Teacher planning: YEAR 9 TGT Mathematics and Technology 2005/06

TITLE: Schoolyard Blitz

(Design/Redesign a school area)

Mathematics	Technology
Level 5 Measurement – M5.1 Students develop formulae to calculate areas, volumes and lengths of boundaries where the relationships between dimensions are known, and investigate a range of other shapes to explain the relationships between dimensions. Level 6 Measurement – M6.1 Students interpret, analyse and solve measurement problems and justify selections and applications of formulae. Level 5 Space – Students investigate the properties of shapes, including congruence and similarity, and identify shapes embedded within irregular shapes to assist with the calculation of areas. They interpret and draw plans and elevations with attention to suitable scales, … and perspective, and use geometric tools to assist with the construction of shapes and angles…(S5.1) *to create representations of geometric objects at satisfy design requirements.* Level 5 Number - Students use a range of computational methods to solve problems that involve positive rational numbers, rates, ratios and direct proportions.	Level 5 Technology practice Students analyse the links that exist between information gathered and the design and development of products. They develop design proposals that show an understanding of factors influencing the production of their products. Students use predetermined criteria to evaluate their processes and products. Level 5 Materials Students compare and contrast materials according to their characteristics to determine how effectively the materials meet predetermined standards.

Key concepts • geometric properties of shapes • Formulae as a mathematical representation • Measurement concepts of dimension, area, length, boundary, volume • Scale, perspective • Number – rate, ratio, proportion • Cost effectiveness Key processes • Working mathematically	Key concepts • Technology practice • The nature of materials Key processes • Working technologically Key values • Appropriateness: economic, functional.

IF THE DESIRED RESULT IS FOR LEARNERS TO UNDERSTAND THAT…

- Maths is a tool to view and shape the world in which we live.
- Geometric properties of space such as perimeter volume and area can be represented mathematically through formulae.
- Large problems or challenges can be broken down into a number of manageable stages.
- Designs will be enhanced by the use of modelling and problem solving.
- Designing and problem solving are usually team endeavours.
- Designs will be affected by value considerations such as cost effectiveness and function.
- The characteristics of materials need to be understood before determining the appropriateness.
- Cost effectiveness requires financial decision making that balances a range of factors including function and cost.

Then you need evidence of the student's ability to:

- Use and apply appropriate formulae to calculate perimeter, area and volume.
- Use units appropriate to the task and convert between units.
- Analyse compound shapes in terms of regular shapes.
- Use scale and perspective to create plans and elevations.
- Justify financial decisions using mathematical principals.
- Identify characteristics of materials and match material selection and construction to functional and cost considerations.
- Use the steps of technology practice to develop a product.
- Create and evaluate a design within identified parameters.

Then the assessment tasks need to include:
Folios of activities that record a technology process from initial site selection to design and possible construction/presentation.
These folios will include:

- Student selection and justification of suitable area.
- A series of designs and modifications incorporating technology practice.
- Student justifications for alterations.
- Mathematical calculations.
- Worksheets in which students demonstrate mathematical skills eg. Area of a circle.
- Evaluations of designs.
- Reflections on the design process.

Then the learning activities need to help students:

- Share and compare choices and mathematical solutions at various stages in the task, so that students become more adept in judging the elegance or efficiency of mathematical and technology solutions to specific task requirements.
- Gather, interpret and represent data.
- Record and reflect on each phase of the technology process.
- Demonstrate their knowledge of the characteristics of various materials through evaluation.
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Task Outline:
Working in teams, applying the principles of the technology process and knowledge of measurement, shape, number and materials, design a suitable redevelopment/development of an area within the school grounds that meets given parameters (mathematical and technological).

YEAR 9 TGT 2006 – Mathematics and Technology – Task Sheet

Schoolyard Blitz (Design/redesign a school area)

Working in teams, you are to use the specifications below to design the development/redevelopment of a garden area within the school highlighting the functional and cost appropriateness of your design.

Task Specifications

Your team design must:

- improve an under-utilised part of the school grounds.
- occupy a total area between 10-50m² & the perimeter boundary must include at least one curved line.
- include compound geometric shapes
- include no more than 40% of the total area in hard landscaping.
- be achievable using volunteer labour and a materials budget of $2000.

As a team you will submit a GROUP FOLIO of what your team produces at each stage.
As an individual you will submit a JOURNAL of your own contributions, worksheets and ideas.

Steps	Items for Group Folio	Items for your Journal
1. Identify area of school in need of development/redevelopment that meets the given parameters.	▪ Written justification for area selection	▪ Calculations ▪ Sketches and notes
2. Given initial parameters, draft a design plan of the area to be developed/redeveloped including appropriate features.	▪ Initial design plan of area for development/redevelopment ▪ Scale diagram	▪ Sketches and notes ▪ Calculations
3. Obtain feedback from another group and from a teacher, which tells you how well you have met the task specifications and includes comments on the functionality of the design..	▪ Evaluation of initial design plan from teacher and other group ▪ Proposals for redesign (if necessary)	▪ Own feedback to another group
4. Given parameters, investigate and gather information on materials to be used. Justify material selection, eg cost, properties, appropriateness etc	▪ Specifications for materials ▪ Costing of design	▪ Research and appraisal of material appropriateness eg. costs, properties
5. Redesign based on materials research.	▪ Final Design	▪ Reflection on the re-design process
6. Collaboratively work with all groups to evaluate all designs to shortlist for presentation to school administration / P & C using a supplied criteria sheet/evaluation form.	▪ Group evaluation of all designs	▪ Individual feedback comments
7. (Optional) Students construct approved design.	▪ Record of construction of approved designs, eg powerpoint	

The work in this task will identify how well you:

- Know
  - ◊ Measurement
  - ◊ Number
  - ◊ Space
  - ◊ Materials
  - ◊ Technology practice
- Can
  - ◊ Analyse
  - ◊ Design
  - ◊ Evaluate
- Work in teams

YEAR 9 TGT 2005/06 –Mathematics and Technology Criteria Sheet Name/s: _____

Schoolyard Blitz: Teacher:_____

		A	B	C	N
Knowledges	Knowing About: • Measurement • Space • Number	Shapes in the design are thoroughly described, explained and appropriately represented in terms of geometric properties and with accurate and effective use of mathematical terms, scale and formulae Appropriately and effectively uses a range of units and tools of measurement.	Shapes in the design are described, explained and represented in terms of geometric properties and with effective use of mathematical terms, scale and formulae Appropriately uses a range of units and tools of measurement.	Shapes in the design are described and represented with the use of formulae. Uses a range of units and tools of measurement.	*This student has submitted*
	Knowing about: • Materials • Technology practice	Uses a range of appropriate considerations to select and use materials whose characteristics are apt for the design brief. Each stage of product development is reflected and refined using information, ideas, criteria and feedback	Selects and uses materials whose characteristics are suited to the design brief. Records and reviews each stage of product development.	Selects and uses materials whose characteristics are sensible to the area. A series of stages is apparent in the product development.	*some work..* *The work has not met the*
Processing	Designing	An original and effective design concept based on a sophisticated resolution of the design requirements.	An effective design concept based on a competent resolution of the design requirements.	A design based on the resolution of the design requirements.	*acceptable standard described*
	Evaluating	Insightful feedback in terms of the design specifications and relevant considerations. Justifies financial and functional decisions by using accurate and appropriate information and calculations involving quantity and cost.	Helpful feedback in terms of the design brief. Justifies decisions based on appropriate information and calculations	Provision of feedback. Calculations and information contribute to the decision-making.	*for this criteria*
Self and Others	Working in teams	Significant and collaborative contribution to the design process	Significant contribution to the design process.	Identifiable contribution to the design.	