KS3.M-S2 Collecting Data, Tally and Frequency Tables

AQA KS3.M-S2 · Calculators not allowed · about 50 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State whether each of these is qualitative or quantitative data.

(a) The colour of cars parked in a street. **(1)**

(b) The number of books each pupil has read this term. **(1)**

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2 A class records the number of pets each pupil has: 0, 1, 2, 1, 3, 0, 1. Complete a tally chart and write the frequency for each category 0, 1, 2, 3.

(a) Fill in the tally and frequency for 0, 1, 2, 3 pets. **(2)**

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3 The table shows shoe sizes of 10 pupils. Complete the tally column and the frequency column.
Sizes: 2, 3, 3, 4, 2, 5, 3, 4, 2, 3. Categories: 2, 3, 4, 5.

(a) Tally and frequency for each size **(3)**

4 Give one advantage and one disadvantage of using tally marks when collecting data in class.

(a) Give one advantage. **(1)**

(b) Give one disadvantage. **(1)**

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5 A survey asked 30 pupils which fruit they prefer. The frequency table below is partly completed.
Fruit: Apple, Banana, Orange, Grapes. Frequencies: Apple 12, Banana 6, Orange ?, Grapes 5. Total 30.
Find the frequency for Orange.

(a) Work out the missing frequency for Orange. **(2)**

(b) Explain briefly how you found the answer. **(1)**

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6 Complete the grouped frequency table for shoe lengths (cm). Data from 12 pupils: 19, 21, 20, 22, 19, 23, 21, 20, 22, 24, 20, 21.
Groups: 19-20, 21-22, 23-24.

(a) Fill in the frequencies for each group. **(2)**

7 A teacher records how many minutes pupils spend reading each night. The data for 8 pupils is: 10, 15, 20, 15, 25, 10, 30, 20.
(a) Draw a frequency table for these exact values.
(b) What is the mode of the data?

(a) Complete the frequency table with values 10, 15, 20, 25, 30. **(2)**

(b) State the mode. **(1)**

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8 The heights (cm) of 7 plants are grouped: 10-14, 15-19, 20-24. The frequencies are 3, 2, 2 respectively.
Write down which group contains the median plant height.

(a) Find the median group. **(2)**

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(b) Explain your working briefly. **(1)**

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9 A class asked 20 pupils how many times they used the school library last month. The grouped table is:
0-1: 6, 2-3: 9, 4-5: 5.
How many pupils used the library less than 4 times last month?

(a) Calculate the number of pupils who used it less than 4 times. **(2)**

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10 Here is a tally chart showing favourite school subjects for 12 pupils. Convert the tally chart into a frequency table.
Maths: ||||, English: |||, Science: ||, History: ||, Art: |.

(a) Write the frequency table with the totals. **(3)**

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11 A survey records the shoe colour of 9 pupils: black, brown, black, blue, black, brown, black, blue, black.
(a) Make a tally chart and frequency table.
(b) Which colour is most common?

(a) Tally and frequency for black, brown, blue. **(1)**

(b) Most common colour. **(1)**

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12 Complete the frequency table and find the mean for the data set: 2, 3, 3, 4, 5, 3, 2.
Provide the mean to one decimal place.

(a) Give the frequency for 2, 3, 4, 5. **(1)**

(b) Find the mean of the data, to one decimal place. **(2)**

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13 A questionnaire asked 40 pupils how many games consoles they have at home. The grouped frequency table is:
0-1: 18, 2-3: 14, 4-5: 8.
(a) Complete the cumulative frequency column.
(b) Use the cumulative frequency to estimate the number of pupils with fewer than 3 consoles.

(a) Fill the cumulative frequencies for the groups in order. **(2)**

(b) Estimate how many pupils have fewer than 3 consoles. **(2)**

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14 A tally chart records the number of siblings pupils have: tallies shown for categories 0, 1, 2, 3 as ||, ||||, |||, |. Write the frequencies for each category.

(a) Frequencies for 0, 1, 2, 3. **(2)**

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15 The table shows the number of pets owned by 15 pupils: 0(5), 1(6), 2(3), 3(1). Using the frequency table, find the mode and the range of the data.

(a) State the mode. **(1)**

(b) Find the range. **(2)**

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16 A teacher grouped ages of 20 pupils into 5-year intervals: 5-9, 10-14, 15-19. The frequencies are 7, 11, 2. Draw a simple bar chart sketch (bars labelled by group) showing these frequencies and state one conclusion you can make about the ages in the class.

(a) Sketch a bar chart with correct heights for each group (no need for exact scale). **(2)**

(b) State one conclusion from the bar chart. **(2)**

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17 Stretch: A teacher records the number of times 25 pupils visited a museum: grouped table 0-1: 9, 2-3: 10, 4-5: 6.
(a) Calculate the cumulative frequency table.
(b) Use the cumulative frequency to find the median group and explain why this group contains the median pupil.

(a) Complete cumulative frequencies. **(2)**

(b) Find the median group and explain. **(2)**

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18 Stretch: A teacher collected the time (minutes) pupils spent on a club each week and grouped them: 0-9 (8 pupils), 10-19 (12 pupils), 20-29 (5 pupils). Estimate the median time in minutes by assuming uniform distribution within the median group. Show working and give your answer to the nearest minute.

(a) Estimate the median time and give your answer to the nearest minute. **(3)**

Mark scheme · KS3.M-S2 Collecting Data, Tally and Frequency Tables

Question 1

- (a) **B1** qualitative cao
- (a) Answer: **Qualitative**
- (b) **B1** quantitative cao
- (b) Answer: **Quantitative**

Question 2

- (a) **M1** correct tallies shown: 0 -> ||, 1 -> |||, 2 -> |, 3 -> |
- (a) **A1** frequencies 0:2, 1:3, 2:1, 3:1 cao
- (a) Answer: **0: tally || frequency 2; 1: tally ||| frequency 3; 2: tally | frequency 1; 3: tally | frequency 1**

Question 3

- (a) **M1** correct tallies shown: 2 -> |||, 3 -> ||||, 4 -> ||, 5 -> |
- (a) **A1** frequencies 2:3, 3:4, 4:2, 5:1 cao
- (a) **A1** total frequency = 10 cao
- (a) Answer: **2: tally ||| frequency 3; 3: tally |||| frequency 4; 4: tally || frequency 2; 5: tally | frequency 1**

Question 4

- (a) **B1** e.g. quick to add marks when observing responses or easy to keep running count
- (a) Answer: **Quick to use in real time so counts can be recorded easily**
- (b) **B1** e.g. can become messy or hard to read if many marks, or not useful for calculation without conversion
- (b) Answer: **Can become messy and hard to count if there are many items**

Question 5

- (a) **M1** method: 30 - (12 + 6 + 5) or equivalent
- (a) **A1** 7 cao
- (a) Answer: **7**
- (b) **B1** subtraction from total or explanation of missing part of total
- (b) Answer: **I added the known frequencies and subtracted from 30 to find the missing number**

Question 6

- (a) **M1** correct counts in groups: 19-20, 21-22, 23-24
- (a) **A1** frequencies 19-20:5, 21-22:5, 23-24:2 cao
- (a) Answer: **19-20: 5; 21-22: 5; 23-24: 2**

Question 7

- (a) **M1** correct frequencies shown e.g. 10:2, 15:2, 20:2, 25:1, 30:1
- (a) **A1** total 8 cao
- (a) Answer: **10:2, 15:2, 20:2, 25:1, 30:1**
- (b) **B1** mode is 10, 15 or 20 (all have highest frequency 2) with explanation or any one listed
- (b) Answer: **Mode: 10, 15 and 20 (three modes)**

Question 8

- (a) **M1** method: cumulative frequencies and position of median (7 pupils -> median is 4th)
- (a) **A1** 15-19 group cao
- (a) Answer: **15-19**
- (b) **B1** explanation identifying median position (4th) and showing it lies in the 15-19 group
- (b) Answer: **Median is the 4th value; cumulative counts show 10-14 gives first 3, so the 4th is in 15-19**

Question 9

- (a) **M1** method: add frequencies for 0-1 and 2-3
- (a) **A1** 15 cao
- (a) Answer: **15**

Question 10

- (a) **M1** correct conversion of tallies to numbers
- (a) **M1** correct frequencies: Maths 4, English 3, Science 2, History 2, Art 1
- (a) **A1** total 12 cao
- (a) Answer: **Maths 4, English 3, Science 2, History 2, Art 1; total 12**

Question 11

- (a) **M1** correct tallies and frequencies e.g. black: ||||| frequency 5; brown: || frequency 2; blue: || frequency 2
- (a) Answer: **Black: tally ||||| freq 5; Brown: tally || freq 2; Blue: tally || freq 2**
- (b) **B1** black cao
- (b) Answer: **Black**

Question 12

- (a) **B1** frequencies 2:2, 3:3, 4:1, 5:1 cao
- (a) Answer: **2:2, 3:3, 4:1, 5:1**
- (b) **M1** method: sum of values divided by 7 or sum from frequencies
- (b) **A1** 3.1 cao
- (b) Answer: **3.1**

Question 13

- (a) **M1** correct cumulative method shown
- (a) **A1** cumulative 0-1:18, up to 2-3:32, up to 4-5:40 cao
- (a) Answer: **Cumulative frequencies: 0-1 = 18; 0-3 = 32; 0-5 = 40**
- (b) **M1** method: use cumulative frequency up to 2-3 and consider fewer than 3 implies up to 2
- (b) **A1** 18 + estimate half of 14 = 25 cao (accept 25 if method stated)
- (b) Answer: **25**

Question 14

- (a) **M1** correct conversion from tallies
- (a) **A1** frequencies 0:2, 1:4, 2:3, 3:1 cao
- (a) Answer: **0:2, 1:4, 2:3, 3:1**

Question 15

- (a) **B1** mode = 1 cao
- (a) Answer: **1**
- (b) **M1** method: maximum value 3 - minimum value 0
- (b) **A1** 3 cao
- (b) Answer: **3**

Question 16

- (a) **M1** bars labelled and roughly proportional: heights showing 7, 11, 2
- (a) **A1** bars ordered by groups and heights clear
- (a) Answer: **Bar heights: 5-9 -> 7, 10-14 -> 11, 15-19 -> 2**
- (b) **M1** conclusion that refers to the data, e.g. most pupils are in 10-14 group
- (b) **A1** conclusion stated clearly e.g. majority are aged 10-14 cao
- (b) Answer: **Most pupils are in the 10-14 age group**

Question 17

- (a) **M1** correct cumulative method
- (a) **A1** cumulative 0-1:9, up to 2-3:19, up to 4-5:25 cao
- (a) Answer: **Cumulative: 0-1 = 9; 0-3 = 19; 0-5 = 25**
- (b) **M1** correct median position: (25+1)/2 = 13th
- (b) **A1** median group 2-3 and explanation that 13th lies in cumulative to 19 (2-3 group) cao
- (b) Answer: **Median group: 2-3; the 13th pupil lies within the cumulative count up to 19 which is the 2-3 group**

Question 18

- (a) **M1** find median position: (25+1)/2 = 13th and cumulative frequencies showing median group 10-19
- (a) **M1** use linear interpolation within 10-19: position of 13th within group = 13 - 8 = 5 out of group size 12
- (a) **A1** median approx = 10 + (5/12)*10 = 14.17 -> 14 minutes cao
- (a) Answer: **14**