APPENDIX A   -   COGNITIVE ACHIEVEMENT TESTS

- Framework for the cognitive achievement tests

- Content analysis of the cognitive achievement tests

- Copy of the cognitive achievement tests

- Frequencies for each item scored by learners on the pre- and post-tests

Cognitive achievement test framework

Categories: Number and Algebra

Focus of cognitive domains: Knowing and Using concepts

Ratio of closed to open ended   ≈   2:1

Ratio of number to algebra   ≈   2:1

Length of instrument: 40 minutes

Number of items: 30

Total score: 30

Breakdown of content

Number

- Calculations using four basic operations
    - addition
    - subtraction
    - multiplication
    - division
    - terminology that indicates calculations
- Place value
    - numbers to words
    - words to numbers
    - rounding off to nearest tens, hundreds and thousands
    - understanding
- Number patterns
    - complete
    - identify
    - generalise
- Fractions
    - terminology and notation
    - four operations
    - ordering
    - conversion to decimals
    - simplification

- Decimals
    - rounding off to nearest whole number and one, two and three decimal places
    - ordering
    - four operations
- Contextual problems

- involving arithmetic
- reasoning, interpreting and decision making
- Integers
  - understanding of place value
  - four operations
  - application

Algebra

- Terminology and notation
  - variable
  - more than, less than, a certain number
  - increase, decrease, is greater than, is smaller than etc
  - exponential notation
- Generating mathematical expressions from language sentences
  - translations from sentences to mathematical expressions
- Calculations involving algebraic expressions with whole numbers
  - addition
  - subtraction
  - multiplication
  - division
- Calculations involving algebraic expressions with integers
  - addition
  - subtraction
  - multiplication
  - division
- Simplifying algebraic expressions
  - distributive law
  - collecting like terms
- Solving simple equations by trial and error

Cognitive domains

A.	Knowing facts and procedures:	$\approx 50\%$
B.	Using concepts:	$\approx 30\%$
C.	Solving routine problems:	$\approx 15\%$
D.	Reasoning:	$\approx 5\%$

Content analysis of cognitive achievement tests

Item	Multiple choice (MC) Short Answer (SA) Explanation (E)	Score	Language/ Non language	Understanding Notation	Cognitive domain	Category Number-n Algebra-a	Topic	Specific
1	MC	1	NL	N	B	n	Place value	Words to number
2	MC	1	NL	N	B	n	Place value	Number to words
3	MC	1	NL	N	B	n	Place value	Decimal - words to number
4	MC	1	L	-	A	n	Rounding off	To nearest hundred
5	MC	1	NL	-	A	n	Operations	Subtraction
6	MC	1	NL	-	B	n	Fractions	Ordering
7	MC	1	NL	-	C	n	Rounding off	Complex procedure
8	MC	1	NL	N	A	n	Fractions	Terminology/Notation
9	MC	1	NL	N	A	n	Fractions	Terminology/Notation
10	MC	1	NL	N	B	n	Place value	Decimal - words to number
11	MC	1	NL	N	A	n	Place value	Decimal - number to words
12	MC	1	NL	N	B	n	Fractions	Conversion to decimals
13	SA	1	NL	-	A	n	Fractions	Division
14	SA	1	NL	N	B	n	Fractions	Notation
15	MC	1	NL	N	A	a	Algebra notation	Notation
16	MC	1	NL	N	A	a	Algebra notation	Notation
17	SA	2	L	-	C	n	Contextual problem	Integers
18	SA	2	NL	N	A	a	Simplification	Two like terms
19	SA	2	NL	N	A	a	Simplification	Three like terms
20	MC	1	L	-	A	n	Operations	Division-complex procedure
21	MC	1	NL	-	A	n	Integers	Subtraction of integers
22	SA	2	NL	N	A	a	Simplification	Two like terms
23	SA	2	NL	N	B	n	Fractions	Order and place value
24	MC	1	NL	-	D	n	Patterns	Square numbers
25	SA	2	NL	N	A	a	Simplification	Like terms - Integers
26	MC	1	NL	-	B	n	Integers	Order
27	E	3	L	-	A	n	Rounding off	Contextual problem - estimation
28	SA	2	NL	N	A	a	Simplification	Multiplying factors
29	SA	2	L	N	D	n	Contextual problem	Addition of decimals
30	MC	1	NL	N	C	a	Equations	Trial and error
	19 MC 10 SA 1 E	40	5 L 25 NL		23 A (58%) 10 B (25%) 6 C (15%) 1 D (2%)	22 n 8 a		

Cognitive achievement test

[1]Learner's name and surname: _____

Class: _____

Mathematics concept test

General instructions

This test is designed to help your instructor and your teacher to evaluate your needs regarding your mathematics work. The test will not affect your marks in this class in any way. However, it is very important that you take it seriously and do your best.

NO CALCULATORS MAY BE USED.

There are a series of questions in Mathematics that you are required to answer.
You have 40 minutes to answer these questions.

Some are multiple choice questions and for these you are requested to circle ONE correct answer. If you decide to change an answer to a question, put an "X" over your first choice and then put a circle over the correct answer.

For other questions you will be asked to write short answers in the space provided below the question. For these questions, you may use words, drawings and numbers in your answers.

You may use the extra space on the page to do your work. Please show all your working out on the test. When an answer line is provided, place your final answer on the line.

1.   Which one of the following numbers represents:

Five hundred thousand, four hundred and ninety two

    A.   50 040 092
    B.   5 492
    C.   5 004 092
    D.   500 492

_____

2.   Which of the following words represents:

1 086 003

    A.   One hundred and eighty six thousand, and three
    B.   One million eight hundred and sixty thousand and three
    C.   One million, eighty six thousand and three
    D.   One hundred thousand, eight hundred and sixty three

_____

3.   Which number is two hundred and six and nine-tenths?

    A.   206,09
    B.   206,9
    C.   206,910
    D.   2006,9

_____

4.   A company produced 17 175 cars in 1998. For a report, this number was rounded off to the nearest hundred. Which was the number of cars given in the report?

    A.   17 000
    B.   17 100
    C.   17 200
    D.   17 270

_____

5.   Subtract:

           7 004
        − 4 078

    A.   3 034
    B.   2 926
    C.   3 006
    D.   3 926

_____

6.   Which one of these fractions is the smallest?

A. $\dfrac{1}{6}$

B. $\dfrac{2}{3}$

C. $\dfrac{1}{3}$

D. $\dfrac{1}{2}$

_____

7.   The sum of 497 + 304 is closest to the sum of:

A.   400 + 300

B.   500 + 300

C.   400 + 400

D.   500 + 400

_____

8.   In the fraction $\dfrac{3}{4}$, what number represents the number of parts the whole is divided into?

A.   1

B.   3

C.   4

D.   7

_____

9.   In the fraction $\dfrac{7}{8}$, what is the numerator?

A.   7

B.   8

C.   15

D.   1

_____

10.   How do you write thirty-two hundredths?

A.   320

B.   3,2

C.   0,32

D.   0,032

_____

11.   What is 0,01?

A.   One

B.   One tenth

C.   One hundredth

D.   One thousandth

12.   Write $\dfrac{3}{5}$ as a decimal:

   A.   0,3
   B.   0,8
   C.   0,5
   D.   0,6

13. $\dfrac{8}{35} \div \dfrac{4}{5} =$

   Answer: _____

14.   Shade in $\dfrac{3}{8}$ of the unit squares in the grid.
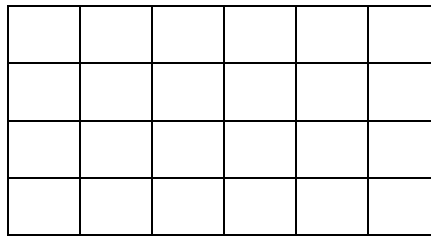
15.   Which of these expressions is equivalent to n x n x n for all values of n.

   A. $\dfrac{n}{3}$
   B. $n + 3$
   C. $3n$
   D. n^3

16.   For all numbers k,

   $k + k + k + k + k$ can be written as:

   A. $k + 5$
   B. $5k$
   C. k^5
   D. $5(k + 1)$

17.   If you owe your mother R30 and you then pay her back R10 of that, how much do you still owe her?

   Answer: _____

18.   Simplify the following expression:

        $2x + 3x$

        Answer: _____

_____

19.   Simplify the following expression:

        $x + 4x - 2x$

        Answer: _____

_____

20.   What is the remainder if 87 is divided by 7?

        A.   12
        B.   7
        C.   0
        D.   3

_____

21.   Calculate:

        $-6 - 8 =$

        A.   14
        B. -14
        C.   2
        D. -2

_____

22.   Simplify:

        $3x^3 + 6x^3 =$

        Answer: _____

_____

23.   Write down any fraction smaller than a half.

        Answer: _____

_____

24.   Which sequence below continues the following pattern correctly:

1 ; 4 ; 9 ; 16 ; …………………………..

A.   20 ; 24 ; 28
B.   25 ; 30 ; 35
C.   25 ; 36 ; 49
D.   19 ; 26 ; 34

_____

25.   Simplify the following expression:

$-3x + 5x$

Answer: _____

_____

26. $- 8$ is greater than:

A. $- 10$
B. $- 4$
C. $- 7$
D.   8

_____

27.   Tebogo wants to record 5 songs on tape. The length of time each song plays for is shown in the table:

Song	Amount of Time
1	2 minutes 41 seconds
2	3 minutes 10 seconds
3	2 minutes 51 seconds
4	3 minutes
5	3 minutes 32 seconds

ESTIMATE to the nearest minute the total time taken for all five songs to play and explain how this estimate was made.

Estimate: _____

Explain:

_____

28.   Multiply:

$3y \ x \ 5y =$

Answer: _____

_____

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29.   A chemist mixes 3,75 millilitres of solution A with 5,265 millilitres of solution B to form a new solution. How many millilitres does this new solution contain?

Answer: _____

---

30.   In order to make the following equation true,

$3x + 2 = 14$

the value of the x must be:

A.   14
B.   0
C.   – 4
D.   4

---

31.   A recipe for making a cake requires that you put $2\dfrac{1}{4}$ cups of flour in to make 1 cake. How many cups of flour will you need to add if you want to bake 6 cakes? Please show all your working out in the space provided below.

Frequency of learners who answered items correctly

(n = 11)

Item number	Pre-test	Post-test
1	7	9
2	8	9
3	6	5
4	5	10
5	5	6
6	6	6
7	9	11
8	5	7
9	7	11
10	4	5
11	5	6
12	3	4
13	5	9
14	2	7
15	6	7
16	4	8
17	11	11
18	7	8
19	2	8
20	7	8
21	5	6
22	4	1
23	9	8
24	5	7
25	2	4
26	3	6
27	5	5
28	1	3
29	6	9
30	8	8

APPENDIX B   -   DOCUMENTS FROM THE SITE

- Outline of times and dates of lessons

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- Standardised assessment

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- Final examination

APPENDIX B   -   DOCUMENTS FROM THE SITE

Outline of times and dates of lessons

8X

Day 3 : lesson 2 (08:35 – 9:15)

Day 6 : lesson 4 (09:55 – 10:35)

Day 10: lesson 3 (09:15 – 09:55)

8Y

Day 1 : lesson 7 (12:30 – 13:10)

Day 5 : lesson 5 (11:00 – 11:40)

Day 9 : lesson 2 (08:35 – 09:15)

Term 2
APRIL

Date	Day	PHSG day	Lesson	Time	Class
16 April	Wednesday	5	5	11:00	8Y
17 April	Thursday	6	4	09:55	8X
24 April	Thursday	9	2	08:35	8Y
25 April	Friday	10	3	09:15	8X
29 April	Tuesday	1	7	12:30	8Y

MAY

Date	Day	PHSG day	Lesson	Time	Class
2 May	Friday	3	2	08:35	8X
6 May	Tuesday	5	5	11:00	8Y
7 May	Wednesday	6	4	09:55	8X
12 May	Monday	9	2	08:35	8Y
13 May	Tuesday	10	3	09:15	8X
14 May	Wednesday	1	7	12:30	8Y
16 May	Friday	3	2	08:35	8X
20 May	Tuesday	5	5	11:00	8Y
21 May	Wednesday	6	4	09:55	8X
26 May	Monday	9	2	08:35	8Y
27 May	Tuesday	10	3	09:15	8X
28 May	Wednesday	1	7	12:30	8Y

Term 3
JULY

Date	Day	PHSG day	Lesson	Time	Class
21 July	Monday	10	3	09:15	8X
23 July	Wednesday	1	7	12:30	8Y
25 July	Friday	3	3	08:35	8X
29 July	Tuesday	5	5	11:00	8Y
30 July	Wednesday	6	4	09:55	8X

AUGUST

Date	Day	PHSG day	Lesson	Time	Class
4 August	Monday	9	2	08:35	8Y
5 August	Tuesday	10	3	09:15	8X
6 August	Wednesday	1	7	12:30	8Y
8 August	Friday	3	2	08:35	8X

12 August	Tuesday	5	5	11:00	8Y
13 August	Wednesday	6	4	09:55	8X
18 August	Monday	9	2	08:35	8Y
19 August	Tuesday	10	3	09:15	8X
20 August	Wednesday	1	7	12:30	8Y
22 August	Friday	3	2	08:35	8X
26 August	Tuesday	5	5	11:00	8Y
27 August	Wednesday	6	4	09:55	8X

SEPTEMBER

Date	Day	PHSG day	Lesson	Time	Class
1 Sept	Monday	9	2	08:35	8Y
2 Sept	Tuesday	10	3	09:15	8X
3 Sept	Wednesday	1	7	12:30	8Y
5 Sept	Friday	3	2	08:35	8X
9 Sept	Tuesday	5	5	11:00	8Y
10 Sept	Wednesday	6	4	09:55	8X
15 Sept	Monday	9	2	08:35	8Y

Term 4
OCTOBER

Date	Day	Day	Lesson	Time	Class
1 October	Wednesday	6	4	09:55	8X
6 October	Monday	9	2	08:35	8Y
7 October	Tuesday	10	3	09:15	8X
8 October	Wednesday	1	7	12:30	8Y
9 October	Friday	3	2	09:15	8X
14 October	Tuesday	5	5	11:00	8Y
15 October	Wednesday	6	4	09:55	8X
20 October	Monday	9	2	08:35	8Y
21 October	Tuesday	10	3	09:15	8X
22 October	Wednesday	1	7	12:30	8Y
24 October	Friday	3	2	09:15	8X
28 October	Tuesday	5	5	11:00	8Y
29 October	Wednesday	6	4	09:55	8X

NOVEMBER

Date	Day	PHSG day	Lesson	Time	Class
3 November	Monday	9	2	08:35	8Y
4 November	Tuesday	10	3	09:15	8X
5 November	Wednesday	1	7	12:30	8Y
7 November	Friday	3	2	09:15	8X
11 November	Tuesday	5	5	11:00	8Y

Standardised test

MATHEMATICS TEST
GRADE 8 - CHAPTER 10

TIME: 35 min
MARK: 30

$\frac{13}{30}$

1. Calculate

1.1. 18% *of* 360   (2)   1.2. $11\frac{1}{2}$% *of* 1200   (2)

64.80   138.00

look for your decimal !

2. The number of elephants in a reserve decreased by 10%. If there were
   1400 elephants previously, how many are there now?

$\frac{12}{100} \times \frac{1400}{1} = 1400 = 140$

There are 140 elephants now.
                                                                    (4)

3. The price of a certain bicycle increased from R680 to R816. Calculate
    by what percentage the price of the bicycle increased.

① $R680 \times \frac{R816}{100}$, $= R 5548,8 - 816 = 4732.8$

② R816 – 680 = R136 = 4732.8
                                                                    (4)

4. The cost price of an item is R14 and the profit made on it is 12%. What
    is the selling price?

① $\frac{R12}{100} \times \frac{R14}{100} = R1,68$ ② R1,68 + R14
                                          = R15,68
                                                                    (3)

5. Lindiwe buys shirts at R75 each. Her percentage profit is 20% on each
shirt. After the calculation of profit she must also add 14% vat.
Calculate the selling price of each shirt. What will her total profit be if
20 shirts are sold? Ignore this.

$\frac{20\%}{100} \times \frac{75}{1} + 14$ $\frac{20}{100} \times \frac{75}{1} \times 20$

= R 29.   = R 300
                                                                    (5)

7. Calculate the interest if R660 is invested for $6\frac{1}{4}$ years at 12% simple
interest.   or

$\frac{12}{100} \times \frac{R660}{1} \times 6\frac{1}{4}$ ys $\frac{12}{100} \times \frac{R660}{1} \times (6\frac{1}{4} = 25)$

= R495   = 1980
                                                                    (3)

8. What is compound interest?

It is when you've invested money in the bank
intrest over the original amount. Intrest over intrest (2)

9. Calculate the value of a house in five years time if it is worth
R120 000 now and appreciates in value at a rate of 10% per annum
Compounded annually.   1 way   Other way

1st yr $\frac{10}{100} \times \frac{120000}{1} + 120000 = 132000$ $\frac{10}{100} \times \frac{120000}{1} = 12000$

2nd " $\frac{10}{100} \times \frac{120000}{1} + 130000 = 142000$ $\frac{10}{100} \times \frac{120000}{1} + 12000 = 24000$

3rd " $\frac{10}{100} \times \frac{120000}{1} + 142000 = 154000$ $\frac{10}{100} \times \frac{120000}{1} + 24000 = 36000$

4th " $\frac{10}{100} \times \frac{120000}{1} + 154000 = 166000$ $\frac{10}{100} \times \frac{120000}{1} + 36000 = 48000$

5th " $\frac{10}{100} \times \frac{120000}{1} + 166000 = 178000$ $\frac{10}{100} \times \frac{120000}{1} + 48000 = 60000$ (5)

Other way

1. 144 12000
2. 156 12000
3. 1705 2000
4. 18 492000
5. 199 32000

Final mathematics examination

1

Mathematical Literacy, Mathematics & Mathematical Science

Grade 8   December 2003

Time: 2,25 hrs   Marks: 140

Strand 1: Number & algebra (Questions 1,4,7,10)

Strand 2: Measurement (Questions 2,5,8,11)

Strand 4: Space & shape (Questions 3,6,9,12)

Instructions:

1) Calculators may be used.

2) **Answer all questions on the answer sheet. Show all working out!**

QUESTION 1   S1

1.1)   What fraction of the figure is shaded?   L3   (1)
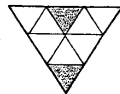
1.2)   Three fractions and three diagrams are given. Colour in, in
        pencil, one fraction per diagram <u>on the answer sheet</u>.   (3)
        The fractions are $\frac{2}{3}$; $\frac{2}{5}$; and $\frac{1}{4}$.
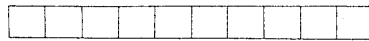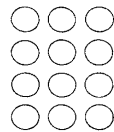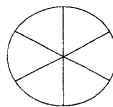
Figure A   Figure B   Figure C

1.3)   Write sixty-two thousand and sixty-three in figures.   (1)

2

QUESTION 2   S2

2.1) Determine the area of the shaded shape.   L3   (1)
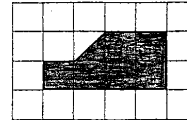
2.2) Here is a drawing of a swimming pool. Each square of the
     sidewalk paving has a length of 1,5m.

Pool

Sidewalk   Diving Board

1.5m
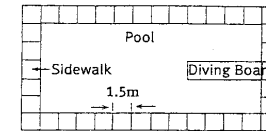
     Using the drawing, find the perimeter of
2.2.1) one square of the sidewalk paving.   (2)
2.2.2) the swimming pool (inner edge of sidewalk).   (2)

2.3) Nurses have to be very accurate when they measure out
     medicine. If they measure incorrectly, patients may die!
     Read the following dosages:-

2.3.1)   (1)

2.3.2)   (1)
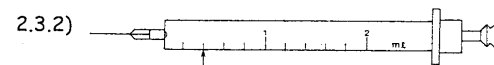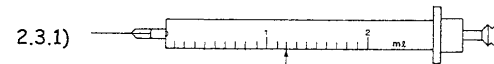
QUESTION 3   S4
                                                          L3

3.1) What type of angle is each of the following?   (5)

(a)   (b)   (d)

(c)   (e)
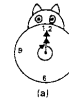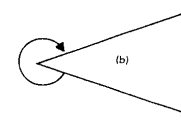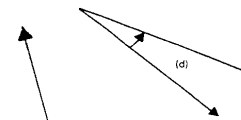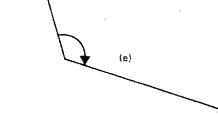
3

3.2) Through how many degrees does the railway boom gate move, from the open to the shut position? (1)

Open

CLANG! Shut
CLANG!
CLANG!
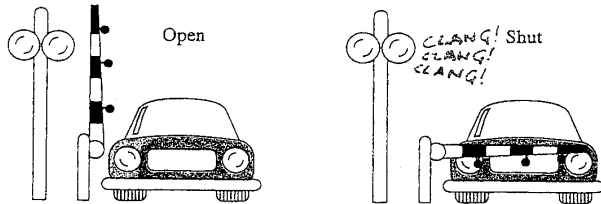
3.3) Patricia lives on the fourth floor of the block of flats, in the sixth flat from the left. Her flat number is 6-4.

Nelo's flat

Patricia's flat
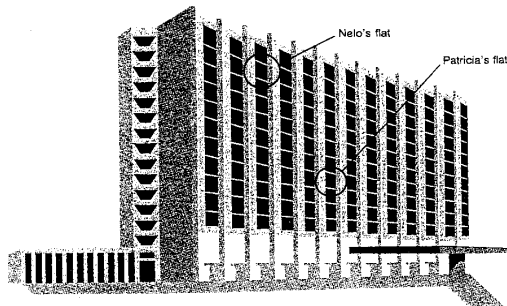
3.3.1) Thamsanqua lives in flat 10-9. Indicate his flat on the grid on the answer sheet, using a " ✗ ". (1)

3.3.2) Nelo's flat is indicated in the picture. What is the number of his flat? (1)

QUESTION 4   S1 L4

4.1)
4.1.1) Write 387 to the nearest ten. (1)
4.1.2) Write 121 to the nearest hundred. (1)

4.2) Complete the number sequences:
4.2.1) 0,5 ; 1 ; 1,5 ; 2 ; ___ ; ___. (1)
4.2.2) 6 ; 10 ; 9 ; 13 ; ___ ; ___. (1)

4.3) Write in ascending order:
$$\frac{1}{6} ; \frac{5}{12} ; \frac{1}{12} ; \frac{1}{4} ; \frac{1}{3}$$
(2)

4.4) What fraction of these seeds has **NOT** begun to germinate? (1)

4.5) What percentage are wearing spotted ties? (1)

4.6) How much colder is the reading at B than at C? (1)
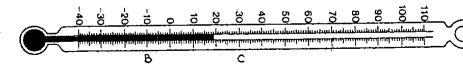
4.7) The school principal offers a prize to the class that collects the most money per learner for a new school bus. Study the bar graph and answer the questions:

Amount (in rands) per pupil

Grade 3 Grade 4 Grade 5 Grade 6 Grade 7

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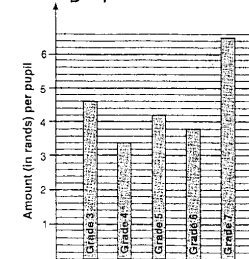
|	
4.7.1) Which class collected the largest contribution per learner?	(1)
4.7.2) What was the amount per learner?	(1)
4.7.3) There are 30 learners in this class. How much did they collect in total?	(1)
4.8) An adult education class has 14 students and 1 teacher. The teacher writes on the board that 20% of the total number of people in the room are men.	
4.8.1) How many men are in the classroom?	(2)
4.8.2) If 6 of the people in the room are between 20 and 30 years old, what percentage will this be?	(2)

QUESTION 5

S2
L4

5.1) Calculate the perimeter of the pumpkin patch. (2)

2 m
4 m   5 m
2 m
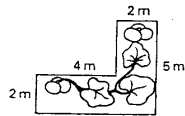
5.2) Calculate the volume of the cereal box, if it's dimensions are 3cm, 4cm and 20cm. (2)

CEREAL

20 cm
4 cm
3 cm
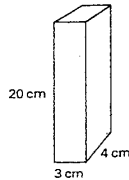
5.3) The dimensions of a postcard are shown.

144 mm

POST CARD
POSKAART

To/Aan

120mm
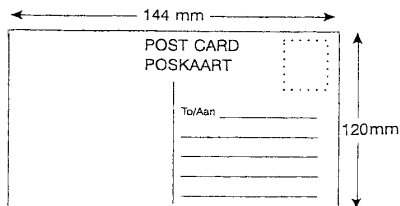
5.3.1) Calculate the area of the postcard. (2)
5.3.2) If the dimensions of a stamp are 24mm by 30mm, how many stamps will cover the postcard completely? (3)
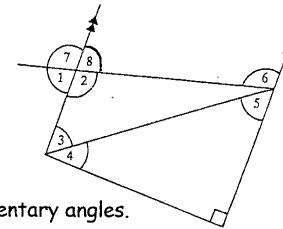
QUESTION 6

S4
L4

6.1) Name the following triangles, according to their <u>sides</u>. (3)

A   B   C
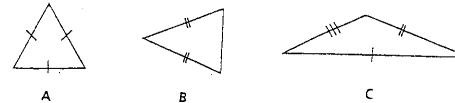
6.2) Name the angles for each of the following descriptions, using the <u>numbered angles</u> in the sketch.

7 8
1 2
6
5
3
4

6.2.1) 1 pair adjacent supplementary angles. (1)
6.2.2) 1 pair vertically opposite angles. (1)
6.2.3) Angles round a point. (1)

6.3) Draw in the axis/axes of symmetry (if any), for each motif. Do this on the answer sheet! (2)

QUESTION 7

S1
L5

7.1) Calculate the following, without using a calculator.

7.1.1) $\sqrt{100 - 64}$ (2)

7.1.2) $\sqrt[3]{-64}$ (1)

7.1.3) $\dfrac{-2}{3} \div 1\dfrac{1}{4}$ (3)

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7.2) A wool jersey is advertised as 99% pure wool.

7.2.1) The price of this jersey is R280,95 but it has a 30% discount tag on it. Calculate the sale price. (2)

7.2.2) A jersey that is 100% pure wool costs 10% more than the original price of the jersey above. What will it cost? (2)

7.2.3) What does 99% pure wool mean? (1)

7.3) An adult's ticket for a concert costs R5 more than a student's ticket. Mrs Dube buys 5 adult tickets and 3 student tickets.
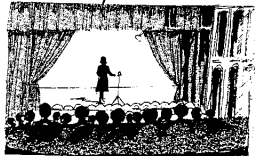
7.3.1) If the price of one student ticket is x rand, write an expression for the price of one adult ticket. (1)

7.3.2) Write an expression for the cost of:- (2)
7.3.2.1) 3 student tickets.
7.3.2.2) 5 adult tickets.

7.3.3) If the total cost of the tickets is R105, how much does each type of ticket cost? (use an equation) (4)

7.4) A brand new car costs R60 000.
7.4.1) It will lose 10% of its value after each year. What will its value be after 3 years? (3)
7.4.2) If after 4 years the car is sold at a give-away price of R27 000, what percentage is this of the original amount? (2)

QUESTION 8

S2
L5

8.1) The diagram shows a circular cricket field with centre O and a radius of 70 metres. The batting pitch is rectangular with measurements 22m by 2m.
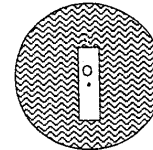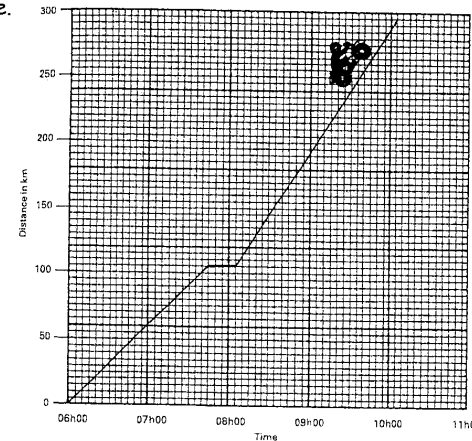

Calculate the following, **correct to the nearest metre**.

8.1.1) At the start of every practice, the team members have to run around the field 5 times. What distance does each player run? (3)

8.1.2) How many square metres of grass was planted to cover the field, excluding the batting pitch? (4)

8.2) The graph depicts a motor cyclist's journey from Durban to Dundee.

8.2.1) How long did he take to complete his journey? (1)
8.2.2) What distance did he travel from Durban to Dundee? (1)
8.2.3) For how long did he rest? (1)
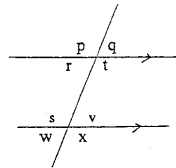8.2.4) Calculate the cyclist's speed before resting.(in km/hr) (3)

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8.2.5) He increased his speed after resting. By how many km an hour did he increase his speed? (3)
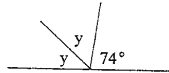
QUESTION 9

S4
L5

9.1) Write down **one** pair of angles from the diagram, for each of the following:-

9.1.1) Co-interior angles (1)
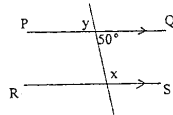9.1.2) Corresponding angles (1)
9.1.3) Alternate angles (1)

9.2) Determine the values of x *and* y in the diagrams.
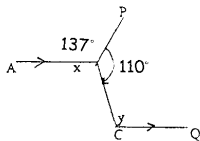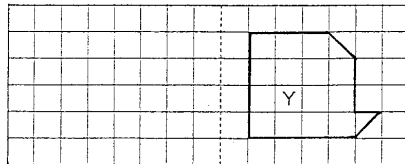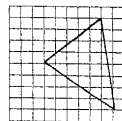9.2.1)   9.2.2) (6)

9.2.3)

9.3) On the grid, draw the reflection of shape Y, about the dotted line. (2)

9.4) Translate the triangle two units to the left. (2)

9.5) The switch on a stove has five possible positions, equally spaced.

Through how many degrees does the switch turn from the OFF position to position 2? (2)

QUESTION 10

S1
L6

10.1) The ratio of the chemicals, Nitrogen (N), Phosphorus(P) and Potassium (K) in plant fertiliser, is 3 : 2 : 1 . The large bags of the fertiliser contain 3 750 grams of the chemical mixture.
Calculate how many grams N, how many grams P and how many grams K make up this mixture of 3 750 g. (4)

10.2) Five eighths of a farm is **arable** land **(used to plant crops)** and the rest is used for sheep farming.

Wheat is grown on $\frac{2}{3}$ of the arable land.
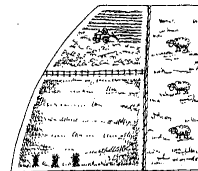
10.2.1) What fraction of the farm is used for wheat cultivation? (2)
10.2.2) What is the size of the farm if wheat is cultivated on 100 hectares? (2)
10.2.3) What area of the land is used for sheep farming? (2)

10.3) The moon is nearly 384 000km from the earth.
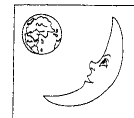
Write this distance in scientific notation. (2)

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APPENDIX C   -   INTERVIEW AND OBSERVATION SCHEDULES

- Interview schedule for 8Y (end of cycle one)

- Interview schedule for 8X (end of cycle two)

- Observation schedule for cycle three

8Y - Semi-structured interview with learners from remedial programme

After first module on place value   - end of May 2003

Purpose:

- To get the learners' viewpoints on their experience of the programme so far in terms of:
- Their understanding
- Their confidence
- Their enjoyment
- The content
- To find out more about the reasons learners chose certain answers on the pre-test of the concept test and to monitor any change in their thinking and understanding.
- To gather any comments or suggestions from the learners in relation to the next term.

Format: The interviews will take an oral format initially for the questions relating to their concept tests but learners will be offered the option of continuing orally or answering the questions in the form of a written letter to me.

Questions

1.   What do you think of the module/classes so far?
     Can you describe what the classes have been like for you?

2.   a)   What did you like/enjoy most about the classes?

     b)   What did you like/enjoy least about the classes?

3.   a)   Is there anything in the course you found difficult?
         What? How? Why? When? Anything else?

     b)   Is there anything in the course you found easy?
         What? How? Why? When? Anything else?

4.   What do you think about your understanding of place value now compared to before we started the classes?

5.   What do you think about mathematics?

6.   Can you make any suggestions for changes for next term?

8X - Semi-structured interview with learners from remedial programme

After second module on fractions and decimals   - end of Sept 2003

Purpose:

To get the learners' viewpoints on their experience of the programme so far in terms of:

- Their understanding
- Their confidence
- Their enjoyment
- The content
- To find out more about the reasons learners chose certain answers on the pre-test of the concept test and to monitor any change in their thinking and understanding.
- To gather any comments or suggestions from the learners in relation to the next term.

Format: The interviews will take an oral format initially for the questions relating to their concept tests but learners will be offered the option of continuing orally or answering the questions in the form of a written letter to me.

Questions

1. What do you think of the module/classes so far?
    Can you describe what the classes have been like for you?

2. a)   What did you like/enjoy most about the classes?

    b)   What did you like/enjoy least about the classes?

3. a)   Is there anything in the course you found difficult?
        What? How? Why? When? Anything else?

    b)   Is there anything in the course you found easy?
        What? How? Why? When? Anything else?

4. What do you think about your understanding of fractions and decimals now compared to before we started the classes?

5. What do you think about mathematics?

6. Can you make any suggestions for changes for next term?

Teacher observation schedule

Date: Class:

	SA	A	D	SD	N/A
1. Introduction					
1 Teacher clearly introduces and formulates the problems.					
2 Teacher asks relevant guided questions to introduce the lesson.					
3 Teacher responds to learners' ideas.					
4 Teacher asks learners for their own ideas and encourages learners to share them.					
5 Teacher often encourages learners to ask questions.					
6 Teacher often guides the learners to the conclusion.					
7 Problem presented is clearly within the frame of reference of the learners.					
8 Problem presented is within the zone of proximal development of the learners.					
9 Teacher "familiarises" learners with the context of the problem if necessary.					
10 Learners interact with the teacher.					
11 Learners understand and are able to engage with the context of the problem.					
12 Learners share their ideas willingly.					
13 Learners appear bored and disinterested.					
14 Learners appear interested in the work.					
15 Learners experience the problem being formulated as real and meaningful.					
16 Learners are encouraged to work together with each other.					

	SA	A	D	SD	N/A
2. Body					
1 Learners explore problems in groups or individually.					
2 Teacher allows learners to choose their own approach.					
3 Learners actively make use of their knowledge.					

		SA	A	D	SD	N/A
4	Learners discuss the operation employed in the problems.					
5	Teacher focuses learners' attention on crucial aspects.					
6	Teacher draws attention to and re-emphasizes the relevant mathematical notation and terminology relevant to the lesson.					
7	Teacher interacts with learners during the lesson.					
8	Teacher assists learners when necessary.					
9	Teacher asks learners guiding questions, but does not directly provide the answers.					
10	Teacher encourages learners to discuss with peers in their groups.					
11	Teacher allows learners to draw own conclusions.					
12	Learners ask questions during the lesson.					

		SA	A	D	SD	N/A
3.	Conclusion					
1	Teacher asks several groups/individuals to report their results to the class.					
2	Teacher invites and encourages learners to comment on their outcomes.					
3	Teacher asks critical open-ended questions regarding the outcomes.					
4	Teacher compares learners' outcomes and their differences or discrepancies.					
5	Teacher guides learners to understand discrepancies in their solutions.					
6	Teacher draws conclusions from the activity with the learners.					

		SA	A	D	SD	N/A
4.	General					
1	Teacher acknowledges learners' ideas.					
2	Teacher uses and discusses learners' ideas.					
3	Teacher summarises learners' answers.					
4	Teacher asks open-ended questions to individual learners.					
5	A classroom atmosphere prevails that encourages learners to ask and answer questions					

General impression of the lesson:

Useful	5	4	3	2	1	Not useful
Interesting	5	4	3	2	1	Not interesting
Easy to apply	5	4	3	2	1	Not easy to apply
Enjoyable	5	4	3	2	1	Not enjoyable

Remarks or comments

_____

_____

_____

_____

_____

_____

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_____

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APPENDIX D   -   ETHICAL CONSIDERATIONS

- Letter to parents/guardians

Letter to parents/guardians

7 April 2003

Dear ....

Ms Hayley Barnes is a lecturer from the University of Pretoria who is currently completing her Masters in Mathematics Education. The Masters involves implementing a remedial intervention for Grade 8 learners over four months to assist them in improving their confidence, conceptual understanding and academic performance in Mathematics.

Your daughter's mathematics class has been selected to be part of this study and we therefore request your permission for your daughter to be taught her remedial mathematics lessons by Ms Barnes for the next two terms of this year. Your daughter will still attend her usual mathematics lessons with her teacher and in addition to that, she will continue to attend three remedial mathematics lessons during school with Ms Barnes. Ms Barnes is a former member of our Mathematics staff and taught at Girls' High for almost seven years.

Please could you complete this form and return it to the school as soon as possible as lessons will commence next week.

Thank you for your co-operation in this regard.

Yours sincerely

APPENDIX E   -   FROM THE INTERVENTION

- Worksheet one (with Dienes blocks)

- Worksheet three (contextual place value)

- Item 19 from diagnostic assessment

- Item 20 from diagnostic assessment

Worksheet 1

To do this worksheet you need to use the blocks available. The blocks are called "Dienes' Blocks" after the man who invented them.

Activity one

Using the blocks display the following numbers:

1.   12
2.   123
3.   2 345
4.   Five thousand and sixteen
5.   One thousand, two hundred and three

Activity two

Work in pairs (or groups of three):

- Each of you have a turn at being the teacher, while the other one is the learner.
- First of all both of you have to do the calculation.
- Then the teacher must show the learner how to get the answer to the calculation using the blocks.

Calculations:

1.   23 + 46
2.   15 + 12
3.   42 + 39
4.   27 + 14
5.   59 + 44
6.   66 + 46

Worshee 3

Activity one

Some annual salaries of people in various positions have been listed below:

Accountant: R240 450

Lawyer: R180 000

Personnel Manager: R175 233

Store manager: R210 398

Chartered Accountant: R560 900

Computer programmer: R490 080

Network manager: R308 120

Which of the above salaries is the highest?

Which of the salaries above is the lowest?

How much does the accountant earn per month?

What is the difference between the salary earned by the Accountant and the one earned by the Chartered accountant?

Write down in words what the computer programmer earns per year.

Activity two

The following houses are on sale and their prices are given:

- ✓ A beautiful architectural designed house with three bedrooms and a swimming pool for a small family: **R 987 400**
- ✓ A lovely upmarket townhouse in a secure complex overlooking the mountains. **R688 400**
- ✓ A real investment for the clever homebuyer. You will not regret this one. With five bedrooms and a large family room, it's a steal!   **R999 500**

Which house costs the most?

Which house costs the least?

How much would it cost to buy all three houses?

What is the price difference between the most expensive and the cheapest house?

Diagnostic assessment **- Item 19**

You decide to start making banana bread to sell in order to earn some extra money. To start off with, you decide to make 5 loaves of banana bread. According to the recipe, each loaf requires $4\frac{1}{2}$ bananas. How many bananas will you need to make the 5 loaves of banana bread? Show your working out in this space provided below and write your answer in the space provided:

Diagnostic assessment **- Item 20**

The jive and eat shop	
Cup of Coffee:	R4, 50
Cup of tea:	R4, 00
Breakfast:	R11,50
Toasted sandwich:	R9, 80

A waiter at the "Jive and Eat shop" needs to work out the bill for a table of people that she served. In total they had:

- 2 cups of coffee
- 1 cup of tea
- 2 Toasted sandwiches
- 1 Breakfast

What is the final bill for this table? Show all your working out in the space provided below and write the answer on the line provided: