

UNIVERSITY OF MALTA

**SECONDARY EDUCATION CERTIFICATE
SEC**

GRAPHICAL COMMUNICATION

May 2009

EXAMINERS' REPORT

**MATRICULATION AND SECONDARY EDUCATION
CERTIFICATE EXAMINATIONS BOARD**

**SEC Graphical Communication
May 2009 Session
Examiners' Report**

Administration.

The board wishes to thank Examination Offices at centres for the co-operation they showed by presenting the scripts in an orderly manner. Instructions to candidates to leave the drawing paper as a whole and not cut/tear the drawing paper into four separate size A3 sheets, was very well received.

General Comments.

There was no radical change in the syllabus. The examination consisted of two papers, paper 1 and paper 2, each of two hours duration. Paper 1 was common to all candidates. In paper 2 a question regarding the use of computer aided design was introduced. There were two versions of paper 2, 2A and 2B. Questions in paper 2A were more difficult than those set in paper 2B.

Reading the set questions thoroughly with attention before attempting to answer the question seemed to be a major fault. This point was already stressed in the previous examiner's report. There is no point in submitting a neat solution, yet, not relevant at all to the set question.

Candidates opting for paper 2A proved to be well prepared and responded positively to the questions set. The other candidates did not understand the question at all and seemed to forget the fundamental principles of geometry and were unprepared for such an examination. Paper setters make it very clear to candidates so that they leave sufficient construction lines to give a clear indication of the geometrical construction used. This point was so important that in some instances, it was repeated again in the question, so as to remind candidates to leave construction lines slightly visible.

Part 1. Statistical Information

The tables below show the distribution of grades for the May 2009 session.

Distribution of Grades**Table 1: Graphical Communication**

Grade	1	2	3	4	5	6	7	U	Abs	Total
Paper1&2A	28	64	78	109	125	-	-	62	5	471
Paper1&2B	-	-	-	15	49	45	48	65	19	241
Total	28	64	78	124	174	45	48	127	24	712

Table 2: All Candidates

Grade	1	2	3	4	5	6	7	U	Abs	Total
Candidates	28	64	78	124	174	45	48	127	24	712
%	3.9	9.0	11.0	17.4	24.4	6.3	6.7	17.8	3.4	100

Paper 1**Question 1**

This question was divided into two sections having five marks each.

The examiners noted with concern that a considerable number of candidates were unable to correctly construct

- (i) a regular polygon on a given side;
- (ii) a triangle given the perimeter and the ratio of the sides.

- a) Candidates were request to construct, using a geometrical construction a regular heptagon on a specified given side. Some candidates drew the circle without showing how the centre of the circle was obtained. The heptagon was later drawn with no construction visible whatsoever. It has already been stressed in the previous reports that trial and error methods are not accepted.

- b) In the second part of the question candidates were asked to divide a given line into three equal parts. These three parts formed the sides of the triangle. Many candidates found it very difficult to construct the triangle. Marks were deducted for dividing the line mathematically and for not using the proper basic geometrical construction of the division of a line.

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

	0	1 to 4 marks	5 to 9 marks	Full marks
Paper 2A	5.7 %	35.9 %	41 %	15.3 %
Paper 2B	20 %	46 %	24 %	1.6 %

Question 2

One expected that candidates attempting this question about circles in contact should be mature enough to decide whether to add or subtract the radii to locate the exact centre of the circle/arc. Examiners noted that some candidates still fiddle around to locate the centres of the circles, from which the blending arcs are found. It is very important that when attempting questions regarding tangency, construction lines, intersecting arcs and points of tangency are not to be erased. These construction lines are to be shown by very light lines and not dark and bold as the outline of the figure.

	0	1 to 6 marks	7 to 11 marks	Full marks
Paper 2A		9.6 %	71.3 %	18 %
Paper 2B		35.7 %	53.9 %	1.7 %

Question 3

Although the ellipse is a popular question in examinations, some candidates are still confused when the rubric of the question is changed. Many candidates were not aware that the distance $F1P + F2P =$ the length of the major axis. In some cases candidates had no other option but to scale from the paper and calculate roughly the length of the major axis. Once that this problem was solved it was then easy for them to complete the question. There were a few candidates who completely forgot how to draw a normal to the ellipse. These properties just cannot be left out and forgotten.

	0	1 to 6 marks	7 to 11 marks	Full marks
Paper 2A	7.6 %	22.7 %	48 %	20.6 %
Paper 2B	34 %	32 %	22 %	37 %

Question 4

Two incomplete orthographic views of a sectioned square pyramid were presented in this question. A very common and popular exercise worked out many times during the course. Many candidates attempting this question were not able to complete and attain full marks. The reason for this might be that usually the front elevation was normally given complete and then they had to complete the rest of the views. In this case the end elevation was given complete and candidates had to complete the front elevation and plan. A slight change and candidates were completely disorientated. Difficulty was experienced by some candidates when constructing the true shape of the section. Unfortunately many marks were lost because the true shape of the section was not constructed properly.

SEC EXAMINERS' REPORT MAY 2009

	0	1 to 7 marks	8 to 13 marks	Full marks
Paper 2A	3.2 %	53.3 %	37 %	4.9 %
Paper 2B	11.2 %	70.2 %	10 %	0.4 %

Question 5

This question tested the knowledge of a) orthographic projection, b) the differentiation between the types of lines and c) the rules and exceptions of sectional views.

A pictorial view, two complete and one incomplete orthographic views of a bearing mounting were given. A half-sectional front elevation was requested.

A good number of candidates managed to project construction lines from the end elevation and the plan to form the profile of the front elevation however, a frequent mistake was made in the selection of areas which needed to be sectioned. Some candidates are totally unaware of the basic principle that a web is not shown sectioned when it is cut along the axis. The fillet radii were generally omitted and most candidates ignored the counter bored hole located in the upper boss. Another common shortcoming was that several students were not able to make a "final statement" and use different line thickness to distinguish between outlines, construction lines, centre lines and section lines. In some instances this led to a difficulty in interpreting the answer that the student had in mind.

In the second part of the question candidates were asked to draw the symbol of the projection used. Quite a few students confused the type of projection while others totally omitted this part of the answer.

	0	1 to 8 marks	9 to 15 marks	Full marks
Paper 2A	4.3 %	21.2 %	71 %	1.1 %
Paper 2B	18.3 %	37 %	36.5 %	

Question 6

The question tested the spatial ability of the candidates. Three orthographic views in third angle projection of an armchair were given and a planometric interpretation was requested. A considerable number of candidates tried to solve the problem without even drawing the crate. The base and the armrests (which were vertical and horizontal) could be drawn with or without a crate; in fact a good proportion of students managed to score marks in this part, but when they came to tackling the inclined backrest, the results were far from satisfactory. The task of finding the internal points to localize the bottom and top of the backrest was the main stumbling block. A small percentage of the candidates managed to successfully complete this question.

A number of candidates have the wrong impression that when drawing a 30° / 60° planometric, the height is reduced by half. Reducing the height only applies to 45° / 45° planometric and the reduction scale is normally indicated in the question.

Another common misinterpretation concerned the given orthographic projection. Since the end view was given on the left of the front view, a number of candidates confused the end with the front (which had slightly different dimensions), thus mistakenly changing the orientation of the planometric view. Students need to do a lot of practice in conversion from 2-d to 3-d views in both 1st and 3rd angle to be able to distinguish between the two without hesitation.

	0	1 to 9 marks	10 to 17 marks	Full marks
Paper 2A	0.4 %	28.7 %	66.8 %	1.1 %
Paper 2B	2.1 %	49.8 %	39.8 %	

Question 7

This question tested the knowledge of the principles of perspective drawing. An isometric and two dimensioned orthographic views of a computer desk were given. A two-point estimated perspective drawing on the given start lines was requested. Although there were some exceptions where candidates simply copied the given isometric view, most answers had the correct beginning i.e. orthogonal lines were joined from the corner of the start lines to the two vanishing points. However the method of foreshortening of the sides varied considerably, from the right angle method and the rectangle method, to visual judgment foreshortening. Some candidates did not foreshorten at all while others foreshortened the height as well. The method of finding the perspective scale also varied. Some used the diagonal method, others used the rectangle method while others divided the front geometrically into four equal parts, which is an incorrect procedure. Apparently recent proposals and approaches meant to standardize and facilitate perspective drawing have not reached the majority of the teachers. It is advisable that teachers keep in touch with the latest updates regarding this topic, both by refereeing to the specimen examples given in the syllabus or by consultation.

	0	1 to 9 marks	10 to 17 marks	Full marks
Paper 2A	7.2 %	22.4 %	64.7 %	2.8 %
Paper 2B	22 %	36.1 %	33.2 %	0.4 %

Paper 2

Question 1

A familiar picture of a public telephone set was illustrated, together with three blank rectangles where to present the solutions. Designs were very disappointing with many candidates ignoring the instructions completely. Careless reading of the question led to many inaccurate answers and waste of time. In fact a good number of the candidates presented three graphics instead of two. The majority of the candidates showed the two graphics, 'Insert telecard' and 'Dial number' with the telephone receiver hooked in place. A number of candidates presented a solution with the telephone card inserted in the number display at the top, instead of drawing the telephone card placed into the elongated slot shown at the bottom of the telephone set. Only a couple of students could draw well proportioned hands or fingers. Very few candidates could present two graphics which could form part of a set in presentation.

	0	1 to 6marks	7 to 11 mark	Full marks
Paper 2A		61. %	37.6 %	0.4 %
Paper 2B	20 %	64.7 %	7.1 %	

Question 2

It was quite evident that the majority of the candidates were not prepared to answer this question, dealing with true lengths and true shapes. It has already been pointed out in the previous examiner's report that candidates must cover thoroughly and be familiar with all the topics listed in the syllabus. One considers the construction of a true length of a line and the angle it makes with the plane as an important topic. Once the concept is established then students ought to find no difficulty in constructing the true shape of a triangle or any other shape.

	0	1 to 7marks	8 to 13 mark	Full marks
Paper 2A	18.9 %	62.6 %	17 %	0.4 %
Paper 2B	0.4 %	52.3 %	39 %	2.4 %

Question 3

This question was reasonably straightforward and success depended on the knowledge of vectors and triangle of forces. The method of using the triangle of forces to solve problems and obtain graphically what is requested is not that complicated. Many candidates merely copied the given diagram with the lengths drawn equal to the specified force scale, omitting completely the vector diagram. Some candidates appeared unaware that force vectors should be drawn parallel to the given diagram. One wonders why some candidates work the solution, but do not bother to jot down the values of the answers obtained in the allocated space as requested.

	0	1 to 7marks	8 to 13 mark	Full marks
Paper 2A	12.1 %	16.3 %	26 %	44.6 %
Paper 2B	34.1 %	35.3 %	22.4 %	

Question 4

Candidates sitting for an examination must make sure that they refer to the syllabus, so that they cover all the topics and are aware of any changes that might arise. Matsec office received complaints from candidates that this question was out of subject. The latest revised syllabus introduced a new topic regarding 'Computer Graphics'. Detailed instructions and a specimen question and answer were included in the syllabus to guide all those interested in this subject. The question set was well in-line with the requirements of the syllabus and similar to the given specimen paper. Once the instructions in the question were thoroughly read and understood then the problem was very easy and straightforward. Some candidates did not comprehend the word 'Move' and 'Draw'. Lines were to be drawn with coloured pens/pencils according to the given codes. The examiners were not expecting candidates to colour the whole drawn picture, for this led to a waste of time. The response on the whole was encouraging and this question proved to be a popular question and examiners saw some excellent solutions.

	0	1 to 7 marks	8 to 14 mark	Full marks
Paper 2A	11.6 %	5.3 %	41 %	41 %
Paper 2B	11.2 %	70.2 %	10.3 %	

Question 5

A popular question and most candidates were able to construct the locus of the points requested so as to construct a right hand helix. Almost all candidates who opted to take Paper 2A attempted this question. The method of constructing a helix was well mastered by the majority of the candidates. Many candidates who opted to sit for paper 2B seemed unable to distinguish and notice the given distance of the pitch/lead. In fact some candidates decided to establish this length at their own leisure. Another point noticed was that the given length of the pitch/lead was not divided into the same number of parts as the circle/semicircle. The division of the line left much to be desired. Other candidates found it necessary to construct another circle to the one printed. The helical curve was at times joined by straight lines, instead of by a smooth curve. A number of candidates lost marks by failing to present the solution in a neat manner.

	0	1 to 7 marks	8 to 13 mark	Full marks
Paper 2A	1.9 %	16 %	40.1 %	40.5 %
Paper 2B	18.2 %	28.6 %	42 %	29 %

Question 6

Many candidates were attracted to this question, in fact only a few candidates left the paper blank. The well illustrated isometric view of the book end, included with the orthographic views seemed to be of great help to the candidates to understand and attempt the question. Unfortunately, after that it became apparent that not all candidates knew how to present the solution in a neat manner to obtain full marks. Candidates ought to master the few steps necessary to present the finished auxiliary view. Projection lines were nearly always correctly projected from the front elevation to the plan and to the auxiliary view. It was clear that many candidates did not know how to complete the final stage by picking the correct heights from the elevation to the corresponding distances on the auxiliary view. Working similar exercises during the course, definitely helps to eliminate this problem. Candidates are reminded that when dealing with this type of question, where quite a number of lines are drawn, sometimes crossing and overlapping each other, light and sharp lines must be neatly drawn. When this method was adopted, the solution was excellently submitted. No marks were awarded to those candidates who presented an excellent isometric view of the book end.

	0	1 to 7 marks	8 to 14 mark	Full marks
Paper 2A	2.5 %	23 %	54.6 %	19 %
Paper 2B	2 %	33.6 %	50.2 %	5.8 %

Question 7

Interpenetration of right and regular solids together with their surface developments was definitely not a popular question. A small but significant number of weaker candidates revealed their general inability to work such questions. These weaker candidates avoided the question altogether and took refuge in their own inventions by presenting to the examiner, a pictorial sketch of the truck illustrated. A typical example of the intersection was illustrated in a pictorial view of a truck fuel tank. The illustration was included so that candidates orientate themselves and notice how the curve of intersection is developed when two solids intersect each other. The orthographic view of a sectioned cylinder together with its surface development should offer no difficulty whatsoever to any ordinary level student. To construct the curve of intersection, candidates had to draw a circle/semi-circle representing the cylinder and divide it into a number of equal parts. Some candidates left this construction out, others did not divide the two elevations into the same number of parts. Neatness was again lacking when presenting the solution, for the construction lines and the curve of intersection were of the same denseness and boldness.

In the second part of the question, candidates were requested to present a half surface development of the cylinder. One wonders why this part of the question was neglected and given no attention. It merely involved drawing a line equal to half the circumference of the cylinder, inserting the correct heights from the elevation and constructing the shape of the lower part. The convention indicating "half development" was at most instances left out.

	0	1 to 8 marks	9 to 15 mark	Full marks
Paper 2A	7.9 %	49.1 %	39.7 %	2.1 %
Paper 2B	22 %	30.7 %	36.1 %	29 %

Chairperson
Board of Examiners
July 2009