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

Unit 01 Understanding the engineering world

Paper number: P001396

Thursday 17 March 2022 **09.00am – 10.30am**

Time allowed: 1 hour 30 minutes

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

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 Commercial companies have successfully launched manned rockets into orbit.

Which discipline of engineering is this?

[1 mark]

A Aerodynamic

B Aerospace

C Biomedical

D Communications

Answer _____

2 Employers must protect workers from harm by putting controls in place to protect them.

Identify **one other** employer responsibility under the Health and Safety at Work Act **and** explain how this responsibility protects employees.

[3 marks]

Employer responsibility: _____

_____

How it protects employees: _____

_____

_____

_____

3 Which **one** of the following hazards might be prevented by using a full face respirator?

[1 mark]

A Chemical burns to the hands

B Inhalation of harmful fumes

C Injury to the neck

D Loud noises damaging the ears

Answer _____

4 A solvent is used to remove paint from metal.

Identify **two** hazards of using a solvent.

[2 marks]

1: _____

2: _____

Please turn over for the next question.

5 (a) There is an accident in an engineering workshop.

Identify the document that must be completed **and** give **one** piece of information that must be written in this document.

[2 marks]

Document: _____

Piece of information: _____

5 (b) Who must complete the document identified in **5(a) and** when must this happen?

[2 marks]

Who: _____

_____

When: _____

_____

6 (a) Which **one** of the following units is one thousandth of an amp?

[1 mark]

A Kiloamp

B Microamp

C Milliamp

D Millivolt

Answer _____

6 (b) Which **one** of the following is a unit of measurement for luminous intensity?

[1 mark]

A Centimetre

B Millicandela

C Milligram

D Nanomole

Answer _____

6 (c) State **two** scales used in engineering to measure temperature.

[2 marks]

1: _____

2: _____

6 (d) Complete **Table 1** by answering the questions below.

i. How many millimetres are in one metre?

ii. How many millimetres are in 50 centimetres?

[2 marks]

Table 1

Question	Answer
i.	
ii.	

7 A train uses 100 000 joules of energy to move in one hour.

Calculate the average power used by the train in **one** second.

Use the equations on pages 2 and 3.

Show your working.

[2 marks]

Examiner use only

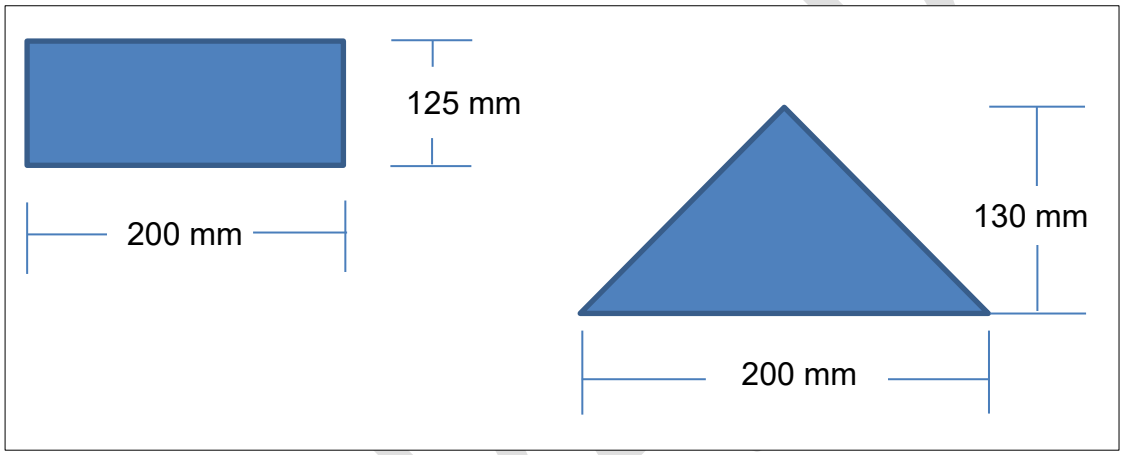
8 Discuss the general responsibilities that **employees** have in protecting the safety of **other** workers in an engineering workshop.

[9 marks]

DO NOT WRITE IN THIS SPACE

9 **Figure 1** shows two components to be cut from the same square sheet of material, that has an area of 40 000 mm^2.

Figure 1



Calculate if **both** shapes in **Figure 1** can be cut from the same square sheet.

Use the equations on pages 2 and 3.

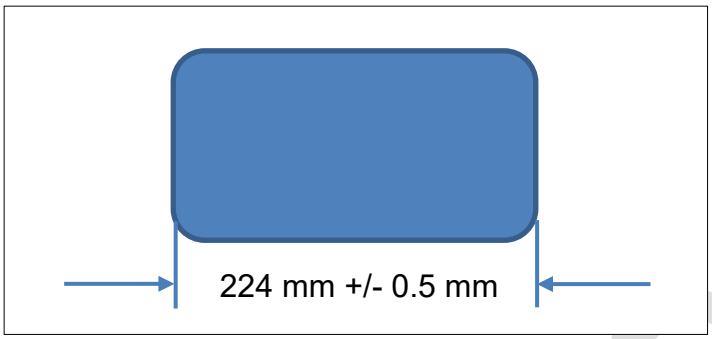
Show your working.

[3 marks]

Can **both** shapes be cut from the same square sheet? (Yes/No)

10 (a) **Figure 2** shows the tolerance of a component in an engineering drawing.

Figure 2



Calculate the minimum **and** maximum dimensions for the component shown in **Figure 2**.

[2 marks]

10 (b) A ratio of 1:50 has been used on an engineering drawing with units in millimetres.

Briefly describe what the ratio 1:50 means.

[1 mark]

10 (c) Which **one** of the following would be written in a drawing title block?

[1 mark]

A Address

B Border

C Line weight

D Material

Answer _____

11 Which **one** of the following is the resistance of a material to impact?

[1 mark]

A Elasticity

B Malleability

C Strength

D Toughness

Answer _____

12 Identify **three** ways British Standard 8888 (BS 8888) is applied to an engineering drawing.

[3 marks]

1: _____

_____

2: _____

_____

3: _____

_____

13 Explain how water in a copper pipe conducts heat to a radiator.

[3 marks]

_____

_____

_____

_____

_____

_____

14 (a) Which **one** of the following is an optical property of a metal?

[1 mark]

A Durability

B Oxidation

C Plasticity

D Reflectivity

Answer _____

14 (b) Which **one** of the following identifies an engineering product's ability to burn?

[1 mark]

A Conductivity

B Ductility

C Flammability

D Melting point

Answer _____

14 (c) Which **one** of the following is an aesthetic characteristic used in traffic signs?

[1 mark]

A Colour

B Magnetism

C Sustainability

D Weight

Answer _____

14 (d) Which **one** of the following is a characteristic of brushed stainless steel?

[1 mark]

A Finish effect

B Melting point

C Sustainability

D Toxicity

Answer _____

15 Give **one** example where hand-sanding should be used **and** explain why it would be used instead of electric disc-sanding.

[3 marks]

Example: _____

_____

Explanation: _____

_____

_____

_____

Please turn over for the next question.

16 Discuss the benefits of using cement in civil engineering.

[9 marks]

17 Identify **one** example of environmental damage caused by extracting raw material **and** explain how this type of damage can be reduced.

[3 marks]

Environmental damage:

How it can be reduced:

18 (a) Identify the type of material that high-impact polystyrene is **and** give **one** example of how it could be used.

[2 marks]

Type:

Example:

18 (b) Identify the type of material that cast iron is **and** give **two** examples of how it could be used.

[3 marks]

Type: _____

Example 1: _____

_____

Example 2: _____

_____

19 (a) **Figure 3** shows a tool.

Figure 3

Identify the tool in **Figure 3 and** give **one** reason why this size of tool would be used instead of a larger version.

[2 marks]

Tool: _____

Reason: _____

_____

_____

19 (b) **Figure 4** shows a joining tool.

Figure 4

Identify the joining tool in **Figure 4 and** give **one** example of a product this tool can join.

[2 marks]

Tool: _____

Product: _____

_____

19 (c) Give **one** reason why the joining tool shown in **Figure 4** would be used instead of another method.

[1 mark]

_____

_____

Please turn over for the next question.

20 Employees face risks when using fixed machines such as lathes and pillar drills in an engineering workshop.

Evaluate the control measures an engineering company could use to reduce the risks from different hazards.

[9 marks]

This is the end of the external assessment.

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