To be completed by the examiner			
Question	Mark	Question	Mark
1		18	
2		19	
3		20	
4		21	
5		22	
6		23	
7		24	
8		25	
9		26	
10		27	
11		28	
12		29	
13		30	
14		31	
15		32	
16		33	
17			
		TOTAL MARK	

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

Unit 01 Understanding the engineering world

Past Paper

Thursday 21 March 2019 **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 & 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

Examiner use only

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 Genetic modification is the process of changing the DNA of plants by adding a gene from bacteria or a virus.

Golden rice is an example of a food that has been genetically modified by introducing beta-carotene, found in carrots, to give the rice its 'golden' appearance.

State the engineering discipline responsible for the modification to the rice.

[1 mark]

2 In aeronautical engineering which would be the **most suitable** scale for producing drawings of a Boeing 747 aircraft on A3?

[1 mark]

A 2:1

B 1:2

C 1:20

D 1:200

Answer _____

3 In a single-wheel pulley system the amount of downward force required to lift the load is equal to the weight of the load.

Which **one** of the following is the required downward force of a **two-wheel** pulley system?

[1 mark]

A The downward force required would be equal to the weight of the load

B The downward force required would be half the weight of the load

C The downward force required would be twice the weight of the load

D The downward force required would be a quarter of the weight of the load

Answer _____

4 Which **one** of the following is **not** covered under COSHH?

[1 mark]

A Chemicals

B Dust

C Fumes

D Radioactive substances

Answer _____

5 When using a pillar drill it is essential to wear the correct personal protective equipment (PPE).

State **one** form of PPE that should be worn **and** explain how this would protect the individual.

[2 marks]

Please turn over for the next question.

6 **Image 1** below shows a 1800s dolly, dolly tub and mangle used for washing clothes. **Image 2** below shows a modern-day washing machine.

Image 1

Image 2

Explain how the invention of the washing machine has solved problems and the impact the washing machine has had on the modern world.

[9 marks]

Examiner use only

7 Which **one** of the following is the correct full title for 'RIDDOR'?

[1 mark]

A Recording of Incidents, Diseases and Dangerous Occurrences Regulations

B Recording of Injuries, Diseases and Dangerous Occurrences Regulations

C Reporting of Injuries, Diseases and Dangerous Occurrences Regulations

D Reporting of Incidents, Diseases and Dangerous Occurrences Regulations

Answer _____

8 Which **one** of the following SI units would be used to measure an amount of substance?

[1 mark]

A Milliamp

B Millicandela

C Milligram

D Millimole

Answer _____

Please turn over for the next question.

9 Which **one** of the following units of measurement is **not** an SI base unit?

[1 mark]

A Ampere

B Candela

C Inch

D Second

Answer _____

10 The initials CFRP refer to a form of composite material, popular with engineering applications.

State what the initials CFRP stand for **and** give **one** engineering application.

[2 marks]

11 A household kettle is an electrical appliance. The kettle heats the water using an electrical heater that is connected to a 240 volt mains supply. The power of the electrical heater is 1.5 kW (1500 watts).

Using the equations provided on pages 2 and 3, calculate the **current** going through the kettle.

Show your working out.

[3 marks]

Use this blank space for your working out.

Answer _____

12 A flight from London to New York takes 8 hours and covers a distance of 5540 km.

Using the equations provided on pages 2 and 3, calculate the **speed** that the aircraft must be travelling at.

Give your answer in kilometres per hour (km/h).

Show your working out.

[3 marks]

Use this blank space for your working out.

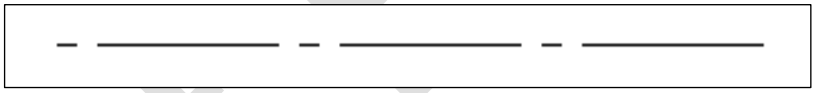
Answer _____

13 It is important to use an accurate scale on a technical drawing.

Explain what impact the use of an incorrect scale can have on the manufacturing process and the final outcome.

[4 marks]

14 The image below shows a type of line that is used in engineering drawings.



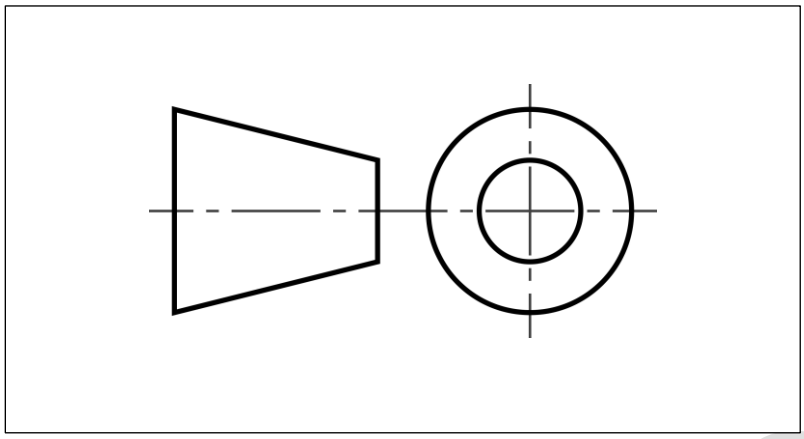
What is the name of this type of line?

[1 mark]

15 Which system of measurement is a yard associated with?

[1 mark]

16 The image below shows a symbol used in engineering drawings.



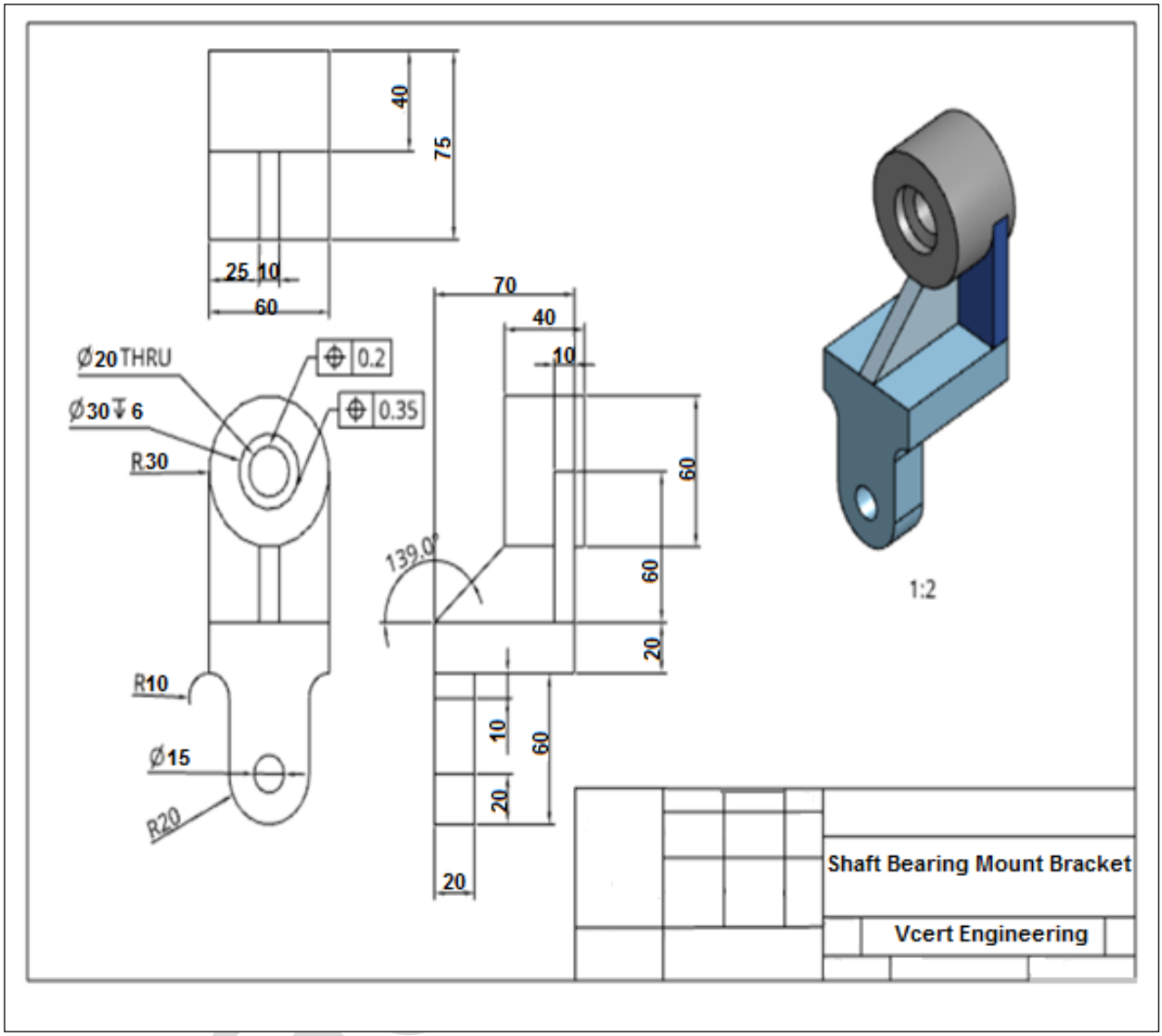
What does this symbol represent?

[1 mark]

Please turn over for the next question.

17 The image below shows an engineering drawing of a shaft bearing mount bracket.

Unless otherwise stated, all dimensions are in millimetres (mm).



Read the drawing and state in millimetres (mm), the full height, width and depth of the bracket.

[3 marks]

18 It is beneficial to include and state tolerance when producing an engineering drawing.

Analyse the benefits this has on the manufacturing process of a product.

[9 marks]

Please turn over for the next question.

19 What is the purpose of BS 8888 in engineering drawings?

[3 marks]

20 Which **one** of the following is **not** a chemical property?

[1 mark]

A Heat of combustion

B Oxidation state

C Photosensitivity

D Toxicity

Answer _____

21 State **one** mechanical property of a car tyre **and** explain why this is important to its function.

[3 marks]

22 Name **one** type of aesthetic characteristic.

[1 mark]

23 Which discipline of engineering would a smartphone be associated with?

[1 mark]

24 Acrylic is made from natural gas and petroleum. Natural gas and petroleum are both fossil fuels.

Explain what a fossil fuel is and the impact that manufacturing acrylic is having on the environment.

[3 marks]

Please turn over for the next question.

25 Urea formaldehyde is a thermoset polymer. Acrylic is a thermoplastic polymer.

Discuss the similarities and differences between thermoset polymers and thermoplastic polymers **and** why they might be selected to perform different engineering functions.

[9 marks]

26 **Image 3** shows a common engineering tool.

Image 3

Name the tool in **Image 3 and** explain how it would be used in a practical application.

[3 marks]

27 List **two** tools that could be used to mark out cutting lines on a piece of flat bar steel.

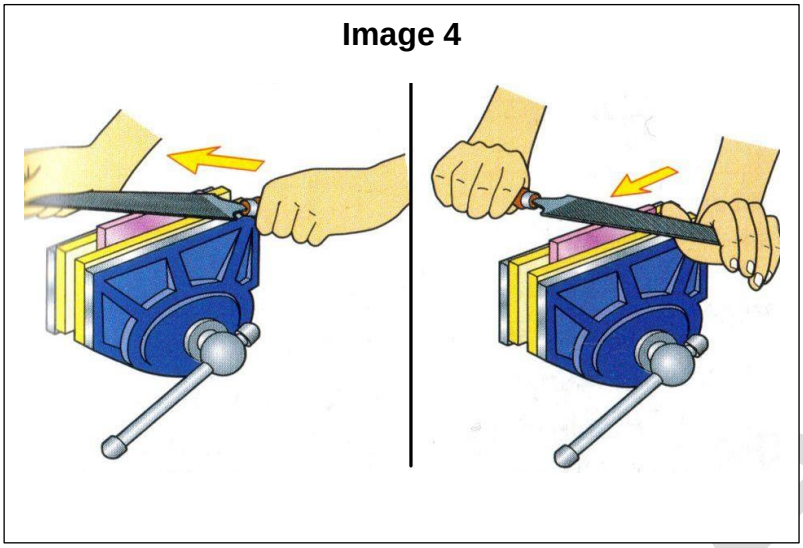
[2 marks]

1 _____

2 _____

28 **Image 4** shows two methods of filing a work piece.

Image 4



State the **two** methods of filing in **Image 4**.

[2 marks]

1 _____

2 _____

29 Which **one** of the following would be the **most suitable** saw to cut intricate external shapes and interior cut-outs?

[1 mark]

A Coping saw

B Hacksaw

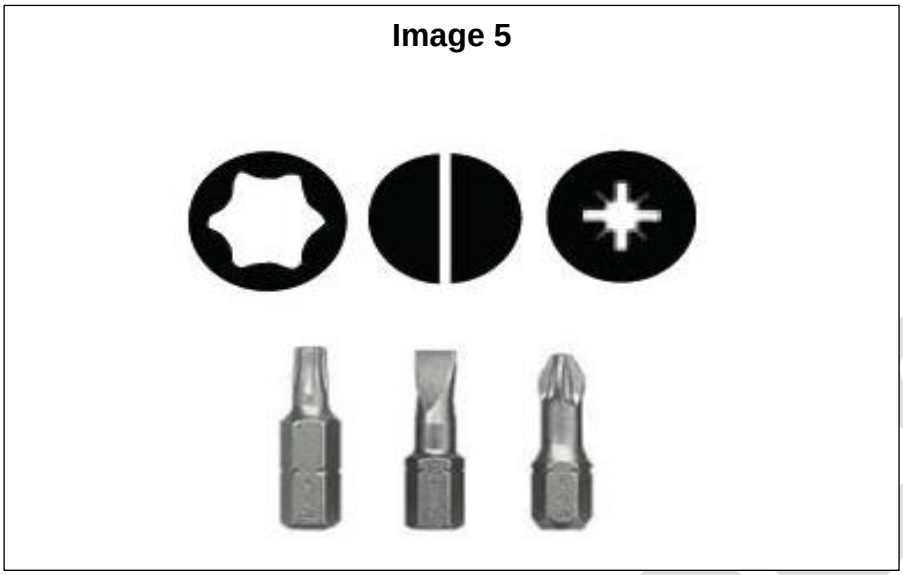
C Junior hacksaw

D Tenon saw

Answer _____

30 **Image 5** shows a range of screwdriver heads.

Image 5



Which **one** of the following is **not** shown in **Image 5**?

[1 mark]

A Phillips

B Posidrive

C Slotted

D Torx

Answer _____

31 List **two** mechanical fastenings used in the engineering industry to join together two pieces of aluminium.

[2 marks]

1 _____

2 _____

32 List **two** control measures used in an engineering workshop.

[2 marks]

1 _____

2 _____

33 Which **one** of the following is the **best** way to protect an employee working at a noisy machine?

[1 mark]

A Allow the machine to only be used for short periods of time

B Conduct an observation of the employee using the machine

C Provide a pair of ear defenders

D Reduce or eliminate noise from the machine

Answer _____

This is the end of the external assessment.