EFFECT OF NATIONAL SENIOR CERTIFICATE AND OUTCOMES BASED EDUCATION ON THE CIVIL ENGINEERING INDUSTRY IN SOUTH AFRICA

30 September 2009

100
1908 - 2008
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

BACKGROUND

"MID-YEAR pass marks for first year engineering students have dropped significantly - from 71 percent to 35 percent – compared with last year"

Pretoria News, 29 June 2009

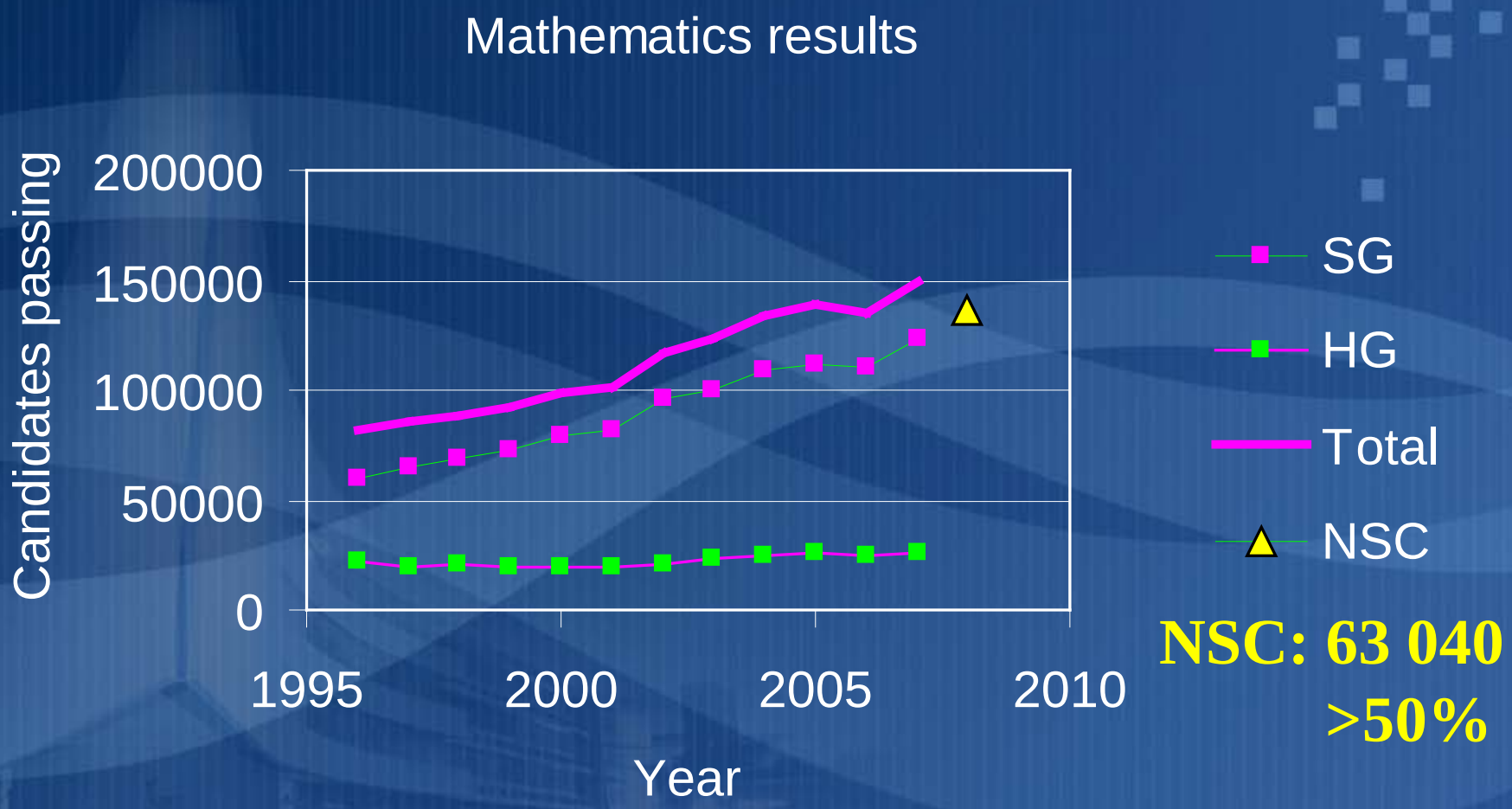
NSC MATHEMATICS CURRICULUM:

- Learning Outcome 1: Number and Number Relationships
- Learning Outcome 2: Functions and Algebra
- Learning Outcome 3: Space, Shape and Measurement
- Learning Outcome 4: Data Handling and Probability

ONLY RELATIVELY SMALL PROBLEMS SUCH AS :

- No absolute values,
- Nature of roots not covered,
- Logarithms not covered in depth
- No inverse trigonometric functions (cosec, sec and cot)

NSC RESULTS IN COMPARISON TO PAST



MATHEMATICS RESULTS: EQUIVALENT HISTORY

SG Symbol	2006	2007
A	6616	7458
B	6823	7488
C	12590	13944
D	19418	21941
E	27386	31561

NSC: 63 040
>50%

28890

+ 25415

= 54305

SUBJECT ASSESSMENT GUIDELINES

Table 3.7: Taxonomical differentiation of questions on Grade 12 question papers

TAXONOMICAL CATEGORIES	APPROXIMATE PROPORTION OF THE PAPER		
	%	150 mark paper	150 mark paper
Knowledge	± 25	25 – 35	25 – 35
Performing routine procedures	± 30	30 – 40	30 - 40
Performing complex procedures	± 30	30 – 40	30 - 40
Problem Solving	± 15	15 – 25	15 – 25

SUBJECT ASSESSMENT GUIDELINES

Table 3.6: Suggested distribution of marks for Grade 12 question papers

PAPER 1			PAPER 2			OPTIONAL PAPER		
Bookwork: max of 6 marks			Bookwork: 0 marks			Bookwork: max of 15 marks		
LO1:	Patterns and sequences	± 30	LO3:	Coordinate geometry	±40	LO1:	Recursive sequences	±5*
LO1:	Annuities and finance	±15	LO3:	Transformation	±25	LO3:	Geometry	±40
LO2:	Functions and graphs (see note below)	±35	LO3:	Trigonometry (see note below)	±60	LO4:	Descriptive statistics and interpretation	±20
LO2:	Algebra and equations	±20	LO4:	Data handling	±25	LO4:	Probability	±20
LO2:	Calculus	±35				LO4:	Bivariate data	±15
LO2:	Linear programming	±15						
	Total	150		Total	150		Total	100

APPENDIX 2: OPTIONAL MATHEMATICS ASSESSMENT STANDARDS FOR EXAMINATION IN GRADE 12 IN 2008, 2009 and 2010

Learning Outcome 1: Number and Number Relationships

When solving problems, the learner is able to recognise, describe, represent and work confidently with numbers and their relationships to estimate, calculate and check solutions.

Grade 10 We know this when the learner is able to:	Grade 11 We know this when the learner is able to:	Grade 12 We know this when the learner is able to:
		12.1.3 (d) Correctly interpret recursive formulae: (e.g. $T_{n+1} = T_n + T_{n-1}$)

Learning Outcome 2: Functions and Algebra

The learner is able to investigate, analyse, describe and represent a wide range of functions and solve related problems.

Grade 10 We know this when the learner is able to:	Grade 11 We know this when the learner is able to:	Grade 12 We know this when the learner is able to:

Learning Outcome 3: Space, Shape and Measurement

The learner is able to describe, represent, analyse and explain properties of shapes in 2-dimensional and 3-dimensional space with justification.

Grade 10 We know this when the learner is able to:	Grade 11 We know this when the learner is able to:	Grade 12 We know this when the learner is able to:
10.3.2 (a) Disprove false conjectures by producing counter-examples. (b) Investigate alternative definitions of various polygons (including the isosceles, equilateral and right-angled triangle, the kite, parallelogram, rectangle, rhombus and square).	11.3.2 (a) Investigate necessary and sufficient conditions for polygons to be similar. (b) Prove and use (accepting results established in earlier grades): • that a line drawn parallel to one side of a triangle divides the other two sides proportionally (the Mid-point Theorem as a special case of this theorem); • that equiangular triangles are similar; • that triangles with sides in proportion are	12.3.2 (a) Accept the following as axioms: • results established in earlier grades • a tangent is perpendicular to the radius, drawn at the point of contact with the circle, and then investigate and prove the theorems of the geometry of circles: • the line drawn from the centre of a circle, perpendicular to a chord, bisects the chord and its converse • the perpendicular bisector of a chord passes

OPTIONAL CONTENT:

- Polygons (isosceles, equilateral and right-angled triangle, the kite, parallelogram, rectangle, rhombus and square).
- Pythagorean Theorem
- Similar triangles
- Theorems of the geometry of circles
  - Tangents
  - Chords
  - Arcs.

SOLVING PROBLEMS (DoE CURRICULUM STATEMENT)

“

•Solving non-routine, unseen problems by demonstrating higher level understanding and cognitive processes.
•Interpreting and extrapolating from solutions obtained by solving problems based in unfamiliar contexts.
•Using higher level cognitive skills and reasoning to solve non-routine problems.
•Analysing problems to identify what is to be solved and then use appropriate methods to solve the problems.
•Solve non-routine problems based on real life context. ”

MATHEMATICS OPTIONAL PAPER 3

- Department of Education suggested that Paper 3 should be part of the entrance criteria for engineering faculties.
- Of the 42 060 candidates that obtained 65% or over for Mathematics in 2008, 64% did not write Paper 3.
- Most of the traditional feeder schools do not present the work examined in Paper 3 in school hours.
- Learners have to pay for private tuition if they want to write Paper 3.

WHO NEEDS EUCLIDEAN GEOMETRY?

EVERYBODY ?

NOBODY?

SOUTH AFRICAN SCENARIO in 2009

- 50 000 artisans needed by 2011
- Nearly 100 000 students in tertiary education that can benefit from in depth knowledge of Euclidian geometry

- 71.4% of 15 to 24 year olds are unemployed

Quarterly Labour force Survey Q2:2009
Statistics South Africa

"*Against this backdrop of global capitalism in crisis, ……..Government is committed to doing all it can to help companies in these distressed sectors. Financing interventions, designed to help mining, auto, construction, clothing and textile and others sectors to survive, and importantly, to keep workers in jobs - are being implemented……. workers will be able to attend training courses instead of being retrenched.*

Dr Blade Nzimande,
Minister of Higher Education and Training
11 September 2009

IMF COUNTRY REPORT 2008:

" *identified limited competition, skill shortages, and implementation capacity within government among the factors constraining growth…… improving educational attainment is important for ensuring labour productivity gains in the long term. Since South Africa already spends comparatively generously on education, efforts need to focus on improving results within the existing budget envelope and raising student achievement towards international standards.*"

TOP 10 TIPS FOR SURVIVING THE DOWNTURN

1. TRAIN AND DEVELOP YOUR WORKFORCE

- Your workforce is your greatest asset and key to your competitive edge.
- Assess where you have the skills to take your business forward.
- Consider up-skilling and re-skilling your workforce to shift focus to where the work is.
- A ConstructionSkills Training and Development Plan makes planning and delivering training easy.
- The Investors in People standard can help structure the continual development of your workforce.

2. APPRENTICES

- Keep your competitive edge sharp with an apprentice.
- An apprentice is an effective way of bringing in new skills to compete for contracts.
- An apprentice takes on the day-to-day work, freeing up senior people.
- Grants are available to train your apprentice.
- Partly trained apprentices are ready for work.

FOCUS ON

- Surviving the downturn
- Management and Leadership
- Technical and Professional
- Sustainability
- Health and Safety
- Migrant workers

RELATED LINKS

- Business survival in actio
- Business Improvement
- Financial Support
- Business Advice
- Top 10 Tips

The Builder Training Centre

Station Buildings, Waddon Station, Epsom Road, Croydon, Surrey, CR0 4UP TEL. 0800 389 2775

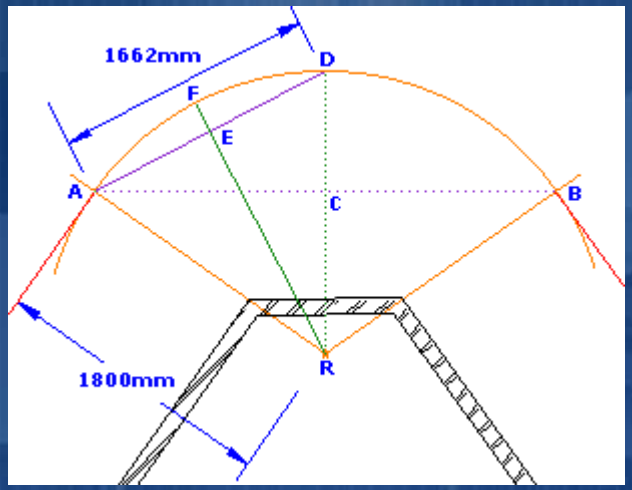
buildertrainingcentre.co.uk

The Telegraph

Plumbing is the new accountancy

As we report today, a growing number of young graduates are abandoning their dreary jobs and retraining for the gleaming prospects of the plumber's trade. A shortage of plumbers means that their talents are at a premium.

Daily Telegraph - 19th January 2004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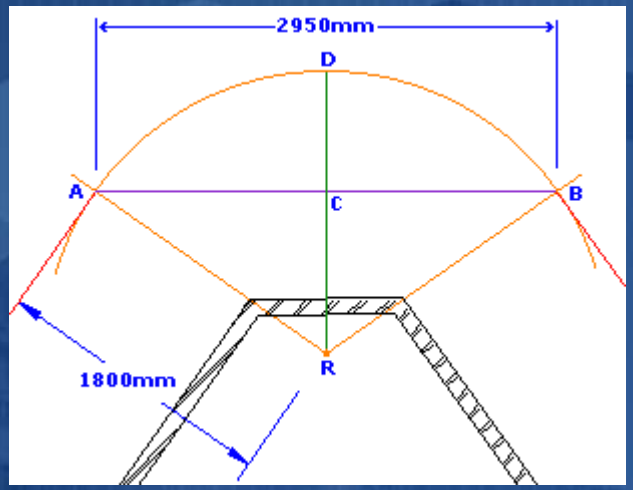
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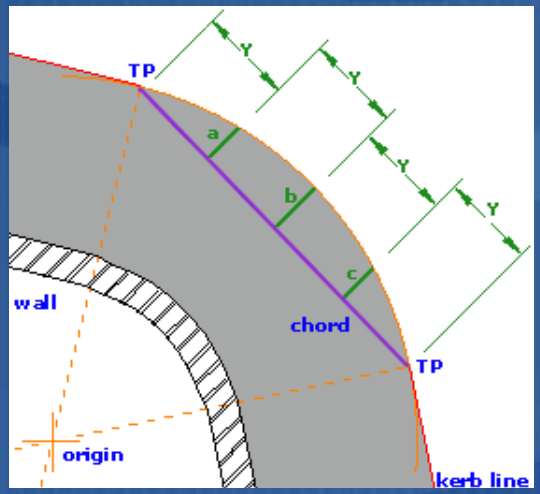
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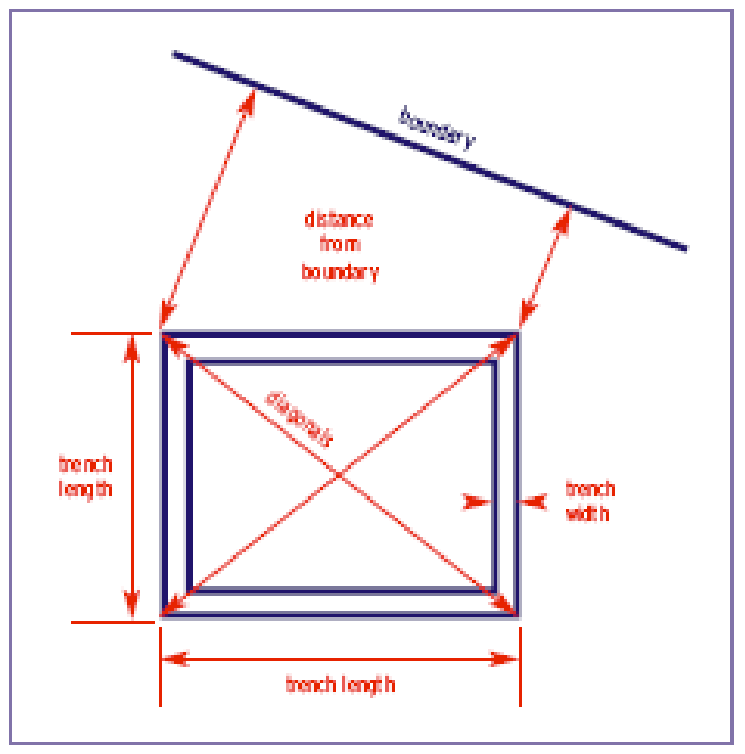
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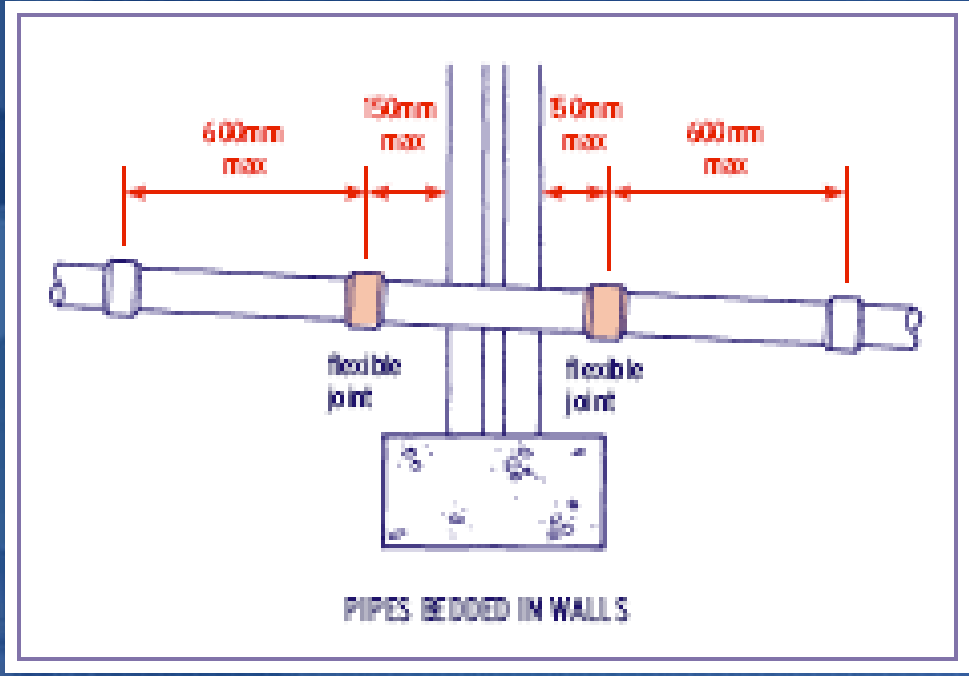
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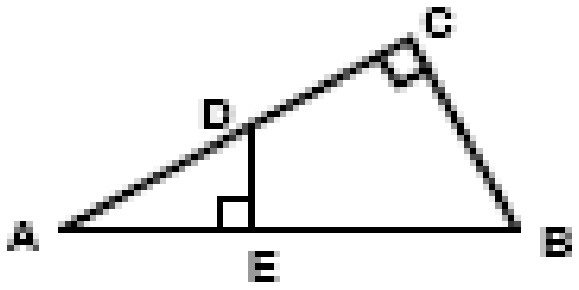
PIPES BEDDED IN WALLS

Optional:

- In the figure AE=6, EB=7 and BC=5. What is the area of EBCD?



CONCLUSION

In theory OBE can work **BUT**

- The curriculum **can not have significant non-compulsory components** and the NSC examination has to ensure that a basic level of competence has been reached in **all** components.
- Knowledge of Euclidian **geometry is a basic life skill** that all school leavers need in their day to day activities.
- **Well staffed schools** should **not** be given an opportunity to **opt out** of teaching a significant part of the curriculum.
- Schools with capacity problems should have to **apply for special permission** to not teach certain aspects of the curriculum.