MATHEMATICS GRADE 8
NUMBER DEVELOPMENTS AND DISCOVERIES
CRITERIA C

THE INTERNATIONAL SCHOOL IN GENOA
SINCE 1966

Respect, Responsibility, Reaching for Excellence

Representing and simplifying quantities in different forms can help explore remarkable discoveries and developments
Orientation in Space and Time
Key Concept: Form

ASSESSMENT TASK:

Your goal is to demonstrate your understanding of how to use and calculate numbers using exponential notation and scientific notation. Your role is to write a news article about a microchip you design. Your audience is the general public. You are a new reporter for a technology magazine and this is your big break! (situation). Your product is a newspaper article. You will be assessed on criteria C.

ASSESSMENT RUBRIC:

Level	Descriptor
0	Your work **does not** reach a standard described by any of the descriptors below.

1-2	You are able to:
	  i. use **limited** mathematical language *in your report*
	  ii. use **limited forms** of mathematical representation to present information *in the individual questions attached*
	  iii. Communicate your reasoning in the report, but reasoning is **difficult to understand**

3-4	You are able to:
	  i. use **some appropriate** mathematical language *in your report*
	  ii. use **appropriate forms** of mathematical representation to present information **adequately** *in the individual questions attached*
	  iii. communicate through lines of reasoning *in your report* that are **able to be understood**, although these lines are **not always coherent**
	  iv. **adequately** organize information using a logical structure throughout this assessment

5-6	You are able to:
	  i. **usually** use **appropriate** mathematical language *in your report*
	  ii. **usually** use **appropriate forms** of mathematical representation to present information **correctly** *in the individual questions attached*
	  iii. communicate through lines of reasoning *in your report* that are **usually coherent**
	  iv. **present** work that is **usually** organized using a logical structure *throughout this assessment*

7-8	You are able to:
	  i. **consistently** use **appropriate** mathematical language *in your report*
	  ii. **consistently** use **appropriate forms** of mathematical representation to present information **correctly** *in the individual questions*
	  iii. communicate **clearly** through **coherent** lines of reasoning *in your report*
	  iv. present work that is **consistently** organized using a logical structure *throughout this assessment*

COMMAND TERMS:

Use - Apply knowledge or rules to put theory into practice.
Organise - Put ideas and information into a proper or systematic order.

Part One - Individual Assessment
Microchip technology

How is it possible to surf the internet? How can a smartphone control so many devices? At the core of all of these is a single device called a transistor. The transistor was invented in 1945 in Bell Labs and the inventors had little idea how much it would revolutionize our way of life. In this task, you will analyze the growth of transistor technology and the development of the microprocessor chip.

You will present your work for each part in a single report. Show your working in each section.
Perform all your calculations and write all your answers using scientific notation.

Part 1

In what has been named Moore's law, Moore predicted that the number of transistors that would be on a chip would double every two years.

A. If the very first chip had four transistors, calculate the number of transistors on a chip every two years over the next 10 years. Copy and complete this table, writing your answers as powers of 2.

Year	Number of transistors on chip
0	4
2	$4 \times 2 = 2^?$
4	
6	
8	
10	

B. Between the years of 1965 and 1985 the number of transistors on a chip increased. In the year 1985 there were 4096 transistors on a chip. Write this number in exponential notation.

C. By the year 2015, there were 33, 554, 432 transistors on a chip. Write this number in scientific notation.

D. During a speech in 2014, one of Intel's vice presidents said that, by 2026, the company would make a processor with as many transistors as there are neurons in a human brain. It is predicted that this processor would have 2147483648 transistors. There are 1.0×10^{11} neurons in the human brain. Find by how much the vice president was incorrect and write your final answer in scientific notation.

E. Smartphones have chips in them that can contain 3.3 billion transistors. If each transistor weighs 5.1×10^{-23} grams, find the total mass of the transistors in a smartphone.

F. If each chip has a length of 3.5×10^{-8} nm, how many would you need to circle the Earth, which has a radius of 6371 km?

Grade 8 Assessment Unit 1 Part Two Group Work

Microchip technology

Part 2 – Design your own

What if you could design your own processor? How small would you make it? How many transistors could you put on it? The size of transistors has decreased dramatically since they were first invented. Assume you will use transistors that are approximately rectangular and measure 35 nm by 14 nm.

A. Select a chip size that sounds impressive (e.g. a fingernail). Find its area. (You may choose to research the area or calculate it after taking measurements.)

B. Find the number of transistors that you will be able to fit on your chosen area.

C. If transistors cost $0.000000003 USD each, find the cost of the transistors on your chip.

D. Create a headline to announce your technology to the world.

E. Write a newspaper article about your invention and create a cool name for your chip. Your article must include the following:

- *Headline* – usually only a few words. Its purpose is to attract the interest of the reader by giving a hint about what the article is about. It should be short.

- *By-line* – the authors of the article.

- *Introduction* – sets the scene and summarizes the main points of the article: who, what, when, where

- *Body* – provides more detail about the event, in particular it answers the questions how and why

- *Quotes* – what a person (such as an eye-witness or an expert) has said about the invention. These will be in speech marks.

- *Photograph and caption* – include a drawing or photograph of your invention as well as a caption that describes what is in the photo.

- *Answers to these questions* – What does it take to make the next great discovery? Are great discoveries planned or accidental?