Name: .... Class: .... Date: ....

12.3 MODE

Key Skills Checklist	Confidence Level					Related Questions
	1	2	3	4	5	
Identify the mode of a data set						1, 3
Identify the mode of a grouped data set						2, 6, 7, 8, 11
Identify the modes of a data set with bimodal distribution						1, 7, 11
Solve problems involving mean, median and mode						4, 5, 7, 8, 9, 10, 11
Suggest whether mean, median or mode is the most appropriate average for a data set						4, 7

WORD TOOLBOX

bimodal	The mode of a set of data is the value that occurs most often.
	The table shows the number of siblings for 10 students.

0	1	1	0	2
3	2	1	1	0

The value 0 appears three times, 1 appears four times, 2 appears two times and 3 appears one time. Since 1 occurs the most often, the mode is 1.

The following table shows the number of siblings for another 10 students.

0	1	1	0	2
1	2	1	0	0

The value 0 appears four times, 1 appears four times and 2 appears two times.
Since 0 and 1 occur the most often, both 0 and 1 are the modes.
Since there are two modes, the distribution is said to be **bimodal**.
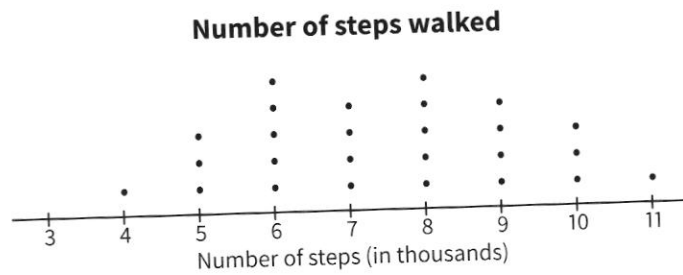
1. Find the mode of each of the following sets of numbers.

   (a) 27, 14, 35, 7, 25, 17, 7, 22

   (b) 34, 16, 19, 56, 49, 76, 33, 66

   (c) 52, 47, 24, 55, 82, 92, 25, 66, 55, 33, 24

2. The dot diagram shows the survey results of the number of steps walked by some students the previous day.

Number of steps walked

Number of steps (in thousands)

Find
   (a) the number of students who took part in the survey,

   (b) the median number of steps walked,

   (c) the modal number of steps walked.

3 The table shows the number of library visits made by 35 adults in a month.

Number of library visits	0	1	2	3	4	5
Frequency	3	5	9	6	8	4

(a) Write down the modal number of library visits.

(b) Find the median number of library visits.

INTERMEDIATE

4 The shoe sizes of 12 students measured using the US scale are shown below.

9	8.5	11	9	10.5	10
9.5	10	8	9.5	9	7.5

(a) Find
   (i) the median shoe size,

   (ii) the modal shoe size,

   (iii) the mean shoe size.

(b) Sheila claims that the mean best represents this set of data as it accounts for all the values in the set. Do you agree with her claim? Explain your answer.

5. The masses, in kg, of 20 female students' school bags, are listed below.

3.2	2.8	4.5	5.3	3.9	4.2	4.2	3.4	5.2	2.7
2.1	5.9	4.6	2.8	3.4	4.0	3.4	3.8	4.3	4.5

(a) Using the above data, complete the stem-and-leaf diagram.

Masses of school bags

Stem	Leaf
2	1
3	
4	
5	

Key: 2 | 1 represents 2.1 kg.

(b) Find

(i) the mean mass,

(ii) the median mass,

(iii) the modal mass

of a school bag.

(c) A health organisation recommends that the mass of a school bag should not be more than 10% of a student's body mass. Given that the female students in the school have a mean mass of 47.5 kg, find the number of school bags that have exceeded the recommended mass.

6. The table shows the number of books read by a group of students during the holidays.

| Number of books read	0	1	2	3	4	5	6
Frequency	5	8	x	9	7	6	5

Given that x is a positive integer, find

(a) the largest value of x if the modal number of books read is 3,

**(b)** an inequality in terms of x if the modal number of books read is 2,

(c) the mean number of books read if the number of students surveyed is 45.

7 The histogram shows the utility bills of households staying in a block.

Utility bills of households in a block
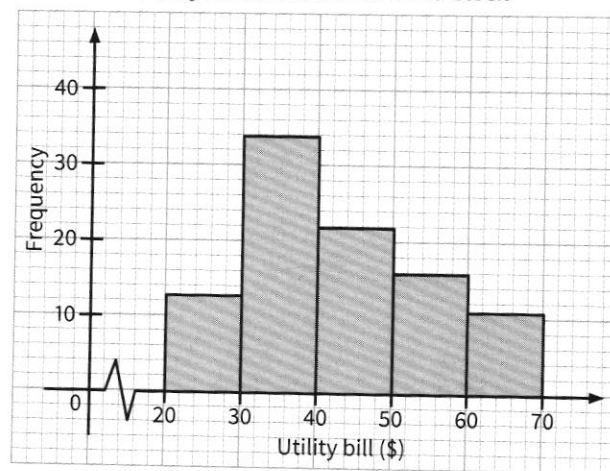
(a) Write down the number of households staying in the block.

(b) Find

    (i) the modal class,

    (ii) the class interval which contains the median,

    (iii) the estimated mean of the distribution.

(c) Comment on which measure of central tendency is the best representation for this set of data.

8 A shopkeeper records the number of apples found in some boxes using a dot diagram.

Number of apples per box
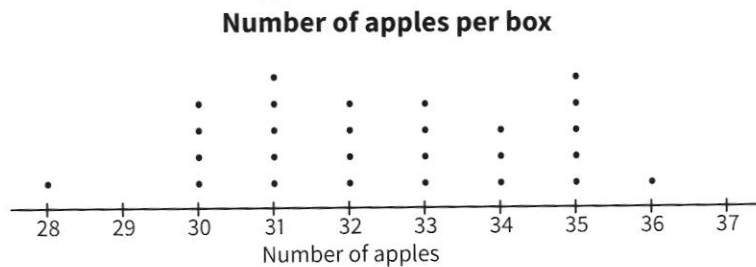
Number of apples

(a) Find the total number of boxes of apples.

(b) Find the mode.

(c) Find the mean.

(d) The distributor claims that at least 70% of the boxes contain at least 32 apples. Determine if the claim is accurate.

9 A set of numbers, containing eight positive integers, is arranged in ascending order:

$$a, \quad 40, \quad b, \quad 43, \quad 45, \quad c, \quad 47, \quad d.$$

- The mean of the set of numbers is 44.
- The median of the set of numbers is 44.
- The mode of the set of numbers is 43.
- The largest difference between any two numbers is 10.

Find the values of a, b, c and d.

10 The table shows the number of times a group of students arrived late for school.

Number of times	0	1	2	3	4	5	6
Frequency	3	14	x	6	6	3	2

(a) Find the value of x if the modes are 1 and 2.

(b) Find the value of x if the mean is $2\frac{15}{44}$.

(c) Is it possible for the median to be 3? Explain your answer.

11. The History and Geography test scores of 22 students are presented in the back-to-back stem-and-leaf diagram. Each test has a maximum of 50 marks.

Test scores of students

Leaf for History	Stem	Leaf for Geography
6 5 4	1	2 3 7 7
9 9 8 6 5	2	0 3 5 8
8 8 6 6 5 4	3	1 4 4 5 6 7 7 8
7 5 4 4 3 1 0	4	2 2 2 4 5 8
	5	0

Key: 4 | 1 | 2 represents 14 marks for History and 12 marks for Geography.

(a) For each subject, find

   (i) the mean test score,

   (ii) the median test score,

   (iii) the modal test score.

(b) The passing grade is 50% and the distinction grade is 70% for both subjects. Calculate the percentage of passes and percentage of distinctions for each subject.

(c) "Students performed better in the History test than in the Geography test". Determine if the above statement is true.

POP QUIZ 12A

① The table shows the number of goals scored in each game by a football team in one season.

Number of goals scored	0	1	2	3	4	5	6
Frequency	5	9	10	6	6	1	2

Find

(a) the mean,

.... [2]

(b) the median.

.... [1]

② **(a)** The means of data set A and data set B are 4.2 and 3.16 respectively.
There are 25 and 30 values in set A and set B respectively.
Find the mean of the combined values in sets A and B.

.... [2]

(b) The median of a set of six consecutive odd integers is 36.
Find the largest value in the data set.

.... [1]

3 The dot diagram shows the satisfaction ratings of a product given by 30 customers.
A higher score means that the customers are more satisfied.

Satisfaction ratings of a product

Satisfaction rating

(a) Find the mean rating.

.... [2]

(b) Find the median rating.

.... [1]

(c) Due to the low ratings, the products were recalled and revised product versions were sent to the same customers. The mean and median of the new satisfaction ratings are as follows.

Mean	3.6
Median	3

Explain if the customers were more satisfied with the revised version of the product.

....

.... [1]
....

POP QUIZ 12B

Duration: 15 minutes /10

1. The table shows the number of daily sales made by a salesman in 30 days.

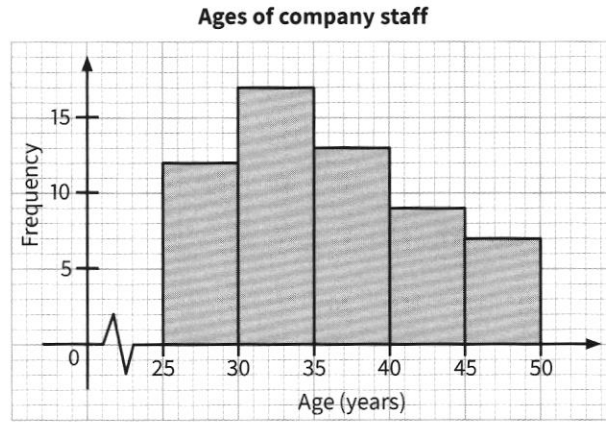| Number of sales	10	11	12	13	14	15
Frequency	3	6	7	x	y	4

(a) Show that $x + y = 10$. [1]

(b) Given that the mean number of sales is $12\frac{7}{15}$, form an equation in x and y and show that it reduces to $13x + 14y = 134$. [1]

(c) Solve the simultaneous equations in **(a)** and **(b)** to find the values of x and y.

.... [2]

2. The histogram shows the age distribution of 58 staff at a company.

Ages of company staff

(a) State the modal class.

.... [1]

(b) Find an estimate of the mean age of the staff at the company.

.... [2]

(c) A fund is available for the company if 40% or more of their staff are 35 years old and below. Determine if the company is eligible for the fund.

.... [1]

(d) A team of executives aged 40–45 joins the company. The median age is now in the 35–40 class. Find the maximum possible number of people in this team.

.... [2]