

**UNIVERSITY OF MALTA**  
**THE SECONDARY EDUCATION CERTIFICATE**  
**EXAMINATION**

**GRAPHICAL COMMUNICATION**

**MAY 2011**

**EXAMINERS' REPORT**

**MATRICULATION & SECONDARY EDUCATION**  
**CERTIFICATE EXAMINATIONS' BOARD**

**SEC GRAPHICAL COMMUNICATION  
MAY 2011 SESSION**

**EXAMINERS' REPORT**

**Administration.**

*The board was presented with all the scripts in order, this is very much appreciated and wish to thank the Examination Officers for their co-operation. Nearly all candidates presented the A3 drawing paper neatly folded with page one on the front.*

**General Comment**

*The examination consisted of two papers, paper 1 and paper 2, each of two hours duration. Paper 1 was common to all candidates. As stipulated in the syllabus, questions in paper 2A were more difficult than those set in paper 2B. Some candidates who chose to opt for paper 2B were well prepared and could have taken the option to sit for paper 2A.*

*Candidates are again reminded to read questions thoroughly before attempting to answer the questions.*

*Candidates are continually reminded, to leave sufficient construction lines visible; to give a clear indication of the geometrical construction adopted to solve the problem. Although every possible effort is made by the examiners to identify constructions, marks can only be awarded if construction lines are visible.*

**Part 1. Statistical Information**

The tables below show the distribution of grades for the May 2011 session.

**Distribution of Grades**

**Table 1: Graphical Communication**

<b>Grade</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>U</b>	<b>Abs</b>	<b>Total</b>
<b>Paper1&amp;2A</b>	38	68	89	99	83	-	-	63	4	444
<b>Paper1&amp;2B</b>	-	-	-	13	51	37	32	42	17	192
<b>Total</b>	38	68	89	112	134	37	32	105	21	636
<b>%</b>	6	10.7	14	17.6	21.1	5.3	5	16.5	3.3	100

## Paper 1

### Question No.1 (Ellipse)

In this question the candidates were asked to complete the profile of a swimming swan. The head and neck of the swan were already drawn while the remaining part, which consisted of a part ellipse, a tangential arc and a tangential line, had to be constructed.

A considerable number of candidates attempted this question successfully, however, others lost marks due to the following reasons:

- a) The part ellipse was not constructed and was either drawn as an arc by means of compasses or worse, was drawn freehand. The instructions were clear, the ellipse had to be constructed by any approved recognized method and no form of approximate method was accepted.
- b) The focal points were not located.
- c) The tangent at point P, to represent the swan's tail, was drawn with no apparent construction. Candidates either drew a line parallel to the tail from the given figure or drew the tail freehand. In both cases no marks were awarded. Other candidates took the unnecessary task of constructing a normal and a tangent whereas they could have constructed a tangent straightaway by bisecting the exterior angles.
- d) The normal to the ellipse at point Q, on which the semi circle tangential to the ellipse was to be constructed, was drawn without construction and the candidates simply joined point Q to point R.

The table below shows the performance of candidates regarding this question.

	0	1 to 4 marks	5 to 9 marks	Full marks
Paper 2A	0.5 %	11.5 %	57.0 %	31.0 %
Paper 2B	1.6 %	40.3 %	43.8 %	7.5 %

### Question No.2 (Tangential arcs)

In this question the candidates were tested for their ability and skill to handle compasses accurately and for their knowledge of the principles of tangency. Part of the profile of a cartoon elephant was given and the remaining part, which consisted of blended arcs and tangential lines, was to be constructed geometrically. Most candidates attempted this question although only a few managed to attain full marks. The following are the main hitches that cost candidates valuable marks:

- The two tangential lines, a tangent from a point outside and an internal tangent to two circles of different diameter, were not drawn by construction. Most of the candidates simply copied the angle of the tangent from the given figure.
- The centre of R70, which was supposed to lie on the extended normal PC, was erroneously located in other positions causing the back of the elephant to take a variety of postures.
- The centre of blending arc R12 was frequently found by trial and error. On close inspection, the area around the centre was found to be perforated by a substantial number of compass holes.
- The outline of the profile was lined in freehand by means of a dark pencil, giving the finished work a very untidy appearance.
- Construction lines were erased. Candidates are to leave constructions visible as these provide evidence of their work and, more importantly, translate into marks.

	0	1 to 6 marks	7 to 14 marks	Full marks
Paper 2A	0.5 %	9.0 %	89.0 %	1.5 %
Paper 2B	2.8 %	15.8 %	80.9 %	0.5 %

### Question No.3 (Plane Geometry)

This question tested the candidates' knowledge of the principles of plane geometry. Starting from a given isosceles triangle ABC, (sides AB and BC being also sides of a regular pentagon), the candidates were asked to circumscribe the triangle and proceed to complete the pentagon. They were also asked to draw extended radials from centre O to the corners of the pentagon and escribe five arcs to produce a geometric logo. Only a small percentage of the candidates managed to attain maximum marks in this question. The following are frequent shortcomings which are worth noting:

- The centre of the circumscribed circle was found by trial and error.
- In some cases, the compass work necessary to bisect the sides of the triangle was, either inaccurate with thick and bold construction arcs or, so faint that they were invisible to the naked eye. As emphasized earlier, the constructions should be neat, faint but clearly visible.
- Most of the candidates located the centres of the escribed arcs by trial and error. Only a few candidates succeeded in locating the centres by using acceptable geometric methods.

	0	1 to 6 marks	7 to 12 marks	Full marks
Paper 2A	1.5 %	20.0 %	72.0 %	6.5 %
Paper 2B	12.0 %	43.5 %	44.0 %	0.5 %

**Question No.4 (Linear Enlargement)**

In this question the candidates were asked to enlarge geometrically the profile of a given keyhole plate. Most candidates managed to enlarge the outside profile of the shaped plate successfully, however only a small percentage managed to enlarge the keyhole correctly. The following is a list of errors which is worth noting:

- a) The dimensions of the enlarged figure were calculated mathematically i.e. without the necessary radial lines radiating from the pole in the centre of the keyhole.
- b) The keyhole was either enlarged freehand or was not enlarged at all. Only a few candidates managed to find very interesting geometric solutions to the problem. (This part of the question tested the problem solving skills of the candidates).
- c) Some candidates misread the question and produced only the right hand half of the solution.

	0	1 to 7 marks	8 to 13 marks	Full marks
Paper 2A	3.0 %	26.2 %	66.0 %	4.8 %
Paper 2B	18.8 %	48.0 %	33.2 %	0 %

**Question No.5 (Sectional Orthographic View)**

Two pictorial and two orthographic views of a bracket were given, the candidates were asked to project a sectional end elevation. Most candidates attempted this question but only a few attained full marks. The most common errors committed by the candidates were:

- a) Incorrect orientation of the mirror line. This error resulted in a mirror image of the end elevation or better still a 3<sup>rd</sup> angle projection while the given two views were projected in 1<sup>st</sup> angle projection.
- b) Misinterpretation of the counter bore. Although this detail was clearly indicated in the given pictorial views and in the plan view, the vast majority of the candidates mistook the counter bore for a bush.
- c) Incorrect sectioning of the web. A considerable number of candidates lose substantial marks when they confuse the regulations concerning the sectioning of webs. Webs are not shown sectioned when these are cut along their axis. It is only when the web is cut across the axis that it is shown sectioned.

	0	1 to 7 marks	8 to 13 marks	Full marks
Paper 2A	4.1 %	19.8 %	70.7 %	5.2 %
Paper 2B	15.5 %	44 %	38.3 %	2.3 %

**Question No.6 (Isometric Projection)**

Three orthographic views of a toy piano were given, from which the candidates were asked to draw an isometric view. This question tested the candidates' spatial visualization ability and their ability to transfer measurements. Most of the candidates attempted this question but only a small percentage attained full marks. The following is a list of frequent errors, which were noted:

- a) Incorrect crate dimension or no crate at all. The given orthographic views were full size and the candidates had to pick measurements from the given views.
- b) Isometric arcs drawn freehand without any construction.
- c) Isometric arcs drawn by construction, but construction lines were erased. As emphasized earlier, it is worth noting that marks will be lost when construction lines are not left visible.
- d) Incomplete work. A substantial number of candidates did not manage to complete this projection, maybe because it was one of the questions at the end. Being one of the last questions could be one of the main reasons why a substantial number of candidates did not manage to complete this projection. In some cases it was evident that candidates spent a lot of time to complete the first questions and had little time left to complete the last questions; better time management is recommended.

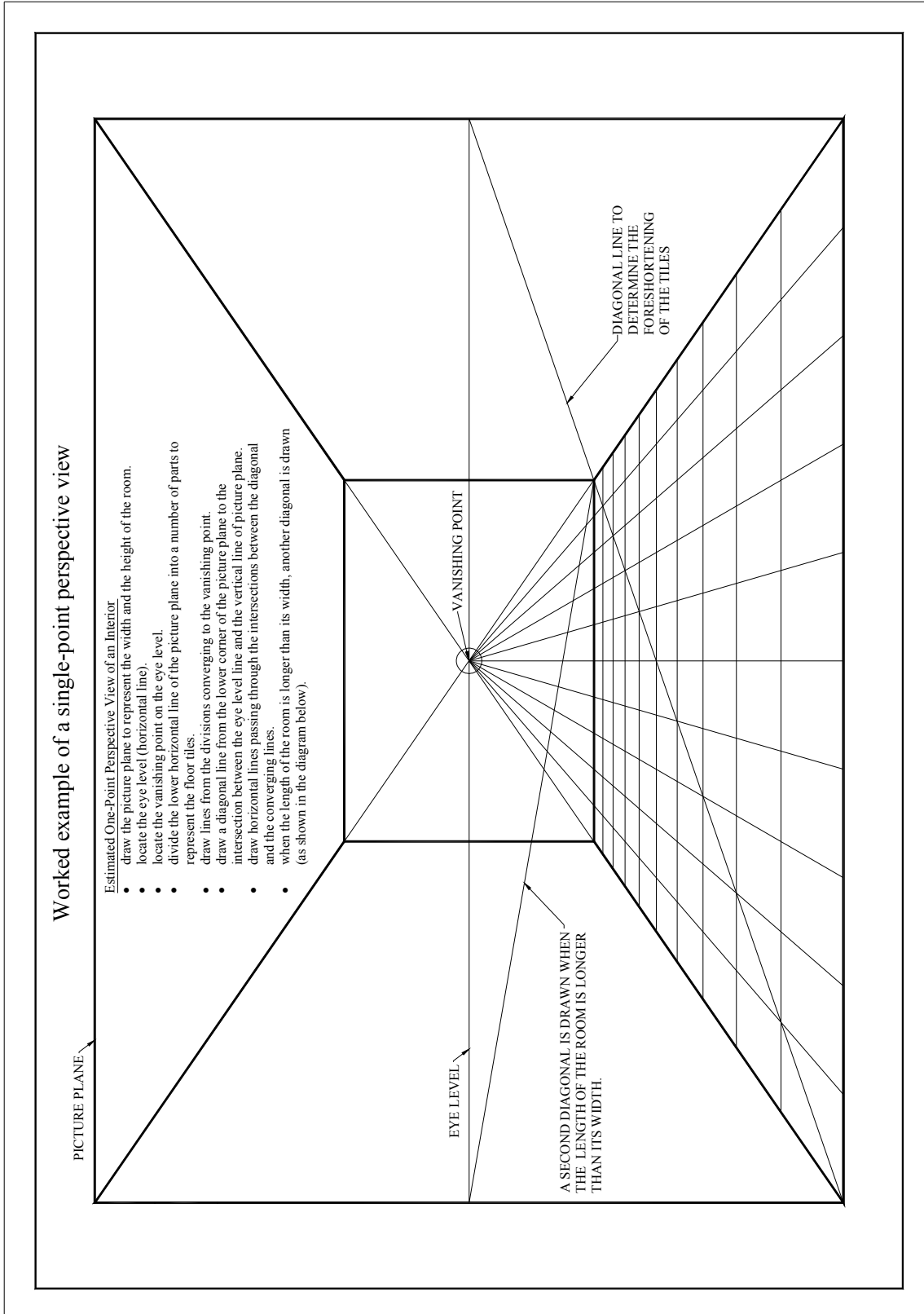
	0	1 to 7 marks	8 to 15 marks	Full marks
Paper 2A	2.3 %	49.1 %	46.8 %	2.0 %
Paper 2B	10.2 %	76.3 %	13.2 %	0 %

### Question No.7 (Two-Point Perspective)

A pictorial and two orthographic views of a bus shelter were given, from which, the candidates were asked to project a two-point perspective view. The vanishing points and the crate, with the front vertical height divided into 16 equal divisions, were also given. Most candidates attempted this question but only a few obtained full marks. In general, the candidates used three different methods to project the perspective drawing (measuring point method, diagonal method and the artistic method) and the methods tended to be clustered in centres. The following are the most common shortcomings noticed:

- a) Some candidates ignored the given crate and produced their drawing either larger or smaller than the already foreshortened crate.
- b) Most of the candidates, who adopted the measuring point method correctly, obtained very good marks. Other candidates obtained poorer results because they decided to place the measuring point on the top of the crate instead of on the eye-level line. (*Refer to Annex D of the Sec Syllabus-attached*) Evidently, the latest perspective drawing methods, which were discussed and approved during the September 2008 In-Service Course are still unknown to a substantial amount of candidates. These perspective methods are described in detail on the Graphical Communication website <http://graphicalcommunication.skola.edu.mt/>. **To improve the dissemination of information regarding the latest perspective drawing methods, further worked examples have been added to Annex D of the SEC Syllabus. These examples are also being attached to this report.**
- c) Nearly 20% of the candidates were unaware of the fundamental principle of perspective drawing that, as an object recedes towards a vanishing point it appears to get smaller. These candidates divided the orthogonals of the crate into equal parts (to represent the bench supports and the wall thickness), which is a completely wrong practice.
- d) Despite the 16 given divisions a number of candidates found difficulty in representing the inclined top, ceiling and the platform of the bus shelter.
- e) Although it was given in the pictorial and end views, a considerable number of candidates did not represent the glass ISO/EN conventional symbol.
- f) A number of candidates did not complete the projection apparently due to bad time management and lack of revision practice.

	0	1 to 9 marks	10 to 17 marks	Full marks
Paper 2A	2.3 %	32.7 %	60.0 %	5.0 %
Paper 2B	8.0 %	55.2 %	36.2 %	0.6 %



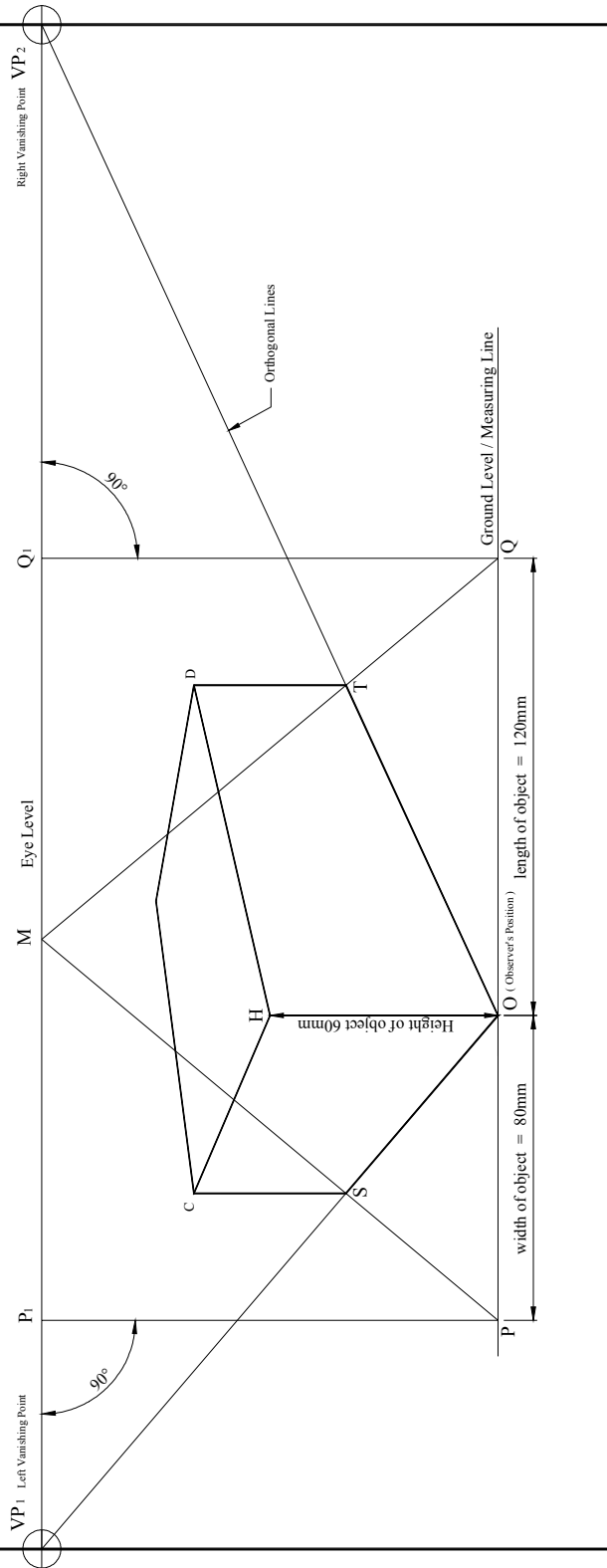
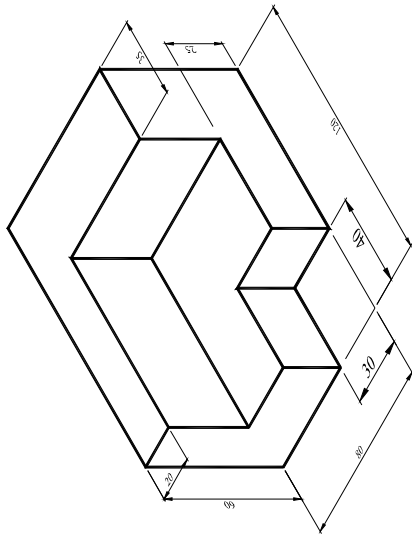


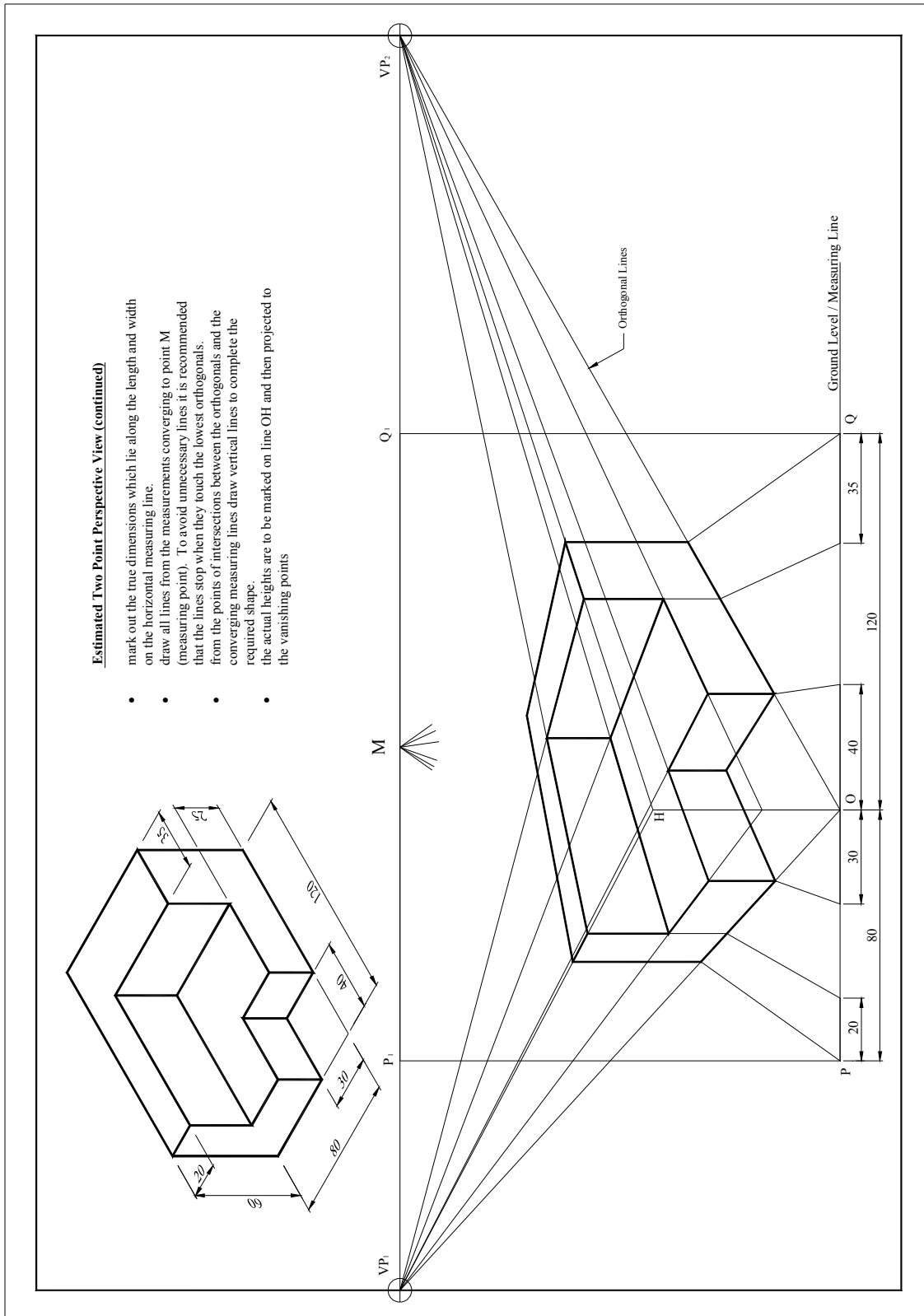
Estimated Two-Point Perspective View

Given: the vanishing points  $VP_1$  and  $VP_2$ ; point 'O' (starting point); length, height and width of object

To draw a crate in estimated perspective

- draw a horizontal line joining  $VP_1$  to  $VP_2$  thus finding eye level;
- mark actual width and length of the object on the horizontal lines  $OP$  and  $OQ$ ;
- draw two perpendicular lines  $P_1P$  and  $Q_1Q$  on the eye level line;
- bisect distance  $P_1Q_1$  to locate mid-point  $M$ ;
- join  $M$  to  $P$  and  $M$  to  $Q$  to obtain the foreshortened lengths  $OS$  and  $OT$ ;
- then  $OT$  represents the perspective length of the crate while  $OS$  represents the perspective width of the crate;
- mark actual height of the object  $OH$ ;
- complete the crate by projecting the lines to the given  $VP$ 's.





## Paper 2

### Question 1

A cabin cruiser being towed in a dock by means of four cables was shown in figure 1. The cables were shown at a specified angle with the direction and magnitude of each force clearly stated. Candidates had to draw a polygon of forces using the given scale and draw the fifth line to read from it the magnitude of the resultant force. Furthermore they were asked to write down in the space provided the magnitude and direction of the resultant force.

In paper 2B the cabin cruiser was shown being towed by three cables.

There were many candidates who copied the lines representing the cables using the correct scale and parallel but emerging from a single point. The resultant was drawn pointing to the opposite direction. Some candidates managed to complete the polygon but the end result was incorrect since one or more of the forces were not drawn to scale or not drawn parallel to the given figure. There were slight inaccuracies in the written result of the magnitude. In some cases the written answer for the angle of inclination was written as  $180^\circ$  even though the drawn answer was  $0^\circ$  to the horizontal

	0	1 to 4marks	5 to 9 marks	Full marks
Paper 2A	2.5 %	10.9 %	48.9 %	38.0 %
Paper 2B	22.5 %	34.8 %	28.4 %	14.5 %

### Question 2

Short instructions and a printed grid were presented. Candidates were to follow the given instructions and create an image of a label by drawing nine straight lines forming the outline of the label using four different colours. The image of the label is normally found on clothes guiding customers “not to iron the item”. This question was well received and understood by most of the candidates. Some candidates filled the entire shape with colour rather than using the appropriate colour for just the lines.

In paper 2B the image of the label was to be drawn with seven lines and three colours. The label indicated that the item was to be ironed at a normal temperature.

	0	1 to 6marks	7 to 11 mark	Full marks
Paper 2A	3.6 %	8.6 %	23.1 %	65.0 %
Paper 2B	18 %	21.5 %	23.8 %	37.6 %

### Question 3

Candidates were to use their imagination and create a logo reminding workers with long and loose hair not to operate machinery. Preliminary brief sketches were requested, indicating the relevant ideas and design of such a safety sign. The finished sign was to be neatly drawn using the proper colours to conform to health and safety regulations. Not a popular question, in fact very poor solutions were presented. A common mistake was that of drawing a scene instead of a pictogram and including words in the design. The colours used did not conform to the specified health and safety regulations.

The logo in paper 2B was to remind workers that they were not to operate machinery with loose neck- ties/scarfs.

	0	1 to 6marks	7 to 11 marks	Full marks
Paper 2A	1.6 %	23.2 %	69.7 %	5.4 %
Paper 2B	0.6 %	12.8 %	71.5 %	15.6 %

### Question 4

A side view of a typical Maltese boat was shown. The top profile of the boat was formed by two curves joined together by a straight line in between. Both curves were of cycloidal form. A similar but larger incomplete figure of the boat was printed with the top curve missing. Candidates had to complete the drawing of the boat by constructing a half cycloid at the right-hand side and a part cycloid at the left-hand side of the figure. The two curves were to be joined together by a short straight line to complete the diagram. Quite a good number of candidates successfully constructed the cycloid accurately and attained full marks. Some candidates joined the cycloidal curve as if it were a simple harmonic motion curve. A few candidates worked the question as if it was some form of mechanism.

In paper 2B a sketch of an arch was given, stating that the curve of the arch adopted the form of a cycloid. Candidates were to complete the drawing by constructing the cycloid, on the start line and using the given circle printed below the question. The length of the straight line was in many cases not equal to the circumference of the rolling circle. The intersection of the arcs of the rolling circle with the horizontal lines were not correctly plotted. The use of bold lines for the construction of the cycloid rendered an untidy presentation.

	0	1 to 7 marks	8 to 13 marks	Full marks
Paper 2A	4.8 %	37.3 %	21.6 %	36.3 %
Paper 2B	9.3 %	52.3 %	30.2 %	9.3 %

### Question 5

An illustration of a cat resting in a empty box was shown. The rectangular box had a round opening at one of the corners which served as an entrance.

The plan and end view of the rectangular box were printed in first angle projection. A semi-circle in the end view represented the opening situated in the corner of the box. Candidates were requested to:-

- a) complete the front view by showing the outline of the box together with the curve of intersection formed by the semi-circular hole.
- b) draw the two sides of the box showing the true shape of the hole forming the entrance.

A good number of candidates seemed to solve the problem, by working and solving the problem, by assuming the box to be a rectangular prism penetrated by a right cylinder. These candidates managed to attain full marks. Some candidates presented the front view and development of the two sides of the box leaving out the profile of the opening representing the entrance. The profile of the opening was in some solutions represented by ellipses using the concentric circle method. The curve of intersection in the front view and the true shape of the opening on the development were in some cases substituted merely by semi-circle/circles. Some did not bother to solve the problem but merely drew a free hand curve on the front view and on the development.

In paper 2B the entrance to the cat's rectangular box was formed by a semi-octagonal shaped opening. Only a few candidates managed to present an adequate solution. The majority of the candidates presented a few lines answering only a part of the question requested. When confronted with similar problems, candidates seem to have the tendency to draw a series of bold lines haphazardly, without any sense of construction.

	0	1 to 7 marks	8 to 15 marks	Full marks
Paper 2A	7.3 %	35.5 %	40.7 %	16.5 %
Paper 2B	30.8 %	36.6 %	36.5 %	5.2 %

### Question 6

An exploded isometric projection showed how a jewel was securely and neatly seated in a holder in a jewelry shop window. This illustration served to help candidates visualize and understand the problem quicker. The shape of the jewel was similar to two square pyramids joined together at the base. The lower tapering part of the square pyramid was seated in the recess of a right cylinder. The whole arrangement was printed full size in first angle projection. The front view included a section plane passing through the cylinder and the square pyramid, leaving half of the top part of the cylinder untouched and partially cutting the lower square pyramid. The plan was to be completed by the candidates. In the second part of the question, candidates had to present a true shape of the outer profile formed by the inclined plane on the cylinder, and the inner profile receiving the jewel. In the third part of the question, candidates had to draw the surface development of the square pyramid, showing how the section plane passed through it. Very few candidates managed to attain full marks in the first part of the question, some

omitting the inner profile completely. In the third part of the question, many candidates constructed the surface development of the square pyramid without finding the true length of the slant height. This is becoming a recurring mistake. Whenever a question regarding the development of a cone or a pyramid is set, the proper method of constructing the surface development is not adopted. In order to draw a development of the cone or a pyramid, the true length of the slant height must be first constructed. This important procedure is very often neglected. This is not a popular question. Similar comments may be applied to Paper 2B in which the candidates were only asked to project the true shape and the surface development.

	0	1 to 8 marks	9 to 17 marks	Full marks
Paper 2A	7.5 %	66.1 %	25.5 %	0.7 %
Paper 2B	27.8 %	65.3 %	6.9 %	0 %

### Question 7

A front and end elevation of an anchor were printed in first angle projection. Candidates were to draw an auxiliary projection of the anchor in the direction stipulated. Even though the words in the direction of the arrow 'A' were included, some candidates ignored this statement and the sign completely, and presented an auxiliary view from the opposite direction. Many candidates successfully presented the auxiliary projection of the anchor without including the thickness of the anchor. Others presented the thickness of the anchor incorrectly. Some candidates forgot that the line representing a circle ought to be represented by an ellipse in the auxiliary projection. The top hook of the anchor was in many cases represented by two concentric circles. In previous reports it was suggested that candidates must work similar exercises during the year, dealing with auxiliary projection. Some candidates showed that they were not familiar with the auxiliary projection method, for they drew a series of vertical construction lines on the two given elevations. Candidates presenting a free hand sketch instead of the projection requested were not awarded marks. The attention is drawn to candidates that, when working exercises of this kind, they must be careful not to draw too many horizontal lines on the given views. This will obviously present an accurate projection but takes a considerable amount of time to accomplish.

	0	1 to 8 marks	9 to 17 marks	Full marks
Paper 2A	2.1 %	31.2 %	58.2 %	8.5 %
Paper 2B	14.5 %	50.9 %	33.5 %	1.1 %