

11.3 STEM-AND-LEAF DIAGRAMS

Key Skills Checklist	Confidence Level					Related Questions
	1	2	3	4	5	
Construct a stem-and-leaf diagram from given data						3, 6
Solve problems involving stem-and-leaf diagrams						1, 2, 3, 4, 5, 8
Solve problems involving back-to-back stem-and-leaf diagrams						6, 9
Compare statistical diagrams						7, 10

WORD TOOLBOX

<p>stem-and-leaf diagrams</p> <p>stem</p> <p>leaf</p> <p>split stems</p>	<p>The table shows the test scores of students from Class A.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>26</td><td>22</td><td>19</td><td>24</td><td>21</td></tr> <tr><td>22</td><td>18</td><td>16</td><td>23</td><td>26</td></tr> <tr><td>27</td><td>20</td><td>11</td><td>19</td><td>20</td></tr> </table> <p>We represent the data using a stem-and-leaf diagram.</p> <p style="text-align: center;">Scores of students from Class A</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Stem</th> <th>Leaf</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>1</td><td>6 8 9 9</td></tr> <tr><td>2</td><td>0 0 1 2 2 3 4</td></tr> <tr><td>2</td><td>6 6 7</td></tr> </tbody> </table> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Split stem</div> } </div> <p style="text-align: center;">Key: 1 1 represents 11 marks.</p> <p>In the stem-and-leaf diagram,</p> <p>(a) the more significant digits of each value, the tens digit is extracted to form a stem,</p> <p>(b) the next significant digit of the value, the ones digit is displayed as a leaf,</p> <p>(c) split stems are used when there are too many values for a certain stem.</p>	26	22	19	24	21	22	18	16	23	26	27	20	11	19	20	Stem	Leaf	1	1	1	6 8 9 9	2	0 0 1 2 2 3 4	2	6 6 7								
26	22	19	24	21																														
22	18	16	23	26																														
27	20	11	19	20																														
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2	6 6 7																																	
<p>back-to-back stem-and-leaf diagram</p>	<p>The table shows the test scores of students from Class B.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>21</td><td>19</td><td>22</td><td>16</td><td>18</td><td>28</td></tr> <tr><td>20</td><td>19</td><td>15</td><td>15</td><td>18</td><td>22</td></tr> <tr><td>27</td><td>11</td><td>14</td><td>17</td><td>24</td><td>23</td></tr> </table> <p>We represent the test scores of students from Class A and Class B using a back-to-back stem-and-leaf diagram.</p> <p style="text-align: center;">Scores of students</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Leaf for Class A</th> <th>Stem</th> <th>Leaf for Class B</th> </tr> </thead> <tbody> <tr><td></td><td>1</td><td>1 4</td></tr> <tr><td>9 9 8 6</td><td>1</td><td>5 5 6 7 8 8 9 9</td></tr> <tr><td>4 3 2 2 1 0 0</td><td>2</td><td>0 1 2 2 3 4</td></tr> <tr><td>7 6 6</td><td>2</td><td>7 8</td></tr> </tbody> </table> <p style="text-align: center;">Key: 6 2 7 represents 26 marks for Class A and 27 marks for Class B.</p>	21	19	22	16	18	28	20	19	15	15	18	22	27	11	14	17	24	23	Leaf for Class A	Stem	Leaf for Class B		1	1 4	9 9 8 6	1	5 5 6 7 8 8 9 9	4 3 2 2 1 0 0	2	0 1 2 2 3 4	7 6 6	2	7 8
21	19	22	16	18	28																													
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4 3 2 2 1 0 0	2	0 1 2 2 3 4																																
7 6 6	2	7 8																																

BASIC MASTERY

- 1 The stem-and-leaf diagram shows the mass, in grams, of each cherry tomato in a batch of cherry tomatoes from a farm.

Masses of cherry tomatoes

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

Key: 3 | 7 represents 37 grams.

- (a) Write down the number of cherry tomatoes in the batch.
- (b) Write down the heaviest and lightest cherry tomatoes in the batch.
- (c) Cherry tomatoes which are less than 42 g are rejected. Find the percentage of cherry tomatoes accepted from this batch.

- 2 The stem-and-leaf diagram displays the ages of volunteers at an animal shelter on a particular weekend.

Ages of volunteers

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

Key: 1 | 4 represents 14 years old.

- (a) Write down the number of volunteers at the animal shelter.

(b) Find the number of volunteers who are above 25 years old.

Volunteers 18 years old and below spend an average of 7 hours and volunteers above 18 years old spend an average of 10 hours at the shelter.

(c) Find the total number of hours spent by the volunteers at the shelter.

3 The table shows the number of sit-ups done by 18 girls in a minute.

34	23	39	22	24	45
41	50	28	32	31	23
26	29	21	17	45	33

(a) Construct a stem-and-leaf diagram to represent the data.

Number of sit-ups done	
Stem	Leaf

Key:

(b) To achieve 5 points in the NAPFA test, a girl has to complete at least 30 sit-ups in a minute. Write down the number of girls who will achieve 5 points for sit-ups.

- 4 The stem-and-leaf diagram displays the high jump heights, in cm, of a group of boys in a trial.

High jump heights	
Stem	Leaf
14	8 9 9
15	0 2 2 4 5 6 8 9
16	0 0 1 2 4 6 6 6 7 8 9
17	1 3 6 7 7 8
18	2 3 4

Key: 14 | 8 represents 148 cm.

- (a) Find the number of boys in the group.
- (b) Find the percentage of boys who jumped lower than 160 cm.
- (c) Write down the most common height achieved by the boys.
- (d) Bryan has yet to participate in the trial. If the participants whose results are in the top 8 will move on to the next round, what is the minimum height Bryan must achieve to get to the next round?

- 5 The stem-and-leaf diagram shows the amounts of donations collected by a student during a charity drive.



Amount per donation	
Stem	Leaf
0	2 2 2 2 2 2 4 4 5 5 5 5 5 5
1	0 0 0 0 0 0 0 0 0 0
2	0 0 0
5	0

Key: 0 | 2 represents \$2.

(a) Write down the number of donations collected by the student.

(b) (i) Find the total amount of donations collected by the student.

(ii) Find the average amount per donation collected by the student.

(c) Describe briefly an observation from the data.

6 The table shows the masses, in grams, of some macarons sold by Café A and Café B.

Café A	14.3	15.2	15.8	14.7	14.1	15.3	15.0	16.2
	15.7	14.5	14.9	15.2	15.6	16.1	15.3	13.8
Café B	15.3	14.8	15.2	14.9	14.8	15.1	15.4	14.6
	15.0	15.0	14.9	15.3	15.1	14.7	14.9	15.3

(a) In the given space below, construct a back-to-back stem-and-leaf diagram for the above data. Your diagram should include a title and key.

(b) Describe briefly the distribution of the masses of macarons from both cafés.

- 7 For each of the following data set, suggest an appropriate statistical diagram to represent the data. Explain your answer.



- (a) The heights, in metres, of 20 plants in a nursery.

1.23	1.52	1.32	1.34	1.35	1.29	1.37	1.39	1.44	1.37
1.36	1.32	1.26	1.40	1.33	1.34	1.30	1.31	1.48	1.41

- (b) The number of books borrowed by 16 adults in a year.

8	2	14	11	15	5	9	12
15	14	3	17	7	13	12	7

- (c) The exam scores of 200 students, out of 100 marks.

88	56	72	67	71	82	62	66	47	63	...
57	52	49	77	69	66	59	52	82	42	...

- (d) Daily earnings of two shops from the past month, to the nearest hundred dollars.

Shop A	1400	1800	1100	2400	1700	3100	2700	...
Shop B	3300	2300	1200	1800	2600	3000	2500	...

8 The stem-and-leaf diagram shows the masses, in grams, of 30 mangoes in a box.



Masses of mangoes

Stem	Leaf
34	3 8 9 9
35	1 1 4 6 6 8 9
36	2 2 5 5 5 7 8 9 9
37	1 4 7 7 8 8 9
38	0 0 5

Key: 34 | 3 represents 343 grams.

(a) Find the most common mass of the mangoes.

(b) Find

(i) the total mass of the 30 mangoes,

(ii) the average mass of each mango.

(c) The mangoes are assigned a grade each based on their masses.

Grade	Mass of mango (m)
A	$375 \leq m < 400$
B	$350 \leq m < 375$
C	$325 \leq m < 350$

Find the number of mangoes that are assigned

(i) Grade A,

(ii) Grade B,

(iii) Grade C.

(d) Mabel intends to pack the 30 mangoes into packets of 3. The packets should be of similar mass. Using your answer in (c), suggest how Mabel can do so without weighing each packet individually.

(c) (i) Suggest a context in which using the stem-and-leaf diagram would be more appropriate than the histogram.

(ii) Suggest a context in which using the histogram would be more appropriate than the stem-and-leaf diagram.

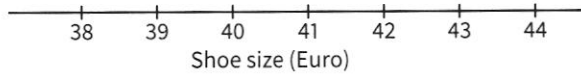
1 The shoe sizes of 20 students measured using the Euro scale are shown below.

39	41	42	39	44	39	41	40	42	40
38	41	41	38	41	38	42	42	43	43

(a) Complete the dot diagram to represent the data in the table.

[2]

Shoe sizes of students



(b) Write down the most common shoe size.

..... [1]

(c) Find the percentage of students who have a shoe size of Euro 41 and above.

..... [2]

- 2 The stem-and-leaf diagram shows the travelling times, in minutes, to school of some students.

Travelling times to school	
Stem	Leaf
0	7 9
1	0 0 1 4 4 6 7 8 8 8 8 9
2	0 1 1 2 3 6 6 7
3	1 5 7

Key: 0 | 7 represents 7 minutes.

- (a) Write down the number of students surveyed from the data.

..... [1]

- (b) The data is represented in a pie chart. Find the angle of the sector that represents the number of students who spend 20 minutes or more travelling to school.

..... [2]

- (c) Find the ratio of the number of leaves in the '1' stem to the number of leaves in the '2' stem.

..... [2]

(d) (i) The school gate closes at 7.25 a.m. Find the latest time that any student surveyed in the data should start his or her journey to school in order to be on time.

..... [1]

(ii) State an assumption made in the answer in (d)(i).

.....

..... [1]

3 Glenn records the masses of 20 mangoes, in grams, from the mango tree in his garden.

452	463	458	449	467	441	458	461	442	451
468	439	455	462	447	449	447	451	462	437

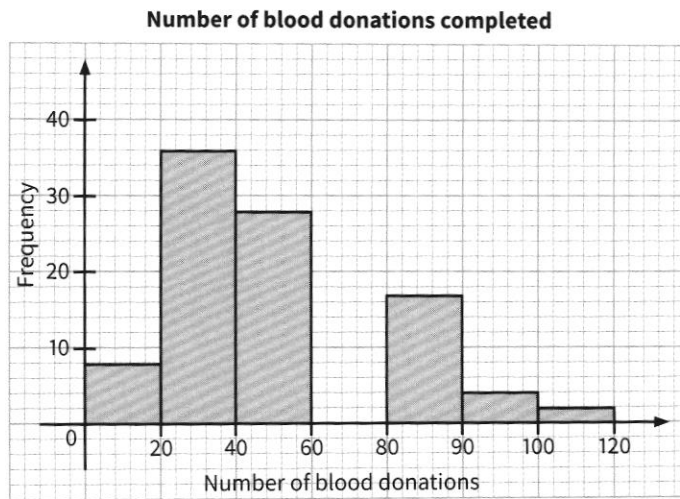
Suggest an appropriate statistical diagram to represent the data. Explain your decision.

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.....

..... [2]

- 4 The histogram shows the number of blood donations completed in a survey of 120 adults. The number of adults who completed between 60 and 80 blood donations are not shown.



- (a) (i) Find the number of adults who had completed between 60 and 80 blood donations.

..... [1]

- (ii) Hence complete the histogram.

[1]

- (b) Joanna suggests that a dot diagram is most suitable for representing the above data as individual values can be observed. Do you agree? Explain your answer.

.....

[2]

- (c) An individual aged 18 is allowed to donate blood every 3 months. Find the maximum possible number of blood donations an individual can make between his 18th and 75th birthdays.

..... [2]