CLASS 9 · CHAPTER 2 · EXERCISE 2.3

Logarithms Super Easy

Very short lines. Very small steps.

Read slow. Take your time. You can do this.



How to read this book

*Read **one box**.*
Stop.
*Look at the **example**.*
*Say the steps **out loud**.*
Then read the next box.

In this book you will learn

- The **Characteristic** — whole-number part of log
- The **Mantissa** — decimal part of log, from the table
- How to find **log** of a number
- How to find **x** — this is **Antilog**

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1. What is a log?

A log answer has **2 parts**.

The parts have real names: **Characteristic** and **Mantissa**. That is all.

log = Characteristic + Mantissa

Characteristic

It is a **whole number**.
Like 2, or 0, or -2.
It tells you: **How big is the number?**

Mantissa

It is a **small decimal**.
Like 0.5019.
It comes from the **log table book**.
It is **always plus**. Never minus.

log (number) = Characteristic + Mantissa

Say it: "Log is Characteristic plus Mantissa."
Say it 2 times. Now you know it.

One easy example

log 43 = 1 + 0.6335 = 1.6335

1 is the Characteristic. 0.6335 is the Mantissa.

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2. Find the Characteristic — the easy way

The **Characteristic** is also the **power of 10**.

Write the number like this:

$$\text{number} = a \times 10^{n}$$

a is a small number. It is from 1 to 10.
n is the power. **n is the Characteristic.**

See it:

$5287 = 5.287 \times 10^{3}$
Power is **3**. So the Characteristic = **3**.

Trick A — Big number (1 or more)

Count the digits **before** the point. Take away 1.

234.7 — digits before point: 2, 3, 4 = **3 digits**.
3 - 1 = **2**. Characteristic = **2**.

Trick B — Small number (less than 1)

Count the **zeros after** the point. Add 1. Put a **minus**.

0.0567 — zeros after point: **1 zero**.
1 + 1 = 2. Put minus. Characteristic = **-2**.

Remember: Big number = plus Characteristic.
Small number = minus Characteristic.

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Question 1 — Find the Characteristic

Do the **same 2 steps** each time.

1. Write as $a \times 10^n$
2. Read n. That is the answer.

(i) 5287

$5287 = 5.287 \times 10^3$

$n = 3$

Answer: 3

(ii) 59.28

$59.28 = 5.928 \times 10^1$

$n = 1$

Answer: 1

(iii) 0.0567

$0.0567 = 5.67 \times 10^{-2}$

$n = -2$

Answer: -2

(iv) 234.7

$234.7 = 2.347 \times 10^2$

$n = 2$

Answer: 2

(v) 0.000049

$0.000049 = 4.9 \times 10^{-5}$

$n = -5$

Answer: -5

(vi) 145000

$145000 = 1.45 \times 10^5$

$n = 5$

Answer: 5

Check: Is the number big? Answer must be plus.
Is the number small? Answer must be minus.

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Question 2 – Find the log

Do the **same 3 steps** each time.

1 Find Characteristic 2 Get Mantissa from table 3 Add them

(i) 43

Characteristic = 1

Mantissa = 0.6335

1 + 0.6335

log 43 = 1.6335

(ii) 579

Characteristic = 2

Mantissa = 0.7627

2 + 0.7627

log 579 = 2.7627

(iii) 1.982

Characteristic = 0

Mantissa = 0.2971

0 + 0.2971

log 1.982 = 0.2971

(iv) 0.0876

Characteristic = -2

Mantissa = 0.9425

-2 + 0.9425

log 0.0876 = -1.0575

(v) 0.047

Characteristic = -2

Mantissa = 0.6721

-2 + 0.6721

log 0.047 = -1.3279

(vi) 0.000354

Characteristic = -4

Mantissa = 0.5490

-4 + 0.5490

log 0.000354 = -3.4510

Do not worry. The Mantissa is given in the table.
You do not need to learn it by heart.

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Question 3 — Same digits?

Then the Mantissa is the same.

Given: log 3.177 = 0.5019

So for digits **3177**, the Mantissa = **0.5019**. Always.

Look at the digits:

3177 — digits are 3, 1, 7, 7
31.77 — digits are 3, 1, 7, 7
0.03177 — digits are 3, 1, 7, 7

Only the **point** moves. Only the **Characteristic** changes.

(i) log 3177

Characteristic = 3 | Mantissa = 0.5019

Answer: 3 + 0.5019 = 3.5019

(ii) log 31.77

Characteristic = 1 | Mantissa = 0.5019

Answer: 1 + 0.5019 = 1.5019

(iii) log 0.03177

Characteristic = -2 | Mantissa = 0.5019

Answer: -2 + 0.5019 = -1.4981

Say it: "Same digits. Same Mantissa."

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3. What is antilog?

Log goes one way.

Number → log value

Antilog goes back.

log value → Number

> If log x = a value,
> then x = antilog of that value

Question 4 gives you log x. You find x. So you use **antilog**.

The hard part — made easy

Sometimes log x is **minus**. Like -3.434.

The **Mantissa** must **never** be minus. So fix it first.

Fix -3.434 like this:

-3.434 = **-4 + 0.566**

Now the Characteristic = **-4**. Good.
Now the Mantissa = **+0.566**. Good. It is plus.

How to fix: Go 1 step more minus. Then write the rest as plus.

-3 becomes -4. -1 becomes -2. -2 becomes -3.

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Question 4 — Find x

1 Split into Characteristic + Mantissa 2 Antilog of Mantissa 3 Place the point

(i) log x = 0.0065

Characteristic = 0, Mantissa = 0.0065

Antilog 0.0065 = 1.015

x = 1.015

(ii) log x = 1.192

Characteristic = 1, Mantissa = 0.192

Antilog 0.192 gives 15.56

x = 15.56

(iii) log x = -3.434

Fix it: -4 + 0.566

Antilog 0.566 gives 0.0003681

x = 0.0003681

(iv) log x = -1.5726

Fix it: -2 + 0.4274

Antilog 0.4274 gives 0.02675

x = 0.02675

(v) log x = 4.3561

Characteristic = 4, Mantissa = 0.3561

Antilog 0.3561 gives 22704

x = 22704

(vi) log x = -2.0184

Fix it: -3 + 0.9816

Antilog 0.9816 gives 0.009585

x = 0.009585

Quick check: x = antilog (log x).
Example: x = antilog 0.0065 = 1.015. Done.

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Remember — only 5 lines

1. Log = **Characteristic + Mantissa**
2. Characteristic = **power of 10**
3. Mantissa comes from the **table**. It is always **plus**.
4. **Same digits** = same Mantissa.
5. **Antilog** is the **opposite** of log.

Do not make these mistakes

- **Wrong sign?** Small number must give a minus Characteristic.
- **Mantissa is minus?** Fix it first. See page 7.
- **Wrong point in Q4?** Use the Characteristic to place the point.

Try it yourself

Cover the answers. Do **one** question. Check it.
Wrong? Read that one box again. Try again.
One question at a time is **enough**.

Question	Answers — for checking only
Q1 — Characteristic	3, 1, -2, 2, -5, 5
Q2 — Log	1.6335, 2.7627, 0.2971, -1.0575, -1.3279, -3.4510
Q3 — Use 0.5019	3.5019, 1.5019, -1.4981
Q4 — x	1.015, 15.56, 0.0003681, 0.02675, 22704, 0.009585

Well done. You finished Exercise 2.3.

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