Rewarding Learning

General Certificate of Secondary Education

Engineering and Manufacturing

Unit 2

assessing
Production

[GEM21]

Assessment

MARK SCHEME

General Marking Instructions

Introduction
Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide teachers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses. The mark schemes should be read in conjunction with these general marking instructions.

Assessment Objectives
Below are the assessment objectives for GCSE Engineering and Manufacturing.

Candidates must:

AO1 Recall, select and communicate their knowledge and understanding of engineering and manufacturing in a range of contexts;
AO2 Apply skills, knowledge and understanding, including quality standards in a variety of design contexts. Plan and carry out investigations and making tasks involving an appropriate range of tools, equipment, materials and processes; and
AO3 Analyse and evaluate evidence, design proposals and outcomes, make reasoned judgements and present conclusions and recommendations.

Quality of candidates' responses
In marking the examination papers, teachers should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16–year–old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking
Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, teachers are expected to use their professional judgement to assess the validity of answers.

Positive marking
Teachers are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Teachers should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16–year–old GCSE candidate. Teachers are encouraged to use the full range of marks available.

Awarding zero marks
Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Types of mark schemes
Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Part 1

AVAILABLE MARKS

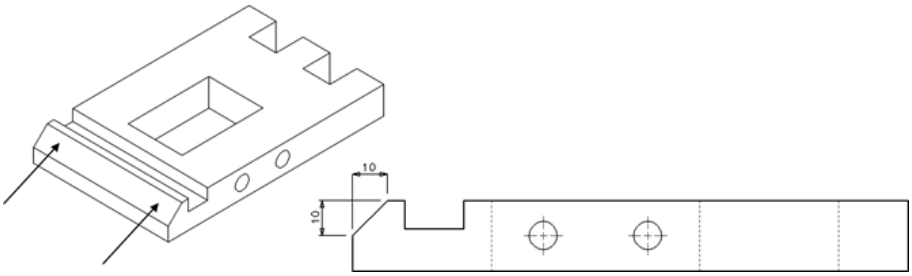
1 10mm chamfer.

If within a tolerance of ± 1 mm at each end of the chamfer. (2 × [2])
If within a tolerance of ± 2 mm at each end of the chamfer. (1 × [2])
Outside a tolerance of ± 2 mm at each end of the chamfer. [0]

The chamfer is to be measured in two places, 10 mm from each end of the feature using a steel rule.

The table below indicates how marking is to be applied to the chamfer.

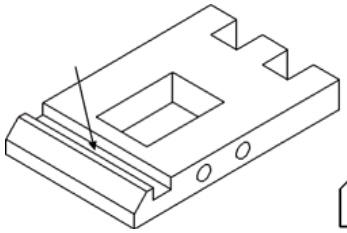
Both dimensions within 1 mm	[2]
One dimension within 1 mm and one within 2mm	[1]
Both dimensions within 2 mm	[1]
One dimension within 1 mm and one outside 2 mm	[0]
One dimension within 2 mm and one outside 2 mm	[0]
Both dimensions outside 2 mm	[0]



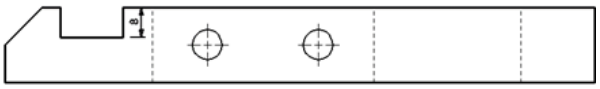
(2 × [2]) [4] 4

2 Channel depth (8 mm)

If within a tolerance of ± 1 mm at the mid-point of the channel. (1 × [2])
If within a tolerance of ± 2 mm at the mid-point of the channel. (1 × [1])
Outside a tolerance of ± 2 mm at the mid-point of the channel. [0]



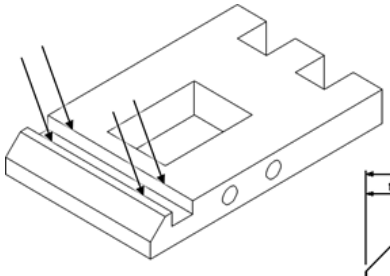
Measured at the mid-point of the channel using the depth gauge on vernier calipers.



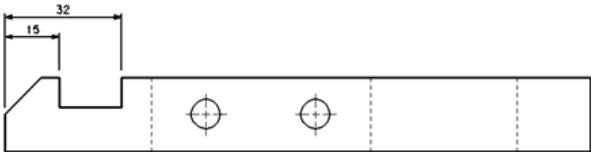
(1 × [2]) [2] 2

3 Position of the channel. (measured at each end of the feature)

If within a tolerance of ± 1 mm. (4 × [2])
If within a tolerance of ± 2 mm. (4 × [1])
Outside a tolerance of ± 2 mm. [0]



The 15 mm and 32 mm dimensions should be measured in two places, 10 mm from each end of the feature using a steel rule.



(4 × [2]) [8] 8

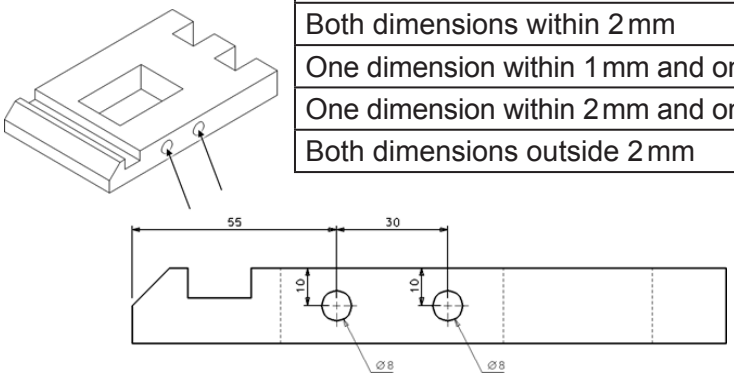
AVAILABLE MARKS

4 (i) 2 off 8 mm holes correctly located.
If within a tolerance of ± 1 mm. (2 × [2])
If within a tolerance of ± 2 mm. (2 × [1])
Outside a tolerance of ± 2 mm. [0]

The table below indicates how marking is to be applied **for each hole**.

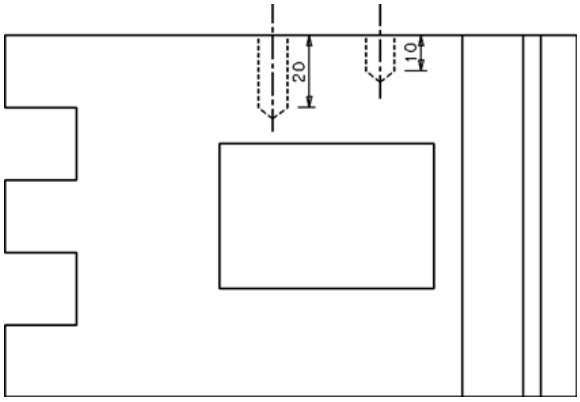
Measured using vernier calipers from the edge of the part to the edge of the hole.

Both dimensions within 1 mm	[2]
One dimension within 1 mm and one within 2mm	[1]
Both dimensions within 2 mm	[1]
One dimension within 1 mm and one outside 2 mm	[0]
One dimension within 2 mm and one outside 2 mm	[0]
Both dimensions outside 2 mm	[0]



(2 × [2]) [4]

(ii) Depth of holes.
If within a tolerance of ± 1 mm. (2 × [2])
If within a tolerance of ± 2 mm. (2 × [1])
Outside a tolerance of ± 2 mm. [0]

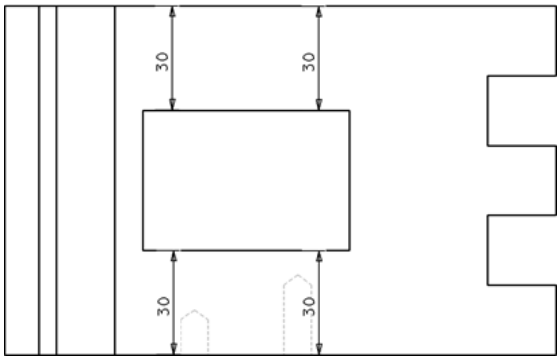


The parallel portion of the hole to be measured using the depth gauge on vernier calipers.

(2 × [2]) [4] 8

	AVAILABLE MARKS

5 (i) Position of the cut out. (30 mm measured at each end of the feature)
If within a tolerance of ± 1 mm. (4 × [2])
If within a tolerance of ± 2 mm. (4 × [1])
Outside a tolerance of ± 2 mm. [0]

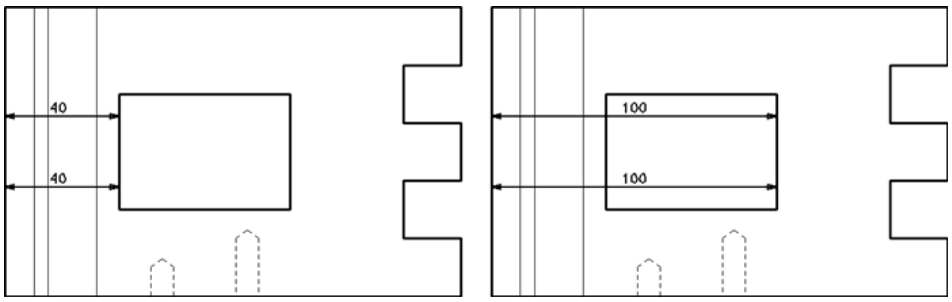


The 30 mm dimension is to be measured in the 4 places shown on the sketch (left) using a steel rule.

(4 × [2]) [8]

(ii) Position of the cut out. (40 mm and 100 mm measured from chamfered end in the positions shown below)
If within a tolerance of ± 1 mm. (4 × [2])
If within a tolerance of ± 2 mm. (4 × [1])
Outside a tolerance of ± 2 mm. [0]

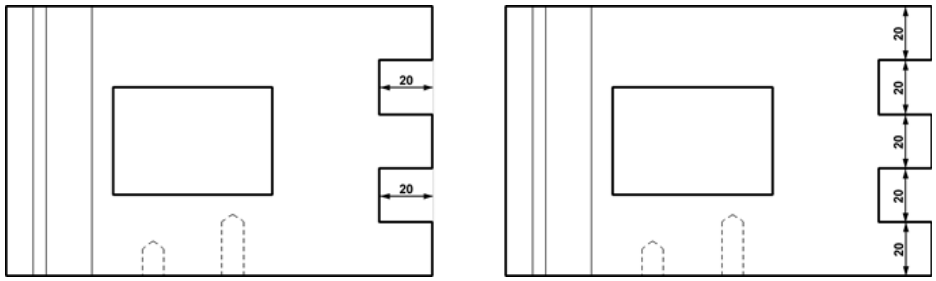
The 40mm and 100mm dimensions are to be measured in the 4 places shown on the sketches (below) using a steel rule.



(4 × [2]) [8] 16

6 Position of the fingers. (20 mm)
If within a tolerance of ± 1 mm. (7 × [2])
If within a tolerance of ± 2 mm. (7 × [1])
Outside a tolerance of ± 2 mm. [0]

Each of the 20 mm dimensions measured from their mid-point as shown below using vernier or digital calipers.



(7 × [2]) [14] 14

			AVAILABLE MARKS
7	**Quality of edges of Part 1** High quality edges on all of the part. (1 × [4]) High quality edges on more than 75% of the part. (1 × [3]) Good quality with some tool marks on the edges. (1 × [2]) Poor quality with some saw and chisel marks on the edges. (1 × [1]) Rough and unfinished edges. [0] (1 × [4])	[4]	4

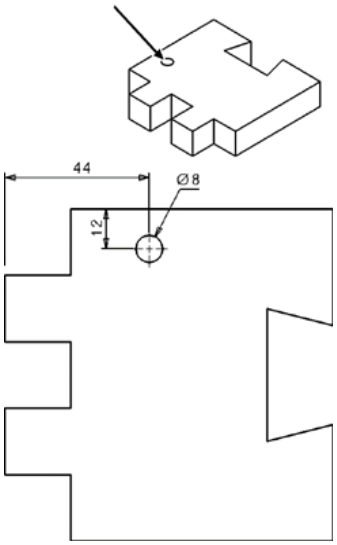
Part 2

AVAILABLE MARKS

8 1 off 8 mm hole correctly located.
If within a tolerance of ± 1 mm. (1 × [2])
If within a tolerance of ± 2 mm. (1 × [1])
Outside a tolerance of ± 2 mm. [0]

The table below indicates how marking is to be applied for the hole.

Measured using Vernier calipers from the edge of the part to the edge of the hole.

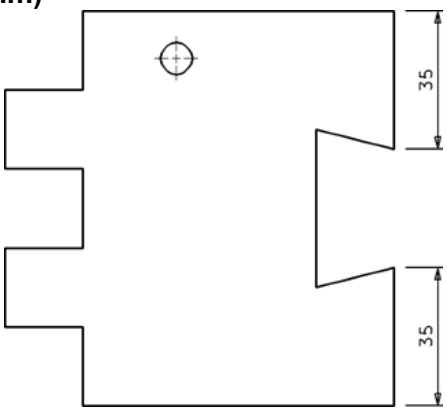


Both dimensions within 1 mm	[2]
One dimension within 1 mm and one within 2 mm	[1]
Both dimensions within 2 mm	[1]
One dimension within 1 mm and one outside 2 mm	[0]
One dimension within 2 mm and one outside 2 mm	[0]
Both dimensions outside 2 mm	[0]

(1 × [2]) [2] 2

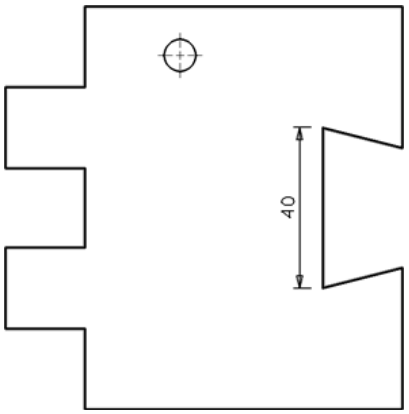
9 (i) Width on each side of the dovetail. (35 mm)
If within a tolerance of ± 1 mm. (2 × [2])
If within a tolerance of ± 2 mm. (2 × [1])
Outside a tolerance of ± 2 mm. [0]

The 35 mm dimensions are to be measured in 2 places shown on the sketch using a steel rule.



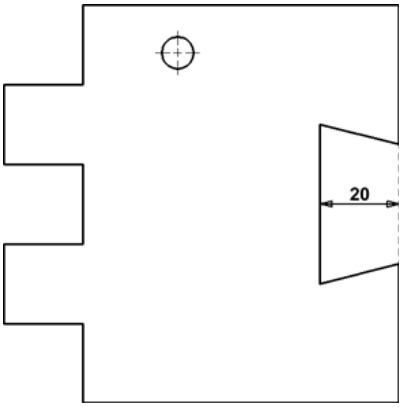
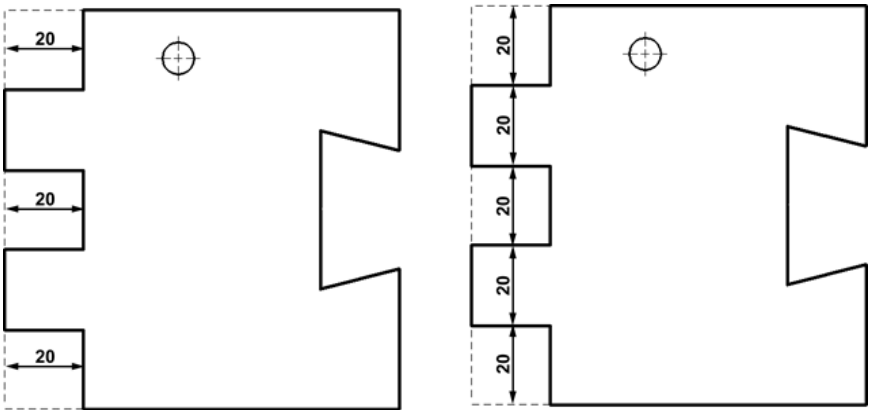
(2 × [2]) [4]

(ii) Width of the dovetail. (40 mm)
If within a tolerance of ± 1 mm. (1 × [2])
If within a tolerance of ± 2 mm. (1 × [1])
Outside a tolerance of ± 2 mm. [0]



The 40 mm dimension is to be measured using a steel rule.

(1 × [2]) [2]

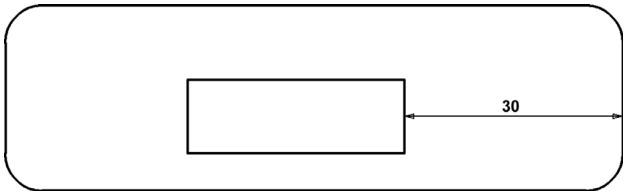
		AVAILABLE MARKS
(iii) Depth of the dovetail. (20 mm measured at the centre) If within a tolerance of ± 1 mm. (1 × [2]) If within a tolerance of ± 2 mm. (1 × [1]) Outside a tolerance of ± 2 mm. [0]		
	The 20 mm dimension is to be measured at the centre line of the part using a steel rule.	
(1 × [2])	[2]	8
10 Position of the fingers. (20 mm) If within a tolerance of ± 1 mm. (8 × [2]) If within a tolerance of ± 2 mm. (8 × [1]) Outside a tolerance of ± 2 mm. [0]	Each of the 20mm dimensions measured from the mid-point of the feature as shown below using vernier or digital calipers.	
		
(8 × [2])	[16]	16
11 Quality of edges of Part 2 High quality edges on all of the part. (1 × [4]) High quality edges on more than 75% of the part. (1 × [3]) Good quality with some tool marks on the edges. (1 × [2]) Poor quality with some saw and chisel marks on the edges. (1 × [1]) Rough and unfinished edges. [0]		
(1 × [4])	[4]	4

Part 3

AVAILABLE MARKS

12 (i) Rectangular slot. (30 mm dimension)

If within a tolerance of ± 0.5 mm. (1 × [2])
If within a tolerance of ± 1.5mm. (1 × [1])
Outside a tolerance of ± 1.5 mm. [0]

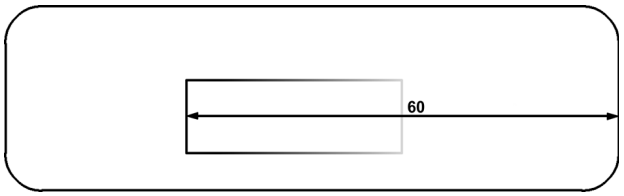


The 30 mm dimension is to be measured at the centre line of the slot using digital or vernier calipers.

(1 × [2]) [2]

(ii) Rectangular slot. (60 mm dimension)

If within a tolerance of ± 0.5 mm. (1 × [2])
If within a tolerance of ± 1.5mm. (1 × [1])
Outside a tolerance of ± 1.5 mm. [0]

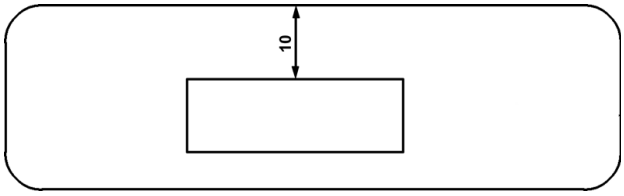


The 60 mm dimension is to be measured at the centre line of the slot using a steel rule.

(1 × [2]) [2]

(iii) Rectangular slot. (10 mm dimension)

If within a tolerance of ± 0.5 mm. (1 × [2])
If within a tolerance of ± 1.5mm. (1 × [1])
Outside a tolerance of ± 1.5 mm. [0]

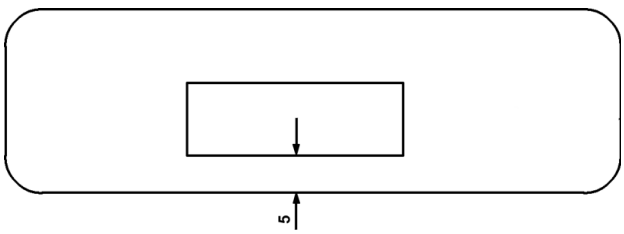


The 10 mm dimension is to be measured at the centre line of the slot using digital or vernier calipers.

(1 ×[2]) [2]

(iv) Rectangular slot. (5 mm dimension)

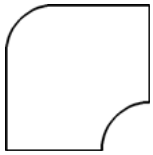
If within a tolerance of ± 0.5 mm. (1 × [2])
If within a tolerance of ± 1.5mm. (1 × [1])
Outside a tolerance of ± 1.5 mm. [0]



The 5 mm dimension is to be measured at the centre line of the slot using digital or vernier calipers.

(1 × [2]) [2]

8

			AVAILABLE MARKS
13	**5 mm Radii** 5 mm radius completed to a satisfactory degree of precision. (4 × [1]) 5 mm radius completed to a limited degree of precision. [0]  The 5 mm Radii should be checked using a radius gauge which can be quickly made. The radii should be even and conform closely to the radius gauge. [1] for each satisfactory radius. (4 × [1])	[4]	4
14	**Quality of finish** High quality of finish on the part edges. (1 × [2]) Satisfactory quality of finish on the part edges. (1 × [1]) Poor quality finish or edges unfinished. [0] (1 × [2])	[2]	2
		Total	**100**