3.6 Common Distributions

Student Text Pages
148–155

Suggested Timing
80–160 min

Tools
- calculators
- rulers
- grid paper
- graphing calculators

Related Resources
BLM 3-13 Section 3.6 Common Distributions
BLM 3-14 Section 3.6 Achievement Check Rubric
BLM G-1 Grid Paper

Link to Prerequisite Skills

Students should complete questions 4 and 7 prior to starting this section.

Warm-Up

1. Describe the difference between continuous and discrete data. Give an example of each.
2. Describe the similarities and differences between a histogram and a bar graph.

Warm-Up Answers

1. Examples may vary. Discrete data has only a finite number of values and the values cannot be subdivided meaningfully. For example, population data is discrete because it impossible to record part of a person. Continuous data can have almost any numeric value and can be subdivided. For example, the heights of a population are continuous data because height can be measured in parts depending on how much detail is needed: metres, centimetres, millimetres.
2. Similar: the heights of the bars in both graphs equal the frequency of the items being measured. Different: a histogram is used for continuous data so there are no spaces between the bars. A bar graph is used for categorical data that is discrete so there are spaces between the bars.

Teaching Suggestions

Warm-Up

- Write the Warm-Up questions on the board or on an overhead. Have students complete the questions independently. Then, discuss the solutions as a class.

Section Opener

- Review variance and standard deviation as you introduce the concept of a distribution. Ask students about their impression of the opener photograph.

Investigate

- Have students work in pairs. Supply students with **BLM G-1 Grid Paper** for Method 1. Method 2 will require graphing calculators. Discuss students' answers to **question 6**.

Investigate Answers (pages 148-149)

Method 1 and Method 2

1.

Class Intervals of Heights (cm)	Frequency
[100-110)	5
[110-120)	8
[120-130)	16
[130-140)	25
[140-150)	35
[150-160)	41
[160-170)	34
[170-180)	14
[180-190)	8
[190-200)	2

2. See graph on page 149.

4. A normal distribution is a bell-shaped curve.

5. The mean is the maximum point of the normal distribution curve. The median and the mode also cluster around the mean value.

6. Answers may vary. Sample answer: Most people at the game are between 150 cm to 160 cm tall.

Examples

- In Example 1, students should understand the meaning of *bimodal* from their knowledge of other words such as *bicycle* and *binomial*. Ask students to give some other examples of bimodal data. Examples may include heights of grade 11 students, shoe sizes, or life spans.
- In Example 2, students have already seen the term *skewed* when studying bias in a survey. Stress that the skewing in this distribution does not have to be due to bias in the data, but can be due to survey bias. For example, if someone is interested in data regarding shoe sizes, but only collects information from basketball players, the bias in the survey will skew the data to larger sizes. But if they are collecting this data to compare basketball players' shoe sizes to those of the whole population, then the collected data will be free of bias but will still be skewed to larger sizes.
- Discuss Example 3 to consolidate the concepts discussed in the previous Examples.

Key Concepts

- Check that students understand all the Key Concepts.

Discuss the Concepts

- Have students answer the Discuss the Concepts questions in pairs. Take up the questions before assigning the exercises.

Discuss the Concepts Suggested Answers (page 152)

D1. In a normal distribution, the mean, median, and mode are close in value and are located at the centre of the distribution. A graph of female students' heights at a high school has a normal distribution. A skewed distribution has been pushed to one side of the mean. The result is an asymmetrical or lopsided distribution. A graph of teacher's ages might have a skewed distribution if most of the teachers in the school are close to retirement.

D2. Yes, if the difference between the greatest value and the least value is the same.

Common Errors

- Some students may put spaces between the bars of a histogram.

R_x Have students recall the differences between a bar graph and a histogram; remind them that a histogram is used for continuous data and therefore has no spaces between the bars.

Accommodations

Memory—develop an organizational chart describing the types of distributions; include diagrams

Visual—provide photocopies of frequency charts

Perceptual—prepare an organizational chart in different colours for the different distributions

Gifted and Enrichment—research other types of distributions and prepare a report for the class

Practise (A)

- Encourage students to refer to the Examples before asking for assistance.
- Have students compare their examples from **question 2** with a partner.

Apply (B)

- **Question 4** is a Literacy Connect. You may wish to assign this question as a journal entry or to discuss the question as a class.
- **Questions 4** to 6 have students analyze the distribution and give reasons why certain situations may have certain distributions. This analysis will help students better understand the various distributions.
- **Question 7** is an Achievement Check question. You may wish to use **BLM 3-14 Section 3.6 Achievement Check Rubric** to assist you in assessing your students.

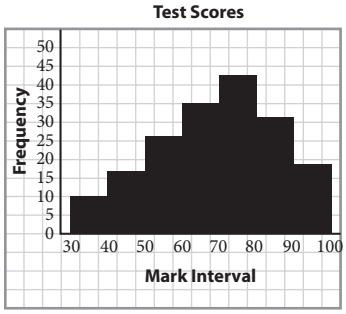
Extend

- **Questions 8 and 9** deal with normal distributions and patterns associated with normal distributions. Students should be able to use ratio and proportion to solve **question 8**, rather than dealing with in-depth details of normal distributions.

Achievement Check Answers (page 155)

7. a)

Mark Interval	Frequency
[30–40)	10
[40–50)	17
[50–60)	26
[60–70)	35
[70–80)	43
[80–90)	31
[90–100]	19



c) This is a skewed distribution because it is asymmetrical or lopsided.

Mathematical Process Expectations

Process Expectation	Questions
Problem Solving	3–6, 8, 9,
Reasoning and Proving	4–7, 9
Reflecting	1, 3–6
Selecting Tools and Computational Strategies	8
Connecting	n/a
Representing	2, 7
Communicating	3–7, 9

Extra Practice

- You may wish to use **BLM 3-13 Section 3.6 Common Distributions** for remediation or extra practice.