

Math 3131 Prof. Pennance – Exercises

- (a) Find the first twenty terms in the sequence of multiples of ||||||| in Ancient Egyptian.
(b) Explain how multiples of 9 can be counted easily using ones fingers.
(c) Draw a 5×5 multiplication table in Ancient Egyptian.
(d) Draw a 5×5 multiplication table in Roman.

- Let T be the set of all numbers in the 10×10 multiplication table. i.e.

$$T = \{n \times m : 1 \leq n \leq 10 \text{ and } 1 \leq m \leq 10\}$$

Prove or disprove each of the following without looking at the table.

- (a) $101 \in T$
(b) $37 \in T$
(c) $44 \in T$
(d) $42 \in T$
(e) $63 \in T$
(f) $\{6n \in \mathbb{N} : 1 \leq n \leq 9\} \subseteq T$
(g) $\{6n \in \mathbb{N} : 1 \leq n \leq 20\} \subseteq T$
(h) $\{2n \in \mathbb{N} : 1 \leq n \leq 20\} \subseteq T$
(i) $T = \{n \times m \in \mathbb{N} : 1 \leq n \leq 5 \text{ and } 6 \leq m \leq 10\}$
- (a) How many times do 30 and 16 occur in the 10×10 multiplication table?
(b) In general, when does a number appear an even number of times in the 10×10 multiplication table? Explain.
(c) Which numbers occur exactly three times?, exactly four times? in the 10×10 multiplication table?
- Explain in words where in the 10×10 multiplication table the terms of the following sequences are located:
 - $f(n) = n^2$, where $n \leq 10$.
 - $f(n) = n$, where $n \leq 10$.
 - $f(n) = (n - 1)n$, where $n \leq 10$.
 - $f(n) = (n - 2)n$, where $n \leq 10$.
 - $f(n) = 6n$, where $n \leq 10$.
- Let T be the 10×10 multiplication table. Consider the set

$$A = \{n \times m \in T : n - m = 4\}$$

- (a) Find the elements of the set A .
 - (b) Explain in words where in the 10×10 multiplication table T , the set A can be found.
 - (c) Write a formula for a sequence whose terms are elements of A in increasing order.
6. Write a formula for the sequence of numbers which forms the north east pointing diagonal of the 10×10 multiplication table.
7. Which of the following strategies might be best to teach a four bar piece of music? Discuss the advantages and disadvantages of each one.
- (a) 1, 2, 3, 4, 1234
 - (b) 1, 12, 3, 123, 4, 1234
 - (c) 1, 2, 12, 3, 123, 4, 1234
 - (d) 1, 2, 12, 3, 23, 4, 34, 1234
8. What kind of teaching strategy is typically employed to teach the successor function to pre-kindergarten students?
9. (a) Give an example of a *concept* which could be taught in the kindergarten and explain briefly a teaching strategy.
- (b) Give an example of a *verbal association* which could be taught in the kindergarten and explain briefly a teaching strategy.
- (c) Give an example of a *relation* which could be taught in the kindergarten and explain briefly a teaching strategy.