To be completed by the examiner			
Question	Mark	Question	Mark
1		12	
2		13	
3a		14	
3b		15	
3c		16	
4a		17a	
4b		17b	
4c		18a	
5		18b	
6		19a	
7		19b	
8		20	
9		21	
10		22	
11			
		TOTAL MARK	

NCFE Level 1/2 Technical Award in Engineering (603/2963/4)

Unit 01 Understanding the engineering world

Past Paper

Thursday 19 March 2020

9.00 am–10.30 am

Time allowed: 1 hour 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 with 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	power = energy ÷ time P = E ÷ t
Work done	work done = force x distance W = F x d

Forces and Motion

Speed	speed = distance ÷ time s = d ÷ t
Acceleration	acceleration = change in velocity ÷ time a = (v-u) ÷ t
Force	force = mass x acceleration F = m x a
Moment of force	moment = force x perpendicular distance from pivot m = F x d
Weight	weight = mass x gravity w = m x g
Momentum	momentum = mass x velocity p = m x v
Density	density = mass ÷ volume d = m ÷ v
Pressure	pressure = force ÷ Area p = F ÷ A

Electricity

Power	power = voltage x current P = V x I
Voltage	voltage = current x resistance V = I x R
Current	current = power ÷ voltage I = P ÷ V
Resistance	resistance = voltage ÷ current R = V ÷ I

Geometric

Area

Square	length of side^2
Rectangle	length of side 1 x length of side 2
Triangle	(length of base x height of triangle) ÷ 2
Circle	π x radius^2

Volume

Cube	length of side^3
Pyramid	(1/3) x (base area) x height of pyramid
Cylinder	π x radius^2 x height of cylinder

Please turn over for the first question.

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

Total available marks **80**.

1 What type of engineering includes the construction of bridges, roads and railways?

[1 mark]

A Civil

B Construction

C Electrical

D Mechanical

Answer _____

2 What regulations control the use of chemicals in engineering?

[1 mark]

A COSHH

B HASAWA

C MHOR

D RIDDOR

Answer _____

3 An employer must make sure that employees are kept safe when they are working in an engineering workshop.

3 (a) Discuss **two other** duties that the employer has under the Health and Safety at Work Act.

[4 marks]

3 (b) State **three** items of personal protective equipment (PPE) that workers must use when they are welding steelwork.

[3 marks]

3 (c) Explain **two** employee duties under the Manual Handling Operations Regulations.

[4 marks]

4 The engineering industry uses many different combinations of materials to manufacture products.

4 (a) Which **one** of the following is a hardwood timber?

[1 mark]

A Cedar

B Oak

C Scots pine

D Spruce

Answer _____

4 (b) State **two** thermal properties of a metal.

[2 marks]

4 (c) Give **two** examples of pure non-ferrous metals.

[2 marks]

Please turn over for the next question.

5 Modern automotive engineering designs are using more composite materials and fewer traditional steel materials.

Explain why using composite materials would benefit the consumer.

[9 marks]

6 Which **one** of the following is **not** a property of aluminium?

[1 mark]

A Corrosion resistant

B Electrical conductance

C Good thermal conductor

D Poor malleability

Answer _____

7 Calculate the density of a metal if its mass is 15kg and volume is 0.25m^3.

Use the formulas on pages 2 and 3.

Show your working.

[2 marks]

Please turn over

8 A hydraulic cylinder is 150mm long and has an internal diameter of 40mm. The cylinder is filled with hydraulic oil when the valve is operated.

Calculate the volume of oil.

Use the equations on pages 2 and 3.

Show your working.

[2 marks]

9 What is a lathe used for?

[1 mark]

A Cutting

B Milling

C Soldering

D Turning

Answer _____

10 Which **one** of the following reduces the environmental impact of engineering activities?

[1 mark]

A Magnetism

B Production

C Sustainability

D Wastage

Answer _____

11 Which **one** of the following is measured in kelvin?

[1 mark]

A Amount of a substance

B Electrical current

C Microcandela

D Thermodynamic temperature

Answer _____

Please turn over for the next question.

12 Each type of engineering discipline covers specific products which have shaped the modern world.

Draw a line to connect each engineering discipline on the left to an example of a product manufactured on the right.

[3 marks]

Aerospace	Fibre optic
Biomedical	Integrated circuits
Communications	Missiles
Electrical	Prosthetics

13 What does British Standard 8888 refer to?

[1 mark]

A Engineering drawings

B Engineering finishes

C Engineering lubricants

D Engineering tools

Answer _____

14 Which **one** of the following is an optical property of a material?

[1 mark]

A Ductility

B Photosensitivity

C Temperature

D Toughness

Answer _____

15 What type of property is ‘oxidation state’?

[1 mark]

A Chemical

B Electrical

C Mechanical

D Thermal

Answer _____

16 **Figure 1** shows an early steam-powered excavator and **Figure 2** shows a modern excavator.

Figure 1. Steam-powered excavator

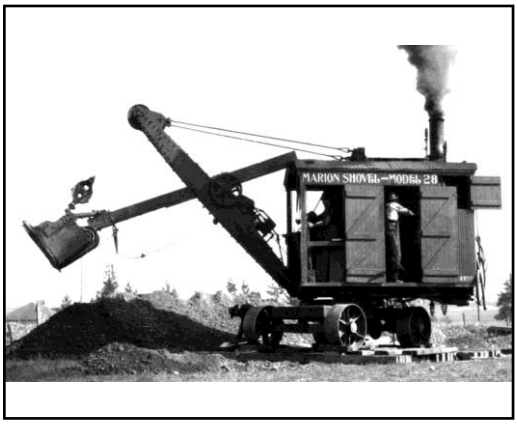


Figure 2. Modern excavator

Explain the technological advances between the excavators in **Figure 1** and **Figure 2 and** discuss how these advances have affected the modern world.

[9 marks]

Please turn over for the next question.

17 **Figure 3** shows an image of a modification tool.

Figure 3.

17 (a) Name the modification tool shown in **Figure 3** and state what it is used for.

[2 marks]

17 (b) Describe how you would operate the modification tool shown in **Figure 3**.

[4 marks]

Please turn over for the next question.

18 (a) Name **one** finishing tool used to complete a metal surface.

[1 mark]

18 (b) Explain how **two** control measures ensure that a pillar drill can be used safely.

[4 marks]

19 (a) **Methods of Projection**

Figure 4.

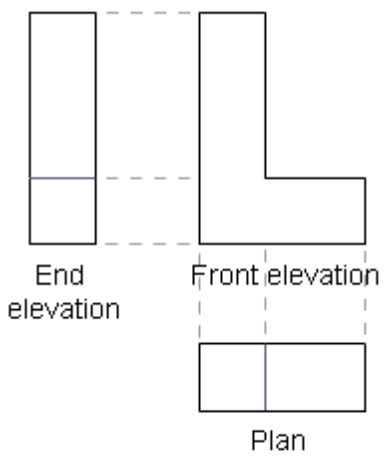
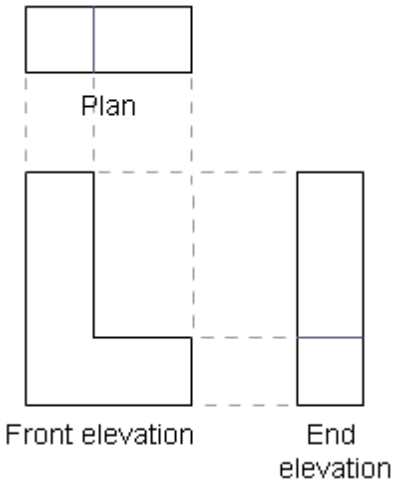


Figure 5.



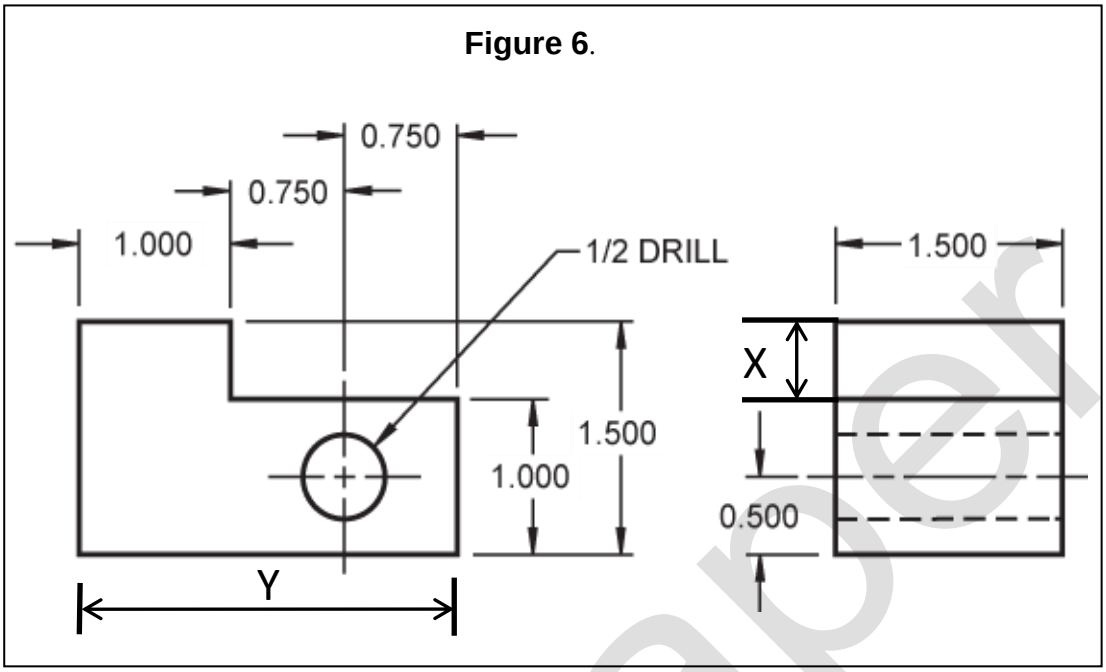
The designer has drawn two images, one in first angle projection and one in third angle projection.
Which image **(Figure 4 or 5)** is in first angle projection?

[1 mark]

Please turn over

19 (b) Calculate the height **(X)** and length **(Y)** of the product shown in **Figure 6.**

Figure 6.



Show your working.

[4 marks]

20 An engineer wants to mark a drill hole before machining. What tool should they use? Explain how they should use this tool.

[3 marks]

21 State **two** types of dimension that callipers can measure.

[2 marks]

Please turn over for the next question.

22 It is important to use SI units and equations in engineering to make sure that applications function and are safe to operate.

Explain the ways that SI units and equations have been applied to aerospace engineering.

[9 marks]

This is the end of the external assessment

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