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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Design and Technology (Resistant Materials Technology)

Specification 3545/3555

Report on the Examination

2006 examination - June series

- Full Course 3545
- Short Course 3555

Further copies of this Report on the Examination are available to download from the AQA Website: www.aqa.org.uk

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Introduction

Administration

Most centres complied with AQA's instructions relating to the collation, packaging and dispatch of scripts. There were, however, a number of centres that in one or more ways contravened the regulations, which in turn resulted in difficulties for the examiners. The following examples highlight these difficulties:

(i) Failure to sort scripts into attendance order;
(ii) Candidate details either omitted or incorrectly recorded on the script;
(iii) Incorrectly submitting the sheet of colour photographs with the script.

Fewer candidates, this year, contravened the regulations with regard to the use of correction fluid and the colour of ink employed to record their answer.

General

The examiners reported that once again there was substantial evidence of the use of the preparation material by centres when preparing their candidates for the examination.

The use of the preparation material is intended to give the candidates 'ownership' of their paper. It allows them to produce real and valid responses based on work completed in the weeks before the examination. It is anticipated and intended that teachers should have full involvement when preparing candidates for the examination by fully utilising the preparation material. Where centres had made good use of the preparation material their candidates invariably went on to produce high quality scripts. However, centres and/or candidates who failed to take advantage of the preparation material generally found themselves disadvantaged.

The quality of sketching was found to be particularly good in most centres. The use of rendered, well-annotated, pictorial views is now the norm rather than the exception.

There was some evidence of candidates misinterpreting questions. Teachers should emphasise good examination techniques to their candidates, in particular the need to read and re read each question carefully before attempting it. They should also be taught to use any 'spare' time at the end of the examination to carefully go through both the questions and their answers.

The manufacturing/making question remains the least well answered question on the paper and centres are encouraged to prepare their candidates thoroughly for this type of question.

Full Course Foundation (3545/F)

Question 1

The majority of candidates answered this question well. Many candidates gained full marks by producing four relevant specification requirements for a child's educational toy and subsequently went onto expand their answer and provide a suitable explanation for each. Candidates failed to gain marks by repeating answers already given.

Question 2

The majority of candidates answered this question well. It was clearly evident that they had worked with the preparation material and had subsequently gone on to produce quality responses.

- **Variety of Ideas**

Many candidates were able to access high marks by showing three **different** ideas. However there was less evidence this year of candidates demonstrating their creative ability by producing original designs. There were more copies of existing products which had been manipulated and developed. Some candidates had chosen to design rather complicated and unworkable solutions.

- **Quality of sketching**

The standard of sketching was generally good. Many candidates made an attempt at producing a pictorial view of their idea. The majority of 2D line drawings were clear and in proportion. There was good use of colour/rendering techniques.

- **Quality of notes**

The quality of annotation varied considerably. Most candidates chose to provide simple notes to describe the features of their ideas. Weaker candidates simply labelled the parts of their design, whilst higher marks were awarded to candidates who provided detailed notes regarding the function of their designs.

Question 3

(a) This part of the question was very well answered. Most candidates were able to provide two reasons why their chosen design was the best. High quality responses reflected back to the specification.

(b) The majority of candidates circled at least one suitable modeling material, with many going on to gain full marks by circling two.

(c) Few candidates were able to give two correct reasons why you would use the chosen materials. Simple references to it being 'cheap' and 'saving money' were common, but correct responses.

Question 4

(a) Most candidates were able to name a suitable material from which to make their chosen counting frame. When answering questions of this type, candidates should be aware that there are more marks for naming a specific material rather than a generic material. Most candidates went on to give a correct reason for choosing their material.

(b) Last year, the new format of this question was found to elicit a better response from the candidates. Unfortunately, this improvement has not continued and the majority of candidates are still producing vague responses regarding the types of tools and processes they would use to make their counting frame. Those candidates who elected to give details of how they would make their chosen counting frame by CAD/CAM methods, similarly, failed to produce a detailed response.

Question 5

(a) The majority of candidates were able to identify four processes which use heat. Some marks were lost when candidates simply named tools.

(b) Most candidates were able to gain full marks for this part of the question by correctly identifying a risk to the user and a correct precaution for the given hazard.

Question 6

There was an improvement in the performance of the candidates on the materials question this year. However, once again, candidates should be made aware that there are more marks available for electing to name a specific rather than a generic material.

(a) **High chair A**

Most candidates correctly identified that High chair A was made from 'wood', with many going on to name a suitable specific material such as 'beech', 'pine' or 'oak'. Reference to its 'appearance' was generally given as a correct reason for choosing this material.

High chair B

Most candidates correctly identified that High chair B was made of 'metal' then chose a specific type of metal which gained them an extra mark. 'Steel' and 'aluminium' were the most popular correct specific materials chosen. Reference to 'strength' was generally given as correct reason for choosing this material.

High chair C

Most candidates correctly identified that High chair C was made from 'plastic'. Many chose a specific plastic which gained them an extra mark. Reference to it

being 'colourful' was generally given as a correct reason for choosing this material.

(b) **High chair A**

Most candidates gave a suitable specific finish which could be applied to High chair A. 'Varnish' was the most popular correct specific finish chosen.

High chair C

Many candidates correctly chose 'polish' or 'lacquer' as a correct method of finishing High chair C.

The finishes must relate to the chosen material for the candidate to be awarded a mark.

Question 7

(a) Most candidates were able to correctly identify at least two ways in which the internet can assist the designer. Many struggled for a third. Using the Internet for a variety of researching tasks was the most popular correct response.

(b) Most candidates gained one of the three marks available by stating that the use of CAD was 'more accurate' than designing by traditional methods. The majority went on to give simple generic terms such as 'quicker' or 'easier' without qualifying their answer and failed to improve their mark.

Question 8

Very few candidates gained full marks. Many were able to recognise the pictures and gained marks by correctly matching them to the relevant saw cut, but few went on to correctly name the saw.

Question 9

(a) This part of the question was well answered by the majority of candidates. Most were able to identify one correct reason why the swing in the picture would not be suitable for use by a one year old child. Many went on to name a second correct reason. 'Lack of support' being the most common correct response.

(b) This part of the question was well answered. Many candidates were able to incorporate a number safety features into their design. The use of a 'harness', 'leg slots' and 'a back rest' were the most common correct features given.

Question 10

(a) Most candidates were able to gain two of the four marks on offer by correctly inserting two of the four words into the statement.

(b) This part of the question was not well answered. Many candidates failed to provide any reasons as to why wood is generally considered to be an environmentally friendly material. Reference to it being 'renewable' and 'recyclable' were the most popular correct responses.

Full Course Higher (3545/H)

Question 1

This question was well answered. Many candidates gained full marks by producing five relevant specification points for a child's educational toy and subsequently expanding their answers to provide suitable explanations. Candidates lost marks by repeating answers already given.

Question 2

It was clearly evident that the majority of teachers and candidates had obviously worked with the preparation material.

- **Variety of Ideas**

The change in the format of this question has lead to greater differentiation of candidates' responses. Weaker candidates produced simple push along toys, simple shape sorters and single cam operated mechanisms. There appeared to be less originality evident than in previous years, which tended to suppress the marks of the majority of the candidates.

- **Quality of sketching**

The standard of sketching was very impressive. Most candidates were able to produce a pictorial view of their idea, with many displaying fully rendered pieces of artwork.

- **Quality of notes**

An increasing number of candidates gained full marks by providing detailed notes regarding the function of their designs, rather than simple labelling.

- **Quality of evaluation**

Most candidates were able to gain one of the two marks on offer by showing some measure of analytical thinking. Weaker candidates simply listed features of their design without making any value judgements, or simply stated that their design fulfilled the design requirements, making no further comment.

Question 3

Many candidates showed a good understanding of the mechanism they had used in answer to Question 2, gaining half marks or better. To gain full marks candidates must have given full details of the function of the mechanism using 'technical' language e.g. linear motion, rotary motion, reciprocating motion, cam, gear, follower etc.

Question 4

This question was the least well answered. In general, candidates' responses tended to be vague, showing little understanding of tools and making processes. Most candidates elected to use some form of template to aid them when marking out their chosen design, but few went on to give

details of the use of jigs to aid them when cutting/joining their design. Similarly, those candidates who elected to make their design by a CAD/CAM method failed to give a detailed response. Many marks were again lost due to vague, superficial answers.

Question 5

(a) Weaker candidates tended to misinterpret this question and gave responses which related the use of 'Lego' as a child's toy. Where candidates had fully understood the question they went on to produce good advantages and disadvantages as to why you would use commercial modelling kits rather than traditional modelling materials.

(b) There was a full range of responses explaining why a manufacturer would model a design before it went into full production. Typically, candidates mentioned that it would allow the designer to 'test the design', that it would 'save money' and that it would 'lead to a better quality product'.

Question 6

(a) The majority of candidates were able to identify four processes which use heat. Some marks were lost when candidates simply named tools.

(b) Most candidates were able to gain full marks for this part of the question by correctly identifying a risk to the user and a correct precaution for the given hazard.

Question 7

Teachers and candidates are reminded that only **specific** materials will be awarded marks on this paper.

(a) **High chair A**

The majority of candidates correctly named a specific type of solid wood from which the high chair was likely to have been made from. 'Beech' and Oak' were the most common correct responses. Reference to its 'appearance' and 'strength' were generally given as correct reasons for their choice.

High chair B

It is pleasing to note that there were an increasing number of correctly named plastics given by the candidates. 'High density polythene', 'PVC' and 'Polypropylene' were the most common. Reference to its 'coloured finish' and 'durability' were generally given as correct reasons for their choice.

High chair C

Most candidates provided a correctly named metal from which the High chair 'steel and 'aluminium' being the most common, correct, responses. Reference to

its 'durability' and 'strength' were generally given as correct reasons for their choice.

(b) Most candidates gave 'varnish' as a suitable specific finish which could be applied to the High chair A. At higher tier level, the examiners are looking for polyurethane or acrylic varnish.

Most candidates gave a suitable specific finish which could be applied to the High chair C; 'polish' and 'lacquer' were the most popular correct responses.

(c) Some candidates misunderstood the question and gave answers relating to 'the safety of the chair' and children 'falling out of it'. 'Toxic fumes being given off' was also a popular incorrect answer. Approximately half the candidates correctly stated that the finish of the high chair should be 'non toxic' and went on to correctly explain why.

Question 8

There was a good range of responses to this question. The majority of candidates gained some marks by identifying that the use of plastics had a detrimental effect on the environment. Many candidates went onto expand their answers and gained high marks. Concepts such as 'plastic is made from oil', 'oil is a non renewable resource', 'plastics are non biodegradable' and 'waste plastic fills up land fill sites' were common correct responses.

Question 9

(a) Most candidates were able to correctly identify two ways in which the internet can assist the designer. Many struggled for a third. Using the internet for a variety of researching tasks was the most popular correct response.

(b) Candidates gained one of the three marks on offer by stating that the use of CAD was 'more accurate' than designing by traditional methods. The majority went on to give simple generic terms such as 'quicker' or 'faster' without qualifying their response.

Question 10

(a) The majority of candidates correctly named two features of the play centre which would make it appealing to a young child. Many went on to explain their answers.

(b) There was a good range of responses to this question. The majority of candidates gained some marks by giving details of some of the ways in which the advances in material and manufacturing technology had affected the development of products. Few went onto provide detailed responses and some incorrectly gave responses relating to the use of CAD.

Short Course Foundation (3555/F)

Question 1

The majority of candidates answered this question well. Many candidates gained full marks by producing four relevant specification requirements for a child's educational toy and subsequently went onto expand their answer and provide a suitable explanation for each. Candidates lost marks by repeating answers already given.

Question 2

The majority of candidates answered this question well. It was clearly evident that they had obviously worked with the preparation material and have subsequently gone on to produce quality responses.

- **Variety of Ideas**

Many candidates were able to access high marks by showing two **different** ideas. There was less evidence this year of candidates demonstrating their creative ability by producing original designs. There were more copies of existing products which had been manipulated and developed.

- **Quality of sketching**

The standard of sketching was generally good. Many candidates made an attempt at producing a pictorial view of their idea. The majority of 2D line drawings were clear and in proportion. There was good use of colour/rendering techniques.

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The quality of annotation varied considerably. Most candidates chose to provide simple notes to describe the features of their ideas. Weaker candidates simply labelled the parts of their design, whilst higher marks were awarded to candidates who provided detailed notes regarding the function of their designs.

Question 3

(a) This part of the question was very well answered. Most candidates were able to provide two reasons why their chosen design was the best. High quality responses reflected back to the specification.

(b) The majority of candidates circled at least one suitable modeling material; few went on gain full marks by circling a correct second.

Question 4

(a) Most candidates were able to name a suitable material from which to make their chosen counting frame. Candidates should be made aware that there are more

marks available for naming a specific material rather than simply naming a generic material.

(b) Last year, the new format of this question was found to elicit a better response from the candidates. Unfortunately, this improvement has not continued and the majority of candidates are still producing vague responses with regards to the types of tools and processes they would use to make their counting frame. Those candidates who chose to give details of how they would make their selected counting frame by CAD/CAM methods, similarly, failed to produce a detailed response.

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High chair B

Most candidates correctly identified that High chair A was made from 'plastic', with many going on to name a suitable specific material such as 'PVC'.
Reference to its 'appearance' was generally given as correct reason for choosing this material.

Reference to its 'coloured finish' and 'durability' were generally given as correct reasons for their choice.

(b) Most candidates gave a suitable specific finish which could be applied to High chair A. 'Varnish' was the most popular correct specific finish chosen.

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(a) The majority of candidates correctly named two features of the play centre which would make it appealing to a young child. The use of 'bright colours' was a common correct response. Many went on to correctly explain their answers.

(b) There was a mixed range of responses to this question. The majority of candidates gained some marks by giving details of some of the ways in which the advances in material and manufacturing technology had affected the development of products. Few went onto provide detailed responses and some incorrectly gave responses relating to the use of CAD.

Coursework

It is pleasing to report that there are an increasingly large number of candidates submitting creative and innovative projects. Centres are to be commended on encouraging this. Many more candidates are also making detailed consideration of industrial practices throughout their designing. CAD and CAD/CAM are becoming more evident in candidates' work as confidence grows and provision of hardware spreads. The vast majority of centres were accurate in their assessment of coursework; where there were inaccuracies, it tended to be in the upper mark ranges. A small number of centres had problems with internal standardisation.

A wide variety of briefs have been attempted by candidates. In some centres, the whole group starts with exactly the same brief, which often leads to a tremendous variety of outcomes, where innovation and creativity are encouraged. At the other extreme, a few centres appear to have made designing lessons excessively teacher led, with outcomes all variations of the same theme.

Design folders

Design folders are generally becoming more concise, in line with the time allowance recommendations. Most are completed in around 20 sides of A3, with some folders achieving A grades in 15 well filled sides. For a significant number of candidates, the bias of the folders is skewed too much towards research at the expense of design ideas and development. Pages of notes on different materials, joints and finishes are not normally needed; it is often sufficient to justify a material choice at the development stage, with a sentence or two explaining the reasons for choice. Samples of materials stuck to pages are definitely not needed.

Well focussed research has often included some of the following: - relevant measurements, analysis of existing products, questions to clients and potential users (these need to be well-focussed), photographic research. The exact nature of research undertaken has varied according to the needs of the design brief, but the best candidates have used research to directly influence the specification and the designing. Many candidates have carried out limited but relevant research at the start of the project, and have then carried out additional research during the development stages of the project.

Specifications have been prepared to widely varying standards, the best being directly derived from the brief and research, and then driving the design ideas.

Design ideas continue to be effectively communicated by many, by means of numerous rapidly produces sketches. The most successful candidates often start to develop ideas immediately, as the ideas are presented. Many more candidates are modelling ideas, to assist development, through a combination of 3D card/foamboard/etc models, and 3D CAD. ProDesktop is very popular, but other CAD software has been used well. CAD is now being used at a more sophisticated level, for example with ideas being represented as an assembly of components. This possibly reflects exposure to CAD software for these candidates at a younger age, throughout Key Stage 3 and year 10. Where candidates have used CAD, they have often been able to produce formal orthographic drawings from their designs in minutes. This has assisted them greatly with the production of a cutting list.

Planning for production has tended to be done less well by many candidates, with "planning" often written as a retrospective diary. A flow chart is an efficient way of producing a plan for making, and gives the opportunity to include quality control points.

Industrial practice has been considered with variable quality. Weak candidates have often ignored it altogether. Others have merely "bolted-on" theory notes on e.g. vacuum forming. The best candidates have considered it throughout the folder, considering how the designs might be adapted for quantity production. They have then gone on to design jigs etc to assist with manufacture in quantity. Use of CAM is also evidence of industrial practice.

3D Outcomes

Wood continues to be the predominant material in the majority of projects, but there is increasing use of plastics, particularly where there is access to CAD/CAM equipment. There has been a slight resurgence in metal elements to coursework.

Project outcomes are becoming generally smaller in size allowing candidates time to achieve a better quality finish in the time available. Many candidates are creative and innovative in their work, which means that their work usually has a higher level of demand. Level of demand directly affects the interpretation of assessment criteria.

CAM has been used by a significant number of candidates. Many have integrated this into their making. Others have made extensive use, particularly of laser cutters, to manufacture a considerable proportion of their project.

In Conclusion

We are delighted to see candidates taking into consideration advice given to teachers in Autumn meetings and in the support materials issued each year. Many centres have made effective use of support materials, to guide project choice and to guide assessments, for example, by displaying exemplar project photos on workshop walls. We look to candidates continuing to focus their research well as well as integrating CAD/CAM into their work. With the introduction of laser cutters at some centres, candidates should be looking to extend the complexity of projects made, rather than just reproducing existing projects more accurately.

Mark Range and Award of Grades

Full Course

Foundation tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Paper	125	140	82.3	18.8
Coursework	95	210	114.7	36.7
Foundation tier overall 3545/F	--	350	197.0	46.8

		Max. mark	C	D	E	F	G
Paper boundary mark	raw	125	90	78	67	56	45
	scaled	140	101	87	75	63	50
Coursework boundary mark	raw	95	60	48	36	24	12
	scaled	210	133	106	80	53	27
Foundation tier scaled boundary mark		350	228	190	153	116	79

Higher tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Paper	125	140	79.8	16.1
Coursework	95	210	163.8	30.0
Higher tier overall 3545/H	--	350	243.7	39.2

		Max. mark	A*	A	B	C	D	allowed E
Paper boundary mark	raw	125	91	84	77	70	58	-
	scaled	140	102	94	86	78	65	-
Coursework boundary mark	raw	95	95	83	71	60	48	-
	scaled	210	210	183	157	133	106	-
Higher tier scaled boundary mark		350	301	272	241	211	171	151

Provisional statistics for the award

Foundation tier (30 172 candidates)

	C	D	E	F	G
Cumulative %	27.1	58.3	79.7	90.9	96.3

Higher tier (25 292 candidates)

	A*	A	B	C	D	allowed E
Cumulative %	5.8	25.2	55.0	81.2	95.7	97.8

Overall (55 464 candidates)

	A*	A	B	C	D	E	F	G
Cumulative %	2.7	11.5	25.1	51.8	75.4	87.9	94.0	97.0

Short Course

Foundation tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Paper	100	120	66.8	16.5
Coursework	95	180	90.1	35.8
Foundation tier overall 3555/F	--	300	156.9	43.4

		Max. mark	C	D	E	F	G
Paper boundary mark	raw	100	75	63	52	41	30
	scaled	120	90	76	62	49	36
Coursework boundary mark	raw	95	60	48	36	24	12
	scaled	180	114	91	68	45	23
Foundation tier scaled boundary mark		300	195	161	128	95	62

Higher tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Paper	100	120	63.2	11.8
Coursework	95	180	143.3	28.9
Higher tier overall 3555/H	--	300	156.9	43.4

		Max. mark	A*	A	B	C	D	allowed E
Paper boundary mark	raw	100	79	72	65	58	43	-
	scaled	120	95	86	78	70	52	-
Coursework boundary mark	raw	95	95	84	72	60	48	-
	scaled	180	180	159	136	114	91	-
Higher tier scaled boundary mark		300	259	238	210	183	143	123

Provisional statistics for the award

Foundation tier (600 candidates)

	C	D	E	F	G
Cumulative %	18.7	47.2	72.2	87.2	94.7

Higher tier (501 candidates)

	A*	A	B	C	D	allowed E
Cumulative %	3.0	20.6	51.1	78.4	95.2	97.6

Overall (1101 candidates)

	A*	A	B	C	D	E	F	G
Cumulative %	1.4	9.4	23.3	45.9	69.0	83.7	91.9	96.0

Definitions

Boundary Mark: the minimum (scaled) mark required by a candidate to qualify for a given grade. Although component grade boundaries are provided, these are advisory. Candidates' final grades depend only on their total marks for the subject.

Mean Mark: is the sum of all candidates' marks divided by the number of candidates. In order to compare mean marks for different components, the mean mark (scaled) should be expressed as a percentage of the maximum mark (scaled).

Standard Deviation: a measure of the spread of candidates' marks. In most components, approximately two-thirds of all candidates lie in a range of plus or minus one standard deviation from the mean, and approximately 95% of all candidates lie in a range of plus or minus two standard deviations from the mean. In order to compare the standard deviations for different components, the standard deviation (scaled) should be expressed as a percentage of the maximum mark (scaled).