

**UNIVERSITY OF MALTA**

**SECONDARY EDUCATION CERTIFICATE  
SEC**

**GRAPHICAL COMMUNICATION  
May 2012**

**EXAMINERS' REPORT**

**MATRICULATION AND SECONDARY EDUCATION  
CERTIFICATE EXAMINATIONS BOARD**

# SEC EXAMINERS' REPORT MAY 2012

## SEC Graphical Communication May 2012 Session Examiners' Report

### Part 1: Statistical Information

The table below shows the distribution of grades for the May 2012 session.

**Table 1: Distribution of Grades**

Grade	1	2	3	4	5	6	7	U	Abs	Total
Paper1&2A	46	69	92	107	96	-	-	61	5	476
Paper1&2B	-	-	-	10	51	36	27	30	18	172
Total	38	68	92	117	147	36	27	91	23	648
%	7.1	10.6	14.2	18.1	22.7	5.6	4.7	14	3.5	100

### Part 2: Comments regarding Administration.

A word of thanks goes to the board and the examination officers for presenting all the scripts in a numerical order manner, this facilitates the correction of the scripts especially when inputting the marks in the data sheets.

### Part 3: General Comments

There were no changes in the contents of the syllabus. Two papers each of two hours duration were set, with Paper 1 common to all candidates. The questions set in paper 2A were more difficult than those set in paper 2B. There were a considerable number of candidates who were well prepared for the examination and yet opted to sit for paper 2B.

The examinations board states certain aspects, directions and guidelines in its final report. These comments are to be forwarded to students studying this subject. The board repeatedly points out certain errors committed in examinations and yet these faults are still being committed by candidates.

Teachers are encouraged to keep the candidates adjourned regarding the ISO standards publications and documents issued by the governing boards regarding the drawing practice.

Some candidates are not aware of the basic principles when solving drawing problems. A case in point is the types of lines and their applications. The outline of the solution is to be represented by bold lines. Construction lines, showing how the problem was solved must be left faint using a thinner type of line. Another point which is continually stressed, is that construction lines must be left visible to give a clear indication of the geometrical construction used. Examiners do their best to identify constructions, but on the other hand, marks may only be awarded if the constructions are visible. Some candidates keep making the mistake of mixing the third angle method of projection, with that of the first angle method. It is also important that candidates take notice of the mark allotted for each question, so as to devote the appropriate time to the question. It was also noted that there were four candidates who attended for Paper One but did not turn up for paper two, and one candidate who did not attend for Paper One but turned up for Paper Two.

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When marking the scripts, the examiners were encouraged and pleased to find a few good candidates still responding well to the question and attaining the highest possible marks. However, the general standard of drawings presented during the examination was not particularly high.

### Part 4: Comments regarding candidate's performance

#### Paper 1

#### Question No.1 (Ellipse)

In this question the candidates were tested for their knowledge about the geometric construction of the ellipse, normals and tangents. The candidates were asked to complete the profile of a vase, which had the main body consisting of a part ellipse. The lower part of the vase was conical with the slanting edges being tangential to the part ellipse. The lip of the vase was given printed and the neck consisted of two arcs tangential to the upper elliptical body and to the parallel portion below the lip. The candidates were requested to construct the part ellipse, construct and reflect two tangents to locate the foot of the vase. They were also asked to construct and reflect two normals to locate the centres of the arcs tangential to the upper part of the ellipse.

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

- The part ellipse was not constructed and was drawn by means of the approximate method of compasses; using the approximate method. The focal points were not located.
- The tangent at point X, to represent the conical base, was drawn with no apparent construction. The candidates either drew a line parallel to the edge of the conical base from the given figure or simply joined the ellipse to the given incomplete base. In both cases no marks were awarded.
- The normal to the ellipse at point Y, on which the arcs tangential to the ellipse were to be constructed, were drawn without any construction and the candidates tried to locate the centres of the arcs by trial and error.
- The candidates were asked to construct one tangent and one normal, the other tangent and normal were to be reflected. A considerable number of candidates ignored or misunderstood this instruction and lost valuable time by constructing the two tangents and the two normals.

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

	0	1 to 6 marks	7 to 11 marks	Full marks
Paper 2A	5	196	217	53
Paper 2B	3	109	36	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 motor

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scooter was given and the remaining part, which consisted of blended arcs, was to be constructed geometrically. Most candidates attempted this question and there were quite a few who managed to attain full marks. However, there were other candidates who lost marks due to the following reasons:

- a) After completing correctly the necessary constructions and arcs by means of compasses, some candidates 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.
- b) Some small radius arcs were either drawn freehand or by means of a circle template without any construction to locate the centres of the arcs.
- c) The centres of blending arcs were sometimes found by trial and error. On close inspection, the areas around the centres were found to be perforated by a substantial number of compass holes. To add insult to injury, some of these candidates draw freehand arcs to mimic the geometric construction (necessary to locate the centres) hopefully to mislead the examiner.
- d) Some candidates seem to be unaware of the basic principles of tangential arcs and instead of using the centres of circles to locate the centres of other touching circles, they chose an approximate point on the circumference of an already drawn arc to locate the centre of the required touching arc .
- e) Others used very dark pencils and some line thicknesses varied between 1.5mm to 2mm.
- f) Some candidates wrongly assumed that the centres of R6, R36 and R22 lie on the same straight line.
- g) Construction lines were erased. Candidates are to leave constructions visible as these provide evidence of their work.

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

	0	1 to 6 marks	7 to 12 marks	Full marks
Paper 2A	2	27	326	116
Paper 2B	/	21	110	22

### Question No.3 (Plane Geometry)

This question tested the candidates' knowledge of the principles of plane geometry and their ability to produce accurate and neat geometrical constructions. A minor arc of the front wheel and parts of the frame of a bicycle were given. The candidates were asked to complete the bicycle.

The front wheel was to be completed by using the three point circle method (bisecting two chords on the given arc) while parts of the frame were to be completed by constructing compass angles ( $60^\circ$  and  $135^\circ$ ) and a triangle (given base, perimeter and base angle).

Although the requested geometric constructions are normally covered by the end of Form 3, a considerable number of candidates seem to have forgotten these basic geometric principles. The following are the main observations which are worth mentioning:

- a) The centre of the front wheel was found by trial and error.

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- b) Some candidates were more clever and although they did not apply the three point circle method, they enclosed the arc in a square, and located the centre of the circle at the intersection of the two diagonals.
- c) Other candidates used the protractor to draw the requested angles.
- d) Only a small number of candidates managed to construct the triangle correctly. Some tried to find a mathematical solution, others assumed that the triangle was equilateral while some others remembered part of the construction but confused the final steps. An explanation of the given problem can be found on the Graphical Communication website:

<http://graphicalcommunication.skola.edu.mt/wp-content/uploads/2010/09/Triangles-13-15.pdf>

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

	0	1 to 6 marks	7 to 12 marks	Full marks
Paper 2A	13	160	282	16
Paper 2B	2	91	60	/

### Question No.4 (Sectional Orthographic View)

This question tested the candidates' understanding of the principles of orthographic projection and their knowledge about the sectioning regulations. The candidates were given two orthographic views of a cast iron anchor bracket and were asked to project a sectional third view. To help them visualize the casting, the candidates were also given two pictorial views.

Although most of the candidates answered this question, only a few managed to obtain full marks. The most common errors committed by the candidates were:

- a) The viewing direction of the sectional view, indicated by the arrows, was misinterpreted. In fact, a considerable number of candidates drew two webs instead of one.
- b) The regulations regarding the sectioning of webs and ribs still confuse the majority of the candidates. Some candidates were totally unaware of the basic rule that a web is not shown sectioned when the cutting plane is along its axis and is shown sectioned when the cutting plane is across its axis. Every year a considerable number of marks is lost due to their lack of knowledge about the sectioning regulations. It is therefore suggested that more emphasis is given to this topic.

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

	0	1 to 7 marks	8 to 13 marks	Full marks
Paper 2A	17	130	320	4
Paper 2B	9	76	68	/

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### Question No.5 (Surface development / enveloping)

This question tested the candidates' knowledge of the principles of surface development and their ability to apply these principles to authentic practical examples. The candidates were presented with a situation where they had to draw the surface development of a sticker to be wrapped around a ceramic mug. When applied, the design of the sticker covered nearly half of the curved surface of the mug; and when viewed from the front, consisted of an eight pointed cross circumscribed by a circle. The front elevation of the mug (with the sticker applied) and the plan were given. The candidates were asked to construct/project the sticker in the flat position (before bending).

Only a small number of candidates managed to obtain full marks and more than 50% of the candidates failed to attain half of the allotted marks. This shows that the candidates fare badly when asked to apply what they have learnt to solve practical problems. More practical work is suggested during the course so that students can learn by doing. The following are the main reasons why candidates lost marks:

- a) Most candidates did not realize that the given design, consisting of an eight pointed cross circumscribed by a circle, was actually mounted on a semi circular surface. When the sticker is laid flat, both the cross and the circle will become elongated. The amount of elongation has to be found by construction. A high percentage of candidates, especially those who opted for Paper B simply copied the design given in the front elevation.
- b) Some candidates considered the given outline of the sticker as an end elevation, drew a mirror line underneath it and projected points from the plan and the front elevation. As argued earlier, some candidates do not try hard enough to solve a problem and in certain circumstances present illogical solutions. This is mainly due to their superficial knowledge of the subject.
- c) Other candidates knew that the circle and the cross had to be elongated and tried to find a solution by treating the elongated circle as an ellipse. They picked the correct measurements from the front elevation and the plan and used them as the major and minor axis of an ellipse. The eight pointed cross was projected from the front elevation and fitted in the ellipse. This was not the exact solution but the results were very close. These candidates were awarded marks accordingly.

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

	0	1 to 7 marks	8 to 13 marks	Full marks
Paper 2A	34	337	66	34
Paper 2B	31	113	8	1

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### Question No.6 (Oblique Projection)

This question tested the candidates' ability to apply the principles of orthographic and pictorial projection. Three orthographic views of a camera were given, from which the candidates were asked to draw a cabinet oblique view.

Nearly all the candidates attempted this question and the majority obtained more than half the allotted marks.

The following is a list of frequent errors, which were noted:

- a) A considerable number of candidates did not draw the crate. Apart from losing marks for omitting the crate, the candidates also lost a valuable guide, which helps them visualize the finished object.
- b) Some candidates did not distinguish between cabinet and cavalier oblique projection. The question clearly asked for a cabinet oblique which means that, in order to make the drawing look more proportionate, the depth had to be reduced by one half (from 70mm to 35mm). These candidates drew a cavalier (full size) oblique view even though there was insufficient space to accommodate it. It is worth emphasizing that at SEC level only the cabinet oblique is to be covered.

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

	0	1 to 7 marks	8 to 15 marks	Full marks
Paper 2A	19	120	307	25
Paper 2B	18	66	69	/

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

This question tested the candidates' ability to interpret an orthographic projection and translate it into a pictorial view. It also tested their knowledge of the laws of perspective.

A pictorial and two orthographic views of a brick barbeque were given, from which, the candidates were asked to project an estimated two-point perspective view. The vanishing points and the crate, with the front vertical height divided into 24 equal divisions, were also given. Most candidates attempted this question and the majority succeeded to gain a decent mark. However, there were quite a few who were still unaware of the main principle of perspective, that is, as objects recede towards a vanishing point they appear to get smaller. The following are other shortcomings noticed:

- a) Some candidates are still confusing or misinterpreting the new perspective drawing method as explained on the Graphical Communication website, <http://graphicalcommunication.skola.edu.mt/> especially when placing point M.
- b) Most of the candidates managed to draw the lower, parallel part of the barbeque correctly, however, only a small number succeeded in drawing the pyramidal hood. This was the tricky part that required a relatively in-depth knowledge about the topic.

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

	0	1 to 9 marks	10 to 17 marks	Full marks
Paper 2A	16	61	373	21
Paper 2B	14	47	92	/

### Paper 2

#### Question 1 Vectors

A detailed diagram of four weights attached at one point by strings was shown. An illustration of the apparatus was also included to help the candidate visualize better the problem set. By using the scale stipulated, candidates were to show how to draw and determine the magnitude and direction of the missing weights so as to keep the arrangement shown in equilibrium. A space beneath the question was provided so that candidates would jot down the magnitude and direction of the weights not given.

This, being a very specific question, did not attract a massive response, especially from those candidates who opted for Paper B. The response from candidates opting for Paper A was very encouraging for quite a good number managed to score full marks.

Difficulties in this question were mainly associated with connecting the forces with each other's end rather than emerging from a single point.

One must point out to students that when dealing with problems of this type, great care and accuracy must be taken when drawing and measuring accurately the lines and angles of the force in question.

	0	1 to 4 marks	5 to 9 marks	Full marks
Paper 2A	20	87	110	254
Paper 2B	50	24	46	30

#### Question 2 Computer Programme

Without doubt this was the most popular and successful question in this section of the paper. Candidates managed to read, understand and plot the image from the numerical values in pixels of the variables given in the data statement. No difficulty was encountered when using the colour commands from the codes stated. Four different coloured lines were used to identify the various parts of the unit. High marks were given for presenting an accurate and neat diagram of the studio television camera. No particular problems were evident with this question.

Weaker answers were encountered when marking scripts of candidates who opted for paper B. The main difficulty was how to locate the correct coordinates. This then resulted in a number of haphazard lines.

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	0	1 to 6 marks	7 to 11 mark	Full marks
Paper 2A	8	18	77	368
Paper 2B	8	27	35	80

### Question 3 Archimedean Spiral

An illustration of an earring formed by a silver wire was shown in a small diagram next to the question. After reading the question and referring to the diagram shown, candidates had to construct one and a half turns of an Archimedean spiral. The spiral was to start from the given point A and terminate at the given point marked C. This question tended to be very well done by those candidates who knew exactly how to construct this type of spiral. Some candidates managed to draw the first part of the question correctly by dividing the distance AC into eighteen equal parts, but tried to join these parts to twelve sectors instead of the eighteen points for one and a half turns. Some candidates also attempted to plot the spiral with just sectors, and no divisions projected from AC.

The pictorial view for option B was that of a candleholder. Two identical spirals formed the handle of the holder. Candidates were to show how one of these spirals was to be drawn, by using a geometrical construction and drawing one turn of an Archimedean spiral, from the given point P to the end point marked Q. More than one third of the candidates scored full marks. Some candidates found difficulty in plotting the locus, which forms the spiral, and joining the corresponding points. Other solutions also depicted a curve with no working or any points to follow.

	0	1 to 7 marks	8 to 13 marks	Full marks
Paper 2A	4	77	73	317
Paper 2B	5	49	38	58

### Question 4 Safety Sign

This question dealt with Safety signs and colours.

Three safety signs were printed on the examination paper and candidates were to colour these signs in accordance with an approved recognized convention. In the second part of the question, a space was provided for the candidate to design and colour a larger sign obliging the worker to wear safety goggles.

Students studying Graphical Communication for an examination should be familiar with Graphical Symbols. These symbols are found in the Graphical Communication website <http://graphicalcommunication.skola.edu.mt/> and in health and safety booklets. The instruction given sets out the principles to be observed in preparing diagrams with a view to securing uniformity in industry.

There were many examples of candidates who clearly had no idea of what was meant by the sentence, "Colouring is to be in accordance with an approved recognized convention".

This was obvious because the colours used for the first and second part of the question were clearly chosen according to their likings. Marks were deducted for drawing the safety goggles similar to reading glasses, going in too much detail, or drawing the goggles only without the

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outline of the face. For the second part of the question, candidates also found difficulty in the correct use of colour, especially the use of white outline.

In the paper for option B, candidates had to colour two safety signs. In the second part of the question candidates had to draw and colour the sign requesting workers to wear Safety Shoes. Marks were deducted for including words and for presenting the sign in an untidy and crude manner.

	0	1 to 7 marks	8 to 13 marks	Full marks
Paper 2A	0	76	354	41
Paper 2B	1	73	65	11

### Question 5

An orthographic view of a greeting card placed on a horizontal surface was shown together with a 3D illustration. Two lines drawn at right angles represented how the card was opened up in the plan view. A rectangle with a semi-circle removed represented the front view. The third view consisted of a square with a circle centrally placed. From the given completed three views, a fourth view was to be drawn, showing how the card with the pierced hole would be seen when viewed from the top of the front view, as indicated by the arrow A. The solution consisted of a heart shape, shown in the auxiliary plan, substituting the circle. The left hand side and the right hand side of the card were symmetrical.

As already pointed out in previous examination reports this topic is not familiar with candidates. There were only a small number who gave good and neat solutions. There were many however, who attempted this question, but the final part of the solution was frequently omitted. In most cases, the first step, that of projecting the lines from the front views, was correct. The major mistake was that the widths on the folded card on the auxiliary plan were incorrectly measured. Candidates ought to work out typical questions of this type, so that they master the method from where to measure the correct distances and transfer these distances on the auxiliary plan.

The orthographic views presented in the 2B option were those of a weighing scale. The scale consisted of a circular disc mounted on a lower rectangular block serving as a base, with a digital dial. The fourth view requested was to show how the scale appeared when viewed from an angle of forty-five degrees when looking on the line representing the disc. Candidates had to show the method employed, how the line representing the disc would appear as an ellipse on the new view. The majority of the candidate's presentation was very muddled, with the candidates showing some understanding but unable to follow the question through.

	0	1 to 7 marks	8 to 15 marks	Full marks
Paper 2A	16	149	250	56
Paper 2B	9	76	57	8

### Question 6

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This question dealt with the topic of the true length of a line. True lengths and auxiliary views are two typical topics which although stipulated in the syllabus are not given enough attention and are not studied properly. There were only a few candidates who managed to score high marks in this question.

A front elevation and a plan view of a board mounted on an easel were printed. The two front legs were of equal length and the back leg was slightly shorter. Candidates were to adopt a recognized method to find (a) the true length of each leg, (b) the true angle to the horizontal of one of the legs and (c) the measurement of the board. There are various methods on how to detect whether a line is a true length and how to determine the true length of the line. It is up to the candidate that the method employed is constructed in less time than the other methods and that it is easily interpreted by the examiners.

The same two views were printed for Paper B, but the requirements were easier and less demanding. It was noticed that many of the candidates had difficulty in solving and answering this type of question. All that was required in this question, was that they showed that they were familiar with and knew the basic principles on how to determine the true length of a line.

	0	1 to 7 marks	8 to 15 marks	Full marks
Paper 2A	35	150	236	50
Paper 2B	24	91	30	5

### Question 7

Two complete views of a bracket for a shower handle were printed. Candidates had to include the missing curve of intersection formed on the given front elevation of the handle, printed below the question. A suitable geometrical construction was to be applied to solve and draw the curve of intersection to satisfy and complete the first part of the question. A few candidates seemed to grasp the question and solved the problem as if working on an inverted right cylinder with an inclined cutting plane. They presented a neat and accurate solution scoring full marks. It was hoped that all candidates would be able to apply the knowledge gained when solving similar questions dealing with the section of a right cylinder. In the second part of the question, candidates were to develop the cylindrical surface of the portion of the right cylinder shown. In the question this part was referred to as the inner cylindrical plastic cover and labelled as part B. The answers to this part of the question were very inaccurate.

In the question set in Paper B the bracket was of a simpler form, suitable for a spray gun. It was surprising that few were able to analyze the given example of the bracket with a cylindrical hole and treat it like that of a cylinder, with an inclined section.

There were many candidates who either got it wrong or gave up after drawing several lines without obtaining the points of intersection.

Apart from a very, very few good answers to the second part of the question, there was a poor response to this question. Examiners wondered why candidates had no knowledge of how to draw the development of a right cylinder.

On the other hand there were some candidates who did not attempt to answer this question, or draw a single line on the answer sheet. This could be due to, either incorrect timing or because they were not confident in answering the question.

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	0	1 to 8 marks	9 to 17 marks	Full marks
Paper 2A	12	100	283	76
Paper 2B	17	75	46	12

**Chairperson  
Board of Examiners  
July 2012**