Tasmanian Certificate of Education

TECHNICAL GRAPHICS

Senior Secondary

Subject Code: TEG315110

External Assessment

2012

Time: Two Hours

On the basis of your performance in this examination, the examiners will provide results on each of the following criteria taken from the course statement:

Criterion 2  Complete complex geometric tasks and solve complex problems.

Criterion 3  Demonstrate geometric skills in interpreting and transferring drawings.
CANDIDATE INSTRUCTIONS

You MUST ensure that you have addressed ALL of the externally assessed criteria on this examination paper.

You must answer SIX questions in total:

ALL FOUR questions from Section A
ONE question from each of Sections B and C

You should spend approximately 60 minutes on Section A and approximately 30 minutes on each of the other two questions.

You are required to use correct linework and presentation, and are encouraged to include freehand sketches, where necessary, to show the development of ideas in the solution of problems. Construction must be shown.

All dimensions are in millimetres unless otherwise stated.

All written responses must be in English.
Answer **ALL** questions in this section.

**Question 1** – This question assesses **Criterion 2**.

Draw the performance graph of a cam that fits onto a 10mm diameter shaft and imparts the following motion to an on-centre knife edge or wedge follower.

- Clockwise rotation of shaft with simple harmonic motion (SMH)
- $0^\circ$ – $270^\circ$ from rest 60 mm above shaft centreline to 75 mm maximum height above the shaft centreline
- $270^\circ$ – $360^\circ$ maximum height to rest (60 mm above shaft)

**Question 2** – This question assesses **Criterion 3**.

Figure 1 shows the side view of a regular hexagonal prismatic container on a horizontal floor.

Graphically determine whether or not the prism, when rolled clockwise, will pass through the opening shown.

![Figure 1](image-url)
Section A (continued)

**Question 3** – This question assesses **Criteria 2 and 3**.

Figure 2 shows a right cone. Name the curves generated by each of the cutting planes A–B and C–D and construct the true shape of one of the cuts.

![Figure 2](image)

Section B continues over the page.
**Section A (continued)**

**Question 4** – This question assesses Criteria 2 and 3.

Figure 3 shows the plan and side view of three poles A, B and C joined by wires at their tops, erected on a horizontal surface and arranged at the vertices of an equilateral triangle. Poles B and C are each supported by two wire stays, with tensions as shown.

Graphically determine the direction and tension in a single supporting stay off Pole A to stabilise the whole structure.

![Figure 3](image-url)
Question 5

An ellipsoid is a solid generated when an ellipse is rotated around its minor or major axis. Any planar section cut at right angles to either axis of an ellipsoid is therefore circular.

Figure 4 shows an ellipsoid that has been generated by rotation around the major axis.

Construct the generating ellipse and draw the true shape of the section A-B.
Section B (continued)

Question 6

Figure 5 shows the lever mechanism used in bolt-cutters to develop a mechanical advantage to enable steel rod to be cut. A, B, C, D and E are pivot points.

Graphically determine the mechanical advantage of the mechanism (i.e. the distance the end of the handles $H_1$ and $H_2$ moves divided by the consequent movement of the end of the jaws $J_1$ and $J_2$).
Section B (continued)

Question 7

The steepness of a ramp is usually defined as a ratio. For example a 1:1 ramp is inclined at 45°; a 1:6 ramp rises 1 metre vertically for every 6 metres horizontally.

The maximum steepness allowed for a ramp giving wheelchair access is 1:14, with a minimum width of 1.2 metres.

Figure 6 shows the plan and elevation of a ground floor space with a mezzanine floor one metre above the ground floor.

Design a ramp of minimum size that will allow wheelchair access from the ground floor to the mezzanine.

Figure 6
Answer **ONE** question from this section.

This section assesses **Criteria 2 and 3** weighted 4:1 respectively.

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**Question 8**

A cylindrical flue (chimney) intersects the ridge of a pitched roof, as shown on the end view in Figure 7.

The flue is to be cut and rolled to shape from a flat sheet of stainless steel.

Draw the shape that has to be cut from the sheet of stainless steel to make the flue.

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**Figure 7**

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Section C continues opposite.
Section C (continued)

Question 9

Figure 8 shows the top and side views of a plan that will be used to make a dinghy from four flat plywood sheets cut to shape, then attached to each other at the corners using wire ties and finally fastened using fibreglass reinforcing.

Develop the true shape of one of the side panels.

Figure 8
Section C (continued)

Question 10

Figure 9 shows the plan and side view of a four panel dome tent.

Draw the auxiliary view of the tent looking from the south-west and develop one panel of the tent.

![Figure 9](image-url)
This question paper and any materials associated with this examination (including answer booklets, cover sheets, rough note paper, or information sheets) remain the property of the Tasmanian Qualifications Authority.