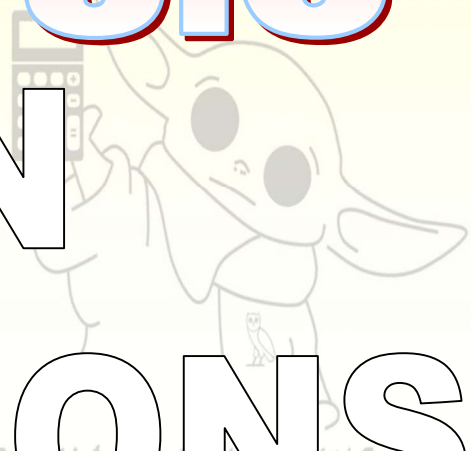
ST. JEAN DE BREBEUF MATHEMATICS

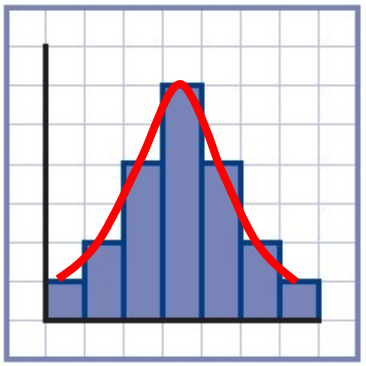
CHAPTER 3.6

COMMON DISTRIBUTIONS



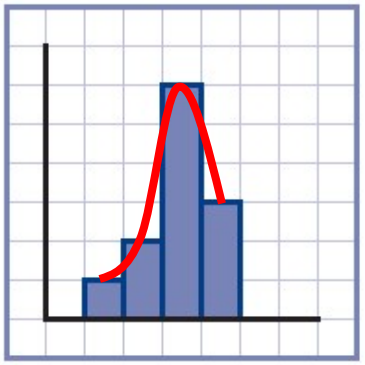
CHAPTER 3.6 COMMON DISTRIBUTIONS

There are three types of distribution:



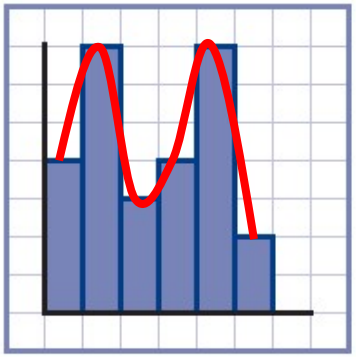
In a normal distribution, the data are distributed **symmetrically** about the *mean*.

The **mean, the median, and the mode are close in value** and are located at the *centre* of the distribution.



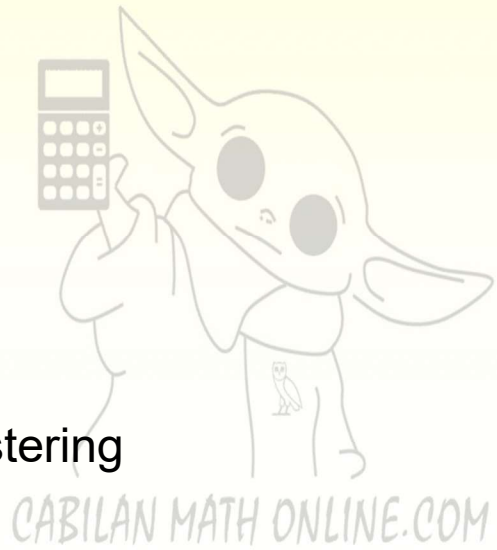
A skewed distribution has the appearance of a normal distribution that has been **pushed to one side of the mean**.

The result is an **asymmetrical** or **lopsided** distribution.



A bimodal distribution has **two peaks**.

It is **symmetrical**, with frequencies clustering around **two sub-groups**.



CHAPTER 3.6 COMMON DISTRIBUTIONS

EXAMPLE 1

Normal Distribution

Ralph recorded the heights of people who walked into a hockey arena over a two-hour period.

1. Complete the table.

Class Intervals of Heights (cm)	Tally	Frequency
[100–110)	𝍸	5
[110–120)	𝍸 |||	8
[120–130)	𝍸 𝍸 𝍸 |	16
[130–140)	𝍸 𝍸 𝍸 𝍸 𝍸	25
[140–150)	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	35
[150–160)	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 |	41
[160–170)	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ||||	34
[170–180)	𝍸 𝍸 𝍸 𝍸 |||	23
[180–190)	𝍸 𝍸 ||||	14
[190–200)	𝍸 |||	8
[200–210)	||	2

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CHAPTER 3.6 COMMON DISTRIBUTIONS

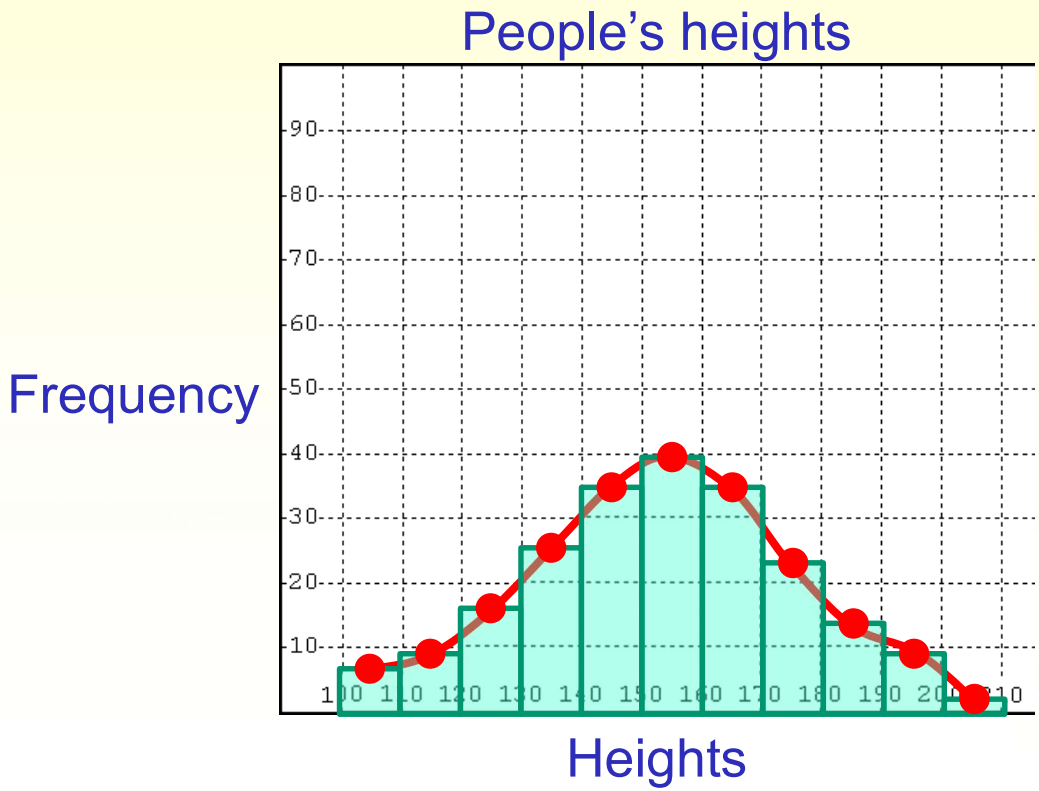
EXAMPLE 1

Normal Distribution

Class Intervals of Heights (cm)	Tally	Frequency
[100–110)	𝍸	5
[110–120)	𝍸 |||	8
[120–130)	𝍸 𝍸 𝍸 |	16
[130–140)	𝍸 𝍸 𝍸 𝍸 𝍸	25
[140–150)	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	35
[150–160)	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 |	41
[160–170)	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ||||	34
[170–180)	𝍸 𝍸 𝍸 𝍸 |||	23
[180–190)	𝍸 𝍸 ||||	14
[190–200)	𝍸 |||	8
[200–210)	||	2

2. Display the data using a **histogram**.

3. Place a **point** at the centre of the top of each bar in your histogram.
Join the points with a **smooth curve**.



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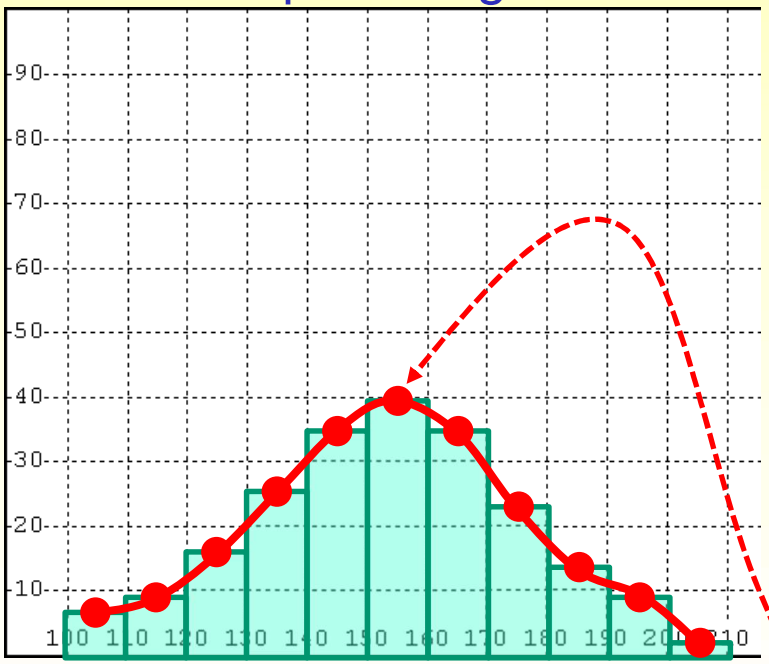
CHAPTER 3.6 COMMON DISTRIBUTIONS

EXAMPLE 1

Normal Distribution

People's heights



Frequency

4. The data approximates a **normal distribution**. Describe the **shape** of a normal distribution in your own words.

- Symmetrical
- "bell shaped"

5. Ralph calculated the **mean height as 154 cm**, the **median height as 152 cm**, and the **mode height as 157 cm**. How do these measures of central tendency relate to the curve in the normal distribution?

The three values are in the **[150, 160)** interval
→highest frequency
→peak of the curve

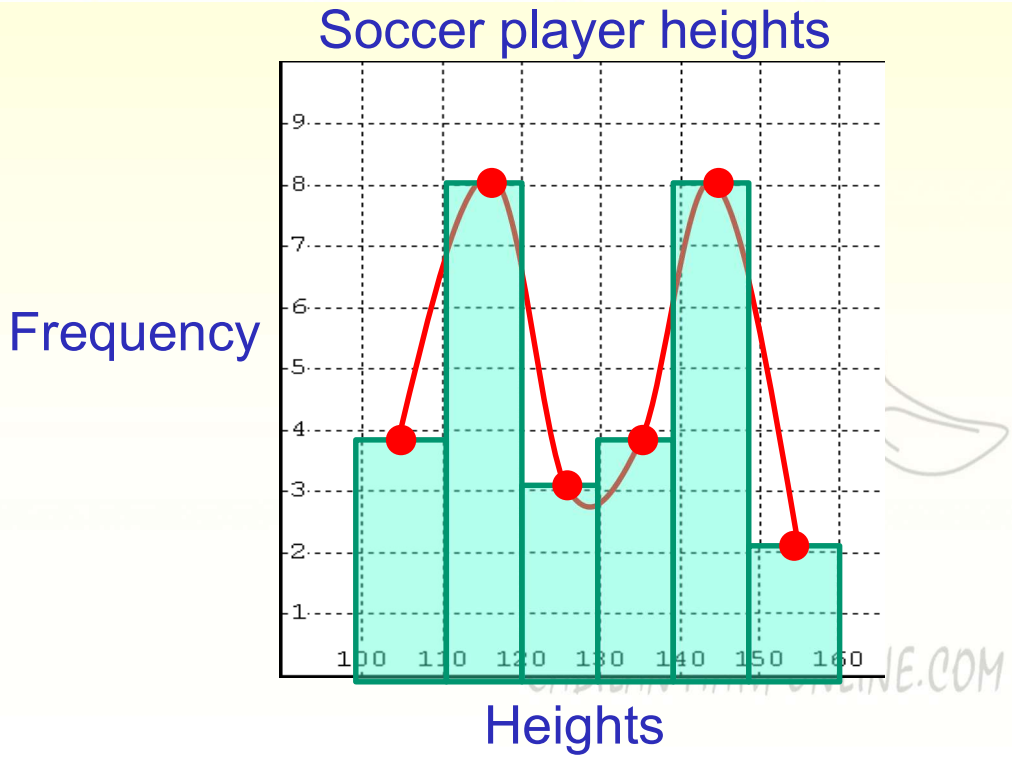
CHAPTER 3.6 COMMON DISTRIBUTIONS

EXAMPLE 2 *Bimodal Distribution*

Francesca recorded the heights of the peewee and senior girls' Falcon soccer teams.

Height (cm)	[100–110)	[110–120)	[120–130)	[130–140)	[140–150)	[150–160)
Frequency	4	8	3	4	8	2

a) Display the data using a **histogram**. Place a **point** at the centre of the top of each bar in your histogram. **Join** the points with a **smooth curve**.



CHAPTER 3.6 COMMON DISTRIBUTIONS

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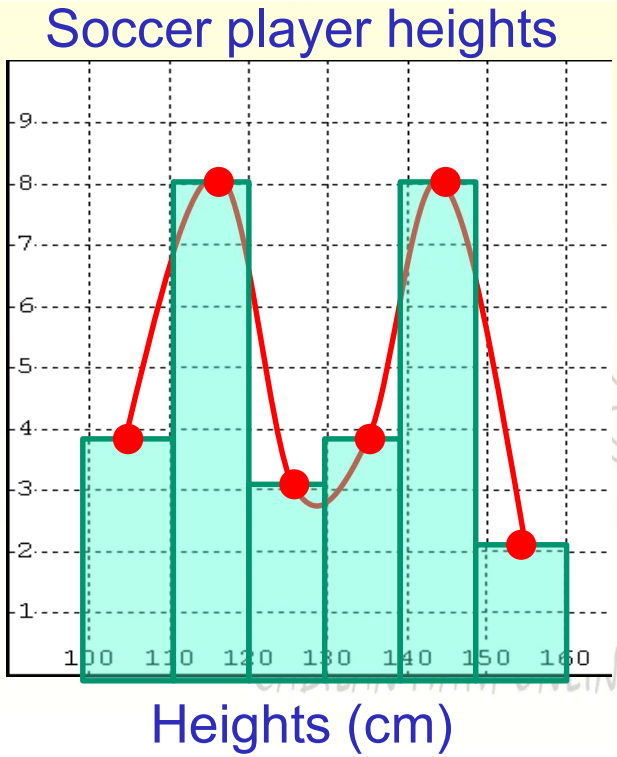
Height (cm)	[100–110)	[110–120)	[120–130)	[130–140)	[140–150)	[150–160)
Frequency	4	8	3	4	8	2

b) Describe the **shape** of the curve.

Bimodal distribution
→two peaks

c) What does the shape of the curve tell you about the heights of the players?

Most of the players are between **110 and 120 cm** and between **140 and 150 cm.**



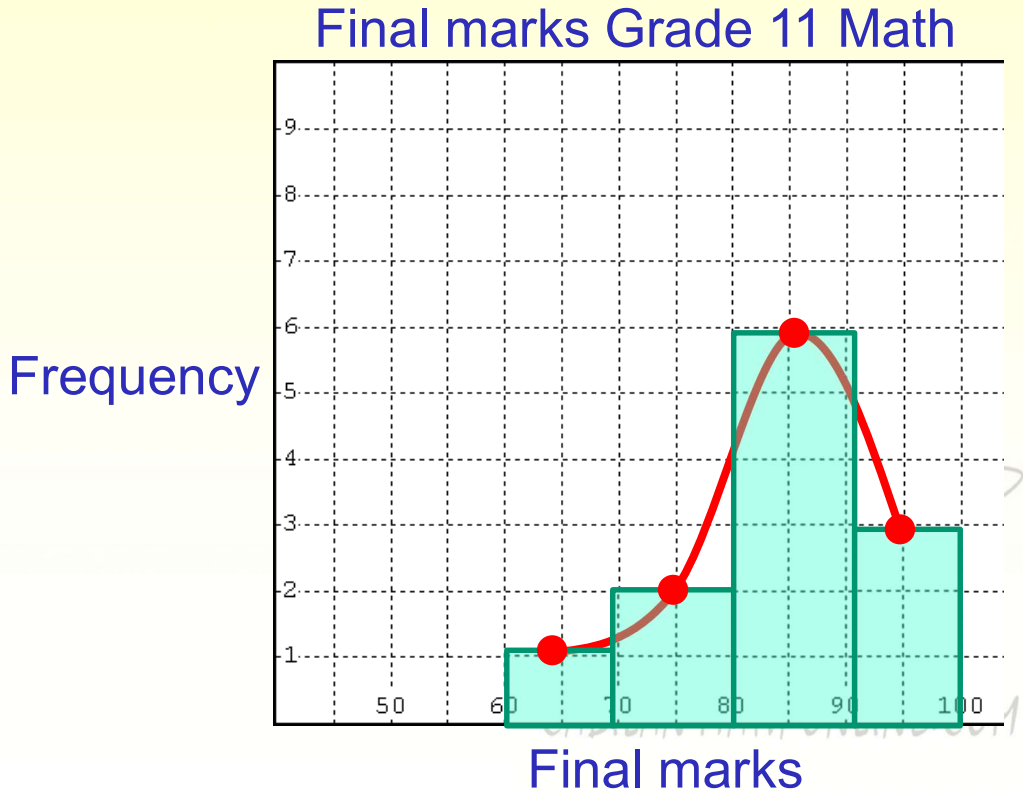
CHAPTER 3.6 COMMON DISTRIBUTIONS

EXAMPLE 3 *Skewed Distribution*

Students in the Grade 11 Math Class recorded their final marks, out of 100.

Interval	[50–60)	[60–70)	[70–80)	[80–90)	[90–100]
Frequency	0	1	2	6	3

a) Display the data using a **histogram**. **Place a point** at the centre of the top of each bar in your histogram. **Join** the points with a **smooth curve**.



CHAPTER 3.6 COMMON DISTRIBUTIONS

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Interval	[50–60)	[60–70)	[70–80)	[80–90)	[90–100]
Frequency	0	1	2	6	3

b) Describe the **shape** of the curve.

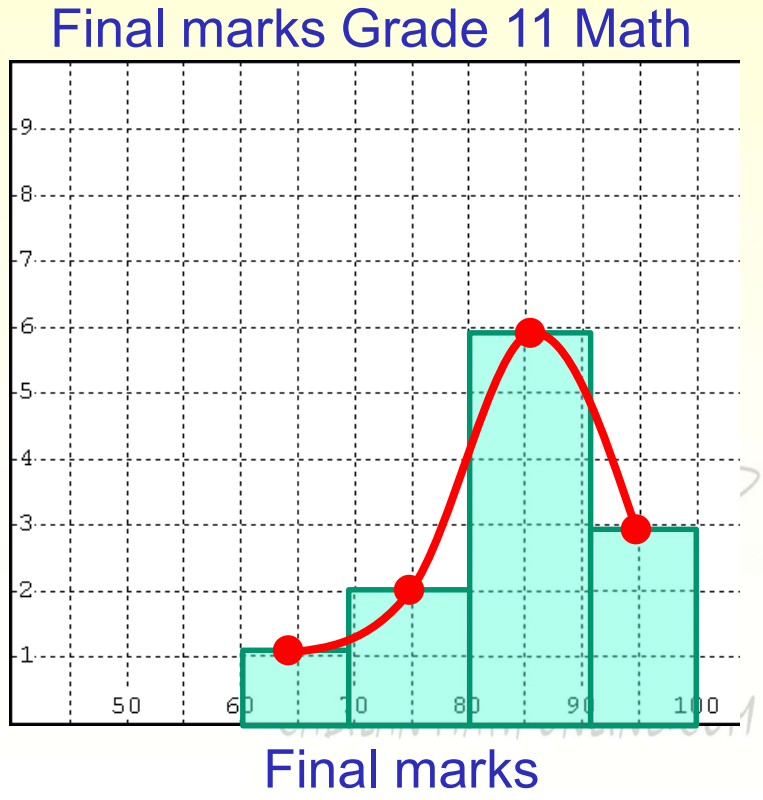
Skewed to the right

→Most pushed to the *right* side

→lopsided/asymmetrical

c) What does the shape of the curve tell you about the students?

Most marks are between **80 and 90**.
Measures of central tendency are not good indicators for this data



CHAPTER 3.6 COMMON DISTRIBUTIONS

EXAMPLE 4 *Identifying Types of Distribution*

In each case, predict the shape of the data distribution. Give a reason for your prediction.

	SHAPE (NORMAL, SKEWED or BIMODAL)	*REASON*
The **heights** of members of the Toronto Raptors basketball team compared to the rest of the population	**Skewed** (to the right) →Lopsided →asymmetrical	Basketball players are relatively **taller** than the average population
The **cost** of 1 L of gas in Hamilton	**Normal distribution** →symmetrical	Gas prices are relative consistent across the city
The **masses** of players on the Canadian Olympic men's and women's hockey teams	**Bi-modal distribution** →Two peaks	Men's masses will be relatively higher than women's masses.

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CHAPTER 3.6 COMMON DISTRIBUTIONS

Homework

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