

Surname	Centre Number	Candidate Number
Other Names		0



LEVEL 1 / LEVEL 2 AWARD

9793/01



**ENGINEERING – Unit 3
Solving Engineering Problems
(VOCATIONAL)**

MONDAY, 5 JUNE 2017 – AFTERNOON

1 hour 30 minutes

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

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.

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. Where the space is not sufficient for your answers, continue at the back of the book, taking care to number the continuation correctly.

INFORMATION FOR CANDIDATES

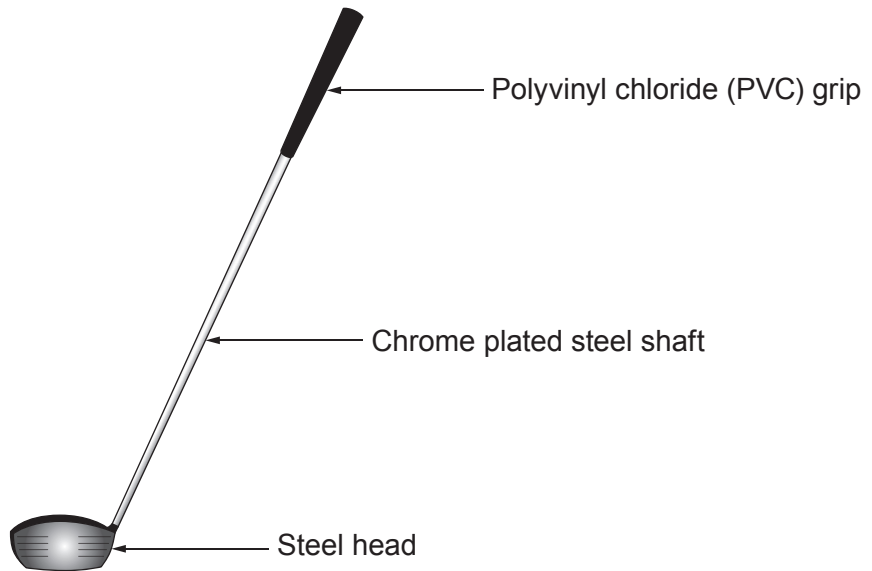
The total number of marks for this paper is 60.

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.

Answer all questions in the spaces provided.

1. Shown below is a golf club used to hit a golf ball. The golf club is composed of a shaft with a grip and a club head.



- (a) Golf clubs are manufactured from a range of materials.

In the table below underline the correct classification for the material.

[2]

Component	Material	Classification
Grip	Polyvinyl chloride (PVC)	Thermoplastic or Thermosetting
Shaft	Chrome plated steel	Ferrous or non-ferrous

- (b) State **two** properties of polyvinyl chloride (PVC) which makes it suitable for the golf club grip. 2 x [1]

Property 1:

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Property 2:

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(c) (i) Suggest how an engineer could increase the strength of the chrome plated steel shaft. [2]

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(ii) Explain why the golf club shaft has been chrome plated. [2]

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(d) You have been asked to measure the golf club's ability to resist bending.

Describe using notes and sketches how you could perform a simple test in a workshop to measure the golf club's ability to resist bending. [6]

- (e) (i) Give **two** reasons why steel might be an appropriate material to manufacture the golf club head. 2 x [1]

Reason 1:

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Reason 2:

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- (ii) The golf club head is sometimes manufactured from an alloy.

Explain the term 'alloy'. [2]

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- (f) Explain the importance of a design specification when designing products. [2]

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- (g) List **four** key design specification criteria required for the design of the golf club. [4]

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2. The world of engineering has been influenced by developments in technology.

An electric delivery drone is an unmanned aerial vehicle (UAV) used to transport packages, food or other goods.



(a) Describe how the use of delivery drones can be beneficial to the environment. [2]

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(b) Describe **two** limitations the delivery company might encounter using this type of technology to deliver parcels. [4]

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- (c) Power and navigation are two important technological developments in the design of the drone.

Describe **two** technological developments which have improved the function of the drone.

Development 1: [2]

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Development 2: [2]

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- (d) Computer-aided design (CAD) and computer-aided manufacture (CAM) are both used by manufacturers of drones.

- (i) Describe **one** use of computer-aided manufacture (CAM) when making drones. [2]

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- (ii) State **two** benefits to the manufacturer of using computer-aided manufacture (CAM) when making drones. 2 x [1]

Benefit 1:

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Benefit 2:

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- (iii) Explain **one** advantage of using computer-aided design (CAD) to design a drone. [2]

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

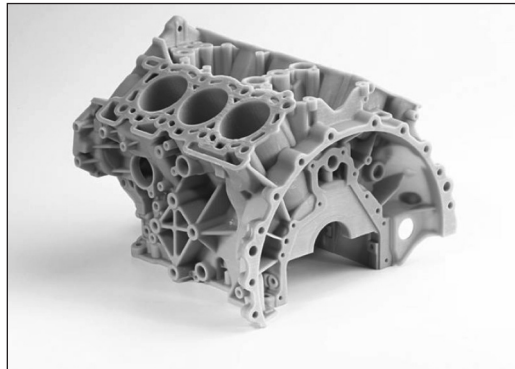
(a) Complete the table below by correctly naming **each** piece of equipment and write a description of its use.

<i>Engineering part</i>	<i>Equipment name</i>	<i>Equipment use</i>
	[1]	[1]
	[1]	[1]

(b) Identify a suitable engineering machine and process required to manufacture the component shown below. [2]

<i>Component</i>	<i>Machine</i>	<i>Process</i>
		

(c) 3D printing is now commonly used to manufacture components as shown in the images below.



Describe **one** benefit of 3D printing to the design engineer.

[2]

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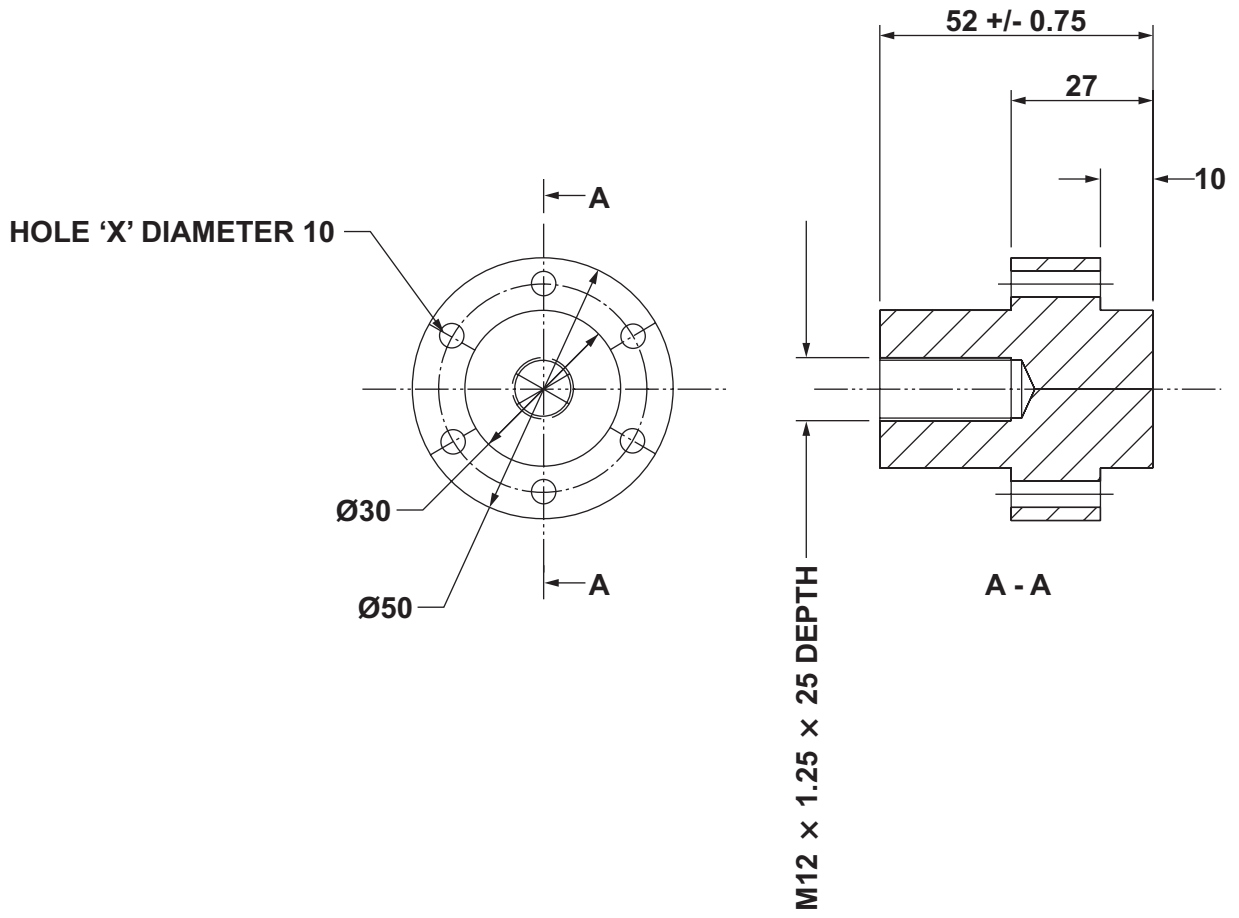
(d) Name **two** safety devices that must be used when operating a pillar drill.

2 x [1]

Name 1:

Name 2:

(e) Below is an orthographic projection drawing of a coupling.



Explain the meaning of the following features shown in the drawing.

(i) **M12 x 1.25** [2]

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(ii) The label **A - A** [2]

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View **A - A** has a dimension 52.00 +/- 0.75

(iii) Calculate the minimum and maximum size for the dimension. [2]

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(iv) Calculate the volume of waste material removed for the hole marked '**X**'. [4]

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END OF PAPER

