

GCE

Design and Technology

H406/02: Problem solving in Product Design

A Level

Mark Scheme for June 2024

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It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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MARKING INSTRUCTIONS

PREPARATION FOR MARKING RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Assessor Online Training*; *OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal <http://www.rm.com/support/ca>
3. Log-in to RM Assessor and mark the **required number** of practice responses (“scripts”) and the **number of required** standardisation responses.

YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or the RM Assessor messaging system, or by email.
5. **Crossed Out Responses**
Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. (*The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.*)

Multiple Choice Question Responses

When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).

When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only **one mark per response**)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth **two or more marks**)

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add a tick to confirm that the work has been seen.

7. Award No Response (NR) if:
- there is nothing written in the answer space

Award Zero '0' if:







- anything is written in the answer space and is not worthy of credit (this includes text and symbols).

Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

8. The RM Assessor **comments box** is used by your team leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
If you have any questions or comments for your team leader, use the phone, the RM Assessor messaging system, or e-mail.
9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.
10. For answers marked by levels of response:
- To determine the level** – start at the highest level and work down until you reach the level that matches the answer
 - To determine the mark within the level**, consider the following

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

11. Annotations

Annotation	Meaning
	Seen
	Tick
	Repetition
	Vague
	Unclear – <i>Must only to be used if the answer cannot be read / illegible</i>
	Benefit of the doubt (= a mark)
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4

Applying the annotations

Every page must have an annotation stamp on it to indicate you have checked all the pages that are available. If a page is blank, use the 'seen' stamp.

Levels of response questions

- Do **not** use ticks, use the highlighter tool to indicate relevant sections. The number of highlighted sections does **not** equal the number of marks awarded.
- Always stamp the level number at the end of the question, e.g. L2.

12. Subject Specific Marking Instructions

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet Instructions for Examiners. If you are examining for the first time, please read carefully Appendix 5 Introduction to Script Marking: Notes for New Examiners.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

Question			Answer	Mark	Guidance	
					Content	Levels of Response
1*			<p>Indicative content:</p> <p>Stakeholder needs</p> <ul style="list-style-type: none"> • Dancers / users videoing full height shots – The camera lens needs to be at distance and elevated to above waist height. There is no way of achieving this with the iStand. • The iStand only holds the phone at one fixed angle which does lend to videoing activities like dancing, playing an instrument, or cooking. • Compatibility – the iStand supports phones up to 150mm x 80mm x 15mm making it unsuitable for many dyslexic phone users who have large format phones such as iPhone 15 plus measuring 161mm x 78mm x 8mm. • Scratching – the anodised surface will provide durability and resistance to scratching, keeping the iStand looking good. • The iStand is very simple to use having limited functionality. The user just needs to open it to an angle where it will support the phone. • Lightweight – at 150g the iStand is portable. • Phone falling may be damaged if it falls off the iStand. • Hands free to allow for activity to continue whilst filming • Different stakeholders e.g. influencers, manufacturers, may have different needs. <p>Function</p> <ul style="list-style-type: none"> • Limited functionality - The camera lens elevation and angle should be adjustable to best suit the position of the user's face. This is not possible with the iStand making it unsuitable for videoing activities like dancing, playing an instrument, or cooking. • Unable to use main lens - Most phone stands/supports enable the user to record video using the main lens of the mobile phone which is the highest quality. The iStand will only enable the user to use the lower quality camera facing on the screen side of the phone. • Unable to use main lens - The iStand only enables use of the user facing camera making it limited to close work, such as video conferencing, or videoing the face only. This makes it unsuitable for many home video activities such as dancing, playing instruments and cooking. 	12	<p>All responses should be in relation to the information provided.</p> <p>Strengths and weaknesses should be identified in relation to a range of stakeholders.</p> <p>Responses are likely to include evidence of all bullet points (see examples).</p> <p>Candidates may extract information from the Resource Booklet. Any such lifted information can be used in</p>	<p>Level 4 [10-12 marks] A comprehensive evaluation of the suitability of the product for the purpose specified. A comprehensive product analysis is evident. Comprehensive understanding of the three elements specified in question. Information in RB is used effectively to fully exemplify the points being made. Well-constructed response in relation to question with a clear and developed narrative.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p>

Question			Answer	Mark	Guidance	
			<ul style="list-style-type: none"> Portability – the iStand folds flat which does make it compact and portable. For example, it should be able to slide into a jacket pocket. Access to buttons on phones is affected. <p>Health and Safety</p> <ul style="list-style-type: none"> Repetitive strain disorder / neck ache – users will need to lean over the iStand to achieve an appropriate angle, this moves the head forwards of the body and will lead to neck strain. Trap – when closing the iStand to move it, it is possible to trap fingers in the hinge area and potentially puncture skin with the square corner to the top sides of the leg. Sharp corner on support lip. When folded for transportation the lip protrudes. If the iStand was in a jacket pocket and subjected to impact it could potentially harm the user. Potential of phone overheating and burning user due to material of iStand. Reference to H&S during manufacture acceptable. If used to video cooking then it does not contaminate food due to material of iStand. <p>In all cases any other valid suggestion.</p>		<p>support of the critical evaluation but no marks should be awarded simply for duplicating text.</p> <p>There is no analysis or evaluation in Level 1.</p>	<p>Level 3 [7-9 marks] A good evaluation of the suitability of the product for the purpose specified. A good product analysis is evident. Good understanding of typically at least two elements specified in question. Information in RB is used for the most part effectively to exemplify points being made although one or two opportunities are missed. Well-constructed response in relation to question although one or two opportunities missed to develop narrative.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant</i></p>

Question			Answer	Mark	Guidance	
						<p><i>and supported by some evidence.</i></p> <p>Level 2 [4-6 marks] A sufficient evaluation of the suitability of the product for the purpose specified. Sufficient product analysis is evident. Sufficient understanding of typically two of the elements specified in question. Information in RB is used to exemplify some points being made although much more could have been done to exploit the stimulus material available. Reasonable response in relation to the question although narrative at times lacks depth and cohesion.</p> <p><i>The information has some relevance and is presented with limited structure.</i></p>

Question			Answer	Mark	Guidance	
						<p><i>The information is supported by limited evidence.</i></p> <p>Level 1 [1-3 marks] A limited examination of the suitability of the product for the purpose specified. Limited product understanding is evident. Limited understanding of typically one element specified in question. Use of information from the RB is used in a simplistic way and adds limited value to the points being made. Limited response in relation to question. Narrative is basic and unstructured.</p> <p><i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship</i></p>

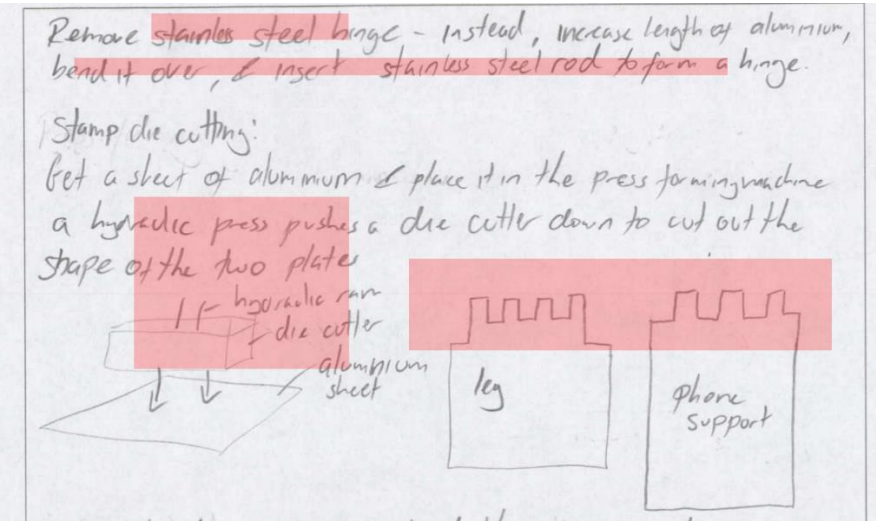
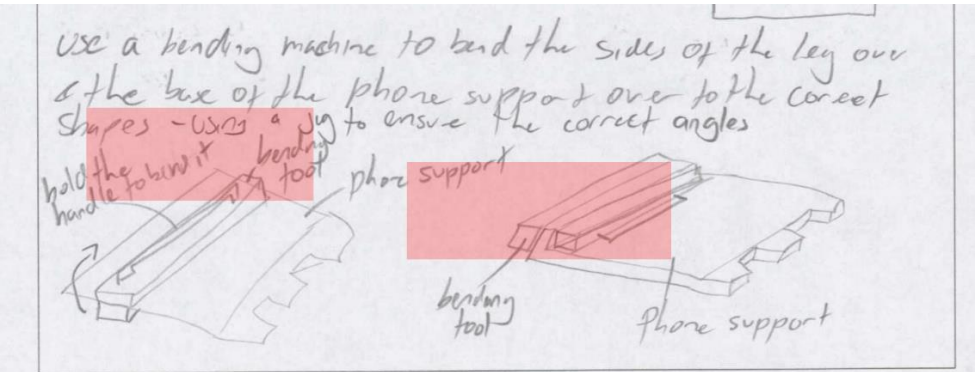
Question			Answer	Mark	Guidance	
						<p><i>to the evidence may not be clear.</i></p> <p>0 marks = No response or no response worthy of credit.</p>
2			<p>Indicative content:</p> <p>Testing for accuracy:</p> <ul style="list-style-type: none"> • Tolerances checked with measuring gauges such as go/no-go devices, vernier callipers and micrometers. • Accuracy of dimensions checks – sampling of products and checked against acceptable dimension ranges. • Weight checked against acceptable weight range tolerances. • Testing that the leg correctly aligns centrally inside the support and does not rub against it. • Alignment of hinge with support and leg – this appears to be bonded. Wear and tear on machine jigs could cause this to misalign. • Testing of machines for accuracy and movement using dial gauges. • Data comparisons – dimensions, weight. • Visual checks 	8	<p>All responses should be in relation to the information provided.</p> <p>Methods of testing should be identified.</p> <p>Candidates may extract information from the Resource</p>	<p>Level 4 [7-8 marks]</p> <p>A comprehensive discussion of testing methods. Comprehensive understanding of the two elements specified in question. Information in RB is used effectively to fully exemplify the points being made. Well-constructed response in relation to question with a</p>

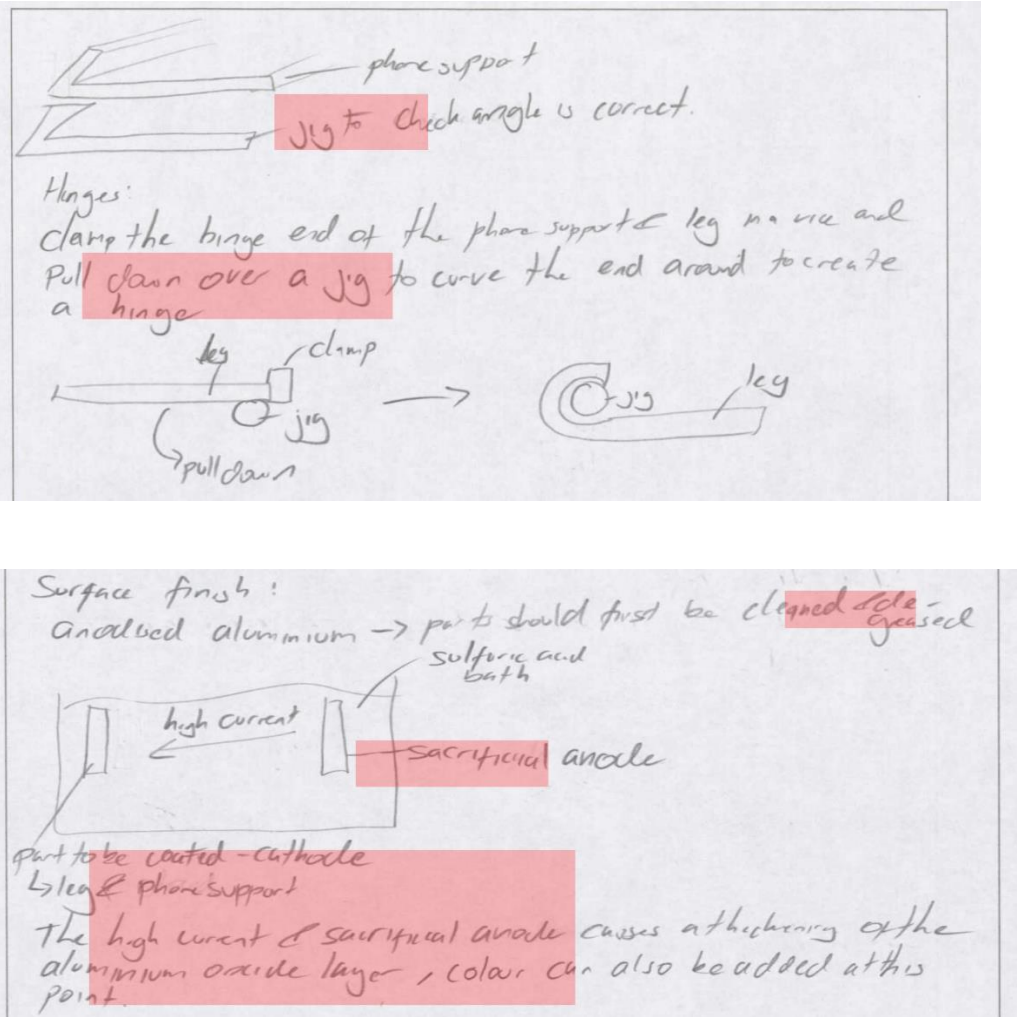
Question			Answer	Mark	Guidance	
			<ul style="list-style-type: none"> Tool path analysis within manufacture, allows manufacturer to predict when the tool will wear and then how long until product runs out of tolerance. <p>Testing of materials:</p> <ul style="list-style-type: none"> Differences in material quality – blemishes, damage, surface irregularities, regularity of thickness checks. Quality of finish tests – comparison against master product / finish. Inspection for any scuffs/marks caused in manufacture. Accelerated testing to test for acceptable lifecycle targets, wear and tear of materials. Components subjected to physical and/or virtual stress analysis and fatigue testing to check for material distortion, deflection, and damage. Drop test <p>Award credit for any other valid suggestion.</p>		<p>Booklet. Any such lifted information can be used in support of the critical evaluation but no marks should be awarded simply for duplicating text.</p> <p>There is no analysis or evaluation in Level 1.</p>	<p>clear and developed narrative.</p> <p>Level 3 [5-6 marks] A good discussion of testing methods. Good understanding of typically the two elements specified in question. Information in RB is used for the most part effectively to exemplify points being made although one or two opportunities are missed. Well-constructed response in relation to question although one or two opportunities not taken to develop narrative.</p> <p>Level 2 [3-4 marks] A sufficient discussion of testing methods. Sufficient understanding of typically at least</p>

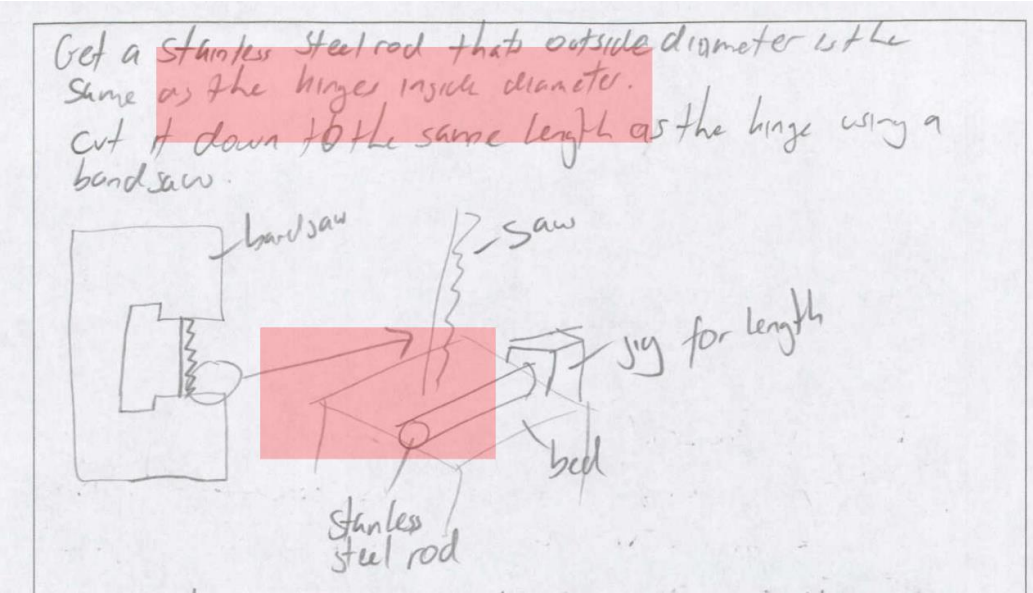
Question			Answer	Mark	Guidance	
						<p>one of the elements specified in question. Information in RB is used to exemplify some points being made although much more could have been done to exploit the stimulus material available. Reasonable response in relation to the question although narrative at times lacks depth and cohesion.</p> <p>Level 1 [1-2 marks] A limited coverage of testing methods. Limited understanding of typically one element specified in question. Use of information from the RB is used in a simplistic way and adds limited value to the points being made. Limited response in relation to question. Narrative is basic and unstructured.</p>

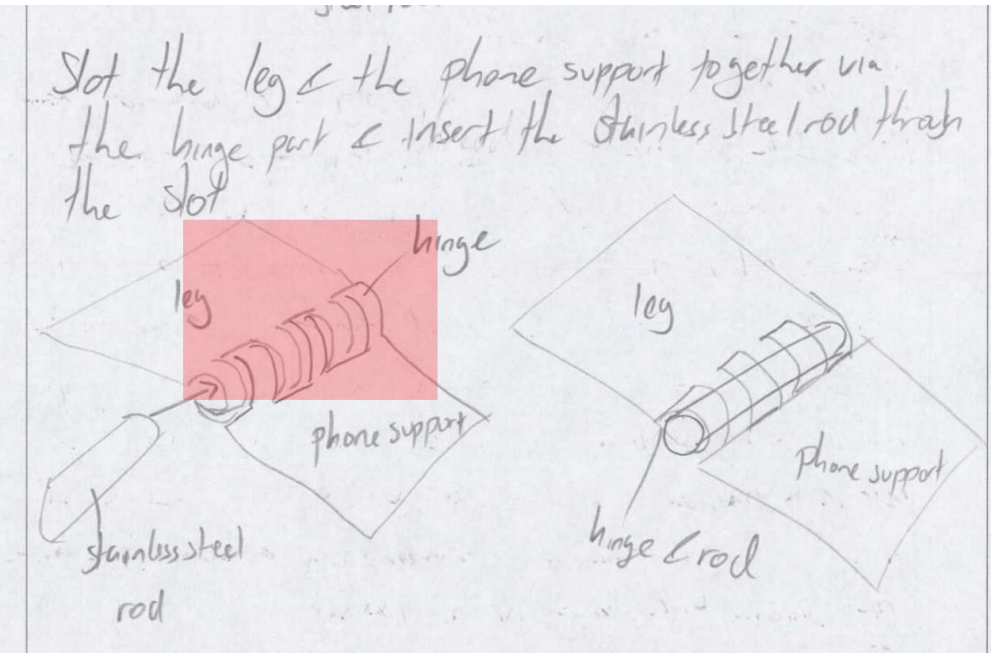
Question			Answer	Mark	Guidance	
						0 marks = No response or no response worthy of credit.
3			<p>Indicative content:</p> <p>Indicative content:</p>	<p>12</p> <p>Candidates may use</p>	Responses should provide details of	<p>Level 4 [10-12 marks]</p> <p>A comprehensive demonstration of methods of</p>


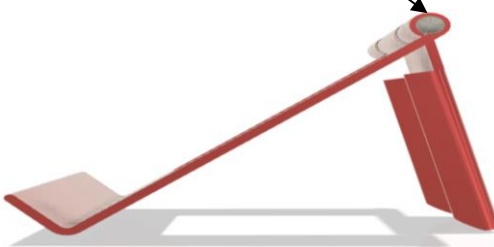

Question			Answer	Mark	Guidance	
			<p>Modifications to minimise materials and components:</p> <ul style="list-style-type: none"> Tessellation of leg and support stand components to reduce material. Leg can be reduced to fit out of the support stand, or vice versa, reducing the material for each product down to a single rectangular sheet no greater than the footprint required for the larger component (see example below). Elimination of hinge to reduce components – integral hinge in the leg and support designs and single stainless steel hinge pin (see example below). Leg scalloped at sides to remove material. Leg and support could be decorative lattices to remove material. Use of standardised components <p>Methods of manufacture:</p> <ul style="list-style-type: none"> Sheet metal forming and stamping. Both components can be pressed out of a singular rectangular blank of aluminium alloy (for example below). Blanking – a punch shears the tessellated leg and support from the sheet metal (for example shown below). Bending – the sides on the legs and lip on the support are folded to 90 degrees. Forming – integral hinges formed by forcing the aluminium alloy sheet into the surface contours of a die(s). Arbor presses used for punching, bending, and cropping operations. Laser cutting – also reduces space between tessellated components Hinge pin cut to length using chop saw and riveted at each end once in position (for example below). Injection moulding or extrusion if material has been changed to polymer <p>Surface finishes:</p> <ul style="list-style-type: none"> Anodised aluminium alloy for leg and support Polished stainless steel / self-finished hinge pin Polished aluminium alloy bushes If changed to polymer – then self-finishing <p>Award credit for any other valid suggestion.</p>	<p>sketches and/or notes to outline suitable methods of manufacture for the features of their modified iStand.</p> <p>Candidates may use sketches and/or notes to outline suitable methods of manufacture for the features of their modified iStand.</p> <p>Responses should be appropriate for manufacture of a batch of</p>	<p>modifications to minimise materials and components.</p> <p>Responses should provide details of methods of manufacture of a batch of 500 standing desks.</p> <p>Responses should include details of surface finishes.</p> <p>Candidates can draw on practical experience to support responses.</p> <p>Candidates are expected to demonstrate understanding of the</p>	<p>manufacture for the iStand concept design. Comprehensive understanding of the three elements specified in question. Information in RB is used effectively to fully exemplify the points being made. Well-constructed response in relation to question with a clear and developed narrative. The methods will be technically accurate and clear in the way they are explained.</p> <p>Level 3 [7-9 marks] A good demonstration of methods of manufacture for the iStand concept design. Good understanding of typically at least two elements specified in question. Information in RB is</p>

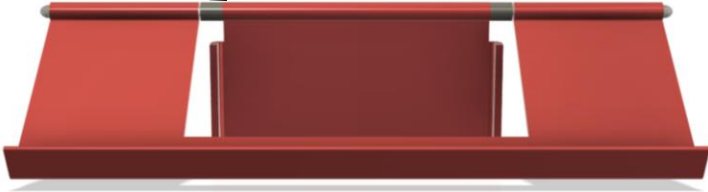


Question	Answer	Mark	Guidance	
	<p>Remove stainless steel hinge - instead, increase length of aluminium, bend it over, & insert stainless steel rod to form a hinge.</p> <p>Stamp die cutting: Get a sheet of aluminium & place it in the press forming machine a hydraulic press pushes a die cutter down to cut out the shape of the two plates</p>  <p>Use a bending machine to bend the sides of the leg over & the box of the phone support over to the correct shapes - using a jig to ensure the correct angles</p> 	500 iStand phone stands.	processes through annotated sketches and/or notes.	<p>used for the most part effectively to exemplify points being made although one or two opportunities are missed. Sketches will for the most part be clear and supported with relevant notes. The methods will be technically accurate and for the most part be clear in the way they are explained.</p> <p>Level 2 [4-6 marks] A sufficient demonstration of methods of manufacture for the iStand concept design. Sufficient understanding of typically two of the elements specified in question. Information in RB is used to exemplify some points being made although much more could have been done to</p>

Question	Answer	Mark	Guidance
	 <p>phone support</p> <p>Jig to check angle is correct.</p> <p>Hinges:</p> <p>clamp the hinge end of the phone support & leg in vice and pull down over a jig to curve the end around to create a hinge</p> <p>leg clamp</p> <p>pull down</p> <p>Surface finish:</p> <p>Anodised aluminium → parts should first be cleaned & degreased</p> <p>sulfonic acid bath</p> <p>high current</p> <p>sacrificial anode</p> <p>part to be coated - cathode</p> <p>→ leg & phone support</p> <p>The high current & sacrificial anode causes a thickening of the aluminium oxide layer, colour can also be added at this point.</p>		<p>exploit the stimulus material available. Sketches will be adequate and supported with notes. The methods will not always be technically accurate with some knowledge gaps evident.</p> <p>Level 1 [1-3 marks]</p> <p>A limited demonstration of methods of manufacture for the iStand concept design. Limited understanding of typically one element specified in question. Use of information from the RB is used in a simplistic way and adds limited value to the points being made. Sketches if used will be unclear with only basic notes to accompany them. The methods may lack technical detail</p>

Question	Answer	Mark	Guidance
	 <p>Get a stainless steel rod that outside diameter is the same as the hinge inside diameter. Cut it down to the same length as the hinge using a band saw.</p>		<p>and be basic in nature.</p> <p>0 marks = No response or no response worthy of credit.</p>

Question			Answer	Mark	Guidance	
			<p>Slot the leg & the phone support together via the hinge part & insert the stainless steel rod through the slot</p> 			

Question			Answer	Mark	Guidance	
			<p>iStand modified design</p>  <p>Stainless steel hinge pin</p>  <p>Leg closed for storage and transportation:</p> 			

Question			Answer	Mark	Guidance	
			<div><p>Aluminium alloy bushes</p><p>Aluminium alloy mobile phone support</p><p>Aluminium alloy leg</p></div>			

Question			Answer	Mark	Guidance	
4*			<p>Indicative content:</p> <p>Ergonomics:</p> <ul style="list-style-type: none"> Operating heights – both products are suitable for tabletop use when the user is seated, The large LED ring of the live stand (30.5cm diameter) will provide better, more consistent illumination of the subject than the smaller rectangular LED light source of the selfie stand (175mm x 175mm). The smaller rectangular LED light source of the selfie stand (175mm x 175mm), is more likely to dazzle the user than the larger LED ring of the live stand, particularly for close table work. The maximum height of the live stand is just over 90cm, and the phone lens can be quite high within the LED ring (as pictured), the maximum height of the selfie stand is about 760mm to the phone camera lens, so they are very similar. Both stands, therefore, are similarly suitable for filming full height users such as dancers, with the lens at roughly half the height of the subject being recorded. The LED light source of the selfie stand is mounted above the mobile phone, whereas on the live stand it is in the middle. Users of the live stand will experience better, more consistent, illumination of their face for close work than users of the selfie stand, where the lower part of the picture will have less illumination. Portability – the selfie stand is 2kg lighter than the live stand, making it less of a burden for the user when carrying. The selfie stand looks easier to use. The telescopic sections do not have clamping mechanisms that need to be used by the user to keep it securely in place. They simply need to be pulled/pushed in/out. This could make it more suitable for use by users with limited mobility or limited strength, particularly for twisting operations. <p>Functions:</p> <ul style="list-style-type: none"> Portability – the selfie stand has a battery unlike the live stand, making it suitable for use away from mains power supply or to avoid trailing cables to it. Portability and storage – the selfie stand folds collapses down into a very compact form of 210mm x 210mm x 64mm. The minimum height of the live stand is about 70cm, although the LED ring can be slightly angled, but this is still significantly less 	16	<p>All responses should be in relation to the information provided.</p> <p>Candidates may extract information from the Resource Booklet. Any such lifted information can be used in support of the critical evaluation but no marks should be awarded simply for duplicating text.</p> <p>There is no analysis or evaluation in Level 1.</p>	<p>Level 4 [13-16 marks] A comprehensive analysis of the two products. Comprehensive understanding of the four aspects specified in question. Information in RB is used effectively to fully exemplify the points being made. Well-constructed response in relation to question with a clear and developed narrative.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 3 [9-12 marks] A good analysis of the two products. Good understanding of</p>

Question			Answer	Mark	Guidance	
			<p>compact than the selfie stand, making the selfie stand much more suitable for compact storage and portability.</p> <ul style="list-style-type: none">• Power supply – the selfie stand can be charged from 5 volt USB sources, rather than 240V mains supply. This would enable users to charge/operate it from a USB power bank.• Indoor/outdoor use – the selfie stand has battery power making it very portable. It is also suitable for outdoor use, providing additional versatility for the videoing of outdoor activities. To use the live stand outdoors a user will need to run 240v mains extension leads out to it from a building power supply, which could create trip hazards.• Both stands provide three colour temperatures: cold; natural, warm.• Versatility - The live stand phone holders are adjustable across 360 degrees of rotation in any direction unlike the selfie stand that has 270 degrees of rotation but only one axis. The live stand will provide greater versatility for focusing the camera.• The iron base of the live stand is likely to provide greater stability than the alloy counterweighted base of the selfie stand.• The telescopic components of the live stand look much harder wearing than the slim components of the selfie stand. Should the stand be knocked over, or be knocked into, the live stand is most likely to withstand the force and subsequent damage.• The live stand has variable height adjustment whereas the selfie stand can only be adjusted to the height of each telescopic section. This means that the user can set the live stand to any height between the range 30.9cm to 53.5cm of the vertical telescopic post, providing more versatility than the selfie stand for a range of users and activities.• The live stand ring LED light source can be angled up or down by a range of 180 degrees, this will make it useful for lighting table-based video demonstrations, such as drawing techniques, cookery and needlecraft. The selfie stand light source, however, seems to be fixed vertically, making it only suited to activities that are directly facing the light. <p>Required maintenance:</p> <ul style="list-style-type: none">• The live stand has external securing mechanisms on the telescopic sections. These may slip if the smaller tube becomes dirty or greasy. Cleaning of these smaller		<p>typically at least three aspects specified in question. Information in RB is used for the most part effectively to exemplify points being made although one or two opportunities are missed. Well-constructed response in relation to question although one or two opportunities not taken to develop narrative.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p>Level 2 [5-8 marks] A sufficient discussion of the issues that would be considered. Sufficient understanding of</p>	

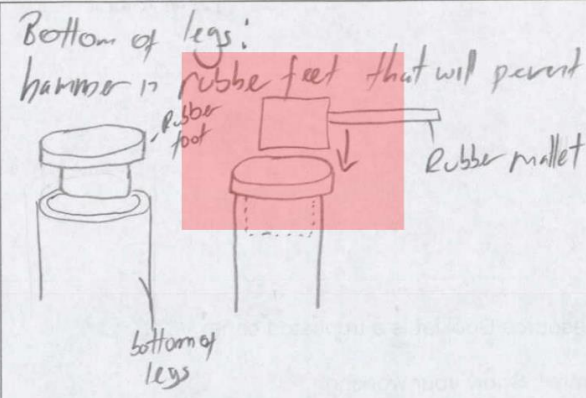
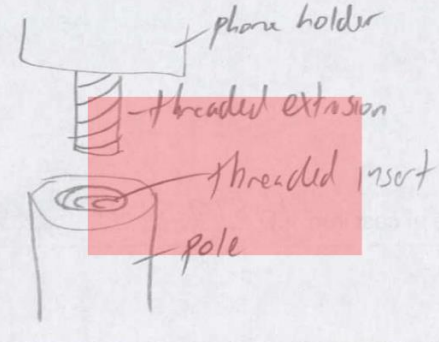
Question			Answer	Mark	Guidance	
			<p>tubes may be necessary over time to prevent this. The selfie stand, however, uses a different system of locating each telescopic section, which will use a sprung ball bearing or rivet inside the tube locating in a hole in the outer tube, thus no cleaning of tubes is necessary.</p> <ul style="list-style-type: none">• The white housing of the selfie stand will show dirt with use quicker than the black live stand and will need more regular cleaning to keep it looking good.• The selfie stand pivoting shaft has a small screw that is likely to come loose with use, like those in spectacles do, it will need to be tightened to avoid it falling out and possibly being lost. <p>Planned obsolescence:</p> <ul style="list-style-type: none">• Battery – the selfie stand has a battery. There is no indication that this can be replaced. If it can't, these features will eventually become useless as the battery loses capacity with use.• The telescopic section securing mechanisms on the live stand are on the outside of the tubes. If a thumb screw or knob is lost it may be possible to buy a replacement standard component. However, if one of the telescopic sections of the selfie stand fails, the whole component would need to be replaced. This is a much more bespoke component, and it may not be possible to source a replacement.• The selfie stand telescopic posts are made up of multiple sections. These are likely to fail long before the two section telescopic tubes of the live stand as dust and dirt builds up in the tubes.• The USB socket in the selfie stand will fail over time as it is subjected to use, sooner than the two-pole jack type connector that is on the live stand. Both sockets are likely to be attached directly to printed circuit boards though and could fail due to movement/dry joints.• End of life e.g. recycling after use, separation of components, replacement of LEDs• Phone sizes getting bigger – may not fit & therefore it will become obsolete• Non-replaceable LEDs means the product would be obsolete when they wear out <p>Award credit for any other valid suggestion.</p>		<p>typically at least two aspects specified in question. Information in RB is used to exemplify some points being made although much more could have been done to exploit the stimulus material available. Reasonable response in relation to the question although narrative at times lacks depth and cohesion.</p> <p><i>The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</i></p> <p>Level 1 [1-4 marks] A limited discussions of the issues that would be considered. Limited understanding of typically one</p>	

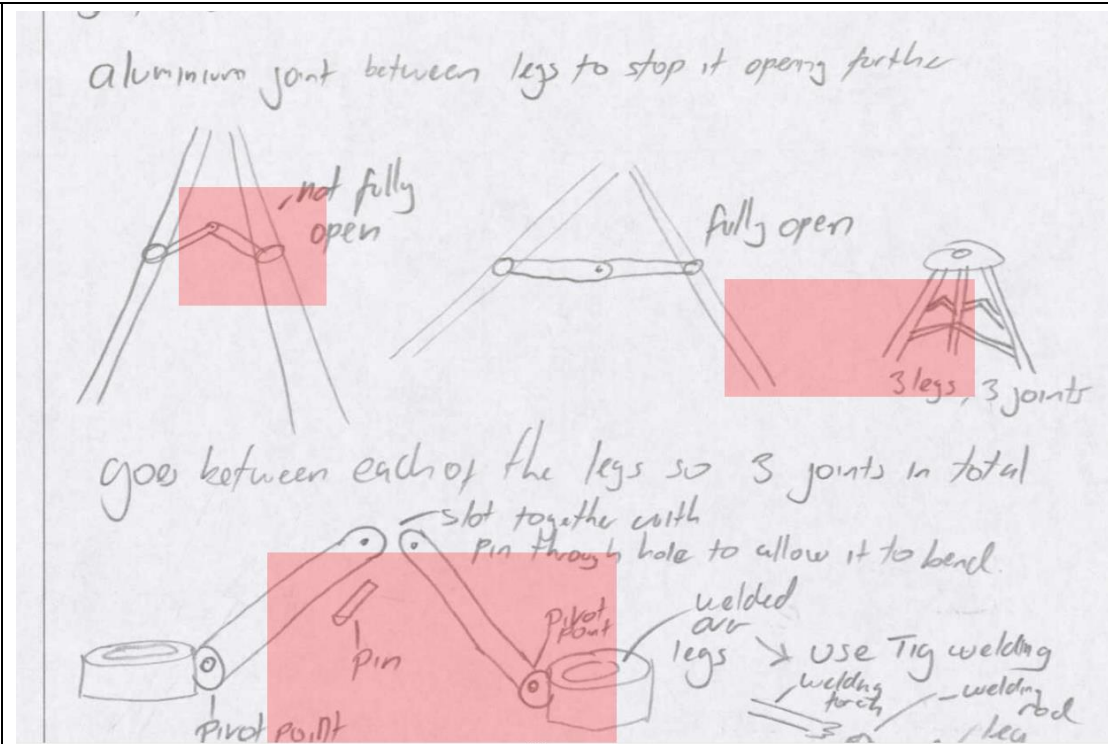
Question			Answer	Mark	Guidance	
						<p>aspect specified in question. Use of information from the RB is used in a simplistic way and adds limited value to the points being made. Limited response in relation to question. Narrative is basic and unstructured.</p> <p><i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p>0 marks = No response or no response worthy of credit.</p>

Question	Answer	Mark	Guidance
5a	<p>Large cylinder volume = $\pi \times 10^2 \times 15$ [1] = 4712.38898 *[1]</p> <p>Volume of hole = small cylinder volume + large cylinder volume</p> <p>= 785.39816 + 4712.38898 *= 5497.78714 mm³= 5498 mm³ [1]</p>	3	<p>Award three marks as follows:</p> <p>One mark for determining the values that need to go into the formula for the large cylinder.</p> <p>One mark for calculating the large cylinder volume.</p> <p>Two marks 4712.38898 shown without working as candidate understands process.</p> <p>4712 rounded is acceptable for 2 marks as well.</p> <p>One mark for determining that the two cylinder volumes need to be added together to give the overall volume of the hole.</p> <p>Where an incorrect answer is given working out should be used to credit appropriate marks.</p> <p>Candidates who answer 5497. Is creditworthy.</p> <p>If candidates have used a different method that provides evidence of correct calculation, award the marks.</p>

Question	Answer	Mark	Guidance
5b	<p><i>Volume of the truncated cone</i></p> $= \frac{1}{3} \pi h(Rr + R^2 + r^2) = \frac{1}{3} \pi 25((150 \times 140) + 150^2 + 140^2)$ $= 1651954.137 [1]$ <p>Volume of cast iron = volume of truncated cone – volume of hole = $1651954.137^* - 5498 [1]$</p> <p>$= 1646456.137^* \text{ OR } 1646456^* \text{ mm}^3 [1]$</p>	3	<p>Award three marks as follows:</p> <p>One mark for putting the correct values in the formula and calculating the volume of the cone.</p> <p>Accept rounding 1651954.14</p> <p>One mark for determining that the volume of the hole needs to be taken away from the volume of the truncated cone.</p> <p>One mark for calculating the volume of cast iron.</p> <p>If correct answer is given without working out shown award full marks.</p> <p>Where an incorrect answer is given working out should be used to credit appropriate marks.</p> <p>*Allow error carried forward (ECF) where correct working out is shown.</p> <p>There is no requirement to round in question but if candidate has rounded appropriately do not penalise.</p>

6		<p>Indicative content:</p> <p>Suitable methods of assembly for the vlogging stand:</p> <p>The phone holder requires an attachment:</p> <ul style="list-style-type: none"> • Attach the phone holder to the central post via a screw that goes into a solid aluminium end-plug in the post. End-plug previously drilled and tapped on a centre lathe. End-plug inserted into central post with an interference fit (see example below). <p>The legs will scratch hard floors and may damage carpets:</p> <ul style="list-style-type: none"> • Standard components such as rubber feet may be added (see example below). <p>The legs need a method to hold them in place when in use:</p> <ul style="list-style-type: none"> • Add linkages (support arms) and a central clamping hub at the bottom of the central post to add stability (see example below). • Add linkages (support arms) and a central clamping hub at the bottom of the central post to keep the legs equi-distant from the central axis on which the phone holder is mounted (see example below). <p>The post requires a method of locking and unlocking it while allowing for adjustment of height:</p> <ul style="list-style-type: none"> • Drill and tap a hole through the tri-leg hub. Modify the hub to provide space for a PP pressure pad to be attached to a thumb screw or knob (see below example). • Add standard components such as pipe clamps above and below the tri-leg hub. • Red tubes slide over blue tubes which are inserted into them by 50mm. Red tube fitted with an inner blue tube that has an interference fit inside the red tube. <p>Award credit for any other valid suggestion.</p>	<p>16</p> <p>Candidates may use sketches and/or notes to outline suitable methods of manufacture and assembly for the vlogging stand.</p>	<p>All responses should be in relation to the information provided.</p> <p>Responses should address the four problems identified and provide details of methods to manufacture and assemble the vlogging stand.</p> <p>Answers should include solutions to each of the problems in the four bullet points in the question.</p> <p>Candidates can draw on practical experience to support responses.</p> <p>Candidates are expected to demonstrate solutions to the</p>	<p>Level 4 [13-16 marks] A comprehensive demonstration of methods to assemble and/or flat pack the vlogging stand. Comprehensive understanding of the four aspects specified in question. Information in RB is used effectively to fully exemplify the points being made. Well-constructed response in relation to question with a clear and developed narrative. The methods will be technically accurate and clear in the way they are explained.</p> <p>Level 3 [9-12 marks] A good demonstration of methods to assemble and/or flat pack the vlogging stand. Good understanding of</p>
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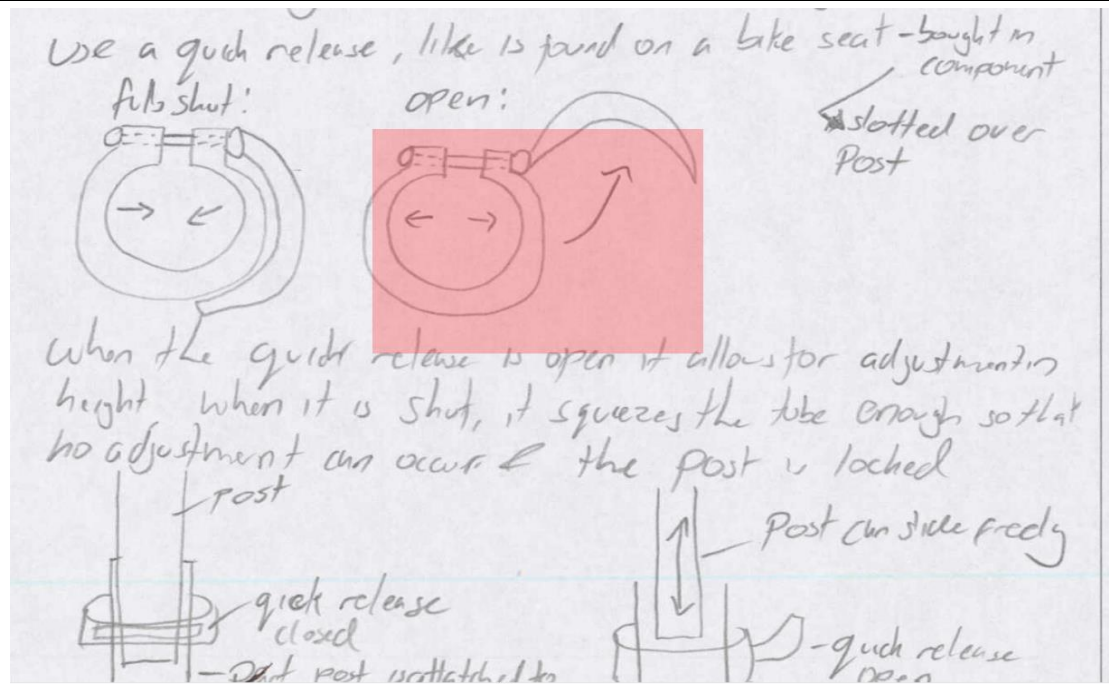
	<p>Bottom of legs: hammer is rubber feet that will prevent them scratching the floor</p>  <p>Phone holder: Phone holder has a threaded extension on the bottom of it & the top of the pole is threaded internally, so the user assembles the two when they receive the product</p> <p>Phone holder: Phone holder has a threaded extension on the bottom of it & the top of the pole is threaded internally, so the user assembles the two when they receive the product</p> 		<p>problems, as well as methods of manufacture and assembly through annotated sketches and/or notes.</p> <p>*If flat pack assembly is not evident in the response maximum level 3 marks can be attained.</p>	<p>typically three aspects specified in question. Information in RB is used for the most part effectively to exemplify points being made although one or two opportunities are missed. Sketches will for the most part be clear and supported with relevant notes. The methods will be technically accurate and for the most part be clear in the way they are explained.</p> <p>Level 2 [5-8 marks] A sufficient demonstration of methods to assemble and/or flat pack the vlogging stand. Sufficient understanding of typically at least two aspects specified in question. Information in RB is used to exemplify some points being</p>
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made although much more could have been done to exploit the stimulus material available. Sketches will be adequate and supported with notes. The methods will not always be technically accurate with some knowledge gaps evident.

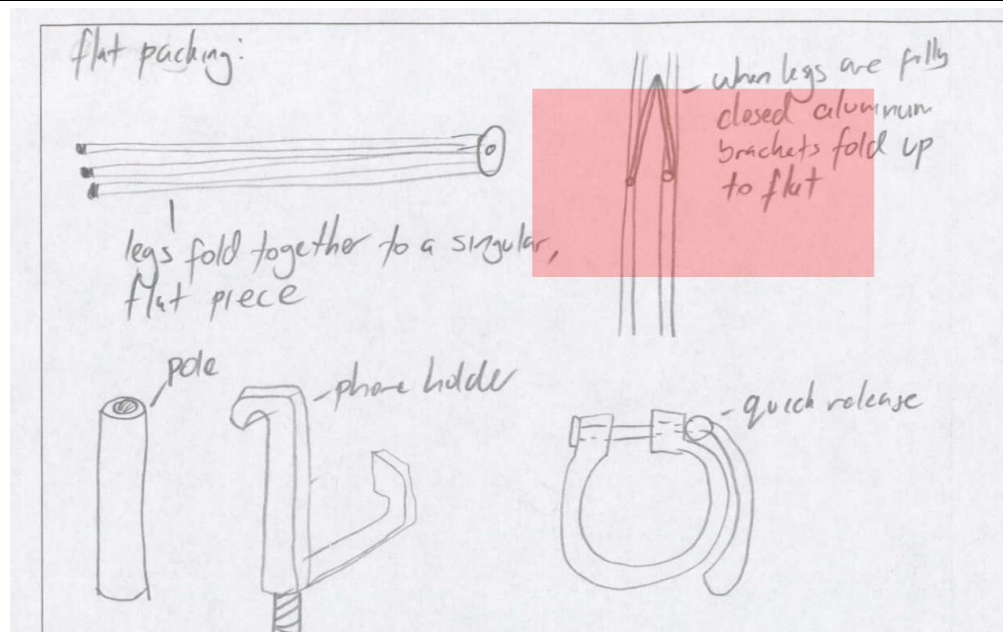
Level 1 [1-4 marks]

A **limited** demonstration of methods to **assemble and/or flat pack** the vlogging stand. 0 marks = No response or no response worthy of credit. Limited understanding of typically **one** aspect specified in question. Use of information from the RB is used in a simplistic way and adds limited value to the points being made. Sketches if used will be unclear

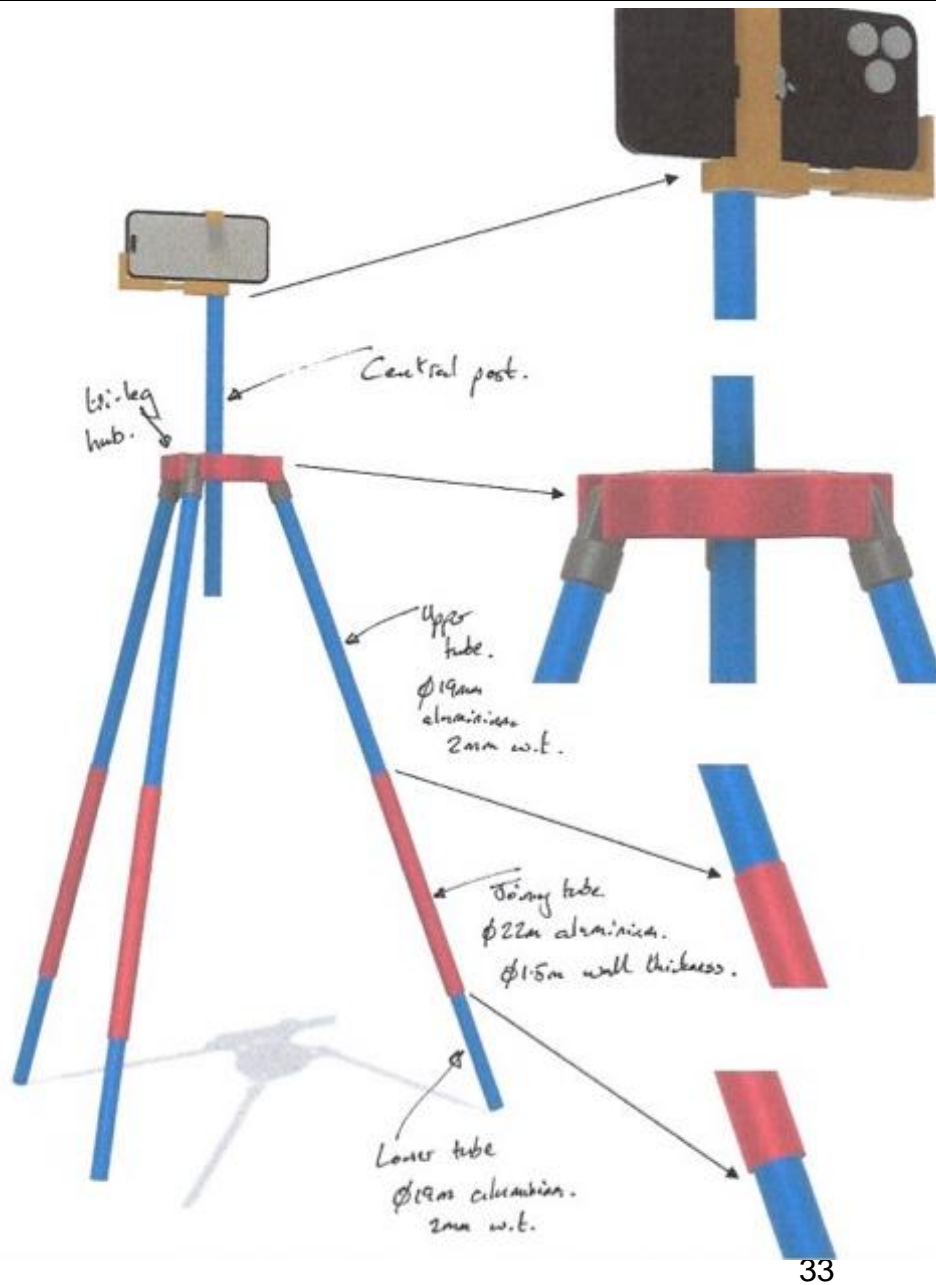


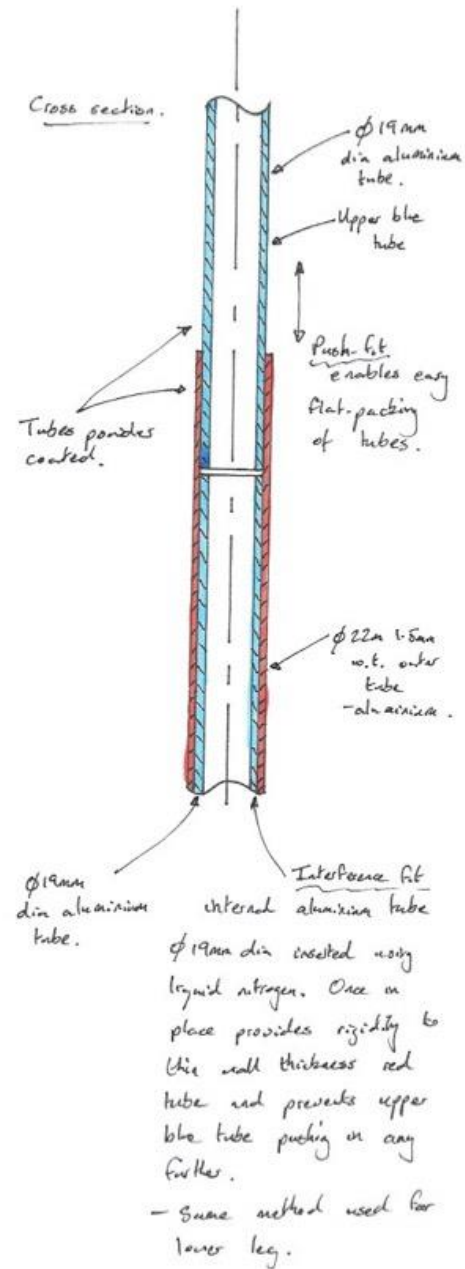
with only basic notes to accompany them. The methods may lack technical detail and be basic in nature.

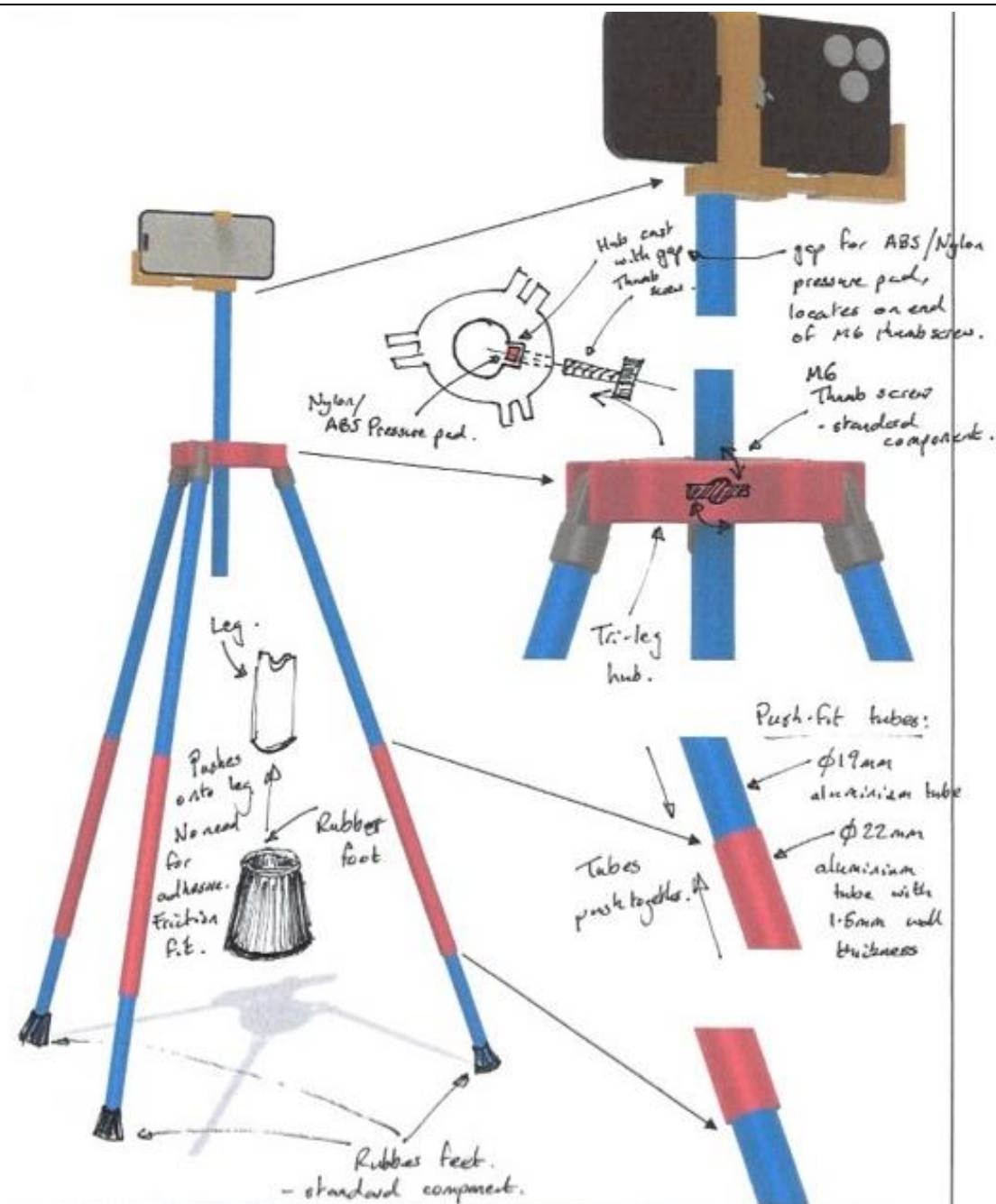
0 marks = No response or no response worthy of credit.



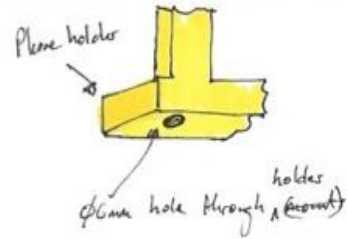
Pole, phone holder & quick release can all be taken apart & so easily flat packed → should be wrapped in bubble wrap or cardboard shavings to avoid any dents to any parts.





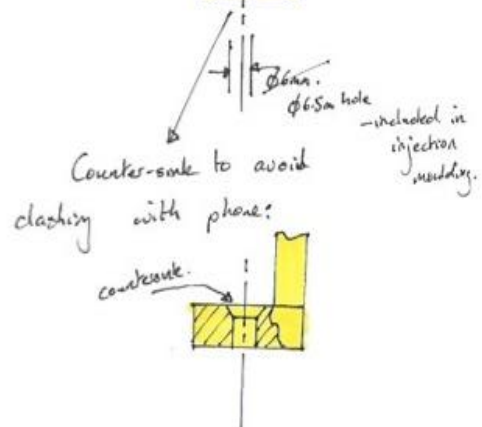


holder
Phone mount attachment method:



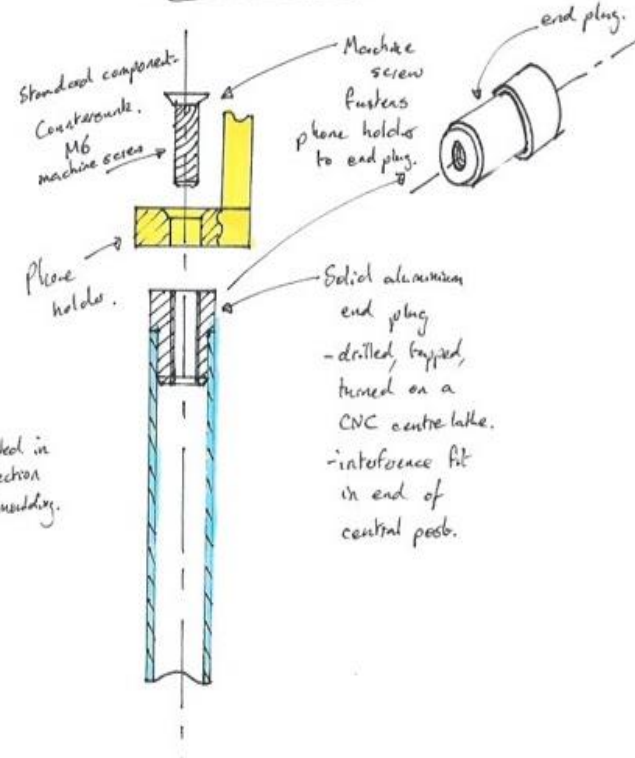
Side elevation.

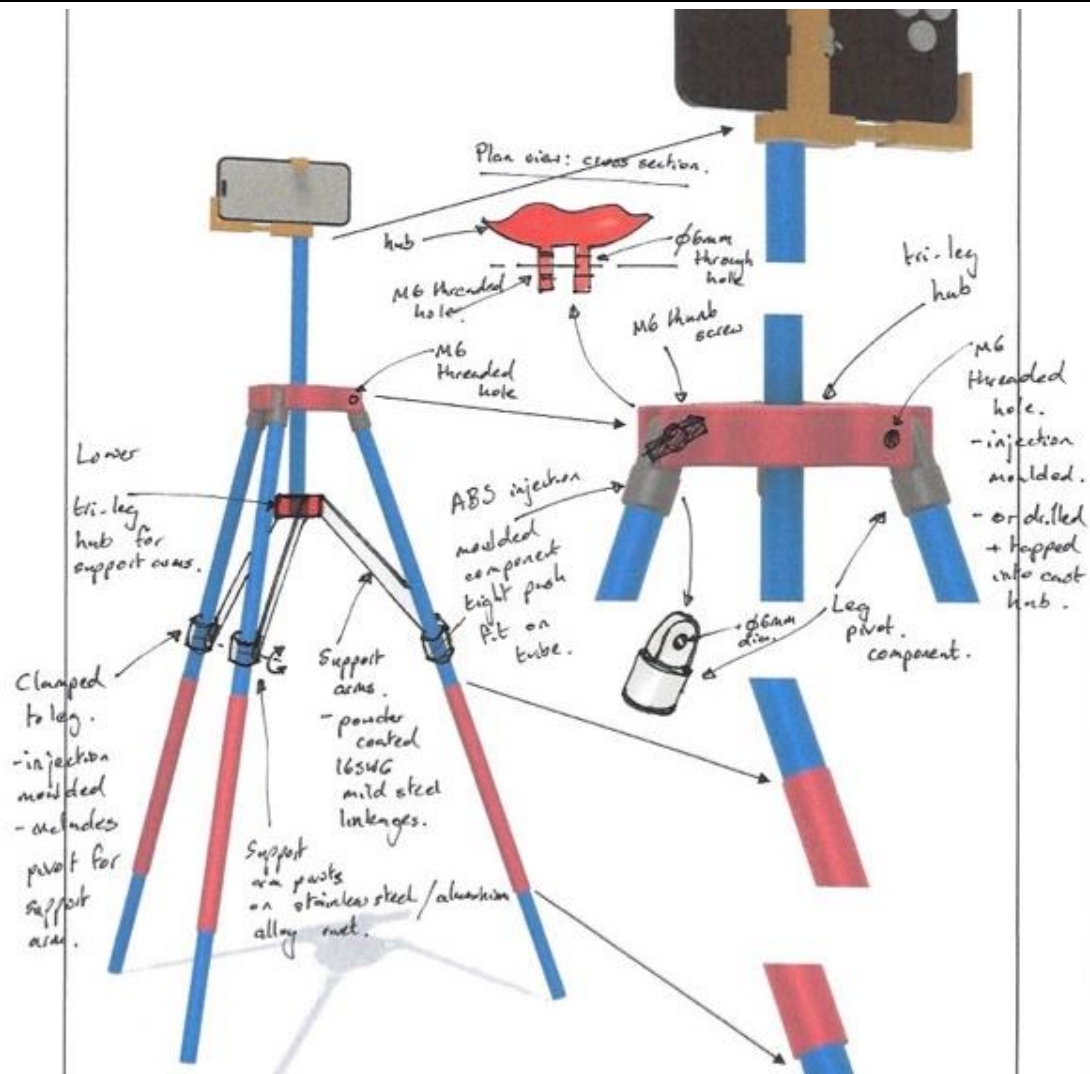
Cross-section to reveal hole.



(18)

Central post fastening:
-dismantled (exploded).





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