



Pearson
Edexcel

Examiners' Report Principal Examiner Feedback

Summer 2019

Pearson Edexcel GCSE
in Design and Technology (1DT0)

1A: Metals

1B: Papers and boards

1C: Polymers

1D: Systems

1E: Textiles

1F: Timbers

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1DT0/01 GCSE Design and Technology 2019

Introduction

This is the first year of the new reformed (9-1) GCSE Design Technology course which has seen some significant changes. The single exam paper is now worth 50% of the overall final qualification and as such has equal weighting alongside the NEA.

There were six different material specialist papers on offer, each with a common core in Section A which was worth 40 marks and a Section B worth 60 marks based on one of the six material areas: Metals, Papers and Boards, Polymers, Systems, textiles and Timbers.

Comments on individual questions

Core

1ai A generally well answered question, with a good number of candidates offering a correct response, mostly related to water resistance / waterproof or durability, all appropriate within the context of the question. It is important to stress here that the question was about the properties of materials in the context of the product or component given in the table and therefore generic properties were not be accepted. Candidates often stated characteristics of materials instead of properties. A clearer understanding of the difference between these is needed.

1aii This question was not well answered well by many candidates with most incorrect answers relating to durable, strong, tough & does not rust. Strong as a generic description of a material is not specific enough whereas **good compressive** strength is because it is focused and specific. Correct answers referred to hardness/hard or hard wearing. Many candidates gave answers about the function of the vice in terms of holding materials rather than the properties of cast iron.

1aiii Most candidates answered this question correctly with water-resistant/waterproof being the most frequently correct response seen. However, many responses concentrated on the user rather than the product with answers based on keeping the person wearing it dry.

1aiv Generally well answered, with a good number of candidates scoring here. The most common responses related to heat insulation or ability to be printed on. Fewer references were seen in relation to it being rigid and safe for food use. Many responses only stated insulator with no justification or conductor of heat and so could not be accepted as being correct because it was not qualified. There were many incorrect responses that related to the environmental impact of the carton and its recyclability or lightweight nature.

1b This question tended to be well answered, although a good number of candidates did not give their answer correct to a whole number. Candidates either got the answer to this question correct with 29% or answered incorrectly with either 71% with Error Carried Forward (ECF) applied. Many candidates had obviously used a calculator, but had failed to offer their calculations on the paper. This proved to be a disadvantage where their answer was incorrect but their calculations were not evident meaning that they could not be awarded a mark for correct calculations shown. It is therefore strongly recommended that candidates show ALL stages of their working out on ALL maths based questions.

1c A generally well answered question, with most candidates scoring at least 1 mark. Most responses referred to loss of jobs/reduced income/profits/loss of income however a linked justification was missing which meant the second mark could not be awarded. Quite often two or more negative effects were given rather than explaining just one given that this was an 'Explain' type question as opposed to a 'Give' type question.

2a This question tended to be well answered; 'Isometric drawing' although there were a huge range of spellings offered. Incorrect responses often related to a form of 3D or orthographic drawing or candidates simply left the question unanswered.

2b A poorly answered question overall, with very few candidates seeming to have an understanding of what Calico is. Plenty of misconceptions were seen based on the material being used by the child, soft and safe to play with rather than it being used as a prototype. 'Cheap' was by far the mostly seen answer however, if candidates stated it was relatively cheap they could justify it with being used as a prototype, so plenty of designs can be used before the final one is chosen. A lot of candidates added lightweight, mouldable, easy to cut and non-toxic as common incorrect answers.

2c This question was well answered by many candidates with most showing a clear understanding of nets and therefore scoring full marks. Candidates presented a good number of different formations for the arrangement of squares. Most common incorrect answers were because the net was not the correct size, drawn to the wrong size, / not showing dotted lines for folds, missing them out or putting in solid lines.

2d This question was generally well answered with a range of answers from the mark scheme. Some candidates failed to correctly identify the transparent properties of tracing paper although many more could say it was see-through / translucent for 1 mark. Some candidates explained the stage without connection to the choice of tracing paper, e.g. to get sizes correct, to reduce mistakes, not mentioning the fact it is translucent and thus allows the shape to be copied. Many referenced the transferring of the design without any mention of this being due to the use of tracing paper.

3a Most candidates answered this question correctly. Some candidates listed general properties of acrylic without relating it to the question. When questions are based on the product or a context, it is important that the answers are given in relation to the product or context and not the more general properties or characteristics such, 'acrylic comes in different colours', 'acrylic can be bent / moulded easily' for example. Transparent / see-through or waterproof / weatherproof were the most common correct responses seen.

3b A generally well answered part question, with most candidates scoring at least 1 mark with many stating it won't rust, but failing to explain because it is resistant to corrosion, often describing inappropriate reasons such as strong or durable. However, many candidates stated that the aesthetics would remain intact when placed outside for long periods of time and that it was also a tough material that could withstand impacts when placed into the ground. Many answers lacked a good suitable justification for the second mark which is required on 'Explain' type questions.

3c Candidates often struggled with this question perhaps because they did not read the question carefully enough confusing 'materials' and

'technology'. This subsequently resulted in a high proportion of incorrect answers relating to using recycled materials for the solar light or bio-plastics and many responses about using locally sourced raw materials to reduce the carbon footprint. The most common correct answers observed were to do with using electric delivery vehicles or powering the factories using a variety of renewable energy sources with newer more energy efficient machinery.

3d In general, this question was answered quite well with many candidates scoring 2 marks. Candidates in general could identify that they needed to divide 4.97 by 12 although some got the calculation wrong by multiplying 4.97 by 12. Some candidates incorrectly rounded up their calculation and some candidates appeared to not understand 'significant figures'. Working out was shown by many candidates however, some candidates only response was limited to recording the correct answer which incurs a risk of no marks being awarded for ECF if the answer is subsequently wrong.

4ai At the most basic level this was a straight forward knowledge based question based on recall with many candidates correctly identifying the component as the LDR. Many other incorrect answers were seen ranging from fuses, LEDs to Light absorbing resistors. In this situation, it was quite appropriate and correct for candidates to write out in full or to simply use the abbreviation or LDR, either being correct.

4aii Unfortunately, this was relatively poorly answered by many candidates to achieve all 3 marks. This question perhaps highlighted a general lack of understanding for systems flow charts within the core section. A lot of candidates made their flow chart responses far more complicated than necessary by adding in additional command and decision boxes and not realising that all the information for the flowchart was already present on the diagram. Many candidates picked up zero marks for this question either through not attempting it or from giving wholly incorrect responses. Many candidates scored 1 mark for the 'Yes' and 'No' in the correct places with the 'no' feedback loop often being successful and in the correct place whilst the 'yes' feedback loop often incorrectly placed or not provided at all.

4b Most candidates answered this question well, scoring both marks with almost every candidate scoring at least 1 mark for the National Parks bar correct at 30%. There were occasions when the bars were drawn incorrectly, particularly being drawn closer to 60 or at 65+. A few candidates but not many had the national parks column at 40% rather than 30%.

4c Generally this was poorly answered by most candidates. Many misread what was being asked and assumed that they had to suggest their own ideas and designs that they could use to create or improve any existing product. Other candidates talked quite strongly about using CAD as a design tool but failed to explain how it could prevent design fixation. Many candidates focused on changes to graphics, characters and music modules. Candidates for the most part could not define the term 'design fixation'. This was evident from the large number of them who either left the question blank completely, or wrote an answer that did not apply to the question. Successful candidates for the most part, could identify two to four different methods that a company could use to avoid fixation. Those candidates familiar with the term 'design fixation' outlined the need for focus groups,

collaboration, user views and feedback during the design process. It feels as though while conversations about design strategies were probably had with candidates while they undertook the NEA, it perhaps was not taught as a separate 'standalone' theory area.

Specialist material areas

This is a single report and therefore not every question from each specialist paper will be commented upon. It should be noted that large elements of the Section B papers are identical or very similar. Respective questions have been drawn from the same specification areas and therefore the comments from one paper apply to all papers. Some specific comments from individual papers have been offered

5a The majority of candidates attempted to sketch and annotate changes to each of the existing ideas with many candidates gaining good marks on this question. In many cases the sketches were very small and the annotation lacked detail, often simply re-stating features given in the specification to be incorporated into the new solution.

Metals

- Candidates responded well to this question with many picking up between 3 and 5 marks. Generally, candidates picked marks up for the placement of a cup holder, with most recognising dimensions were needed for a second mark and most picked marks up for having large feet. Candidates fared less well in creating an adjustable leg for levelling the table out, with few marks being awarded for this point.

Papers and Boards

- Mostly well answered with candidates clearly understanding the question. The element relating to the detachable signage was least well answered, with some candidate leaving this off altogether, or seemingly misunderstanding what was meant. Nonetheless, many candidates performed well in this question and were able to present ideas for the three required features even if annotations did not provide clarifications for the features. Some of the illustrations were quite small and therefore were difficult to award full credit. If candidates had shown enlarged details, it would have helped them show deeper knowledge and understanding.

Polymers

- Generally well answered by many candidates, however many failed to respond to the point of how the postcards could be changed.

Systems

- This design question was well answered by the majority of candidates. A significant number however failed to demonstrate and explain the "security" required to hold the cup rather merely saying it was 'secure' and not allowing / indicating enough 'depth', to explain or justify this point. Many candidates drew a draw to store the mouse in but failed to explain how the storage device enabled easy access to the mouse.

Textiles

- A full range of marks were awarded for this question and candidates responded with a varied level of success. The first specification point seemed to cause candidates the most issues and many did not score for either making the organiser adjustable or secure. Many attempted to include a coffee cup holder although some drawn would not actually work. Candidates did however struggle to achieve the

second mark here as many were not specific enough about how the cup would not fall over. The last specification point was the most successful for many learners who would often divide the pocket into sections and add a fastening to secure the top edge.

Timbers

- Many candidates suggested hinges to the legs, with the minority then recognising the need for supporting brackets or locks to ensure the legs did not refold. Many had placed the cup holder in an appropriate position and applied suitable dimensions successfully. However, a minority made the cup holder too shallow to support the cup without it toppling over, or making it too deep to pick the cup up or failing to show any dimensions that were suitable. Pull out shelves or additional surfaces on the side of the unit being the most popular response to the third specification point. The wipe clean surface was often just described as "plastic" or "wipe clean" without saying how this was to be achieved and as such no marks could be awarded. It is important not to simply re-state the question. Candidates must explain or justify how the surface was wipe clean.

5b A similar product was used on all papers in that the product was a display unit on which a pair of glasses was to be displayed. In general, this question was answered fairly well across all six specialist papers with many candidates scoring 2 or more marks. Most common errors related to the glasses falling off without any further explanation. The most common correct responses were given by candidates who were able to explain in detail how the steep slope of the nose and lack of side restraints on the 'ears' would result in the glasses falling. Many candidates also scored well when referring to the large stable base of the unit. Some responses referred to the side view of the face being recognisable but a front facing view would not help the customer decide about what the glasses would look like being worn.

6a

Metals

- This question was not answered particularly well by candidates. Many demonstrated that they did not really understand what sustainable metals are, and discussed how they could be recycled after their use.

Papers and Boards

- Many candidates did not read the question and discussed recycling and end of life instead of the focus which was on manufacturing. Those who did answer correctly, tended to explain their answer well and included reference to reduced deforestation, reduced energy use and lower emissions. Many candidates provided appropriate linked responses.

Polymers

- The keyword 'sustainable' was ignored by many candidates giving answers that could refer to any polymer. Of the correct responses, 'company image' or 'recyclable' were popular well explained answers.

Systems

- Candidates seemed to be familiar with this topic and offered some good responses with many comments about the RoHS Directive. However, some candidates misread the question and provided answers relating to recycling.

Textiles

- Many candidates performed well on this question and it was clear that issues around recycling and sustainability are being taught in centres. It was common for candidates to discuss the environmental advantages of using upcycled fabrics and most could give at least one linked response. Some candidates misunderstood the question and talked about general fabric properties and how they would be soft for children to hold which was not the point of the question.

Timbers

- This question was not well answered by many candidates, relatively few gaining full marks with many gaining 1 or 2 marks. Some candidates had a clear understanding of sustainable timber and how stocks could be maintained with replanting. Some candidates were also able to explain how FSC certification would be an advantage for the company as it could help to promote their product. The most popular response was timber not running out due to replanting or no effect on the environment through deforestation or more popularity for the product due to market appeal. However, those candidates who were unable to gain marks considered sustainable timber to be long lasting, hard wearing, made using recycled timber and difficult for the child to "break".

6b This question type was a common type of question across all six papers in that it required candidates to use notes and sketches to show how some manufacturing process would be carried out. Some common issues related to candidates just providing notes without any form of sketch.

Metals

- This question provided mixed responses. Very few candidates achieved full marks as they often missed out cleaning the surfaces using an appropriate method or a valid way in which the two parts could be held securely. Some candidates spoke about welding which could not be awarded any marks because it was about brazing and more often than not, candidates got confused between soldering and brazing. Brazing rod / filler was often incorrectly labelled as copper or solder.

Papers and boards

- Most candidates understood the need for adding a support and an requirement for an increase in the surface area, however the responses were often jumbled or unclear with some candidates attempting to provide a non-paper and board solution. Annotations were often lacking in detail so it was unclear how specific aspects of the improvements would provide support. Very few candidates

managed to gain full marks on this question with most missing the need to support pieces whilst the glue/adhesive dried.

Polymers

- The overwhelming majority of the candidates either did not answer or focused on the drilling aspect, which was incorrect since the question was very specific about cutting a screw in the hole. The very few candidates who knew what tapping was, did well but focused on the 'use of a tap' and 'turning it clockwise' but omitted the accuracy of turn forward and back and ensuring it was perpendicular to the surface.

Systems

- A generally well answered question demonstrating candidates understanding of the soldering process however sketches were frequently small and lacked clarity. It was clear that not all candidates were familiar with the polarity of an LED and some candidates described fixing the LED to the board with flying leads rather than directly to the board.

Textiles

- Candidates either did very well or did not score at all. There was very little terminology referenced in the candidate's responses in relation to sewing techniques. There were many candidates who thought that the book was paper based although it is listed as being made from fabric at the start of question and as such gave completely unsuitable answers. Many candidates used notes and sketches which is what was asked for and both were required to achieve full marks.

Timbers

- Many of candidates did not show enough knowledge on how to screw the head to the body to be rewarded high marks. Many gave a very generic answer which just showed a screw from the head to the body, or some even from the body to the head. Some candidates thought they merely had to show that the screw would go through the head, for example through the eye/eyes and into the body, not understanding that this was about the process of securing it. There was a lack of comments and drawings of the stages which included; marking out, using a pilot hole, clearance hole, countersink and naming a screwdriver/electric hand drill. Quite a lot of candidates did mention that adding PVA glue would strengthen the joint further. Some candidates provided some good diagrams and instructions which included all the key points. However, some candidates ignored the question and gave responses concerning dowel joints or tenons.

6c

Metals

- Many candidates responded with answers relating to different properties being required in different areas with some candidates explaining what these different properties were and where they were needed on the candle holder.

Papers and Boards

- Many candidates performed generally well with linked responses referring to different boards having different properties which made them suitable for different parts of the windmill.

Polymers

- Many of candidates referred to cross contamination, but many candidates incorrectly wrote about being able to identify the blade from the handle.

Systems

- A reasonably well answered question with many candidates achieving some marks although 2 marks tended to be the norm. Common answers related to the use of texture to improve the grip and to prevent the user dropping the torch however, many candidates confused the textured handle of the torch with the handle grips and had not read the question carefully enough. In many cases where candidates had picked up a mark for a relevant reason they failed to offer a valid justification and their answers were not detailed enough

Textiles

- This question was well answered by many candidates, many of which wrote about the different textures of the fabrics and how they would represent the textures of the objects in real life.

Timbers

- In general, this question was answered quite well by candidates to score 1 mark. Many candidates merely repeated the question as part of their answer before saying that this would make the toy 'more aesthetically pleasing'. There were many answers concerning the different colours, texture and grain that different woods would bring to the toy, but often this was not expanded upon for the second mark. Many candidates answered based on different woods having different strengths, legs made of oak for example. Very rarely did candidates comment on using scraps of different timber to reduce waste.

6d

Metals

- This question caused some issues with candidates as often they spoke about stamping or punching as a correct technique, however they failed to recognise that this technique would not be suitable for a batch of 1000 due to the production of a die. Most candidates correctly identified a laser cutter, plasma cutter or CNC / CAM as an appropriate method.

Papers and boards

- Many candidates identified at least one method, but the explanations were often not in sufficient depth or detail for both justification marks. Laser cutter was the most frequent response followed by die cutting with the ability to cut and fold with combined dies and folding jigs. Quick and identical components were the most common justifications.

Polymers

- Many candidates answered, 'injection moulding' or 'vacuum forming' which were clearly inappropriate responses for the item being made in a batch of 1000. The repeatability and accuracy of laser cutting was a popular response.

Systems

- A reasonably well attempted question with many candidates achieving some marks. However, few candidates achieved more than 3 marks. Common responses related to the use of the laser cutter as a technique and specifying accuracy, precision or speed as a justification. A handful of candidates touched upon the use of a CNC router and similarly a handful offered the use of jigs as their answer. Where candidates lost marks was due to a lack of detail in their answers and justifications and the failure to offer a second alternative technique. Superficial detail offered in their justifications in many instances led to being awarded only 2 marks.

Textiles

- There seemed to be some misunderstanding by candidates about the terminology used in this question. There was a range of marks awarded with the highest being allocated to candidates who discussed laser cutting, hand cutting and die cutting with detailed explanations showing the advantages of each technique. Some candidates did not understand the question at all and talked about different methods of decoration which could be used.

Timbers

- The quality of answers for this question was mixed. Most candidates understood the question but many named machines rather than the process. There were a lot who had also written template or jig without stating it was a cutting template or jig which are different to ones use to aid marking out. Candidates were well versed in the use of various forms of CAM and where this was given, speed and accuracy were usually alongside as appropriate justifications. A common error was to suggest laser cutting, which is not an appropriate process for this product, but they may have seen similar wood cutting on the laser cutter in school on thinner sections of wood.

7a This question is a basic recall question based on surface finishes or treatments on all six papers.

Metals

- Most candidates scored the one mark available for this question with the most frequent correct answer being 'paint', however a range of correct answers were seen.

Papers and Boards

- Candidates performed well on this question. Each of the potential answers in the mark scheme were seen, with varnishing and lamination being the most popular responses from candidates.

Polymers

- Popular answers included 'paint' or 'laser engraving'. Some candidates lost the mark as they put 'engraving' or 'laser cutting' only.

Systems

- A generally well answered question which reflected candidate's knowledge of surface finishes with galvanising, gold plating, electroplating and various forms of metal coating/plating amongst the most common answers seen. Many candidates offered unsuitable surface finishes since they had not considered electrical conductivity through surface finishes such as painting and plastic coating for example.

Textiles

- This was surprisingly a very poorly answered question by candidates. In the case of the textiles paper this section of the specification includes what is traditionally thought of as decorative techniques which is what the question was looking for. Those candidates that did score here would list screen printing, embroidery and using beads for example. Many incorrect answers were given about having a waterproof finish which did not actually answer the question as candidates seemed to have not taken into account that the question was specifically asking about adding detail to each face.

Timbers

- Most candidates answered this question and performed well using a wide variety of responses from the mark scheme. The most popular answers being varnish and paint. Incorrect answers mentioned 'gloss' or 'sanding' or a surface finish you would not use on timber.

7b

Metals

- This question was not generally well answered. The candidates that did achieve some marks did so for mentioning that it would save time compared to making them from scratch.

Papers and Boards

- Most candidates seemed to understand the concept of stock sized paper but many seemed to have given a reason for using A3 paper, the right size for the design, less wastage for example, rather than the advantages of stock sized paper in general. Where candidates scored marks, it was generally in relation to being able to buy in bulk, reducing costs and paper fitting printers.

Polymers

- Many candidates responded with an unqualified 'cheap' and many did an irrelevant calculation of how many smaller bars could be made from 1 longer bar. The most common response was 'only needing to be cut to length' and better responses referred to saving time.

Systems

- Candidates did not appear to be familiar with insulated sleeving and guesswork was in evidence and as such it was not a well answered question. Where correct answers were observed, they related to availability, reduced cost when bulk buying and cheaper than making it yourself. Many candidates could offer one reason with suitable justification but not 2 reasons.

Textiles

- Most candidates did not score well on this question. Many knew what bias binding was and could list the benefits of using it but unfortunately did not focus on the fact that the bias-binding was stock-sized.

Timbers

- In general, very few candidates gained all 4 marks. Many candidates gained 2 marks, with fewer showing a clear enough understanding to achieve 3-4 marks. Candidates often stated that the dowels could be bought in bulk or that they would be widely available. However, candidates frequently failed to explain/justify the point given. For example, many candidates answered in a simplistic way stating that stock sized wooden dowel was 'cheap' but was not qualified or explained in any way.

7c The maths question was very similar across all papers and in some cases the dimensions of the trapezium were identical as such the comments are also very similar and so just one set of comments are recorded for this part question.

Most candidates who answered this question performed well using range of mathematical methods recognised in the mark scheme. There were a lot of full mark answers awarded with a small number of candidates having a correct answer with little or no clear working out. Some candidates went completely way off in their calculations but could be credited for sections of their answer that were relevant. Many candidates showed some understanding of the question and most converted the units correctly. Candidates sometimes produced an answer that showed no awareness of tessellation to maximise material use.

7d

Metals

- Most candidates performed well on this question, highlighting at least one valid working property with a good explanation. Most candidates suggested malleable and correctly defined it as being able to be shaped or formed in some way, but sometimes missed the third mark in identifying it resulted in it not fracturing or breaking. Some candidates identified brass as being ductile but often were unable to define this fully.

Papers and boards

- A range of good answers observed however many did not expand upon their answer fully enough to gain all three marks. This was often

because of not having a good understanding of the working properties of copier paper. Where a correct working property was identified, it was mainly that it was smooth or white. A large number stated that it was good to print on, or that it was cheap or lightweight. Generic answers such as these should be avoided.

Polymers

- Many candidates identified that HIPS as high impact, and it being able to withstand play by children. Many discussed HIPS being lightweight or cheap, which were both incorrect responses.

Systems

- A reasonably well answered question although candidates in general did not achieve high marks and found it difficult to offer 2 explanations an example being that candidates knew that microcontrollers could be programmed or re programmed but did not always go on to explain the advantages.

Textiles

- This question was attempted candidates with varying degrees of success. Candidates seemed familiar with nylon as a fibre and knew about some of its properties. Many also made a good attempt at linking these properties to the bunting's outdoor use. Candidates should take care with the use of the word 'waterproof' as many things are not and may be better advised to describe things as water resistant instead. Candidates at the very highest level also knew about nylons fade resistance and provided some good linked responses about it being left out in the sun.

Timbers

- In general, this question was answered quite well by many candidates. There were some good responses that were well supported but fewer seen that supported each working property with two points to gain full marks. Other candidates would identify a suitable property but then give an incorrect explanation therefore not linking the two together. A significant number of candidates did not recognise what 'working properties' refers to and so gave characteristics of the material such as its appearance, weight or relative cost. Most candidates who could state at least one working property of beech used tough or hard. Some candidates incorrectly stated that beech was light so would tumble quicker. Some candidates mentioned the fact that beech does not splinter easily and would be safe for the child but the mention of dense grain was unusual.

8ai

Metals

- A poorly attempted question by all candidates overall with many not understanding the focus of the question and therefore providing answers that were not relevant or correct.

Papers and Boards

- The most common answer by far was to make the book more aesthetically pleasing with most candidates explaining why this was important but a significant proportion of candidates did not appreciate this was a two-mark question, and did not expand upon their initial lead point.

Polymers

- Many candidates repeated the question, however, a large number identified that additives would be used to make PVC stronger, however they failed to explain this. Other common responses referred to UV degradation without little justification.

Systems

- Candidates did not understand the requirements of this question as such it was not a well answered question and candidates struggled to offer explanations regarding the cost factor. A handful candidates understood economies of scale with references to bulk buying reducing costs. Component availability and quality of components were frequent points mentioned in answers.

Textiles

- It was most common for candidates to score just one of the two marks available here. Many either responded to say that it would stop the apron from catching on fire or that it would protect the user from burns with very few candidates managing to link these two points together.

Timbers

- This was generally answered well, although a percentage of candidates answered that fireproof coating would stop the roof truss from catching fire due to heat from the sun. The most common answers concerned stopping the roof truss from burning / catching alight with a justification of preventing / slowing possible collapse of the roof inwards and how it would allow time for the occupants to get out.

8aii

Metals

- This question was in parts well answered by candidates. They clearly understood the characteristics of stainless steel with the majority providing answers that were linked to corrosion resistance.

Papers and Boards

- There seemed to be a lack of understanding about bond paper with candidates often suggesting that it was glued together, or was thicker than copier paper, perhaps thinking of something like cartridge paper. Where marks were awarded, it tended to be due to recognition of the rough surface. It is important that candidates are familiar with the phrases and terminology used in the specification.

Polymers

- Many candidates identified PVC as being weatherproof, however, many went on to state another working property which was not what the question had asked for, therefore marks could not be justifiably rewarded.

Systems

- A reasonably well attempted question with many candidates achieving some marks where candidates could demonstrate their knowledge of the function of the thermistor and could offer a reasonably good explanation. They could recognise that the thermistor could detect a change in temperature although they tended to describe this as measuring the temperature. A considerable number could then explain that the thermistors resistance was then affected by the change in temperature.

Textiles

- Many learners did not score well on this question as they could not describe in detail the working properties of the material. Some candidates are confusing the word 'strong' with durability which would be incorrect. Quite a few candidates discussed the wash ability of the material but this was not specific enough to the woven twill.

Timbers

- In general, very few candidates gained all 3 marks. Many candidates who attempted an answer were able to gain 1 mark, with fewer showing a clear enough understanding to achieve 2-3 marks. Most received one mark for mentioning lightweight or compressive strength and some received the second mark for justifying this as a working property. Quite a few received zero for their answer as it related to an aesthetic quality of pine or left it blank.

8b

Metals

- Most candidate were able to provide an answer with the most frequently seen responses relating to mining and the impact on the landscape being the most popular answer.

Papers and Boards

- A significant number of candidates explained the problems with logging, bleaching, and energy use during manufacture of bonded paper. However, a large number of candidates discussed use of adhesives, or commented on negatives for the end of life rather than production.

Polymers

- The majority of candidates identified the 'difficult to recycle' aspect of PVC, but many failed to explain this which restricted the ability of candidates to access all 3 marks.

Systems

- A reasonably well answered question where candidates seemed to be aware of the topic with references to recycling, reusing materials and landfill being the most popular answers however, the lack of detailed development let some candidates down

Textiles

- This was a popular question attempted by most candidates, many of who managed to provide at least one linked response. Common correct answers seen were about water pollution and its effect on wildlife.

Timbers

- In general, very few candidates gained all 4 marks. Many who attempted this question showed a sound understanding of the uses of genetically modified timber. Many were able to suggest 1 reason, most commonly that it can be grown more quickly (with linked justification). Some candidates correctly explained disease and pest resistance. However, many candidates did not attempt to answer this question. Incorrect answers from candidates demonstrated a lack of knowledge and understanding of the application and benefits of genetic modification of pine. There were many answers about the aesthetics of the wood, changing its colour, growing trees without branches (lack of knots), and growing fire-resistant trees. A number also stated that genetically modified trees would stop trees being cut down.

8c

Metals

- Candidates often provided repetitious answers for this question, focusing purely on the issues surrounding local community damage or job opportunities. Some candidates were able to deconstruct the question better and highlighted trends. Often candidates were confused regarding the recyclability of stainless steel. Candidates need to identify that this is an 'Evaluate' type question and responses should be balanced whilst also including a concluding statement. Most responses seen were judged to be of a level 1 with more able candidates demonstrating level 2 responses.

Papers and Boards

- Although there were some excellent answers, a significant number of candidates did not actually address the three elements requested in the question, tending to focus more on the information given in the question and provided descriptions of this. Trend forecasting was probably the most neglected aspect, with a large number not making any reference to it at all. Candidates tended to focus on the environmental impact of the book. It seemed that many were unfamiliar with a 'social footprint' and so veered towards the more familiar 'carbon footprint' in their answers. More candidates were able to discuss the impact of logging on communities and the ease and

difficulty of recycling and disposal. Responses were not very sophisticated and were mainly level 1 and 2. Very few candidates attempted to interrogate and deconstruct information by making connections between factors. Most gave an unbalanced appraisal of the information/issues with judgements that show a limited awareness of the interrelationships between factors or competing arguments. Candidates rarely provided a summary conclusion.

Polymers

- Responses for this question varied, with some of the candidates repeating the information given in the question. Candidates struggled to access level 3 as they tended to state many simple concepts rather than developing and evaluating a few ideas. Where good responses were seen it usually saw candidates discussing transportation issues, the use of additives making it difficult to recycle and extraction issues in relationship to the environment.

Systems

- A very well answered question with the great majority of candidates achieving some marks. Candidates were familiar with many of the issues relating to this question and put forward some excellent responses. Use of fossil fuels, raw materials, energy used in production, transportation, pollution, recycling etc. Candidates appeared very knowledgeable about the subject matter. Where candidates did less well it was due to superficial answers lacking in detail or simply giving a relevant point without expanding upon it.

Textiles

- It was really encouraging to see that candidates of all levels at least attempted to answer this question and very few blank spaces were seen as such a good range of marks were awarded. Where the lower level marks were awarded candidates did not try to summarise or draw conclusions from the points that they made. Many candidates discussed the environmental considerations of the product and many the social aspect of farming in developing countries. A lot of candidates misunderstood the point around trend forecasting or discussed how aprons were 'fast fashion' which they are not.

Timbers

- A very varied set of responses with some attempts to interrogate the information, make appropriate links and express points fully. A number of responses focused on employment and pollution but very few answers were clear on trend forecasting and many candidates confused 'trend' with fashion and styling. Trend forecasting was not well understood but many candidates were able to make points relating to the environment in terms of deforestation, loss of habitat and the need to recycle. There appeared to be a general misunderstanding of what 'alpine' forests were or where they would be found citing indigenous tribes being affected by the logging. Some evaluated the suitability of pine for its use in roof trusses. Many

candidates were able to make links with transportation and pollution linking to climate change.

1DT0/02 GCSE Design and Technology Non-Examined Assessment 2019

Report on the Non-Examined Assessment

Introduction

The moderators would like to take this opportunity to welcome the many centres that submitted work this year for the first time with Pearson / Edexcel and to thank existing centres for continuing to choose us for their awarding body.

As Principal Moderators, it has been very rewarding and encouraging to see that so many centres have embraced the many changes that have occurred to allow their candidates to perform across all the assessment criteria.

Whilst it must be acknowledged that there were some discrepancies in assessment, protocol and compliance issues, the vast majority of candidates produced portfolios and prototypes that addressed the contextual challenges and have been successful. The E9 report to individual centres will address centre specific feedback on the centres administration and candidate performance.

It should be noted that this year we saw an increase in administrative errors from centres relating to either: incorrect samples sent for moderation, addition errors either on the Candidate Assessment Booklet (CAB), errors in transferring the candidate's mark to the EDI forms or the recording different marks on Edexcel Online. This is a basic quality assurance checking procedure that needs to take place in the centre prior to the dispatch of the sample for external moderation.

It should also be noted that the portfolio and prototype must have the complexity, skills and an appropriate level of demand for the end of Key Stage 4 to access all the available marks. As such, many moderators reported lesser projects claiming inappropriately high marks.

Centres are to be congratulated on ensuring that most candidates presented work that was within the six contextual challenge themes set by the board, as a reminder they are different each year.

The following part of this report brings together feedback from all moderators and it is hoped that centres can combine this report with their own E9 report and reflect on the outcomes. It should be noted that the E9 report is available post results day from the centre's Examination Officer.

Administrative issues

Centres are reminded that only the work of the requested sample from Pearson should be sent for moderation. If any requested candidates are withdrawn then centres should send a replacement portfolio. In addition to the sample, the work of the highest and lowest scoring candidates should also be sent if it is not included in the original sample request. This is very important as it enables the moderators to capture the highest and lowest scores for the process of awarding marks to each centre.

Most centres produced work that was in a format that was very accessible, mainly A3 folders. Increasingly the use of USB drives and CDs has been seen. In some cases, centres had securely coded the USB drives and accessing the work was sometimes difficult without a supplied encryption code.

The Candidate Assessment Booklet (CAB) used by centres for each candidate has caused some issues in the first series. These should be used to guide the moderator to understand how centre marks were awarded. It is

vital therefore that each CAB from the sample requested is utilised to the maximum. These documents should not be attached to the respective folder as they worked on by the moderator and retained by Pearson after the moderation process. On the first page, all details should be completed in relation to the centre and candidate including full details about the centre, candidate's number, name and details of the contextual challenge selected. **The CAB is to be signed by both the assessor and the candidate to authenticate the work submitted for assessment.** Moderators had to return many incomplete CABs and front pages to centres so that signatures could be obtained for authentication. It is a requirement to supply photographs of the final outcome. Additional photos could be inserted later in the CAB if required and if it helped to show off the practical work, especially where fine details needed to be conveyed. As a minimum requirement, centres must indicate the page numbers where the evidence is to be found that relates to the marks given for each respective grid. It is therefore recommended that candidates page number the final folder allowing teachers and the moderator to follow it in a logical and sequential manner.

CABs should be printed double sided, portrait style, with appropriate page breaks for each assessment grid and stapled for security. This makes the booklet a very manageable document and allows for the addition of marks to be accurately counted and recorded on the back sheet prior to transferring to the EDI sheets. In extreme cases, CAB sheets were in the wrong order, upside down, not page referenced and contained arithmetic errors. **Due to the volume of addition errors observed centres are advised to have the addition work checked before entering total marks up in the CAB itself and before transferring the marks to the EDI, all prior to the dispatch of the work for moderation.**

Unfortunately, some irregularities were observed within the folder contents and plagiarism was also witnessed with candidates including identical work and declaring it to be their own. In a similar vein, candidates had traced over existing design ideas, some of which had also been printed out and included in their folders, whilst claiming it to be their own work. This practice is to be avoided at all costs in the future. There was also evidence of centre produced templates that had been used by numerous candidates. Centres are reminded of the current JCQ rules regarding the use of templates. It is clear that some centres have failed to comply with regulatory changes.

Contextual Challenges

Most centres responded to the contextual challenges well and embraced the spirit of the new style methodology of working, producing some excellent design folders and some well-made prototypes. There were some instances where centres had not responded to the Contextual Challenges set by Pearson / Edexcel and this served to limit access to some of the assessment grids, restricting the ability of candidates to access the full range of marks available. It was also evident that some centres did not offer the full range of contextual challenges allowing their candidates a choice of topic or theme. JCQ ruling states that all candidates should be given the full range of contextual challenges and they should be open to respond to these in their own way without being led or coerced into choosing a context.

Assessment criteria:

1.1 Investigation of needs and research:

This section was reasonably well completed by many candidates who used this section to really set the scene of the contextual challenge, offered some photographic evidence of visits and showed some insight into who they were designing for (the users) and their needs. Generally marks were appropriately allocated and centres appeared to know how to access the middle and top range of marks. This section is about **investigating the needs** of the user within the context of the challenge selected. The best responses were where the candidate had not only identified the key aspects for research, they had then explained why they were key points and had then also informed the reader how they were going to gather the information required. Where candidates did not always consider the contextual challenge in enough detail, this led to superficial research. Questionnaires sometimes contained a range of closed questions and sometimes asked questions that would not have informed the design ideas or specification, for example "where do you go on holiday?" instead of "when travelling what items do you take with you?" or "what items do you need to store when travelling?" Some candidates unfortunately decided on the prototype that they intended to develop, too early on in the process, making little reference to the contextual challenge. Some centres had included lengthier legacy style research into materials or joining methods; this research usually did not link to the contextual challenge in any meaningful way and was felt to be better placed in the 'development' section with reference to the refinement of the prototype. **Mood boards** (although reduced) were again seen that often bore little or no relation to the project being undertaken, **these should be avoided.**

1.2 Specification:

Candidates generally placed the Design Brief in this section or in the investigation section just before the specification. Candidates produced a good range of specification points with realistic points and higher level candidates added measurable points with the more able candidates writing technical points. The criteria refers to justification of the performance requirements however, this was often the weakest part in the specification rather than focusing on it. This section is perhaps best achieved where candidates have a table with the specification point, a detailed justification, with a measurable point/section. This detail will help candidates in the final section where the product is "tested and evaluated" as it gives measurable points to test the end product against. This work will also be used in the **review** section looking at how the initial ideas rate against the specification points. Moderators reported that some candidates produced specifications that were limited to the middle mark band as they lacked any sort of justification back to the contextual challenge.

2.1 Design ideas:

Most centres submitted good work in this section with many centres submitting excellent sketch work. Annotation of sketches however, was not generally focused on the project's specification points. Some centres had directed their candidates to produce three or four different design ideas to solve the contextual challenge but other centre's candidates might produce ten ideas plus but they often overburdened the candidate lacking any real detail and taking up far too much time to be useful. Candidates must be encouraged to annotate in more detail and add mini sketches to indicate the possible joints/processes that could be used to make them or explain what

materials might be used to make the prototype. Centres that have clearly taught their candidates to sketch and design well, indicating that ideas were well annotated with a detailed understanding of materials, processes and techniques, score well. Research gathered in the earlier sections needs to be better used in leading and formulating design ideas that relate to all key specification points. Due to the nature of the new specification, we saw electronic systems projects, graphic-based projects, product design based projects and textiles projects. There were a few pockets of centres who were using textiles with electronics, product design with textiles, product design with electronics and systems and graphics based product design projects. Centres who submitted their work on CD occasionally did not do the work justice because scanned-in sketches were not easily visible in many cases. Those centres that used only CAD here did not usually successfully generate a good range of ideas. A combination of CAD and sketch work should be encouraged. In some centres however, much of the work seen was too similar, showed limited creativity with little annotation to explain intention, materials or processes. It should be remembered that this section is for initial ideas. **The finished "final design" the candidates produce should not be identical to ideas produced here, there has to be room for refinement and development otherwise access to marks later could be restricted.**

2.2 Review of initial ideas:

The moderators reported that the review stage was generally completed well, but it was a very mixed approach across many centres. If a centre approached it well then most candidates were successful. Those who did not include measurable points in their specifications tended to not score highly here. Some good work was seen where candidates had clearly reviewed their work objectively against the initial specification as a separate sheet and had considered user group feedback all in relation to the contextual challenge. On too many occasions however, candidates simply resort to using tick boxes, smiley faces or a scoring system ranging from 1 to 10 for example to review their work often alongside the idea in question. This is not subjective and candidates must be better guided in future series to undertake objective evaluations. A separate sheet is preferable rather than making comments alongside the initial idea sketches where more room exists to expand the thoughts and decisions. Reviews were often seen beside sketched ideas. If this is the case centres still need to annotate, including page numbers in the CAB's to help identify where the marks are being awarded. Ideally targeted user group feedback should be used which is relevant to the product rather than using peers in the class for opinions. A summary of findings, might then guide the candidate into the development stage with better results both here and potentially in the development stage.

2.3 Development of design ideas into a chosen design

Most candidates entered into the true spirit of the iterative development section by carrying out further research, developing the design over several iterations, including modelling to test the functionality culminating in a chosen design with details for a third party to manufacture it. The variation of work presented by centres in this area was however, extremely varied, it was often weak in many centres and with the raised weighting of marks

from the legacy specification, centres should focus efforts here to reinforce the marks awarded.

Where centres had completed development well, there were a huge number of strategies used from developing logos and fonts, body styling and developing colourways, making structural changes, tracings and overlays, altering electronic circuits and flowcharts and producing PCB track patterns. The use of traditional modelling approaches were observed alongside 3D drawing work, which was a big change from the legacy specification.

It was great to see candidates using and experimenting with card, styrofoam, templates, producing pattern pieces and toiles, modelling joints or samples, modelling system components like gear systems, PCB track patterns and breadboarding. Better candidates then went on to test these cardboard mock ups in relation to contents. Some centres had encouraged pupils to create miniature cardboard models that didn't really offer any insight into refinements or link to the specification. What would be more useful would be to see a second and third model that changed and improved as part of the iterative journey. Where the user is able to offer feedback, this will trigger a change and springboard onto a new model or a different iteration. Many candidates had placed cardboard modelling into their diary of manufacture or toile diary, when it would have been better placed in this section. Some centres used commercial patterns and clearly evidenced changes they had made to these patterns, through the use of sketches and photographs, which helped clarify the marks awarded.

The inclusion of CAD was present for a good number of centres utilising 2D, 3D and graphic development. This dovetailed nicely in the iterative design process by carrying out some light CAD work in the earlier stages and some more detailed CAD work later, once the designs had been firmed up.

This section also includes the Chosen Design which should include the details needed for third party manufacture. Here candidates produced working engineering drawings in third angle orthographic, cutting lists, bought in components, assembly drawings, exploded diagrams, final CAD renders, vector drawings of CAD/CAM CNC files, circuit schematics, PCB track patterns, bill of materials, wiring diagrams, coding and programming, patterns, line drawings and lay plans, design for print and graphic DTP images.

2.4 Communication:

It is in this section that we can credit the communication that is used to design and develop the ideas. In too many cases we saw that centres had written 'throughout' in the CAB and this should be refrained from.

Communication is only assessed through 2.1 Design Ideas and 2.2 Review, 2.3 Development of a Chosen Design and 2.5 Review of a Chosen Design.

This criterion assessed the use of graphical communication, written communication and the use of computer aided design.

Graphical work was well assessed by centres and saw candidates using a wide range of graphic techniques including 2D, isometric, perspective and orthographic. Written work was also appropriate to the design work and candidates were able to annotate in some detail.

Where candidates used CAD in a well-thought-out manner, they were able to achieve the higher mark band. Candidates that utilised CAD had used 3D CAD software, circuit schematic software, circuit board software, electronic programming software, graphic design software for graphics and textiles drawings, photographic manipulation software and 2D CAD vector based

drawing package. Most candidates included photographs in the development stage (modelling) – at best these were clearly annotated and added much to the overall feel of the project. In some cases, we saw no CAD work utilised in centres. CAD should be used as a tool for design, with more and more types of CAD becoming cheaper and many web based packages being free. In a few cases we saw that CAD had been used by the candidates but not credited by the centre assessor in the CAB. Some candidates showed laser cutting in their manufacture diaries for instance, but had not included screenshots of the vector drawing package here in this section, that could have supported an increased mark in this area.

2.5 Review of chosen design:

What is expected here is for candidates to look at the points taken forward from the “Review of Initial Ideas” and evaluate if these points have now been improved during the development, as opposed to looking at the points that had not been changed. The candidates who also ask for feedback from others, preferably the users of the product, will be able to access the higher marks.

The first bullet point in the criterion relates to the analytical points that review the design idea across the development section. The second bullet point relates to the evaluation of the chosen design against the specification points. Candidates generally produced a review on a separate sheet, which made it easy to see where the marks were awarded. There were incidents where centres were asking for marks when the candidate had evaluated their work in the previous section, which was difficult to agree.

The Review of Chosen Design section was in a lot of cases omitted from portfolios. In most cases, candidates had reviewed the chosen design against every point of the specification but was broad and lacked detail. A large number of candidates failed to complete this in any depth, instead they had completed this section using evidence from the annotation of the final idea which resulted in weaker responses.

3.1a Manufacture – selection of materials:

This criterion relates to evidence that underpins and exemplifies the candidate’s reasons for choice of materials used and their fitness for purpose. This section tended to be leniently assessed by a large number of centres as most candidates had used appropriate materials but they had failed to explain and justify why they had chosen these materials in any depth. Quite simply, this section could be completed on a single A3 page. Centres generally awarded credit in this area where no explicit reference to materials was made anywhere other than in the diary of manufacture, which did not include properties and as a result centre assessment was leniently awarded. Where candidates had included a separate area where different materials were identified and listed with material properties, candidates often did not analyse or justify these in relation to the final prototype. It must be remembered that assessor’s annotation alone in the CAB cannot be credited, without evidence from the candidate in the portfolio.

3.1b Manufacture – skills and processes:

This section relates to the skills and processes used by the candidate to manufacture the prototype and pertains to the competence or skill of the process. Centres are to be congratulated on the whole for the high level of outstanding products that were made this year. In many centres candidates

had produced work that was suitably challenging and had demonstrated a wide range of skills accurately performed and were appropriate for Key stage 4.

Candidates had produced an extremely wide range of final prototypes for the contextual challenge across all material specialisms and in some cases overlapping specialisms. Moderators saw prototypes that were solely Timber, Metal, Polymer or a mixture of the three, Textiles prototypes and Textile prototypes with electronics encased inside, Systems products that were encased in a range of different materials. Moderators saw legacy style Electronic Products, Resistant Materials, Graphic Products and Textiles Technology prototypes. A number of centres took full advantage of the ability to now use mixed materials to create innovative prototypes. In some instances candidates had provided little or no information / justification as to why tools, equipment and processes had been used. This is another way to especially to record health & safety issues for the candidate and the safety of others whilst the practical work is being completed. Often the centres had correctly filled in the CAB but in some cases it was difficult to justify how marks had been awarded, particularly at the top end when trying to judge competency through manufacture. Centres would be advised to guide candidates to include such evidence either via photographs or written comments to justify these high marks. **Good sequential manufacturing photographic evidence is very important here to help support marks awarded by centres, through this we can see the candidates using a wide range of tools and equipment and can better assess the quality of what has been produced.**

3.2 Manufacture – quality and accuracy:

This section was again a pleasure to see the varied and detailed work produced by GCSE candidates in centres. The level of complexity of projects, variety of materials used in the prototype and pride candidates had in their work was often well demonstrated.

Photographic evidence of the individual candidate's work could be better used in this section to justify the award of higher marks where the product includes the manufacture of high quality component parts that are accurately assembled and well finished. The CAB allows a variety of photographs to be attached as a record but also the candidate should include photographic evidence in the folder of the finished prototype they have made.

Where moderators have seen projects that did not have the complexity and rigour for KS4 or had prototypes that did not show close up detail to confirm quality and accuracy, it was much harder to agree centre assessments.

4.1 Testing and Evaluation:

The responses to this section varied widely across centres; at best this section was very detailed with a clear range of relevant and measurable tests analysing the prototype that the candidate had made in response to the chosen contextual challenge. This was often with good photographic evidence of the tests alongside their results, along with user group feedback. These tests were developed from the ones initially described in the initial specification points. The photographic results of tests in situ were displayed in a detailed, objective evaluation and future modifications proposed and were fully justified.

A Life Cycle Analysis should discuss the sustainability of the prototype from cradle to grave through headings like Raw Materials, Materials Processing, Manufacture, Distribution, Use, Maintenance and Disposal. The Life Cycle Analysis was attempted and accomplished well in many cases, meaning that the higher band grades could be reached by many candidates, although many life cycle analysis' were based on a single material and did not refer to the prototype in its entirety. A number of centres failed to produce a life cycle analysis of any depth, where they were evident, they often included generic comments. There were many candidates who had failed to understand how to conduct a life cycle analysis effectively with many missing it out completely.

Third party and user group evaluation was in evidence but in most cases it lacked objective or detailed evaluative comments that were of use in assessing the merits of the prototype. In other cases a simple table of specification points and met/not met assessment occurred. This was often subjective especially with tick boxes being used or where one or two generic tests which were not objectively measurable against the specification were used. Where specifications were not measurable, technical and specific, evaluations tended to be vague and meaningless. In some cases, moderators saw a copy and paste of the specification which was then RAG colour-coded or merely with an added column to a table that said 'Yes/No' which was very basic and would have only scored marks if there were a greater body of work to help support the criterion. It is recommended that the user group feedback does not necessarily come from peer groups but reflects the thoughts of the target user of the prototype and the challenge it was set in.

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