NEW ELEMENTARY MATHEMATICS TEACHER'S MANUAL 1
SYLLABUS D (NEW EDITION)
Scheme of Work

Legend

Asse	Assessment	Misc Ex	Miscellaneous Exercise
C	Challenger	PS	Problem Solving
CA	Class Activity	Rev Ex	Revision Exercise
Ex	Exercise	I	Investigation

Week	Topic		Specific Instructional Objectives	Activities	Exercises
Semester 1					
1-3	**Chapter 1** Whole Numbers *p* 1-31	1.1	• Understand place value.	CA 1, *p* 3	Ex 1.1, *p* 3
		1.2	• Use the four operations for calculations with whole numbers.	CA 2, *p* 5	Ex 1.2, *p* 6
			• Apply order of operation when doing combined operations. • Use calculators.		
		1.3	• Find the highest common factor and lowest common multiple of two to four given numbers.	CA 3, *p* 9	Ex 1.3, *p* 10
		1.4	• Recognize prime numbers.	CA 4, *p* 11	Ex 1.4, *p* 13
			• Use prime factorization.		
		1.5	• Find the highest common factor using prime factorization. (U.S: greatest common factor, or GCF)		Ex 1.5, *p* 15
		1.6	• Find the least common multiple using prime factorization.		Ex 1.6, *p* 17
		1.7	• Continue a given number sequence.	CA 5, *p* 19	Ex 1.7, *p* 20
		1.8	• Represent the general term of a sequence by algebraic expressions.	CA 6, *p* 23	Ex 1.8, *p* 24 Omit #5(h)
		1.9	• Understand the commutative, associative, and distributive laws.	CA 7, *p* 26	Ex 1.9, *p* 27
		Challenger 1 (optional)			C 1, *p* 29
		Problem Solving 1			PS 1, *p* 30
4-5	**Chapter 2** Fractions, Decimals and Approximation *p* 32-69	2.1	• Express a fraction in its simplest form. • Convert improper fractions to mixed numbers and vice versa. • Relate fractions to division.		Ex 2.1, *p* 37
		2.2	• Add and subtract fractions.		Ex 2.2, *p* 41 Omit 6(c), 6(e)
		2.3	• Multiply and divide fractions.		Ex 2.3, *p* 44 Omit #6(f)

Answers and Notes to Challengers

Challenger 1 *(p 29)*

1. (a) 88 (b) 888
   (c) 8 888 (d) 88 888
   (e) 888 888 (f) 8 888 888
   (g) 88 888 888 (h) 888 888 888
   (i) 8 888 888 888 (j) 88 888 888 888

Note: $9\,876\,543\,210 \times 9 - 10 + 8$
$= (987\,654\,321 \times 9 - 1)\,10 + 8$
$= 8\,888\,888\,888 \times 10 + 8$
$= 88\,888\,888\,880 + 8$
$= 88\,888\,888\,888$

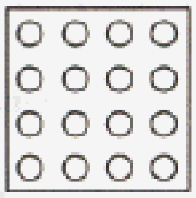
Teachers may wish to use this problem as a 'Quicky' and get the pupils to do the problems as quickly as possible. Conditions may be imposed at teacher's discretions.

For Example:
- Do parts **(a)** to **(d)** without using calculator.
- Calculators may be used for the remaining parts of the problem.

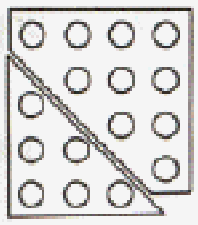
Teachers may wish to walk round and take note of those pupils who write down the answers straightaway using a discovered pattern. Some pupils may simply write down the answer for part **(j)**, but when they are asked to check their answer with the calculator, they will soon realise that the calculator can no longer give the exact value for such a 'huge' answer.

Conduct a brief discussion inviting suggestions to solve this 'real problem' (i.e. overcome this difficulty)

2. Yes



A square number



Consecutive
triangle numbers

The pattern applies to any square number.

3. 10 000

4. 98

5. 480

Watch out for those pupils who simply use the calculator to evaluate the expression
$24 \times 8888 - 24 \times 868$.

Do not allow the pupils to use the calculator. They are expected to solve this problem mentally using the concept of place-value. So, the mental process should be $24 \times 20 = 480$.

6. $4\,398\,756 - 4\,300\,000 + 400\,000$;
$498\,756 - 400\,000$;
$(98\,756 - 56 + 60) \div 10$;
$(9876 - 6) \div 10$;
$(987 - 7) \div 10$;
$(98 - 8) \div 10$

When the pupils are asked to delete the digit 3 from 4 398 756 by 'creative keying' of the calculator, it is pointless if a pupil uses another calculator to first work out the expression 4 398 756 – 498 756 and then subtract the result from 4 398 756 on the original calculator.

The interesting part of this problem is that while a pupil is holding and using a calculator, he is expected to do some mental work demonstrating his mastery of the place-value concept and its application.

Note: Skillful manipulating of the various memory keys including the 'memory-shifting' key $X \leftrightarrow M$ instead of using another calculator should also be rejected as this skill does not serve the purpose of this problem either.

Challenger 2 *(p 67)*

1. **(a)** $\frac{1}{4}(4.5 + 2.5 + 3) = \frac{10}{4} = 2.5$

   (b) Notice that $0.25 = \frac{1}{4}$ and $0.5 \times \frac{1}{2} = \frac{1}{4}$

   Hence, **(b)** can be converted to **(a)**, i.e. answer is 2.5.

   (c) Notice that $4.5 \div 4 = 4.5 \times \frac{1}{4}$, $2\frac{1}{2} = 2.5$,
   $1\frac{1}{2} \times \frac{1}{2} = 3 \times \frac{1}{4}$.

   Hence, **(c)** can be converted to **(a)**, i.e. answer is 2.5.

   (d) $3.85\,(47.3 + 52.7) = 3.85\,(100) = 385$

   (e) $0.32 \times 0.25 = \frac{0.32}{4} = 0.08$

   $8 \times 125 = 1000$
   $\therefore 0.08 \times 1.25 = 0.1$

   (f) $\frac{38.7 \times 17}{51} = \frac{38.7}{3} = 12.9$

Answers to Investigation

Investigation 1 *(p 133)*

1. **(a)** 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, …
(b) 46 368
Assumptions: **(i)** All baby rabbits will become grown-up rabbits after one month.
(ii) Each pair of grown-up rabbits will produce a pair of rabbits (a male and a female) every month.
(iii) None of these rabbits die during this period of 24 months.

2. **(a)** **(i)** $5\frac{1}{3} \div 3\frac{1}{3} = \frac{16}{3} \div \frac{16}{5} = \frac{5}{3} = 5 \div 3$

(ii) $7\frac{3}{5} \div 5\frac{3}{7} = \frac{38}{5} \div \frac{38}{7} = \frac{7}{5} = 7 \div 5$

(iii) $12\frac{7}{8} \div 8\frac{7}{12} = \frac{103}{8} \div \frac{103}{2} = \frac{12}{8} = 12 \div 8$

(b) The rule is:

$$\left(a + \frac{c}{b}\right) \div \left(b + \frac{c}{a}\right) = a \div b$$

Note: Inductive reasoning is used to look for patterns. Deductive proof of the rule is not required at this stage.

3. $50 = 43 + 7, 48 = 41 + 7, 46 = 41 + 5, \ldots$
It certainly looks as if this can be done. As a matter of fact, this is an example of a conjecture, i.e. a 'theorem' which is difficult to prove or disprove.

4. **(a)** 2, 3, 4, 6, 8, 9, 12, 18, 72
(b) Sometimes it works.
For example:

$$\begin{array}{r|rrr} 12 & 72 & 168 & 36 \\ \hline 3 & 6 & 14 & 3 \\ \hline 2 & 2 & 14 & 1 \\ \hline & 1 & 7 & 1 \end{array}$$

$12 \times 3 \times 2 \times 7 = 504$
Same answer as Ali's.

$$\begin{array}{r|rrr} 4 & 72 & 168 & 36 \\ \hline 6 & 18 & 42 & 9 \\ \hline 3 & 3 & 7 & 9 \\ \hline & 1 & 7 & 3 \end{array}$$

$4 \times 6 \times 3 \times 7 \times 3 = 1512$
Different answer from Ali's.

Note: Study

$$\begin{array}{r|rrr} 4 & 72 & 168 & 36 \\ \hline 6 & 18 & 42 & 9 \end{array}$$

Both factors 4 and 6 are composite numbers. Exacting 4 is equivalent to exacting 2 and 2 successively because 4 is a common factor of 72, 168 and 36. But exacting 6 is **not** equivalent to exacting 3 and 2 successively because 6 is **not** a factor of 9 and because 6 contains 3 which is also a factor of 9.

Consider a different case:

$$\begin{array}{r|rrr} 4 & 72 & 168 & 28 \\ \hline 6 & 18 & 42 & 7 \\ \hline 7 & 3 & 7 & 7 \\ \hline & 3 & 1 & 1 \end{array}$$

In this case, exacting 6 is equivalent to exactly 3 and 2 successively because 6 and 7 have no common factors (except 1).

5. **(a)** 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97, 101.
(b) … 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173, 179, 181, 191, 197, 199.
On the 100 chart, do step 1, step 2 and step 3 as before.
Step 4 — Starting with 13, cross out the numbers in the table in step of 9 (i.e. crossing out 13, 22, 31, …).
Step 5 — Starting with 16, cross out the numbers in the table in step of 11 (i.e. crossing out, 16, 27, 38, …).
Final step — same as before
(c) Yes

Investigation 2 *(p 208)*

1. **(a)** $\frac{1}{7} = 0.\dot{1}42\ 85\dot{7}$ $\quad \frac{4}{7} = 0.\dot{5}71\ 42\dot{8}$

$\frac{2}{7} = 0.\dot{2}85\ 71\dot{4}$ $\quad \frac{5}{7} = 0.\dot{7}14\ 28\dot{5}$

$\frac{3}{7} = 0.\dot{4}28\ 57\dot{1}$ $\quad \frac{6}{7} = 0.\dot{8}57\ 14\dot{2}$

The recurring pattern for each of these fractions is make up of the same 6 numbers.
1, 2, 4, 5, 7, 8.
A cyclic pattern is observed for the 6 recurring patterns.