Tasmanian Certificate of Education

TECHNICAL GRAPHICS

Senior Secondary

Subject Code: TEG315110

External Assessment

2013

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**.

Figure 1 shows the front and side views of a tetragonal sphenoid shaped crystal, which occurs in nature.

Draw the true shape of one crystal face.

![Figure 1](image)

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

Draw an isometric view of the tetragonal sphenoid crystal shown in Figure 1.
Question 3 – This question assesses Criteria 2 and 3.

Figure 2 shows the side and end views of a winch drum with a short length of wire still attached.

Graphically determine the length of wire and the number and direction of rotations of the winch needed to completely unwind the wire.
Section A (continued)

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

Figure 3 shows the plan of a transmission tower supported by three cables that are each anchored to the ground 50 metres from the tower. The tensions are indicated on all three cables.

Graphically determine the tension in, and the direction of, a fourth cable anchored on the same circumference in order for it to stabilize the tower.

![Figure 3](image.png)
SECTION B

Answer ONE question from this section.

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

Question 5

Figure 4 shows an elliptical prism that has been cut by a cutting plane A - B.

(a) Draw the true shape of the cut surface.

and

(b) Develop the surface of the lower part of the prism.
Section B (continued)

Question 6

Figure 5 shows a grid map of a horizontal land surface.

Shown on the map are:

- a line, called an outcrop, that represents the intersection of a planar layer of limestone rock with the land surface. The limestone angles downwards to the south-east at an angle of 45°.

- five drill holes A, B, C, D and E that have been drilled vertically downwards and intersect a fault plane (planar crack in the rocks). The depths from the surface at which the plane has been intersected by the drill are indicated.

Rich tin minerals have formed along the line where the fault intersects the limestone.

Graphically determine where the intersection of the limestone and the planar crack meets the surface.

Figure 5
Section B (continued)

Question 7

Figure 6 shows the side and end views of the drum of a cement mixer attached to two planar vertical supports at both the ends and the sides.

Choose a suitable scale and complete the side view showing the intersection between the vertical side support and the mixer drum.

Figure 6
SECTION C

Answer ONE question from this section.

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

Question 8

Design an apparatus that, by turning the lever as indicated in Figure 7, will lift the platform 500 mm vertically.

Freehand sketch the apparatus and show how your design will achieve the vertical lift.

![Figure 7]

Section C continues opposite.
Section C (continued)

Question 9

Answer either (a) or (b) but NOT both:

(a) Figure 8 shows the front and side views of a cylindrical wheel which rolls clockwise on an axle along a horizontal bearing surface towards an opening.

Graphically determine whether or not the spigot A will pass through recess B in the opening.

![Figure 8](image)

Or:

(b) Figure 9 shows the end view of two cylinders sitting on a flat surface. Commencing at the same time they are rolled towards one another, with the same rate of rotation (i.e. same angular velocity).

Determine the point on the flat plane vertically below their point of contact.

![Figure 9](image)

Section C continues over the page.
Section C (continued)

Question 10

A cutting plane passes through points A, B and C on the corners of a regular pentagonal prism, as shown in Figure 10.

Graphically determine where the plane will cut the other two corners, and draw the true shape of the cut plane.

Figure 10