

**UNIVERSITY OF MALTA**

**SECONDARY EDUCATION CERTIFICATE  
SEC**

**GRAPHICAL COMMUNICATION  
May 2013**

**EXAMINERS' REPORT**

**MATRICULATION AND SECONDARY EDUCATION  
CERTIFICATE EXAMINATIONS BOARD**

## SEC EXAMINERS' REPORT MAY 2013

### SEC Graphical Communication May 2013 Session Examiners' Report

#### Administration

A word of praise and thanks goes to the Examination Officers, invigilators and all those concerned with the running of these examinations, for their co-operation. Nearly all the A3 drawing papers were presented in the correct manner, with the exception of a few scripts. The drawing sheet may be folded as required and clipped to the drawing board, without being cut. A lot of time is wasted, by the administration, to rectify this error, if this instruction is not adhered to. The candidate is to present the drawing paper with the solutions, to the invigilators with page one on the FRONT in one pack.

#### General Comment

Candidates must be well prepared for both paper one and paper two, each of two hours duration. In general candidates seemed to be more prepared for paper two and less prepared for paper one, which was common to all candidates. The use of colour on paper two is to be encouraged, especially when it is used in a functional rather than a decorative way. When candidates are instructed to use colour they have to be careful when answering questions dealing with Safety signs, Prohibition signs, Mandatory signs and Warning signs to use the appropriate colour specified by standards authorities.

The difference in performance between paper 2A and paper 2B was very well marked. It was obvious that many candidates opting for paper 2B were ill-prepared for the examination, while a few of the candidates, who opted for paper 2B could have easily answered the questions set in paper 2A.

The note, which was continually repeated, to leave sufficient construction lines visible giving indication of the geometrical construction adopted to solve the problem, was observed by many of the candidates. Most candidates clearly showed constructions and also showed a good differentiation between construction lines and final lines. It was noted that the less able candidates tended to erase their construction lines completely and presented only the final solution, leaving the markers to sort out and identify constructions on how the answers were obtained.

#### Part 1: Statistical Information

The tables below show the distribution of grades for the May 2013 session.

GRADE	1	2	3	4	5	6	7	U	ABS	TOTAL
PAPER A	35	63	77	98	85			55	6	419
PAPER B				13	46	33	29	40	8	169
TOTAL	35	63	77	111	131	33	29	95	14	588
% OF TOTAL	5.95	10.71	13.10	18.88	22.28	5.61	4.93	16.16	2.38	100

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### Part 2: Comments regarding candidate's performance

#### Paper 1

##### Question No.1 (Ellipse)

In this question the candidates were tested for their knowledge about geometric construction of the ellipse and the normal. Candidates were expected to complete the profile of a helicopter by constructing a part ellipse using a major axis of 130mm and a given half minor axis. They were also asked to locate the focal points and construct a normal at a given point. Candidates were also instructed to construct an arc using the normal, passing through a given point and complete the requested profile.

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

- a) Some candidates opted to plot the left hand semi ellipse, and draw freehand the additional point from the vertical centre line to point R.
- b) Candidates did not locate the focal points correctly.
- c) The normal at point R was drawn with no apparent construction. Candidates just extended the given short dash R.
- d) The curve on the ellipse was not drawn smoothly; in fact in many cases the curve was drawn with several inaccurate dark strokes from one point to another.
- e) When constructing the ellipse, some candidates marked the intersecting lines with a crude cross instead of a neat dot, thus rendering the construction untidy.

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

	0 marks	1 to5 marks	6 to11 marks	Full marks
PAPER 2A	0	42	244	127
PAPER 2B	27	28	84	22

##### Question No. 2 (Tangential arcs)

In this question the candidates were tested for their knowledge in tangential arcs (touching circles), their ability and skill to handle compasses accurately and their knowledge on tangents. The candidates were instructed to complete the profile of a model aircraft composed of straight lines and arcs. Candidates had to draw four R10 circles on the given centre lines and to construct internally and externally touching circles (blending arcs). Candidates were also asked to draw an internal tangent between two unequal circles.

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

- a) The R10 circles were not drawn accurately. Some candidates also drew arcs made from several dashes, oval curves and freehand circles.
- b) Candidates did not know how to construct neither externally nor internally touching circles. Several candidates tried to locate the centres of blending arcs using trial and error methods, which are unacceptable.
- c) Candidates did not know how to construct an internal tangent to two unequal circles.
- d) Some candidates completed correctly all the necessary constructions and arcs by means of compasses however they chose to line in freehand the complete profile by means of a dark pencil. This practice is not recommended as it ruins the finishing of the drawing.

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

	0 marks	1 to 5 marks	6 to 10 marks	Full marks
PAPER 2A	1	37	328	47
PAPER 2B	5	42	113	1

### Question No. 3 (Polar enlargement)

The front grill of a jeep was given and the candidates were required to enlarge the drawing by means of the polar method. This question tested the candidates' knowledge of the polar enlargement method, their accuracy, their pencil pressure control and their problem solving skills. The majority of the students managed to attain a decent mark in this question however; there were some shortcomings, which are worth mentioning so that these can be avoided by prospective candidates:

- Some candidates opted to scale the drawing by using a mathematical method, leaving the calculations visible, when it was clearly stated that the problem had to be solved graphically by means of the polar method.
- Other candidates were so careful to conceal their constructions that at first glance the solution appeared to be mathematical. It was only after a close inspection by means of a magnifying glass that short dashes of construction lines were noticed. It is to be emphasized that construction lines are an integral part of the solution and no attempt is to be made to hide or conceal them.
- On the other hand, there were some other candidates who used bold lines throughout the whole solution making no distinction whatsoever between outlines and construction lines.
- Some candidates misunderstood the question and just reflected the given front grill.
- The trickiest element of this question was that of locating the centres of the indicator holes. Some candidates came up with creative methods to locate the coordinates of the centres. Most others, however, used the trial and error method with no apparent construction.

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

	0 marks	1 to 5 marks	6 to 11 marks	Full marks
PAPER 2A	8	42	275	88
PAPER 2B	15	32	107	7

### Question No. 4 (Diagonal scale)

In this question the candidates were asked to construct a diagonal scale and use it to complete a drawing of a scaled down side elevation of a jeep. Only a few candidates managed to attain a decent mark in this question. A high percentage of the candidates did not even attempt it, while others tried to solve the problem mathematically while a few others seem to have remembered parts of the method but missed some key steps which derailed their solution finding process.

Some of the candidates who attempted this question, presumed that the height of a diagonal scale is functional and spent much time in dividing a pre-determined height when any vertical divisions would suffice.

The statistics shown below clearly indicate that this topic, 'Diagonal Scales' was not widely understood, presumably not covered at all or not properly studied.

Apparently, since this topic rarely featured in past examinations, it might be that most candidates decided not to revise it. It is important that no chances are taken and all topics included in the SEC 029 syllabus are covered and revised properly.

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

	0 marks	1 to 6 marks	7 to 13 marks	Full marks
PAPER 2A	54	333	25	1
PAPER 2B	36	122	3	0

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### Question No. 5 (Sectional Orthographic Views)

This question tested the candidates' understanding of the principles of orthographic projection and their knowledge about sectioning regulations. The candidates were given a plan and an end elevation of a cast iron bracket in third angle orthographic projection. They were also given a pictorial view to help them visualize the casting. The candidates were asked to project a sectional front elevation. The plane of the section was indicated by cutting plane X-X in the plan. Candidates were instructed to draw the symbol of the projection used. Most candidates attempted this question and there were some who managed to attain full marks, however, others lost marks due to the following reasons:

- a) The regulations regarding sectioning were not followed. Thin lines drawn preferably at  $45^\circ$  and touching the outline should show a sectioned part. The lines should be equally spaced.
- b) The regulations regarding the sectioning of webs and ribs still confuse a significant number of candidates. These candidates are unaware of the rule that a web/rib is not hatched when the cutting plane is along its axis and hatched when the cutting plane is across its axis.
- c) Misinterpretation of the counter bore. Several students mistook the counter bore for a bush.
- d) Candidates did not use centre lines neither in the middle of the hole nor to show the small hole behind the hatching lines.

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

	0 marks	1 to 6 marks	7 to 13 marks	Full marks
PAPER 2A	12	91	289	21
PAPER 2B	14	77	67	3

### Question No. 6 (Planometric)

This question tested the candidates' ability to apply the principles of orthographic projection in a pictorial projection. Two orthographic views of an octagonal sewing organizer in first angle orthographic projection were given, from which the candidates were asked to draw a  $60^\circ/30^\circ$  planometric projection. They were instructed to start by drawing the planometric crate, followed by the construction of the top octagonal shape, clearly indicating the method used. Candidates had to complete the octagonal prism and the internal compartments given a material thickness of 5mm throughout.

Most candidates attempted this question with a reasonable degree of success. There were some who managed to attain full marks, while others lost marks due to the following reasons:

- a) Candidates did not know how to construct an octagon in a square or an octagon given the distance across the flats.
- b) Inaccurate dimensions mostly in small measurements like the material thickness.
- c) When the axes of the planometric is  $60^\circ/30^\circ$ , the height should not be reduced.

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

	0 marks	1 to 8 marks	9 to 17 marks	Full marks
PAPER 2A	17	126	244	26
PAPER 2B	35	74	51	1

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### Question No. 7 (Single-point perspective)

Two orthographic views and an isometric view of a waiting room were given. The candidates were asked to complete an estimated single-point perspective view of the room. This question tested the candidates' knowledge on the rules of perspective drawing, their pencil control skills and their visualization skills.

This was quite a popular question with a considerable number of candidates attaining a respectable mark. The first major task the candidates had to do was to construct the floor tiles. Only the front left-hand corner tile was given, but this was enough since a diagonal drawn across the corners of the tile and extending towards the vertical right-hand side of the picture plane, would determine the foreshortened dimensions of the receding tiles. Once the floor tiles were completed, the furniture could be located as per the information conveyed in the given views. The construction of the diagonal was made by the majority of the candidates however; there were some candidates who divided the depth of the room by using the *division of a line* method, ignoring completely the rules of perspective. Other more cunning candidates tried to locate the rows of tiles by relating to the positions of the windows and the doors and dividing the spaces by means of diagonals. A few other candidates ignored the vanishing point completely and drew the receding edges of the tiles parallel. Most of the candidates who managed to construct the floor tiles correctly found little difficulty in drawing the furniture. The main shortcomings of the other candidates regarding the drawing of the furniture were in determining by construction:

- a) the height of the coffee table,
- b) the height of the sofa seats,
- c) the width of the sofa backs.

Most of the mistakes made by the candidates can be blamed on their lack of practice in perspective drawing.

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

	0 marks	1 to 8 marks	9 to 17 marks	Full marks
PAPER 2A	4	95	280	34
PAPER 2B	6	90	63	2

## Paper 2

### Question 1 ( Loci )

In this question candidates were tested for their knowledge of drawing the involute. In Paper 2A candidates were given the profile of a semi-cylinder and a starting point for the initial position of the end of the string. The semi circle had to be divided into six equal parts and normals drawn at each division. Tangents to these normals had to be drawn next and the correct length plotted on each tangent. The second part of the question required the use of compass to draw an involute to two quadrants. In Paper 2B, candidates were required to draw an involute from a quadrilateral resulting in a simplified profile of a bird.

A common problem encountered in both Paper 2A and Paper 2B was that of projecting the lines to the opposite direction. Although most candidates in Paper 2A successfully divided the semi-circle into six equal parts, some either abandoned the problem at that stage, or drew tangents as if the string was being unwound in a clockwise direction. Similarly, most candidates in Paper 2B projected the lines to the opposite direction from points B, C and D. This suggests a lack of understanding on how the string is being unwound from around the object, in such a practical example of an involute.

Another common problem in this question was that of not using the compass for drawing the quadrilateral involute (in the second part of the question of Paper 2A and also in the Paper 2B question). Some candidates successfully plotted the correct points of the involute but drew the

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curve freehand resulting in a somewhat inaccurate drawing. A small number of candidates did not plot any points, drawing a random curve, which did not gain them any marks.

	0 marks	1 to 4 marks	5 to 9 marks	Full marks
PAPER 2A	10	142	113	146
PAPER 2B	14	58	13	72

### Question 2. (Computer Graphics)

In this question candidates were given simple instructions and a printed grid to plot a geometric design. Both Paper2A and Paper 2B questions required knowledge of the MOVE and DRAW commands, however Paper 2A also tested understanding of the MIRROR command.

There were no problems in the use of correct colour, although a small number of solutions were depicted entirely in pencil.

A very good number of candidates successfully completed all the drawing albeit some small errors were made in locating the correct position of the variables. Candidates were not penalized again on mirroring the incorrect positions of these variables.

Some candidates did not attempt the question, a possible explanation being due to lack of time.

	0 marks	1 to 5 marks	6 to11 marks	Full marks
PAPER 2A	23	31	134	223
PAPER 2B	8	18	39	92

### Question 3. ( Safety signs )

The question dealt with hazardous signs requiring candidates to draw a preliminary sketch and a final drawing depicting the correct colours.

In Paper 2A, candidates needed to know the correct colours for hazard signs in accordance with approved conventions, i.e.: yellow background, black triangular border and black graphic symbols. The pictorial drawing given proved to be very helpful, hence the high marks scored in this specific question. Most candidates were able to get the message across and depict the concept. However marks were deducted where no instruments were used in drawing the pictogram resulting in the drawing looking somewhat sketchy. Marks were also deducted for incorrect use of colour.

Although there was a high overall score for this question in Paper 2B, there were the same common mistakes as in the Paper 2A question and also in the use of words and exclamation marks. Also, some candidates still chose the wrong colour even though they were clearly specified in the question!

	0 marks	1 to 5 marks	6 to11 marks	Full marks
PAPER 2A	0	17	326	68
PAPER 2B	2	9	114	32

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### Question 4. (True Lengths )

This question tested the candidates' ability to find true lengths and combine them to form the true shape.

Although some candidates scored high marks in this question, a considerable number of candidates showed a lack of basic understanding in finding true lengths. It seems that candidates knew that they have to rotate one of the lines but they had no knowledge on what to do next. Lines were either rotated vertically instead of horizontally or they extended the lines to the horizontal plane in one of the views. Students need a very thorough explanation and understanding of what is really happening when rotating lines in finding true lengths in order to retain their learning.

In Paper 2B, some candidates tried to construct the true shape of the lamina by projecting an auxiliary view from either the front or plan view. Marks were deducted because the true shape was completely left out, without even attempting it; which may have been the result of not reading the instructions properly.

	0 marks	1 to 7 marks	8 to 15 marks	Full marks
PAPER 2A	46	152	124	89
PAPER 2B	44	94	16	3

### Question 5 (Vectors)

This question represented a real life situation, of a pole with five cables attached. In paper 2A, five concurrent, co-planar forces were shown in equilibrium. The magnitude and direction of two of the given forces were not stated. Overall, the majority of the candidates understood the question, because vector diagrams were drawn correctly. The main observation was that some candidates confused the scale. In fact a number of vector diagrams were drawn half or twice the full size of that requested. Somehow this also affected the result written on the answer sheet. With regards to paper 2B question, a concrete block was shown suspended and held by three ropes. The diagram described completely the forces on two of the ropes and the direction of the third rope. Candidates were to draw a vector diagram to the quoted scale, read off and record from the diagram constructed the magnitude of the force on the third rope, and the magnitude of the force exerted by the block.

Overall, the majority had a good idea how to draw the vector diagram. Surprisingly, a good number left the vector diagram without direction arrows. Some of the candidates forgot to write the answer in the space provided. Solutions to paper 2B indicated that candidates were not familiar with scales, even though the scale to be used for this question was quoted.

	0 marks	1 to 6 marks	7 to 13 mark	Full marks
Paper 2A	17	65	145	184
Paper 2B	26	81	37	13

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### Question 6 (Auxiliary Views)

An isometric view together with two orthographic views of a lantern was presented in this question. In Paper 2A candidates were asked to produce an Auxiliary Elevation looking from the direction of the arrow A. The majority of the candidates knew the method to be adopted and drawing procedure required to solve the auxiliary elevation of the lantern given. Yet, only a few managed to finish all the drawing. Candidates must be careful when projecting the details given in the drawing, for altering and leaving out minor details will change the shape of the requested drawing.

With reference to the design at the sides, students who managed to finish the base properly even managed to draw the design at the sides with the rounded window. Regarding the top part of the lantern, there were a number of candidates who managed to project the necessary lines but failed to complete the top part resembling a square pyramid. This shows that a number of candidates didn't properly refer to the isometric pictorial which hinted a lot of detail. The majority of the candidates understood and managed to draw the handle of the lantern by using a number of generators. Some candidates surprisingly found difficulty in representing the thickness of the handle and did not succeed in presenting a complete and neat drawing of the auxiliary elevation.

Candidates answering paper 2B, had the same scenario, but the object in question was a traditional coffee grinder. The accompanying illustration seemed to be a great aid to the candidates, helping them start on a correct note. A good number of candidates encountered difficulties when representing the ellipse at the side and didn't manage to grasp where the ellipse is in the auxiliary elevation, presenting an incomplete view. On the other hand candidates managed to draw the hemi-sphere on the top lid and draw the spherical handle of the grinder to present the right solution.

	0 marks	1 to 8 marks	9 to 17 mark	Full marks
Paper 2A	4	117	254	36
Paper 2B	18	86	49	4

### Question 7 ( Intersection of Solids )

For paper 2A a pictorial view, a complete plan and end elevation were presented. The front elevation was to be completed by the candidate. The column of the podium was part of an octagonal prism piercing a curved plane surface. In part (a) of the question candidates had to use an acceptable construction to obtain the curves of intersection between the prism and the plane surface. In part (b) a surface development of panels marked A, B, and C had to be drawn. The majority of the candidates projected lines from the end elevation to the front elevation and also to the plan to construct the curves and line of intersection requested. Some presented an inaccurate curve drawn by trial and error. Others attempted this question without referring to the pictorial drawing, drawing the middle horizontal line of intersection. A few constructed the curve upside down. For the second part of the question, the majority of the candidates merely drew three rectangular shaped panels. The length of each side of the panel was not measured correctly, resulting in an incorrect development. A good number of the candidates did not include extra point to obtain an accurate and smoother curve. More concern should be given to folding lines because even the best candidates left folding lines out. Overall the majority answered this question correctly,

For Paper 2B a pictorial view of a barbeque grill was shown together with two complete views and a third incomplete view. The grill consisted of a semi-cylindrical drum resting horizontally on a vertical hexagonal prism. The curves and line of intersection between the semi-cylinder and prism were to be constructed in the first part of the question and the development in the second part of the question. Common mistakes repeated themselves as with the paper 2A question.

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Only a few tackled the second part of the question, some even left out the rectangular hole on the centre panel in the development.

	0 marks	1 to 8 marks	9 to 17 mark	Full marks
Paper 2A	6	100	186	119
Paper 2B	12	104	37	4

Chairperson  
2013 Examination Panel