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# Examiners' Report
# June 2022

## GCSE Design and Technology 1DT0 1D

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June 2022

Publications Code 1DT0_1D_2206_ER

## Introduction

This is only the second time that a full cohort of candidates has taken the reformed (9-1) GCSE Design Technology given the disruptions to learning because of COVID.

There are 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.

## Question 1 (a)(i)

A generally well answered question, with a good number of candidates offering a correct response, mostly related to the aluminium being resistant to rust or corrosion, all appropriate within the context of the question.

It is important to stress here that these opening four small questions are about the properties of materials in the context of the product or component given in the table and therefore generic properties will not be accepted. Candidates often stated characteristics of materials instead of properties. A clearer understanding of the difference between these is needed.

## Question 1 (a)(ii)

This question was not well answered well by many candidates with most incorrect answers relating to the hat keeping the sun off your face.

Correct answers referred to softness or insulator of heat.

## Question 1 (a)(iii)

Most candidates answered this question correctly with transparent being the most popular answer seen. Some candidates made reference to what the tracing paper was used for, being able to place over a drawing to copy, which is not a property but an application.

## Question 1 (a)(iv)

The most common responses related to the plywood being flexible or capable of being bent. Fewer references were seen in relation to it having good compressive strength.

## Question 1 (b)

A generally well answered question, with many candidates scoring at least 1 mark. Most responses referred to urea formaldehyde being a thermosetting polymer / plastic with some being able to go onto link how this makes it difficult to recycle for example. Many other responses were about the material being brittle.

## Question 1 (c)

The first of the maths based questions where very many candidates were able to correctly work out the mass of 32.5 kg using some form of ratio calculation.

## Question 2 (a)

This question was overwhelmingly well answered with oak being the most popular response by some margin. Occasionally candidates suggested materials such as plywood or had given mahogany as an answer, which of course was given in the question.

## Question 2 (b)

This was answered reasonably well with the most common answers being responses related to toughness and responses related to hardness. It is important to recognise here that any linked justification of that working property must be correct in relation to the property initially stated in the response.

## Question 2 (c)

This question worked well being the first question on the paper that could be considered a significant discriminator of candidate ability. The focus on the manufacturer should have provided a focus to the response and in many instances, it proved to be the case where candidates made reference to the product being unique allowing the manufacturer to charge more.

## Question 2 (d)

This was a mathematics question that provided slightly more challenge, especially at the point at which unit conversion took place making the numbers manageable for candidates.

The part of the question that was most challenging for candidates was the conversion of units within the context of a cross sectional area rather than conversion on a linear measure, hence the large proportion of almost correct answers 6, 60, 600, 6000 etc.

It is important to note here that candidates should always be encouraged to show their full working out for all maths questions. In this instance if a candidate has an answer of £6 it was still possible to be able to award 3 of the 4 marks due to error carried forward (ECF) with the issue being related to the conversion of units.

## Question 3 (a)

A good number of candidates were correctly able to identify the circuit symbol as an LED or Light Dependent Resistor. Some candidates had responded with LDR or simply that it was a diode.

## Question 3 (b)

A mixed set of responses from candidates. The most common correct answer seen related to the increase or decrease of rotary speed. A small but significant number realised that a reduction in speed would increase the level of torque. The most common incorrect response related to increase in power.

## Question 3 (c)

Nearly all candidates attempted this question with a reasonable proportion getting the correct answer of 1600 or the 1 mark special case response of 800 due to them only calculating one of the two increases rather than a compound increase. The most common incorrect response was 200rpm. Almost all candidates appeared to have some grasp of the concept of gear ratios and their impact on output speed even when they calculated a reduction rather than an increase in speed.

## Question 3 (d)

This appeared to be a very well answered question with candidates most commonly coming up with a response alluding to portability and not needing to be near an electrical outlet or responses related to no power lead resulting in improved safety due to no trailing cables.

## Question 3 (e)

A mixed set of responses providing further discrimination between grades.

The most common correct responses related to the lightweight nature of carbon fibre allowing the user to work for longer because it is less tiring.

## Question 4 (a)

Generally answered well with a reasonable proportion of candidates demonstrating knowledge of agro-textiles especially in relation to protecting crops from pests eating them and how they are used to protect against adverse weather conditions. There were misconceptions about the use of agro-textiles being used to make clothes for farmers and farm workers.

## Question 4 (b)

A mathematics question with a very large proportion of candidates being awarded full marks for a correct answer of 7 that had been calculated using a range of methods.

## Question 4 (c)

This question worked very well as a discriminator at the end of section A. The question performed well by providing a range of responses about fair trade across the whole range of marks available.

## Question 5 (a)

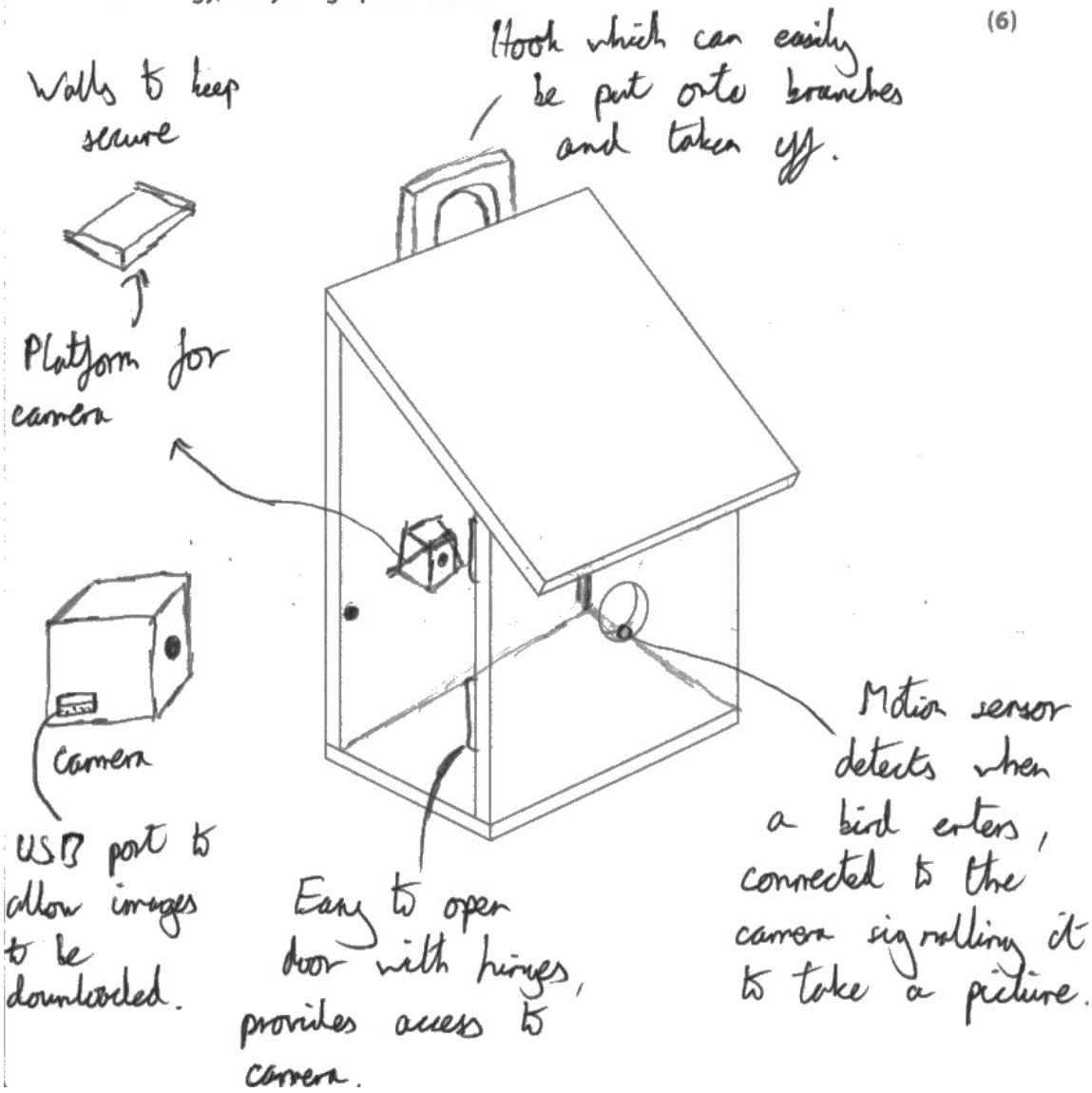
The vast majority of candidates attempted the question with a sketch and annotated changes. There were some instances where sketches were drawn but not annotated. A number of candidate responses simply repeated phrases from the question, ie ' take a photo when the bird enters the hole' without explaining further.

Many candidates failed to show how the camera was held in place nor any explanation about how it was fixed in a non-permanent way, however most candidates showed some form of access to the camera storage. There were many designs where candidates drew a door and noted that you could access the camera. Most candidates were able to name a sensor to trigger the camera although some used the generic term ‘sensor’ which was not sufficient to gain a mark. Most candidates failed to show how the sensor was used to trigger the camera taking the photo. Most candidates were able to draw a hook, plate or string, but failed to explain how it was easy to remove the camera box and simply wrote ‘easy to remove’ which is not worthy of credit.

Use notes and sketches, on the outline below, to show how the bird box could be modified to include these three specification points.

You will be marked on how you apply your understanding of design and technology, not your graphical skills.

**(6)**




**ResultsPlus**
**Examiner Comments**

This is a full scoring response which has been neatly and clearly presented.

**ResultsPlus**
**Examiner Tip**

Make sure you combine notes and sketches in your response and be sure to say how specification points are met rather than simply repeating the question.

## Question 5 (b)

A generally well answered question with many scoring good marks. Where candidates provided a response but failed to score was due to them repeating the information that was given in the question, for example see though screen or that it played music. It is important here to explain how seeing the money, or hearing the tune would encourage children to save. There appeared to be an equal number of responses that identified the failures in the design of the money box as well as the positive points.

(b) Figure 7 shows a money box in the shape of a tea cup that plays a tune every time a coin is dropped in the slot.

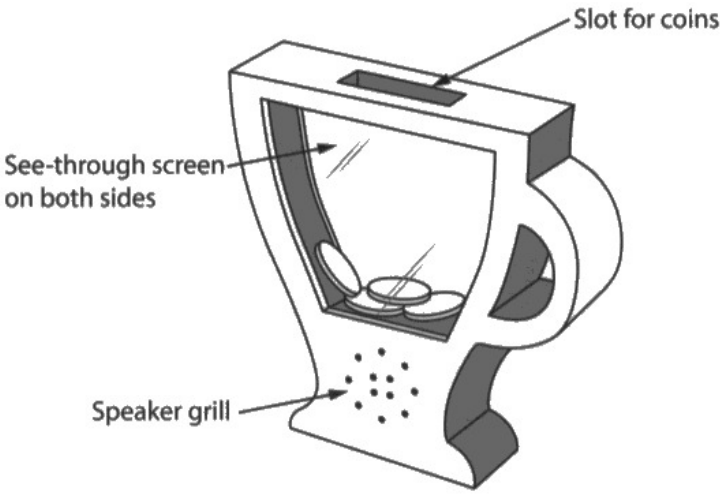



**Figure 7**

Explain **two** ways that the money box meets, or fails to meet, the criteria of providing a method to encourage young children to save money.

**(4)**

1 no easy way to get money out therefore not allowing them to spend it therefore encouraging them to just keep saving but can slot may be too wide and that may cause problems.

2 glass allows them to see both sides and they can see how much money they saved this may encourage them to save more however oreo inside glass gets dirty it will be hard to clean.

**(Total for Question 5 = 10 marks)**

ResultsPlus
Examiner Comments

This response contains two good responses related to getting the money out and the visibility of how much money is already inside the box.

## Question 6 (a)

In general candidates did not seem familiar with using Ohm's law with lots of guesswork in the answers.

Some candidates were able to explain the relationship between Voltage, Current and Resistance well, whereas others struggled to articulate it in written format.

Many candidates gained 1 mark for identifying the voltage, current or resistance but failed to qualify their answer in terms of how it would be useful.

## Question 6 (b)

This was a question where candidates performed well and scored good marks by using notes and sketches to explain the process of vacuum forming which appears to have been widely covered in the majority of centres. Few candidates failed to use sketches.

(b) Figure 9 shows the internal fixing case for the alarm system that has been vacuum formed from high impact polystyrene (HIPS).

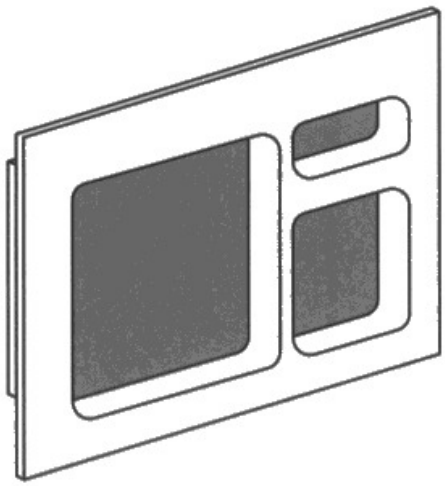


**Figure 9**

Use notes and sketches, in the space below, to show how the internal fixing case would be manufactured using the vacuum forming process.

You will be marked on how you apply your understanding of design and technology, not your graphical skills.

**(4)**

- a mould in the required shape is placed in the vacuum former
- a sheet of HIPS is placed in the vacuum forming machine and is heated until easily manipulated.

- the plastic is held down over the mould and the vacuum is turned on to pull the plastic so that it's a tight fit over the mould.
- the machine is turned off and the plastic is removed from the mould. Excess pieces of plastic are cut off the product until it's the right size.


This response is well laid out with a number of points that could be marked either graphically or by the written words provided.


Be sure to provide notes and sketches in your response. The question is worth 4 marks so make sure you provide at least 4 different marking points or stages to the process.

## Question 6 (c)

A mixed set of responses where some candidates scored well with answers relating to hardness and providing an insulated surface. There were many answers relating to the aesthetics of the front, being shiny and there were some answers of it being corrosion resistant which was not applicable given the material was aluminium. It appeared that many candidates were simply not familiar with anodising and it's benefits.

## Question 6 (d)

Some candidates scored well on this question but did not always explain the method with many references to cable / zip ties, heat shrink sleeve as their main methods. Candidates tended to offer a method and one justification but in a large number of cases candidates failed to gain the extra mark by giving a second justification point. There were lots of references to colour coding which failed to gain marks.

## Question 7 (a)

This question was answered correctly by many candidates stating that the top part of the lamp was in compression.

## Question 7 (b)

There were some responses seen here where the properties of copper would appear to be widely known. Many candidates lost marks for stating conductivity instead of electrical conductivity or stating that current would be transferred. Some candidates mixed up the terms ductility and malleability in their answers.

## Question 7 (c)

As with other mathematical questions on the examination, there were a number of common reasons why candidates did not achieve full marks when answering this particular question.

Conversions and rounding errors were generally the main reason, however a significant number of candidates calculated the area of a circle as opposed to a semi-circle.

Many candidates correctly determined the area of the rectangle/cuboid section even if they did not progress further and achieved some marks as a result.

(c) Calculate the volume of waste material produced when making the main body.

Give your answer to the nearest whole $cm^3$.

Use $\pi = 3.142$

(5)

$30 \times 100 = 3000$

$3000 + (\frac{1}{2} \times \pi \times 15^2) = 3353.475\ cm^2$

$\times 20 = 67069.5\ cm^3$

67,070

Answer ..... $cm^3$

**ResultsPlus**
**Examiner Comments**

The candidate has shown most stages of their working clearly, with the exception of the unit conversion which is indicated through the use of 1.5 and 10 as key values in the calculation.

Each stage has been written out in full, and intermediate values given that avoid excessive early rounding of values.

The answer has been stated to the required whole $cm^3$.

This response although it has the wrong final answer still scores 4 of the 5 marks available because they have shown all of their working out which is worthy of credit, the issue being that the conversion of units is wrong.

**ResultsPlus**
**Examiner Tip**

When completing calculations, it is good practice to:

- show all working
- convert units at the start of the calculation
- avoid rounding until the final step of the calculation
- write the final answer on the answer line.

Candidates should also ensure they give their answer in the correct format, for example to the nearest $cm^3$.

## Question 7 (d)

This question proved to be challenging for many candidates. The question asked candidates to explain two reasons for fabricating the main body of the lamp from separate pieces rather than manufacturing it from a single piece. Only a limited number of candidates were able to provide two three-mark responses, however candidates often identified reasons and justified these with a short linked response. Typical answers included explanations that off-cuts could be used, or that waste is reduced.

## Question 8 (a)

A generally poorly attempted question with candidates tending to evaluate the sign. Where candidates were awarded a mark they failed to qualify their answer.

The most popular response for 1 mark was related to the bright lights or making the sign easy to see.

**8** Figure 12 shows a speed sensing road sign manufactured from aluminium.

The sign displays the speed limit for the area and the speed of a car as it approaches the sign.

The speed of a vehicle is displayed on the road sign using light-emitting diodes (LEDs).

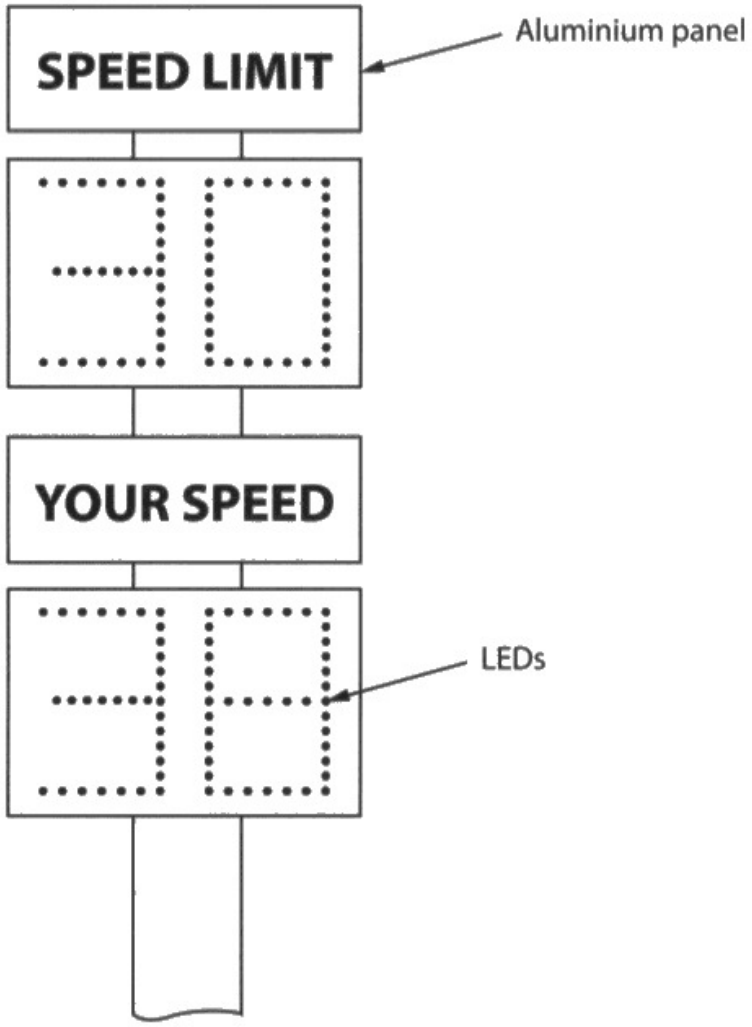



**Figure 12**

(a) Explain **one** benefit of using LEDs to display the number under the words 'YOUR SPEED'.

**(2)**

It's brighter so its more likely to catch their attention.

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Examiner Comments

The response here is good for a single mark in relation to the LEDs being bright. There is no further linked justification and so the mark is capped at 1 out of 2.

## Question 8 (b)

In this question candidates were asked to explain one advantage of carrying out a quality control check on the LEDs during manufacture. The question required an answer to be given that related directly to the LED, for example related to dimensional tolerances or some form of electrical test such as a continuity test to see if the LED lights up. Many candidates gave generic responses that simply stated 'check for errors' which achieved no marks.

## Question 8 (c)

Candidates seemed to be unfamiliar with photo etching as a concept and therefore found this a difficult question with very few achieving full marks with most answers related to photo etching speeding up the process. There were references to higher quality boards and also mass/batch production but little reference to use of the computer to generate/store photo masks.

## Question 8 (d)

This was the final question on the exam paper in which candidates were provided with some information about the materials used in the speed sign, the target market and scales of production.

The question asked candidates to evaluate the speed sign with reference to social and availability factors including:

- use for different social groups
- use of stock materials
- use of specialist materials

Candidates responded with varied success. They often considered sustainability generically and thus achieved band one marks. Where candidates drew together a range of factors such as transportation from source to manufacturing, changes in demand and the use of stock materials from various suppliers, they tended to achieve marks in the higher mark bands.

It is important when writing extended responses to these questions that candidates consider the information in the question, the factors that are to be evaluated, and apply their knowledge and understanding of design and technology to provide a balanced evaluation.

(d) The speed sensing road sign is manufactured from aluminium and the words 'SPEED LIMIT' and 'YOUR SPEED' are screen printed.

Figure 13 shows some additional information about the speed sensing road sign.

| | |
|---|---|
| **Source of aluminium** | Canada |
| **Road sign material** | Stock sized 6 mm aluminium sheet |
| **Potential market** | Local councils, schools and holiday camps |
| **Scale of production** | Batch |

**Figure 13**

Analyse the information in Figure 13.

Evaluate the speed sensing road sign with reference to social and availability factors including:

- use for different social groups
- use of stock materials
- use of specialist materials.

**(9)**

If the product is created in Canada [redacted] the ecological footprint will be much less than many other products as the aluminium will have been sourced locally and not require much transport which releases less pollution into the atmosphere. The material is a stock sized material which means that it will not be too expensive as it doesn't have to be tailor made for the company which designed the sign. One disadvantage is the 'SPEED LIMIT' and 'YOUR SPEED' are screen printed which on a screen printing machine is very expensive. As this product is designed to be produced in batches to request orders a 3rd party would print the text for a price that would be much cheaper than buying and maintaining a screen printing machine. The potential market for the product is

limited as it states ~~local schools~~, 'local councils, schools, and holiday camps'. This means that the product will not create much profit as that demographic doesn't ~~require~~ to have a large demand. Another issue with local sales is that there is a small limit on the amount of customers and with a product such as a speeding sign ~~it~~ are installed it will last for many years ~~as~~ with nothing but cleaning maintenance. This issue can cause the designer to hit a block where there is no longer any customers, this shouldn't be too much of an issue for this product as it is intended to be batch produced ~~and~~ meaning that there will not be a constant outflow of products that they are not able to sell. ~~Another~~ An advantage to selling locally is that it has a much smaller environmental impact as the product which is quite large doesn't need to be transported in bulk over seas or via air which releases alot of carbon into the atmosphere from the fossil fuels that are burnt that run the transport.

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Examiner Comments

This response was awarded a level three mark, just into the top band of marks available.

In their answer the candidate has demonstrated the three required traits to achieve a level three mark.

- Interrogation and deconstruction of information to provide sustained connections and logical chains of reasoning.
- A well-balanced appraisal of the information/issues, containing judgements that show a thorough awareness of the interrelationships between factors or competing arguments.
- A conclusion that is fully supported by relevant judgements.

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Examiner Tip

Make sure that you address each of the three bullet points equally for the areas that you have been asked to evaluate against.

## Paper Summary

Overall the paper provided questions that gave candidates the opportunities to demonstrate their knowledge of Design and Technology via a range different context based questions, including several maths based questions but in a DT context. The paper offered a range of differentiated questions that candidates could answer in differing degrees and a full range of marks were observed across the whole cohort.

## Grade boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

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