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THE NATIONAL BENCHMARK TESTS (NBT):

1. Purpose

The National Benchmark Tests (NBT) comprise three tests:

- Academic Literacy,
- Quantitative Literacy, and
- Mathematics.

The first two are **combined** in one three hour paper (AQL). The Mathematics test (MAT) is separate, but is written on the same day as AQL **for those who need it**.

The NBT is used by several universities in SA to help make decisions about an applicant's access to study at the university. For courses that require mathematical ability, the MAT test is an important part of this. Universities also use the NBT for other purposes – to decide which students might need academic support and to help in designing their courses.

In general, the AQL test is written by applicants for all programmes while **both** tests are written by applicants to programmes for which Mathematics is a requirement, such as Health Sciences, Engineering, Accounting, and most of the sciences. Check with the particular university what is required for the courses you wish to apply for. The MAT test **cannot** be written as a stand alone test.

What is difference between the National Senior Certificate (NSC) and the National Benchmark Tests (NBT)?

THE NSC	In respect of each subject NSC examines - Reflects to what extent a Grade 12 student has met the Curriculum Statement expectations as expressed in the Subject Assessment Guidelines.
THE NBT	In respect of each domain NBT examines - Reflects to what extent a school-leaver, who is applying to University is prepared for the core academic literacy, quantitative literacy and mathematics demands of higher education study.

MESSAGE +27 62 352 1912 FOR NBTS AND ALL SUBJECTS TUTORING

2. The content and focus of the MAT Test

The **topics** from which test questions for the Mathematics test (MAT) can be drawn are the following.

1. PROBLEM SOLVING AND MODELLING

1.1 Algebraic processes.

1.2 Functions represented by graphs and equations; 'functions' to include linear, quadratic, hyperbola, cubic, exponential and logarithmic. Other graphs such as circles are also included.

2. BASIC TRIGONOMETRY, INCLUDING GRAPHS OF TRIGONOMETRIC FUNCTIONS, PROBLEMS REQUIRING SOLUTIONS OF TRIGONOMETRIC EQUATIONS AND APPLICATION OF TRIGONOMETRIC CONCEPTS

3. SPATIAL PERCEPTION INCLUDING ANGLES, SYMMETRIES, MEASUREMENTS, REPRESENTATIONS AND INTERPRETATION OF TWO-DIMENSIONAL AND THREE-DIMENSIONAL SHAPES

4. DATA HANDLING and PROBABILITY

5. COMPETENT USE OF LOGICAL SKILLS IN MAKING DEDUCTIONS AND DETERMINING THE VALIDITY OF GIVEN ASSERTIONS

The NBTs **focus** on academic readiness for university study. Each test requires you to apply prior learning - what you know and are able to do - to materials that reflect expectations for first year students in university programmes.

MATHEMATICS

- ✓ Understand and apply properties of the real number system, including surds and exponents;
- ✓ Recognise and use patterns, including sequences and series;
- ✓ Apply relationships such as ratios and percentages in a variety of contexts;
- ✓ Apply the results of algebraic manipulations with equations and inequalities;
- ✓ Understand the function concept and identify properties of functions
- ✓ Interpret transformations of functions represented algebraically or graphically;
- ✓ Identify relationships between graphs and their equations, or inequalities and the regions they describe;
- ✓ Apply trigonometric identities and concepts in solving problems;
- ✓ Understand properties and interpret representations of two-dimensional and three-dimensional shapes;
- ✓ Apply principles of analytic geometry;
- ✓ Interpret various representations and measures of data; and
- ✓ Use logical skills in making deductions and determining the validity of given assertions.

Example 1

For any **real number** x , which one of the following statements is **always** true?

(A) $-x < 0$

(B) $\frac{1}{x}$ is rational

(C) $\frac{x}{x+1} < 1$

(D) $\frac{1}{x} > 1$, if $0 < x < 1$

3. The experience of writing MAT

Test structure and administration

Timed, 3 hour test, with 60 MCQ items: 4 options, 1 correct

No calculators needed, not permitted

Formula sheet provided

Misconceptions tested, but not in all questions

Progressive distribution through **cognitive levels**

All aspects of the specification table represented, with no 'cueing'

Framework for cognitive levels

Level 1 Knowledge, recall, performing simple routine procedures.

All information for accessing questions is directly available and accessible

Level 2 Performing more complex routine procedures.

All information for accessing questions is directly available and accessible

Level 3 Performing more complex procedures.

Choosing a strategy to solve problems across competence areas

Level 4 Problem solving (reasoning, reflecting) in more complex contexts.

Working across competence areas where greater insight required

Achievement levels are:

Basic

Intermediate

Proficient

with some sub-levels within each.

4. Dealing with Multiple Choice Questions

- Read the question very carefully without looking at any of the possible options.
- Try to work out the question before looking at any of the possible options.
- Look at the options and see whether one of them corresponds to the answer that has been obtained, in which case select that option. But be critical of the reasoning involved, in case the answer reflects a specific misconception, as in the following example:

For $x > 0$, $\sqrt{9x^2 + 16x^2}$ is equal to

- (A) $5x$ (B) $7x$ (C) $\pm 5x$ (D) $\pm 7x$

Working out the question before looking at the answers, and being aware of the misconceptions that (a) the square root of a sum is not equal to the sum of the square roots, and (b) 'square root' is by definition positive, should help writers make the correct choice.

- Pace yourself! If none of the given options corresponds to the answer you have found, start the question over, and try once more. If none of the options is then found, leave the question for later and move on. All questions have one correct option – this has been checked beforehand, and writers need not worry that there may be a mistake in the question.
- Questions in which it is possible to eliminate options by substitution are deliberately avoided. So, for example, there will not be questions asking for a specific solution to an equation, because it is easy to substitute each of the given options and find the correct one by elimination. For example, if we were to ask the following:

The solution of $3x + 4 = -8$ is

- (A) -4 (B) $-\frac{4}{3}$ (C) 4 (D) $\frac{4}{3}$

you can easily substitute -4 and see that (A) must be the correct option.

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