



NAME:

SEMINAR DAY & TIME:

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Launchpad Mathematics

Arithmetic I








General Instructions

- Reading time – 5 minutes
- Working time – 60 minutes.
- Write using black or blue pen
- Draw diagrams in pencil
- All necessary working should be shown in every question

NUMBER SYSTEMS

Question 1

Use the following Egyptian glyphs,

| | | | | | | |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |
| 1,000,000 | 100,000 | 10,000 | 1000 | 100 | 10 | 1 |

to answer the following.



- (a) Express **one million, two hundred and thirty-one thousand, four hundred and thirteen** as an Egyptian hieroglyphic number. Order your hieroglyphs from highest to lowest value.

- (b) Subtract

$$\text{e n n n n n n n n n} \quad (175)$$

from

$$\text{e e n n n n n n n n n} \quad (256)$$

(The aim is to 'kill off' every glyph representing 175). You will need to convert one of your glyphs into 10 of the lower form (e.g. convert  into ten of .

Simplify your answer by minimising the number of glyphs needed to represent the result.





















PLACE-VALUE

Question 2

(a) Express the number 56 027 in expanded form.

(b) What is the value of the digit 7 in 263 732?

(c) The Mayans made use of a 'base 20' number system, meaning that they had 20 special glyphs for the numbers zero to 19:

| | | | | |
|---|---|---|---|--|
|  |  |  |  |  |
| 0 | 1 | 2 | 3 | 4 |
|  |  |  |  |  |
| 5 | 6 | 7 | 8 | 9 |
|  |  |  |  |  |
| 10 | 11 | 12 | 13 | 14 |
|  |  |  |  |  |
| 15 | 16 | 17 | 18 | 19 |

Note that the Mayan's used **dots to mark units** and **bars to mark counts of five**. They also made use of place value, but whereas the Hindu-Arabic system assigns to columns from right-to-left, increasing powers of ten,

... | 10 x 10 x 10 x 1 | 10 x 10 x 1 | 10 x 1 | 1 | ...

... | thousands | hundreds | tens | units | ...

the Mayans assigned to **rows** from ground-up, increasing powers of **20**:

:

20 x 20 x 20 x 1

20 x 20 x 1

20 x 1

1

:

For example, the Mayan number,



has the value



$$\begin{aligned}
 &6 \times 20 \times 20 \times 20 \\
 &+ \\
 &3 \times 20 \times 20 \\
 &+ \\
 &18 \times 20 \\
 &+ \\
 &10
 \end{aligned}$$

that is,



$$= 49\,570.$$

- (i) Find the Hindu-Arabic representation for the Mayan number,



- (ii) Find the Mayan representation for 172 (hint: it will consist of two glyphs, since a third glyph implies the number to be at least $1 \times 20 \times 20 = 400$ in value, which it's not).

ROMAN NUMBERS

Question 3

Write the following Hindu-Arabic numbers in Roman numeric form.

(a) 562

(b) 2484

(c) 97 345

7. Write the following Roman numbers in Hindu-Arabic form.

(a) MLXXXIV

(b) $\overline{\text{DCXCI}}$

(c) $\overline{\overline{\text{MCDXXX}}}$ MMXLVII

LONG DIVISION

Question 4

Evaluate the following using long division, expression your answer as a quotient and remainder.

(a) $2543 \div 4$

(b) $9715 \div 13$

ORDER OF OPERATIONS**Question 6**

Evaluate the following.

$$(a) \sqrt[3]{15 + \sqrt{10^2 + 4 \times 11}}$$

$$(b) \frac{7 \times 4 - 2^3}{\sqrt{100 \div 4 - 9}}$$

$$(c) \left(2 + \frac{\sqrt{4 \times 2 + 5}}{3}\right)^2$$