15) \div 2 = 13$.

19 Answer: Mode 6; range 9 2m

The mode is the most frequent value, 6; range = maximum – minimum = $15-6=9$.

20 Answer: 15 3m

Total of five numbers = $5 \times 15 = 75$; known total = 60; missing value = $75-60=15$.

21 Answer: 13 2m

Mean = total $\div$ number of values = $65 \div 5 = 13$.

22 Answer: 18 2m

Put the data in order: 12, 15, 18, 23, 29. The middle value is 18.

23 Answer: 14 2m

Ordered values: 10, 12, 16, 22. Median = $(12+16) \div 2 = 14$.

24 Answer: Mode 7; range 9 2m

The mode is the most frequent value, 7; range = maximum – minimum = $16-7=9$.

25 Answer: 16 3m

Total of five numbers = $5 \times 16 = 80$; known total = 64; missing value = $80-64=16$.

26 Answer: 14 2m

Mean = total $\div$ number of values = $70 \div 5 = 14$.

27 Answer: 19 2m

Put the data in order: 13, 16, 19, 24, 30. The middle value is 19.

28 Answer: 15 2m

Ordered values: 11, 13, 17, 23. Median = $(13+17) \div 2 = 15$.

29 Answer: Mode 8; range 9 2m

The mode is the most frequent value, 8; range = maximum – minimum = $17-8=9$.

30 Answer: 17 3m

Total of five numbers = $5 \times 17 = 85$; known total = 68; missing value = $85-68=17$.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 45 / S4

Mean, Median, Mode and Range

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: 15 2m

Mean = total $\div$ number of values = $75 \div 5 = 15$.

32 Answer: 20 2m

Put the data in order: 14, 17, 20, 25, 31. The middle value is 20.

33 Answer: 16 2m

Ordered values: 12, 14, 18, 24. Median = $(14+18) \div 2 = 16$.

34 Answer: Mode 9; range 9 2m

The mode is the most frequent value, 9; range = maximum – minimum = $18-9=9$.

35 Answer: 18 3m

Total of five numbers = $5 \times 18 = 90$; known total = 72; missing value = $90-72=18$.

36 Answer: 16 2m

Mean = total $\div$ number of values = $80 \div 5 = 16$.

37 Answer: 21 2m

Put the data in order: 15, 18, 21, 26, 32. The middle value is 21.

38 Answer: 17 2m

Ordered values: 13, 15, 19, 25. Median = $(15+19) \div 2 = 17$.

39 Answer: Mode 10; range 9 2m

The mode is the most frequent value, 10; range = maximum – minimum = $19-10=9$.

40 Answer: 19 3m

Total of five numbers = $5 \times 19 = 95$; known total = 76; missing value = $95-76=19$.

41 Answer: 17 2m

Mean = total $\div$ number of values = $85 \div 5 = 17$.

42 Answer: 22 2m

Put the data in order: 16, 19, 22, 27, 33. The middle value is 22.

43 Answer: 18 2m

Ordered values: 14, 16, 20, 26. Median = $(16+20) \div 2 = 18$.

44 Answer: Mode 11; range 9 2m

The mode is the most frequent value, 11; range = maximum – minimum = $20-11=9$.

45 Answer: 20 3m

Total of five numbers = $5 \times 20 = 100$; known total = 80; missing value = $100-80=20$.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: 2.80 3m

$\Sigma f = 10$; $\Sigma fx = 1 \times 2 + 2 \times 3 + 4 \times 5 = 28$; $\text{mean} = 28/10 = 2.80$.

02 Answer: 18.3 4m

Midpoints are 5, 15, 25. $\Sigma fx = 5 \times 2 + 15 \times 4 + 25 \times 6 = 220$; $\Sigma f = 12$; estimated mean $= 220/12 = 18.3$.

03 Answer: 30 1m

Class midpoint = (lower boundary + upper boundary) $\div$ 2 = $(20 + 40) \div 2 = 30$.

04 Answer: 5-10 1m

The greatest class frequency is 12, so the modal class is 5-10.

05 Answer: 19 1m

Total frequency $\Sigma f = 3 + 5 + 7 + 4 = 19$.

06 Answer: 3.73 3m

$\Sigma f = 11$; $\Sigma fx = 2 \times 2 + 3 \times 4 + 5 \times 5 = 41$; $\text{mean} = 41/11 = 3.73$.

07 Answer: 17.7 4m

Midpoints are 5, 15, 25. $\Sigma fx = 5 \times 3 + 15 \times 5 + 25 \times 7 = 265$; $\Sigma f = 15$; estimated mean $= 265/15 = 17.7$.

08 Answer: 35 1m

Class midpoint = (lower boundary + upper boundary) $\div$ 2 = $(25 + 45) \div 2 = 35$.

09 Answer: 5-10 1m

The greatest class frequency is 14, so the modal class is 5-10.

10 Answer: 24 1m

Total frequency $\Sigma f = 4 + 7 + 8 + 5 = 24$.

11 Answer: 4.67 3m

$\Sigma f = 12$; $\Sigma fx = 3 \times 2 + 4 \times 5 + 6 \times 5 = 56$; $\text{mean} = 56/12 = 4.67$.

12 Answer: 17.2 4m

Midpoints are 5, 15, 25. $\Sigma fx = 5 \times 4 + 15 \times 6 + 25 \times 8 = 310$; $\Sigma f = 18$; estimated mean $= 310/18 = 17.2$.

13 Answer: 40 1m

Class midpoint = (lower boundary + upper boundary) $\div$ 2 = $(30 + 50) \div 2 = 40$.

14 Answer: 5-10 1m

The greatest class frequency is 16, so the modal class is 5-10.

15 Answer: 29 1m

Total frequency $\Sigma f = 5 + 9 + 9 + 6 = 29$.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: 5.80 3m

$\Sigma f = 10$; $\Sigma fx = 4 \times 2 + 5 \times 3 + 7 \times 5 = 58$; $\text{mean} = 58/10 = 5.80$.

17 Answer: 17.7 4m

Midpoints are 5, 15, 25. $\Sigma fx = 5 \times 2 + 15 \times 7 + 25 \times 6 = 265$; $\Sigma f = 15$; estimated mean $= 265/15 = 17.7$.

18 Answer: 45 1m

Class midpoint = (lower boundary + upper boundary) $\div$ 2 = $(35 + 55) \div 2 = 45$.

19 Answer: 5-10 1m

The greatest class frequency is 18, so the modal class is 5-10.

20 Answer: 34 1m

Total frequency $\Sigma f = 6 + 11 + 10 + 7 = 34$.

21 Answer: 6.73 3m

$\Sigma f = 11$; $\Sigma fx = 5 \times 2 + 6 \times 4 + 8 \times 5 = 74$; $\text{mean} = 74/11 = 6.73$.

22 Answer: 17.9 4m

Midpoints are 5, 15, 25. $\Sigma fx = 5 \times 3 + 15 \times 4 + 25 \times 7 = 250$; $\Sigma f = 14$; estimated mean $= 250/14 = 17.9$.

23 Answer: 50 1m

Class midpoint = (lower boundary + upper boundary) $\div$ 2 = $(40 + 60) \div 2 = 50$.

24 Answer: 5-10 1m

The greatest class frequency is 20, so the modal class is 5-10.

25 Answer: 39 1m

Total frequency $\Sigma f = 7 + 13 + 11 + 8 = 39$.

26 Answer: 7.67 3m

$\Sigma f = 12$; $\Sigma fx = 6 \times 2 + 7 \times 5 + 9 \times 5 = 92$; $\text{mean} = 92/12 = 7.67$.

27 Answer: 17.4 4m

Midpoints are 5, 15, 25. $\Sigma fx = 5 \times 4 + 15 \times 5 + 25 \times 8 = 295$; $\Sigma f = 17$; estimated mean $= 295/17 = 17.4$.

28 Answer: 55 1m

Class midpoint = (lower boundary + upper boundary) $\div$ 2 = $(45 + 65) \div 2 = 55$.

29 Answer: 5-10 1m

The greatest class frequency is 22, so the modal class is 5-10.

30 Answer: 44 1m

Total frequency $\Sigma f = 8 + 15 + 12 + 9 = 44$.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 46 / S4, S5

Frequency Distributions and Grouped Averages

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: 8.80 3m

$\Sigma f = 10$; $\Sigma fx = 7 \times 2 + 8 \times 3 + 10 \times 5 = 88$; mean $= 88/10 = 8.80$.

32 Answer: 17.9 4m

Midpoints are 5, 15, 25. $\Sigma fx = 5 \times 2 + 15 \times 6 + 25 \times 6 = 250$; $\Sigma f = 14$; estimated mean $= 250/14 = 17.9$.

33 Answer: 60 1m

Class midpoint = (lower boundary + upper boundary) $\div$ 2 = $(50 + 70) \div 2 = 60$.

34 Answer: 5-10 1m

The greatest class frequency is 24, so the modal class is 5-10.

35 Answer: 49 1m

Total frequency $\Sigma f = 9 + 17 + 13 + 10 = 49$.

36 Answer: 9.73 3m

$\Sigma f = 11$; $\Sigma fx = 8 \times 2 + 9 \times 4 + 11 \times 5 = 107$; mean $= 107/11 = 9.73$.

37 Answer: 17.4 4m

Midpoints are 5, 15, 25. $\Sigma fx = 5 \times 3 + 15 \times 7 + 25 \times 7 = 295$; $\Sigma f = 17$; estimated mean $= 295/17 = 17.4$.

38 Answer: 65 1m

Class midpoint = (lower boundary + upper boundary) $\div$ 2 = $(55 + 75) \div 2 = 65$.

39 Answer: 5-10 1m

The greatest class frequency is 26, so the modal class is 5-10.

40 Answer: 54 1m

Total frequency $\Sigma f = 10 + 19 + 14 + 11 = 54$.

41 Answer: 10.67 3m

$\Sigma f = 12$; $\Sigma fx = 9 \times 2 + 10 \times 5 + 12 \times 5 = 128$; mean $= 128/12 = 10.67$.

42 Answer: 17.5 4m

Midpoints are 5, 15, 25. $\Sigma fx = 5 \times 4 + 15 \times 4 + 25 \times 8 = 280$; $\Sigma f = 16$; estimated mean $= 280/16 = 17.5$.

43 Answer: 70 1m

Class midpoint = (lower boundary + upper boundary) $\div$ 2 = $(60 + 80) \div 2 = 70$.

44 Answer: 5-10 1m

The greatest class frequency is 28, so the modal class is 5-10.

45 Answer: 59 1m

Total frequency $\Sigma f = 11 + 21 + 15 + 12 = 59$.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

- | | | |
|-----------|--|-----------|
| 01 | Answer: 23
The stem gives the tens digit and the leaf the units digit: $2 \mid 3 = 23$. | 1m |
| 02 | Answer: Median 22; range 23
The middle of 7 ordered values is the fourth value, 22; $\text{range} = 35 - 12 = 23$. | 3m |
| 03 | Answer: B has the greater typical result; A is more consistent
B has the higher mean ($28 > 24$); A has the smaller range ($9 < 15$), so its results are less spread out. | 3m |
| 04 | Answer: 80; it increases the mean
80 is far above the main cluster 14–19, so it pulls the mean upward. | 2m |
| 05 | Answer: Sample A
The smaller range indicates less variation: $8 < 14$, so sample A is more consistent. | 2m |
| 06 | Answer: 34
The stem gives the tens digit and the leaf the units digit: $3 \mid 4 = 34$. | 1m |
| 07 | Answer: Median 23; range 23
The middle of 7 ordered values is the fourth value, 23; $\text{range} = 36 - 13 = 23$. | 3m |
| 08 | Answer: B has the greater typical result; A is more consistent
B has the higher mean ($29 > 25$); A has the smaller range ($10 < 16$), so its results are less spread out. | 3m |
| 09 | Answer: 84; it increases the mean
84 is far above the main cluster 15–20, so it pulls the mean upward. | 2m |
| 10 | Answer: Sample A
The smaller range indicates less variation: $9 < 15$, so sample A is more consistent. | 2m |
| 11 | Answer: 45
The stem gives the tens digit and the leaf the units digit: $4 \mid 5 = 45$. | 1m |
| 12 | Answer: Median 24; range 23
The middle of 7 ordered values is the fourth value, 24; $\text{range} = 37 - 14 = 23$. | 3m |
| 13 | Answer: B has the greater typical result; A is more consistent
B has the higher mean ($30 > 26$); A has the smaller range ($11 < 17$), so its results are less spread out. | 3m |
| 14 | Answer: 88; it increases the mean
88 is far above the main cluster 16–21, so it pulls the mean upward. | 2m |
| 15 | Answer: Sample A
The smaller range indicates less variation: $10 < 16$, so sample A is more consistent. | 2m |

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

- 16 Answer: 56** 1m
The stem gives the tens digit and the leaf the units digit: $5 | 6 = 56$.
- 17 Answer: Median 25; range 23** 3m
The middle of 7 ordered values is the fourth value, 25; range= $38-15=23$.
- 18 Answer: B has the greater typical result; A is more consistent** 3m
B has the higher mean ($31>27$); A has the smaller range ($9<18$), so its results are less spread out.
- 19 Answer: 92; it increases the mean** 2m
92 is far above the main cluster 17-22, so it pulls the mean upward.
- 20 Answer: Sample A** 2m
The smaller range indicates less variation: $11<17$, so sample A is more consistent.
- 21 Answer: 27** 1m
The stem gives the tens digit and the leaf the units digit: $2 | 7 = 27$.
- 22 Answer: Median 26; range 23** 3m
The middle of 7 ordered values is the fourth value, 26; range= $39-16=23$.
- 23 Answer: B has the greater typical result; A is more consistent** 3m
B has the higher mean ($32>28$); A has the smaller range ($10<15$), so its results are less spread out.
- 24 Answer: 96; it increases the mean** 2m
96 is far above the main cluster 18-23, so it pulls the mean upward.
- 25 Answer: Sample A** 2m
The smaller range indicates less variation: $12<18$, so sample A is more consistent.
- 26 Answer: 38** 1m
The stem gives the tens digit and the leaf the units digit: $3 | 8 = 38$.
- 27 Answer: Median 27; range 23** 3m
The middle of 7 ordered values is the fourth value, 27; range= $40-17=23$.
- 28 Answer: B has the greater typical result; A is more consistent** 3m
B has the higher mean ($33>29$); A has the smaller range ($11<16$), so its results are less spread out.
- 29 Answer: 100; it increases the mean** 2m
100 is far above the main cluster 19-24, so it pulls the mean upward.
- 30 Answer: An ordered diagram with an appropriate key** 3m
Use tens as stems and units as ordered leaves. A valid key is $2 | 3 = 23$; include every value once.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 47 / S2, S4, S5

Stem-and-Leaf Diagrams and Comparing Distributions

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

- | | | |
|-----------|--|-----------|
| 31 | Answer: 49
The stem gives the tens digit and the leaf the units digit: $4 9 = 49$. | 1m |
| 32 | Answer: Median 28; range 23
The middle of 7 ordered values is the fourth value, 28; range= $41-18=23$. | 3m |
| 33 | Answer: B has the greater typical result; A is more consistent
B has the higher mean ($34>30$); A has the smaller range ($9<17$), so its results are less spread out. | 3m |
| 34 | Answer: 104; it increases the mean
104 is far above the main cluster 20-25, so it pulls the mean upward. | 2m |
| 35 | Answer: An ordered diagram with an appropriate key
Use tens as stems and units as ordered leaves. A valid key is $2 3 = 23$; include every value once. | 3m |
| 36 | Answer: 50
The stem gives the tens digit and the leaf the units digit: $5 0 = 50$. | 1m |
| 37 | Answer: Median 29; range 23
The middle of 7 ordered values is the fourth value, 29; range= $42-19=23$. | 3m |
| 38 | Answer: B has the greater typical result; A is more consistent
B has the higher mean ($35>31$); A has the smaller range ($10<18$), so its results are less spread out. | 3m |
| 39 | Answer: 108; it increases the mean
108 is far above the main cluster 21-26, so it pulls the mean upward. | 2m |
| 40 | Answer: An ordered diagram with an appropriate key
Use tens as stems and units as ordered leaves. A valid key is $2 3 = 23$; include every value once. | 3m |
| 41 | Answer: 21
The stem gives the tens digit and the leaf the units digit: $2 1 = 21$. | 1m |
| 42 | Answer: Median 30; range 23
The middle of 7 ordered values is the fourth value, 30; range= $43-20=23$. | 3m |
| 43 | Answer: B has the greater typical result; A is more consistent
B has the higher mean ($36>32$); A has the smaller range ($11<15$), so its results are less spread out. | 3m |
| 44 | Answer: 112; it increases the mean
112 is far above the main cluster 22-27, so it pulls the mean upward. | 2m |
| 45 | Answer: An ordered diagram with an appropriate key
Use tens as stems and units as ordered leaves. A valid key is $2 3 = 23$; include every value once. | 3m |

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

- | | | |
|-----------|---|-----------|
| 01 | Answer: Positive correlation
When both variables tend to increase together, the scatter graph shows positive correlation. | 1m |
| 02 | Answer: 22
Substitute $x=6$: $y=2 \times 6 + 10 = 22$. | 2m |
| 03 | Answer: 10: interpolation; 35: extrapolation
10 is within the observed range 5–20, so it is interpolation; 35 lies outside, so it is extrapolation. | 2m |
| 04 | Answer: No; correlation does not prove causation
An association can arise through a third factor, coincidence, reversed causation or biased sampling; correlation alone does not establish cause. | 2m |
| 05 | Answer: Negative correlation
As x increases from 3 to 7, y decreases from 30 to 22; the correlation is negative. | 2m |
| 06 | Answer: Positive correlation
When both variables tend to increase together, the scatter graph shows positive correlation. | 1m |
| 07 | Answer: 33
Substitute $x=7$: $y=3 \times 7 + 12 = 33$. | 2m |
| 08 | Answer: 11: interpolation; 38: extrapolation
11 is within the observed range 6–22, so it is interpolation; 38 lies outside, so it is extrapolation. | 2m |
| 09 | Answer: No; correlation does not prove causation
An association can arise through a third factor, coincidence, reversed causation or biased sampling; correlation alone does not establish cause. | 2m |
| 10 | Answer: Negative correlation
As x increases from 4 to 8, y decreases from 29 to 21; the correlation is negative. | 2m |
| 11 | Answer: Positive correlation
When both variables tend to increase together, the scatter graph shows positive correlation. | 1m |
| 12 | Answer: 46
Substitute $x=8$: $y=4 \times 8 + 14 = 46$. | 2m |
| 13 | Answer: 12: interpolation; 41: extrapolation
12 is within the observed range 7–24, so it is interpolation; 41 lies outside, so it is extrapolation. | 2m |
| 14 | Answer: No; correlation does not prove causation
An association can arise through a third factor, coincidence, reversed causation or biased sampling; correlation alone does not establish cause. | 2m |
| 15 | Answer: Negative correlation
As x increases from 5 to 9, y decreases from 28 to 20; the correlation is negative. | 2m |

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: Positive correlation 1m

When both variables tend to increase together, the scatter graph shows positive correlation.

17 Answer: 34 2m

Substitute $x=9$: $y=2 \times 9 + 16 = 34$.

18 Answer: 13: interpolation; 44: extrapolation 2m

13 is within the observed range 8–26, so it is interpolation; 44 lies outside, so it is extrapolation.

19 Answer: No; correlation does not prove causation 2m

An association can arise through a third factor, coincidence, reversed causation or biased sampling; correlation alone does not establish cause.

20 Answer: Negative correlation 2m

As x increases from 6 to 10, y decreases from 27 to 19; the correlation is negative.

21 Answer: Positive correlation 1m

When both variables tend to increase together, the scatter graph shows positive correlation.

22 Answer: 48 2m

Substitute $x=10$: $y=3 \times 10 + 18 = 48$.

23 Answer: 14: interpolation; 47: extrapolation 2m

14 is within the observed range 9–28, so it is interpolation; 47 lies outside, so it is extrapolation.

24 Answer: No; correlation does not prove causation 2m

An association can arise through a third factor, coincidence, reversed causation or biased sampling; correlation alone does not establish cause.

25 Answer: Negative correlation 2m

As x increases from 7 to 11, y decreases from 26 to 18; the correlation is negative.

26 Answer: Positive correlation 1m

When both variables tend to increase together, the scatter graph shows positive correlation.

27 Answer: 64 2m

Substitute $x=11$: $y=4 \times 11 + 20 = 64$.

28 Answer: 15: interpolation; 50: extrapolation 2m

15 is within the observed range 10–30, so it is interpolation; 50 lies outside, so it is extrapolation.

29 Answer: No; correlation does not prove causation 2m

An association can arise through a third factor, coincidence, reversed causation or biased sampling; correlation alone does not establish cause.

30 Answer: Positive correlation; an upward line through the centre of the points 3m

Label both axes, plot each ordered pair accurately, and draw a straight line through the centre of the cluster with roughly balanced points above and below.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.

MODULE 48 / S2, S5, S6

Scatter Graphs, Correlation and Mixed Statistics

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: Positive correlation 1m

When both variables tend to increase together, the scatter graph shows positive correlation.

32 Answer: 46 2m

Substitute $x=12$: $y=2 \times 12 + 22 = 46$.

33 Answer: 16: interpolation; 53: extrapolation 2m

16 is within the observed range 11–32, so it is interpolation; 53 lies outside, so it is extrapolation.

34 Answer: No; correlation does not prove causation 2m

An association can arise through a third factor, coincidence, reversed causation or biased sampling; correlation alone does not establish cause.

35 Answer: Positive correlation; an upward line through the centre of the points 3m

Label both axes, plot each ordered pair accurately, and draw a straight line through the centre of the cluster with roughly balanced points above and below.

36 Answer: Positive correlation 1m

When both variables tend to increase together, the scatter graph shows positive correlation.

37 Answer: 63 2m

Substitute $x=13$: $y=3 \times 13 + 24 = 63$.

38 Answer: 17: interpolation; 56: extrapolation 2m

17 is within the observed range 12–34, so it is interpolation; 56 lies outside, so it is extrapolation.

39 Answer: No; correlation does not prove causation 2m

An association can arise through a third factor, coincidence, reversed causation or biased sampling; correlation alone does not establish cause.

40 Answer: Positive correlation; an upward line through the centre of the points 3m

Label both axes, plot each ordered pair accurately, and draw a straight line through the centre of the cluster with roughly balanced points above and below.

41 Answer: Positive correlation 1m

When both variables tend to increase together, the scatter graph shows positive correlation.

42 Answer: 82 2m

Substitute $x=14$: $y=4 \times 14 + 26 = 82$.

43 Answer: 18: interpolation; 59: extrapolation 2m

18 is within the observed range 13–36, so it is interpolation; 59 lies outside, so it is extrapolation.

44 Answer: No; correlation does not prove causation 2m

An association can arise through a third factor, coincidence, reversed causation or biased sampling; correlation alone does not establish cause.

45 Answer: Positive correlation; an upward line through the centre of the points 3m

Label both axes, plot each ordered pair accurately, and draw a straight line through the centre of the cluster with roughly balanced points above and below.

Award method marks where the correct operation or set-up is shown. Check chart labels, frequencies, units, ordered values and sensible rounding.