PAN AMERICAN
SCHOOL OF BAHIA

GRADE 9 HL MATHEMATICS

UNIT 1: ALGEBRA

COMMON MISTAKES & ERROR ANALYSIS

Mathematicians learn from mistakes.
In this booklet, you will analyze incorrect work, explain the error, and correct the mathematics.

Name: _____

Class: _____

Date: _____

In each task, you will:

- identify the mistake,
- explain why it is incorrect,
- correct the mathematics,
- connect the error to an important rule or idea.

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Section 1
Rounding, Significant Figures & Accuracy

Error Analysis 1

Jordan rounded

$$4.786$$

to 1 decimal place and got

$$4.7$$

What mistake did Jordan make?

Correct the work.

Error Analysis 2

Jordan says

$$0.004560$$

has 7 significant figures.

Explain the mistake.

How many significant figures does the number have?

Section 1 Continued
Rounding, Significant Figures & Accuracy

Error Analysis 3

A mass is measured as

$$12.4 \text{ kg}$$

correct to the nearest tenth. Jordan writes:

$$12.4 \leq m < 12.5$$

Explain the mistake.

Write the correct interval.

Section 2
Scientific Notation

Error Analysis 1

Jordan writes:

$$450000 = 45 \times 10^4$$

Why is this not scientific notation?

Rewrite it correctly.

Error Analysis 2

Jordan writes:

$$0.00038 = 3.8 \times 10^4$$

Explain the mistake.

Correct the answer.

Section 2 Continued
Scientific Notation

Error Analysis 3

Jordan converts

$$7.2 \times 10^{-5}$$

to 72000.

What went wrong?

Correct the conversion.

Error Analysis 4

Jordan writes:

$$2.4 \times 10^{3} = 0.0024$$

Explain why this is incorrect.

Correct the conversion.

Common Errors to Watch For

- The coefficient must satisfy $1 \leq a < 10$.
- Large numbers use positive powers of 10.
- Small numbers use negative powers of 10.
- Moving the decimal in the wrong direction changes the value.

Section 3
Exponent Laws

Error Analysis 1

Jordan simplifies:

$$x^3 \cdot x^4 = x^{12}$$

Explain the mistake.

Correct the solution.

Error Analysis 2

Jordan simplifies:

$$\frac{a^7}{a^3} = a^{10}$$

What exponent law should Jordan have used?

Correct the solution.

Section 3 Continued
Exponent Laws

Error Analysis 3

Jordan simplifies:

$$(x^2)^3 = x^5$$

Explain the mistake.

Correct the solution.

Error Analysis 4

Jordan writes:

$$2^0 = 0$$

Why is this incorrect?

Correct the statement.

Error Analysis 5

Jordan simplifies:

$$\frac{x^2 + y^2}{x^2} = y^2$$

Explain the mistake.

What would be a safer first step?

Section 3 Continued
Fractional Exponents

Error Analysis 6

Jordan writes:

$$81^{\frac{1}{2}} = \frac{81}{2} = 40.5$$

Explain the mistake.

Correct the work.

Error Analysis 7

Jordan simplifies:

$$a^4 \cdot a^{\frac{1}{3}} = a^{\frac{4}{3}}$$

What exponent law should Jordan have used?

Correct the solution.

Error Analysis 8

Jordan simplifies:

$$\left(a^4\right)^{\frac{1}{3}} = a^{4+\frac{1}{3}}$$

Explain the mistake.

Correct the solution.

Section 4
Radicals & Rationalizing Denominators

Error Analysis 1

Jordan simplifies:

$$\sqrt{50} = 25$$

What misconception is shown?

Correct the simplification.

Error Analysis 2

Jordan writes:

$$\sqrt{16+9} = 4+3$$

Explain why this reasoning is incorrect.

Correct the expression.

Section 4 Continued
Radicals & Rationalizing Denominators

Error Analysis 3

Jordan writes:

$$\frac{3}{\sqrt{5}} = \frac{3}{5}$$

Why is this incorrect?

Rationalize the denominator correctly.

Error Analysis 4

Jordan rationalizes

$$\frac{5}{\sqrt{3}}$$

by multiplying by

$$\frac{\sqrt{5}}{\sqrt{5}}.$$

Why is this the wrong choice?

What should Jordan multiply by instead?

Section 4 Review
Radicals & Rationalizing Denominators

Error Analysis 5

Jordan simplifies:

$$\sqrt{72} = 6\sqrt{2}$$

but then writes:

$$6\sqrt{2} = 8.$$

Explain the mistake.

Leave the answer in simplest radical form.

Common Errors to Watch For

- $\sqrt{a+b} \neq \sqrt{a} + \sqrt{b}$ in general.
- To simplify radicals, look for perfect square factors.
- To rationalize $\dfrac{a}{\sqrt{b}}$, multiply by $\dfrac{\sqrt{b}}{\sqrt{b}}$.
- Do not turn irrational numbers into decimals unless the question asks for an approximation.