To be completed by the examiner			
Question	Mark	Question	Mark
1		17	
2		18	
3		19	
4		20	
5		21	
6		22	
7		23	
8		24	
9		25	
10		26	
11		27	
12		28	
13		29	
14		30	
15			
16			
		TOTAL MARK	

NCFE Level 1/2 Technical Award in Engineering (603/7006/3)

Examined Assessment

Paper number: Sample Assessment

Date: Sample 2022 **9.30am – 11.00am**

Time allowed: 1 hours 30 minutes

Learner instructions

- Use black or blue ink.
- Answer **all** questions.
- Read each question carefully.
- You **must** write your responses in the spaces provided.
- You may do rough work in this answer book. Cross through any work you do not wish to be marked.
- All of the work you submit **must** be your own.

Learner information

- The marks available for each question are shown in brackets.
- The maximum mark for this paper is 80.
- You may use a calculator.

Please complete the details below clearly and in BLOCK CAPITALS.

Learner name _____

Centre name _____

Learner number | | Centre number | |

Do not turn over until the invigilator tells you to do so.

You have been provided a list of equations below.

These equations can be used during the assessment.

Equations for properties

- energy:
  - efficiency — efficiency (%) = (useful energy out ÷ total energy in) x 100%
  - power — P = E ÷ t — power = energy ÷ time
  - work done — W = F x d — work done = force x distance
- forces & motion
  - speed — s = d ÷ t — speed = distance ÷ time
  - acceleration — a = (v-u) ÷ t — acceleration = change in velocity ÷ time
  - force — F = m x a — force = mass x acceleration
  - moment of force — m = F x d — moment = force x perpendicular distance from pivot
  - weight — w = m x g — weight = mass x gravity
  - momentum — p = m x v — momentum = mass x velocity
  - density — d = m ÷ v — density = mass ÷ volume
  - pressure — p = F ÷A — pressure = force ÷ area
- electricity
  - power — P = V x I — power = voltage x current
  - voltage — V = I x R — voltage = current x resistance
  - current — I = P ÷ V — current = power ÷ voltage
  - resistance — R = V ÷ I — resistance = voltage ÷ current
- geometric
  - area - square — length of side²
  - area - rectangle — length of side 1 x length of side 2
  - area - triangle — (length of base x height of triangle) ÷ 2
  - area - circle — π x radius²
  - volume - cube — length of side³
  - volume - pyramid — (1/3) x (base area) x height of pyramid
  - volume - cylinder — π x radius² x height of cylinder

Section A

This section has a possible 33 marks.

You should spend about 35 minutes on this section.

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

1

Item 1

The image below shows a prosthetic running blade which is an advanced type of prosthesis used by amputee athletes to replace a missing body part.

State the engineering discipline which is responsible for the development of prosthetic running blades.

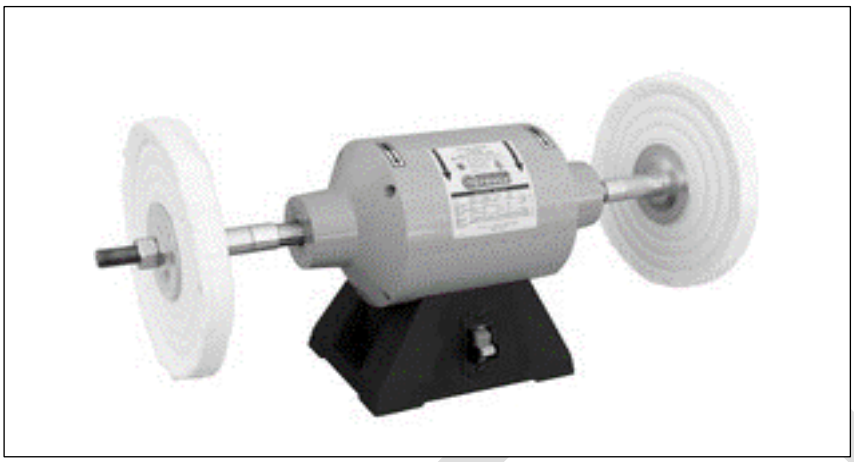
[1 mark]

Please turn over for the next question

2

Item 2

The image below shows a machine commonly found in an engineering workshop.



Identify which **one** best describes its function.

[1 mark]

A Buffing materials

B Polishing materials

C Sanding materials

D Sharpening tools

Answer _____

3 Identify which **one** activity would the manual handling operations regulations be most likely to apply to.

[1 mark]

A Ensuring a work area is free from obstructions

B Handling and storing chemicals in a locked cabinet

C Lifting then moving a heavy box from one location to another

D Setting up a fixed machine for a practical task

Answer _____

4 Identify which **one** of the following is a softwood.

[1 mark]

A Ash

B Balsa

C Cedar

D Oak

Answer _____

5

The image below shows a marking out tool.

Item 3

State the name of this tool.

[1 mark]

_____

6 Identify which **one** of the following saws would be the **most** appropriate tool to use when cutting a 12mm aluminium round bar.

[1 mark]

A Coping Saw

B Hacksaw

C Scroll Saw

D Tenon Saw

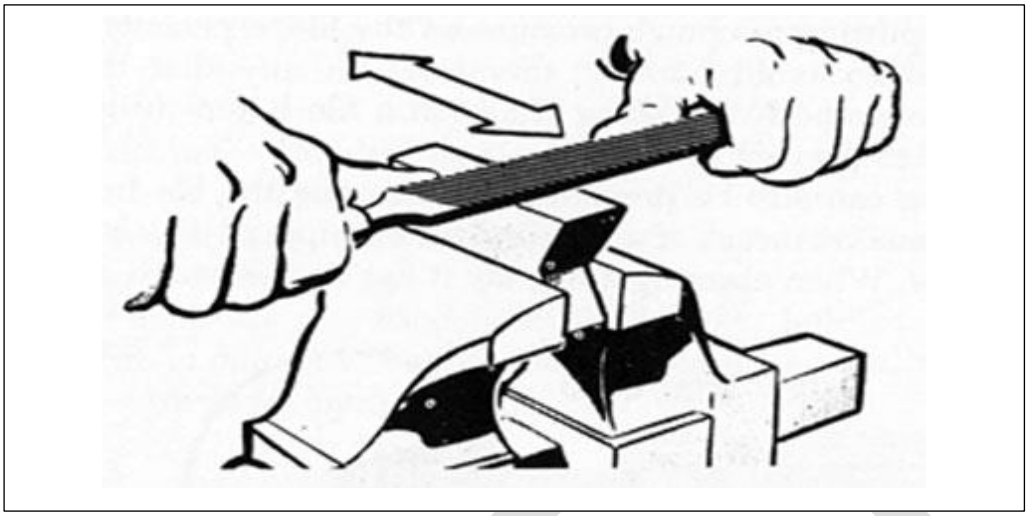
Answer

Please turn over for the next question

7

Item 4

The image below illustrates a modification technique.



Name the technique being used to modify the piece of metal. **[1 mark]**

_____

8 Identify which **one** of the following the initials CNC stand for.

[1 mark]

A Computer number capability

B Computer number capacity

C Computer numerical containment

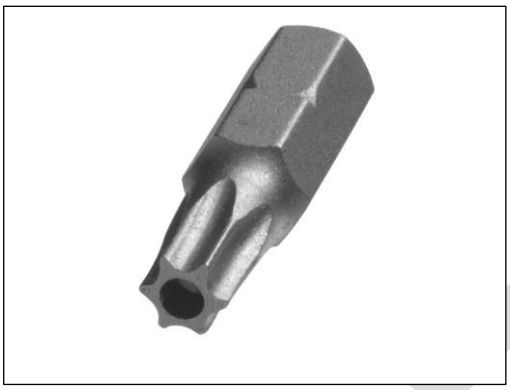
D Computer numerical control

Answer _____

9

Item 5

The image below shows a screwdriver bit.



Identify which **one** of the following is the name of this bit.

[1 mark]

A Allen

B Philips

C Slot

D Torx

Answer _____

Please turn over for the next question

10

Item 6

The image below shows a number of the same type of engineering component.

Identify which **one** of the following is the name of this component.

[1 mark]

A Bolt

B Nail

C Rivet

D Screw

Answer _____

11 State **two** safety features found on a metal lathe.

[2 marks]

_____

_____

12 State **two** types of personal protective equipment (PPE) required when using a soldering iron in an engineering workshop.

[2 marks]

Answer 1

Answer 2

13 As consumers become more environmentally aware, engineers have had to look at better ways to manufacture products.

One example of this is a fleece top which can be fabricated from just eight plastic bottles, by shredding the plastic and turning it into polyester thread.

Identify and explain **one** environmental benefit of using recycled materials in the production of the fleece top.

[3 marks]

Please turn over for the next question

14 Electric vehicle sales are projected to reach 45 million worldwide by 2040. Currently the infrastructure for fossil fuel propelled vehicles is based around access to fuel refilling stations on motorways and throughout the road network. Fossil fuel powered vehicles can expect to travel between 400–600 miles before they require to refuel. Electric vehicles can expect to travel between 200–300 miles before they need to re-charge.

State **two** advantages and **two** disadvantages of current electric car design and related infrastructure.

[4 marks]

Advantages:

Disadvantages:

15

Item 7

The image below shows a row of wind turbines. The blades of a wind turbine are fabricated from **glass reinforced plastic** (GRP).

Explain **one** property of **glass reinforced plastic** which makes it a suitable material for this purpose.

[4 marks]

Please turn over for the next question

16

Item 8

The image below shows a standard household milk pan.

The pan section is fabricated from a non-ferrous metal and the handle from a thermoset polymer.

Explain why these materials have been selected to construct the milk pan, based on their properties and characteristics.

[4 marks]

17 Describe **two** activities which should be undertaken in setting up and preparing a pillar drill for use.

[4 marks]

Please turn over for the next section

Section B

This section has a possible 14 marks.

You should spend about 15 minutes on this section.

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

18 Identify which **one** unit would be used to measure current.

[1 mark]

A Ampere

B Candela

C Degrees

D Seconds

Answer _____

19 Identify which **one** SI base unit of measurement would be best to use in a technical drawing of yacht.

[1 mark]

A Kilogram (kg)

B Kilometre (km)

C Metre (m)

D Millimetre mm)

Answer _____

20 An engineering company needs to modify the shape of plastic sheeting into various shapes and sizes.

State **two** ways in which the shape and size of plastic can be modified.

[2 marks]

_____

_____

21 The total power input to a power station is 672 MW. The useful power output is 536 MW. Making use of the relevant supplied equation, calculate the efficiency of this power station.

Show your workings out and round up to the nearest whole unit.

[3 marks]

Use this blank space for your working out.

Answer _____

Please turn over for the next question

22 If a car increases in velocity from +5 m/s to +15 m/s in 3 seconds, what is its acceleration?

Show your workings out and round up to one decimal place.

[3 marks]

Use this blank space for your working out.

Answer _____

23 Describe **two** elements that should be found in a project planning risk assessment.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

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Please turn over for the next section

Section C

This section has a possible 15 marks.

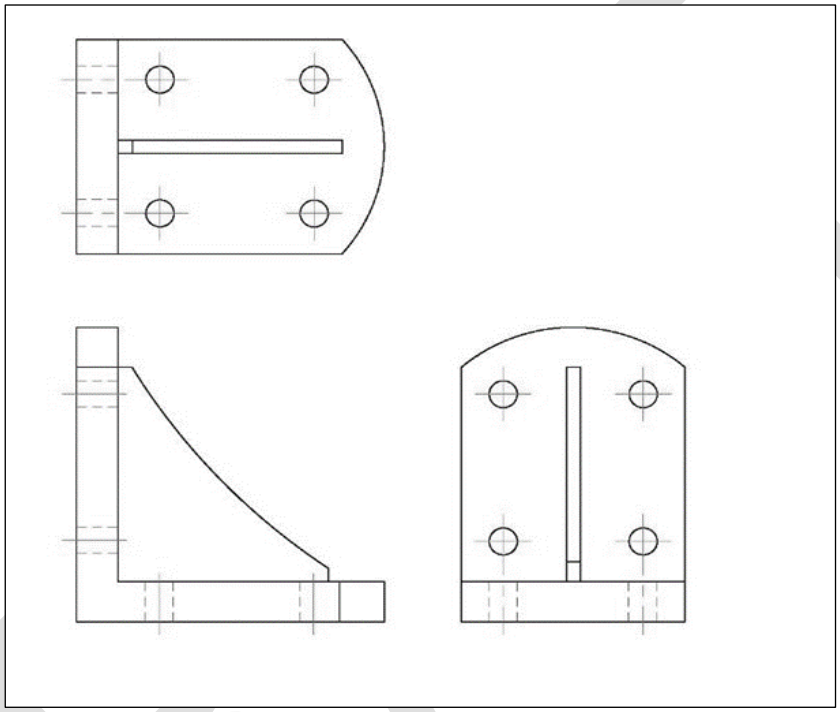
You should spend about 20 minutes on this section.

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

24

Item 9

The image below illustrates an engineering drawing of a support bracket.



State the projection that has been used to produce this engineering drawing.

[1 mark]

25 Other than title, state **two** pieces of information that would be found in the title block of an engineering drawing**.**

[2 marks]

26 A laser cutter is a computer-aided machine (CAM) often found in an engineering workshop**.**

Justify the need for full training prior to using this computer-aided machine.

[2 marks]

27 You are an engineer working for a local electrical engineering company that specialise in renewable energy. You have been asked to draft engineering drawings for a new wind turbine.

Explain why you would apply scale in your engineering drawings.

[4 marks]

Please turn over for the next question

28 You are employed as a civil engineer and are currently working on a new bridge project. The bridge will be used as a transport link and will carry around 8,000 vehicles every day.

Analyse **two** reasons why it is important to include annotations in a freehand sketch of the bridge.

[6 marks]

Section D

This section has a possible 18 marks.

You should spend about 20 minutes on this section.

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

29 Analyse the importance of COSHH in a construction environment and analyse the possible impact of not adhering to the COSHH regulations with regards to the identified risks.

[9 marks]

30 Chemical engineering has led to new products and projects which have solved problems and shaped the modern world.

Analyse the impact of developments in chemical engineering on the modern world.

[9 marks]

This is the end of the external assessment

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