

Calculus Made Easy - 01

Beautiful Ideas Presented Simply

Silvanus P. Thompson¹ Martin Gardner²

¹Original Author

²Annotator

Aug 2025 / Free Learner's School Conversations

Outline

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

1 Introduction

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on *Silvanus Thompson's Book, Calculus Made Easy*, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great *Martin Gardner's Thoughtful Recommendation* Provided The Biggest Stimulus.
- We Also Go on 'Excursions' Outside The Book.
- Each Chapter Is A Separate Slide-deck To Keep Its Size Manageable.
- It Is Supposed To Be Your "Ready Reckoner".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in *Bringing It All Back?*
- New Words Are Introduced Slowly And Carefully, But "Thought Experiments" Are Often Introduced.
 - Let's Not Be Afraid To Take the Leap of Guided Imagination.

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on **Silvanus Thompson's Book, *Calculus Made Easy***, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great **Martin Gardner's Thoughtful Recommendation** Provided The Biggest Stimulus.
- We Also Go on '**Excursions**' Outside The Book.
- Each Chapter Is A Separate Slide-deck To Keep Its Size Manageable.
- It Is Supposed To Be Your "**Ready Reckoner**".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in **Bringing It All Back**?
- New Words Are Introduced Slowly And Carefully, But "**Thought Experiments**" Are Often Introduced.
 - Let's Not Be Afraid To Take the Leap of Guided Imagination.

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on **Silvanus Thompson's Book, *Calculus Made Easy***, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great **Martin Gardner's Thoughtful Recommendation** Provided The Biggest Stimulus.
- We Also Go on '**Excursions**' Outside The Book.
- Each Chapter Is A Separate Slide-deck To Keep Its Size Manageable.
- It Is Supposed To Be Your "**Ready Reckoner**".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in **Bringing It All Back**?
- New Words Are Introduced Slowly And Carefully, But "**Thought Experiments**" Are Often Introduced.
 - Let's Not Be Afraid To Take the Leap of Guided Imagination.

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on **Silvanus Thompson's Book, *Calculus Made Easy***, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great **Martin Gardner's Thoughtful Recommendation** Provided The Biggest Stimulus.
- We Also Go on 'Excursions' Outside The Book.
- Each Chapter Is A Separate Slide-deck To Keep Its Size Manageable.
- It Is Supposed To Be Your "Ready Reckoner".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in **Bringing It All Back?**
- New Words Are Introduced Slowly And Carefully, But "Thought Experiments" Are Often Introduced.
 - Let's Not Be Afraid To Take the Leap of Guided Imagination.

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on **Silvanus Thompson's Book, *Calculus Made Easy***, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great **Martin Gardner's Thoughtful Recommendation** Provided The Biggest Stimulus.
- We Also Go on '**Excursions**' Outside The Book.
- Each Chapter Is A Separate Slide-deck To Keep Its Size Manageable.
- It Is Supposed To Be Your "**Ready Reckoner**".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in **Bringing It All Back?**
- New Words Are Introduced Slowly And Carefully, But "**Thought Experiments**" Are Often Introduced.
 - Let's Not Be Afraid To Take the Leap of Guided Imagination.

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on **Silvanus Thompson's Book, *Calculus Made Easy***, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great **Martin Gardner's Thoughtful Recommendation** Provided The Biggest Stimulus.
- We Also Go on '**Excursions**' Outside The Book.
- Each Chapter Is A Separate Slide-deck to Keep Its Size Manageable.
- It Is Supposed to Be Your "**Ready Reckoner**".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in **Bringing It All Back**?
- New Words Are Introduced Slowly And Carefully, But "**Thought Experiments**" Are Often Introduced.
 - Let's Not Be Afraid to Take the Leap of Guided Imagination.

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on **Silvanus Thompson's Book, *Calculus Made Easy***, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great **Martin Gardner's Thoughtful Recommendation** Provided The Biggest Stimulus.
- We Also Go on '**Excursions**' Outside The Book.
- Each Chapter Is A Separate Slide-deck to Keep Its Size Manageable.
- It Is Supposed to Be Your "**Ready Reckoner**".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in **Bringing It All Back?**
- New Words Are Introduced Slowly And Carefully, But "**Thought Experiments**" Are Often Introduced.
 - Let's Not Be Afraid to Take the Leap of Guided Imagination.

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on **Silvanus Thompson's Book, *Calculus Made Easy***, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great **Martin Gardner's Thoughtful Recommendation** Provided The Biggest Stimulus.
- We Also Go on '**Excursions**' Outside The Book.
- Each Chapter Is A Separate Slide-deck to Keep Its Size Manageable.
- It Is Supposed to Be Your "**Ready Reckoner**".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in **Bringing It All Back?**
- New Words Are Introduced Slowly And Carefully, But "**Thought Experiments**" Are Often Introduced.
 - Let's Not Be Afraid to Take the Leap of Guided Imagination.

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on **Silvanus Thompson's Book, *Calculus Made Easy***, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great **Martin Gardner's Thoughtful Recommendation** Provided The Biggest Stimulus.
- We Also Go on '**Excursions**' Outside The Book.
- Each Chapter Is A Separate Slide-deck to Keep Its Size Manageable.
- It Is Supposed to Be Your "**Ready Reckoner**".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in **Bringing It All Back**?
- New Words Are Introduced Slowly And Carefully, But "**Thought Experiments**" Are Often Introduced.
 - Let's Not Be Afraid to Take the Leap of Guided Imagination.

About *Calculus Made Easy*

Thompson's Lively Treatise for Beginners

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- These Slides Are Based on **Silvanus Thompson's Book, *Calculus Made Easy***, Which Introduces Calculus Simply.
- After Quite Some Deliberation, [KM] Chose This Book To Introduce Calculus to Rujuta, A High Schooler.
 - Great **Martin Gardner's Thoughtful Recommendation** Provided The Biggest Stimulus.
- We Also Go on '**Excursions**' Outside The Book.
- Each Chapter Is A Separate Slide-deck to Keep Its Size Manageable.
- It Is Supposed to Be Your "**Ready Reckoner**".
 - We're All Forgetful. Wouldn't It Be Nice If This Helps You in College or Beyond in **Bringing It All Back**?
- New Words Are Introduced Slowly And Carefully, But "**Thought Experiments**" Are Often Introduced.
 - Let's **Not Be Afraid to Take the Leap of Guided Imagination**.

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck Isn't So Great to Make It So!
- We Therefore Expect That:
 - You Want to Explore Calculus of Your Own Accord.
 - You Can Follow Logical (Deductive, Inductive) Arguments.
 - You've Heard of Natural, Rational, Irrational, Real, Complex Numbers.
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You Understand The Language of School Algebra, And Can Solve Some 'Equations'. Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of 'Functions', And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck Isn't So Great to Make It So!
- We Therefore Expect That:
 - You Want to Explore Calculus of Your Own Accord.
 - You Can Follow Logical (Deductive, Inductive) Arguments.
 - You've Heard of Natural, Rational, Irrational, Real, Complex Numbers.
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You Understand The Language of School Algebra, And Can Solve Some 'Equations'. Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of 'Functions', And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck Isn't So Great to Make It So!
- We Therefore Expect That:
 - You Want to Explore Calculus of Your Own Accord.
 - You Can Follow Logical (Deductive, Inductive) Arguments.
 - You've Heard of Natural, Rational, Irrational, Real, Complex Numbers.
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You Understand The Language of School Algebra, And Can Solve Some 'Equations'. Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of 'Functions', And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck **Isn't So Great to Make It So!**
- We Therefore Expect That:
 - You Want to Explore Calculus of Your Own Accord.
 - You Can Follow Logical (Deductive, Inductive) Arguments.
 - You've Heard of Natural, Rational, Irrational, Real, Complex Numbers.
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You Understand The Language of School Algebra, And Can Solve Some 'Equations'. Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of 'Functions', And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck **Isn't So Great to Make It So!**
- We Therefore Expect That:
 - You Want to Explore Calculus of Your Own Accord.
 - You Can Follow Logical (Deductive, Inductive) Arguments.
 - You've Heard of Natural, Rational, Irrational, Real, Complex Numbers.
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You Understand The Language of School Algebra, And Can Solve Some 'Equations'. Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of 'Functions', And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck **Isn't So Great to Make It So!**
- We Therefore Expect That:
 - You Want to **Explore Calculus of Your Own Accord.**
 - You Can **Follow Logical** (Deductive, Inductive) Arguments.
 - You've Heard of **Natural, Rational, Irrational, Real, Complex Numbers.**
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You **Understand The Language of School Algebra, And Can Solve Some 'Equations'.** Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of **'Functions'**, And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck **Isn't So Great to Make It So!**
- We Therefore Expect That:
 - You Want to **Explore Calculus of Your Own Accord.**
 - You Can **Follow Logical** (Deductive, Inductive) **Arguments.**
 - You've Heard of **Natural, Rational, Irrational, Real, Complex Numbers.**
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You **Understand The Language of School Algebra, And Can Solve Some 'Equations'.** Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of **'Functions'**, And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck **Isn't So Great to Make It So!**
- We Therefore Expect That:
 - You Want to **Explore Calculus of Your Own Accord.**
 - You Can **Follow Logical** (Deductive, Inductive) **Arguments.**
 - You've Heard of **Natural, Rational, Irrational, Real, Complex Numbers.**
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You Understand The Language of School Algebra, And Can Solve Some 'Equations'. Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of 'Functions', And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck **Isn't So Great to Make It So!**
- We Therefore Expect That:
 - You Want to **Explore Calculus of Your Own Accord.**
 - You Can **Follow Logical** (Deductive, Inductive) **Arguments.**
 - You've Heard of **Natural, Rational, Irrational, Real, Complex Numbers.**
 - You Understand How a Number Such as $\sqrt{2}$ **Differs from** a Number Such as **1.737465, 7, or $2 + 3i$.**
 - You **Understand The Language of School Algebra, And Can Solve Some 'Equations'.** Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of **'Functions'**, And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

Calculus
Made Easy

SPT, MG,
KM

Introduc-
tion

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck Isn't So Great to Make It So!
- We Therefore Expect That:
 - You Want to Explore Calculus of Your Own Accord.
 - You Can Follow Logical (Deductive, Inductive) Arguments.
 - You've Heard of Natural, Rational, Irrational, Real, Complex Numbers.
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You Understand The Language of School Algebra, And Can Solve Some 'Equations'. Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of 'Functions', And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Assumptions

Because A Slide-deck Is Not as Fun as A Fairy Tale!

- We Wish Mathematics Were Fun to Thinking People Who Enjoy Fairy Tales, Rap Music, or Memes.
 - Sadly, It Isn't!
- However, This Slide-deck Isn't So Great to Make It So!
- We Therefore Expect That:
 - You Want to Explore Calculus of Your Own Accord.
 - You Can Follow Logical (Deductive, Inductive) Arguments.
 - You've Heard of Natural, Rational, Irrational, Real, Complex Numbers.
 - You Understand How a Number Such as $\sqrt{2}$ Differs from a Number Such as 1.737465, 7, or $2 + 3i$.
 - You Understand The Language of School Algebra, And Can Solve Some 'Equations'. Learning Calculus before Algebra Isn't Helpful!
 - You Have Heard of 'Functions', And Know Some of Them (e.g. Polynomial, Rational, Logarithmic, Exponential, and Trigonometric).

Most Importantly,
Have Fun!

Most Importantly,
Have Fun!