Surname	Centre Number	Candidate Number
First name(s)		4

LEVEL 1 / LEVEL 2 AWARD

Z22-9793-01

9793/01

THURSDAY, 26 MAY 2022 – MORNING

ENGINEERING – Unit 3
Solving Engineering Problems (VOCATIONAL)

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**24**	
2.	**16**	
3.	**20**	
Total	**60**	

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ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The total number of marks for this paper is 60.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

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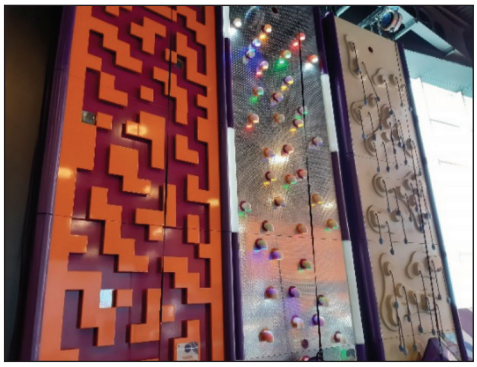
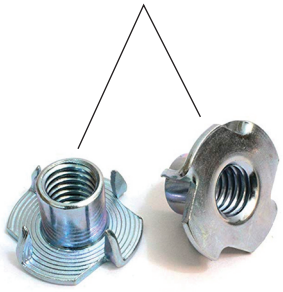
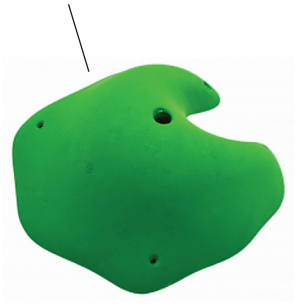
Answer **all** questions in the spaces provided.

1. The images below show a range of indoor climbing walls, fixtures and fittings.





Climbing blocks



(a) Complete the table below giving reasons for the material used for the named parts.

2 × [1]

Named parts	Material	Reason for choice
'T' nuts	Stainless steel	....
Hand holds/grips	Polyurethane	....

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(b) The climbing blocks in the first picture have been manufactured by a plastic moulding process.

Describe **two** advantages of using a plastic moulding process to manufacture the blocks. [4]

Advantage 1:

.....

.....

Advantage 2:

.....

.....

(c) Some advanced climbing walls have hand holds/grips to assist and increase the difficulty to the user.

Write **three** detailed specification points that the design engineer would consider when designing the hand holds/grips. [3]

Specification point 1: .....

.....

Specification point 2: .....

.....

Specification point 3: .....

.....

(d) Complete the table below, by giving the correct classification for **each** named material used in the manufacturing of the climbing wall. 3 × [1]
Note: The first material has been completed.

Material	Classification
Mild steel	Ferrous
Acrylic	.....
Polyester resin	.....
Aluminium	.....

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(e) The climbing walls are assembled using nuts and bolts. Explain, using notes and diagrams, how you would cut an external M8 thread on an 8 mm diameter mild steel bar. [6]

(f) The climbing wall must be thoroughly tested for safety purposes. Explain the difference between a destructive and a non-destructive test. [2]

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(g) The climbing wall uses different forms of fixtures and fittings for all parts of its construction. Explain, using examples, the difference between a temporary and a permanent fixing method. [4]

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2. The world of engineering is greatly influenced by developments in technology.

Below are two different types of attachment to a mobile phone.

(a) Describe **two** technological advances in the development of mobile phones that have created a need for the products shown. [4]

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(b) Discuss **one** disadvantage to the user of having one of these products attached to a phone. [2]

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(c) Explain how the development of mobile phone technology has supported engineers in global manufacturing. [2]

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(d) Discuss the environmental issues that might occur when disposing of mobile phones. [4]

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(e) Describe the importance of the role of the British Standards Institution (BSI) when approving products like the mobile phone before going on sale to the general public. [4]

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3. Shown below are two pieces of equipment used in an engineering workshop.

(a) (i) Complete the table below by correctly writing a description of its use. 2 × [1]

Engineering equipment	Equipment name	Equipment use
	Centre Punch	....
	Outside Callipers	....

(ii) State **three** safety precautions you should apply before you use a milling machine. 3 × [1]

Precaution 1: .....

Precaution 2: .....

Precaution 3: .....

(iii) Name **two** measuring tools that are used for quality control and describe how they are used. 2 × [2]

Measuring tool 1: .....

Description: .....

.....

Measuring tool 2: .....

Description: .....

.....

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(b) This is a picture of a small brass pin tag.

Description of brass tag:

100 mm × 30 mm wide.
Thickness of the material is 3 mm.
Both drilled holes are 3 mm diameter.

(i) Complete the third angle orthographic drawing to produce a fully functioning **working** drawing. [6]
You must show all required features and details.

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(ii) Calculate the total volume of the brass tag after it has been manufactured. [5]

You must show all your calculations.

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END OF PAPER

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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