



**0171-516 JUNE 2019**

**Level 3 Advanced Technical Extended Diploma in Land-Based Engineering (1080)**

Level 3 Land-Based Engineering – Theory exam (1)

If provided, stick your candidate barcode label here.

**Tuesday 18 June 2019  
13:30 – 15:30**

Candidate name (first, last)

First

Last

Candidate enrolment number

Date of birth (DDMMYYYY)

Gender (M/F)

Assessment date (DDMMYYYY)

Centre number

Candidate signature and declaration\*

- If additional answer sheets are used, enter the additional number of pages in this box.
- Before taking the examination, **all candidates** must check that their barcode label is in the appropriate box. Incorrectly placed barcodes may cause delays in the marking process.
- Please ensure that you staple additional answer sheets to the **back** of this answer booklet, clearly labelling these with your full name, enrolment number, centre number and qualification number in BLOCK CAPITALS.
- All candidates need to use a **black/blue** pen. **Do not** use a pencil or gel pen, unless otherwise instructed.
- If provided with source documents, these documents **will not** be returned to City & Guilds, and will be shredded. Do not write on the source documents.

**\*I declare that I had no prior knowledge of the questions in this examination and that I will not divulge to any person any information about the questions.**

**You should have the following for this examination**

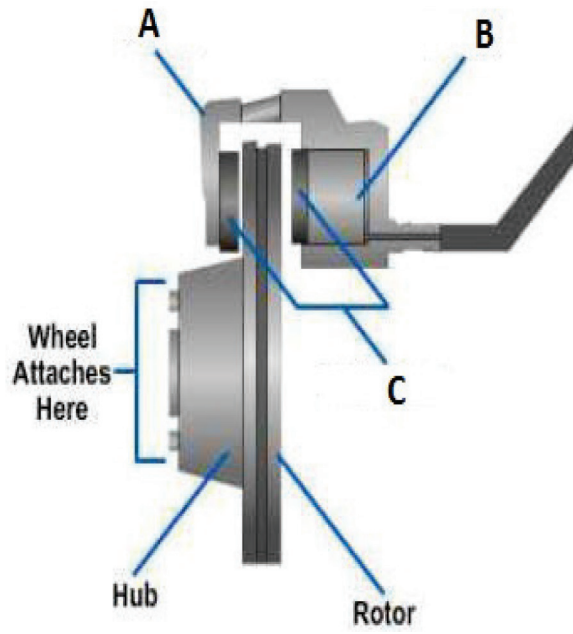
- a pen with blue or black ink
- a non-programmable calculator

**General instructions**

- Use black or blue ball-point pen.
- The marks for questions are shown in brackets.
- This examination contains 12 questions. Answer all questions.
- Answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Cross through any work you do not want to be marked.



1 Identify the components labelled A, B and C in Figure 1. (3 marks)



Source: <http://free-ed.net/sweethaven/mechtech/automotive01/>

Figure 1

A \_\_\_\_\_  
B \_\_\_\_\_  
C \_\_\_\_\_

2 a) Describe **two** functions of an ABS braking system. (2 marks)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

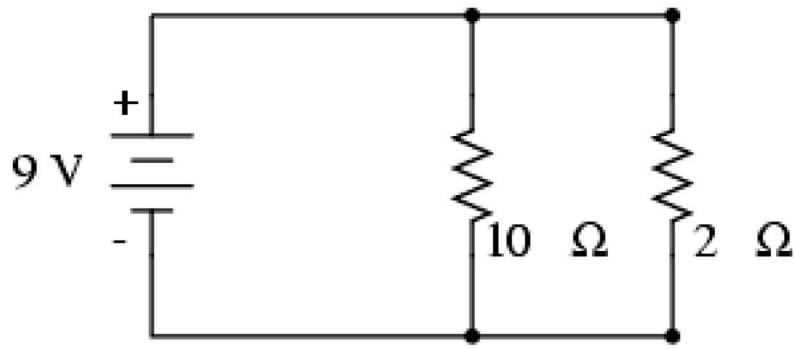
b) Describe **two** working principles of an ABS braking system. (2 marks)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



- 4 a) How much current will be drawn through the 2 Ohm resistor shown in Figure 2?  
Show all workings.

(3 marks)



Source: <https://www.allaboutcircuits.com/textbook/direct-current/chpt-5>

**Figure 2**

- b) What is the total resistance value offered by the circuit?

(2 marks)

---

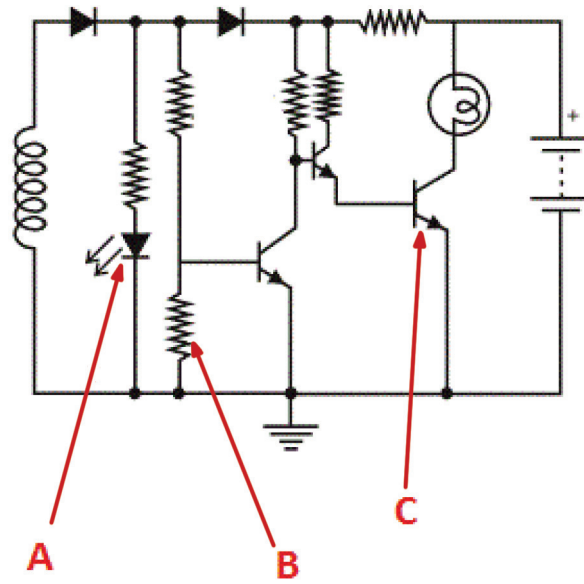
---

---

---

5 Identify the components labelled A, B and C in Figure 3.

(3 marks)



Source: <https://www.pinterest.co.uk/pin/339107046927087361/>

**Figure 3**

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

6 Figure 4 lists the specific gravity readings taken by a hydrometer for a 12 V lead acid battery.

<b>Cell 1</b>	1.225
<b>Cell 2</b>	1.125
<b>Cell 3</b>	1.280
<b>Cell 4</b>	1.100
<b>Cell 5</b>	1.280
<b>Cell 6</b>	1.270

**Figure 4**

Referring to Figure 4, analyse the findings and determine the state of charge of the battery.

(4 marks)

---

---

---

---

---

---

---

---

---

---

7 Describe the role of an electronic monitoring and control system on a modern engine fitted to a land-based machine.

(5 marks)

---

---

---

---

---

---

---

---

---

---

8 A tractor with a common rail engine has gone into limp mode. What parameters could be monitored during the fault diagnostic process? (4 marks)

---

---

---

---

---

---

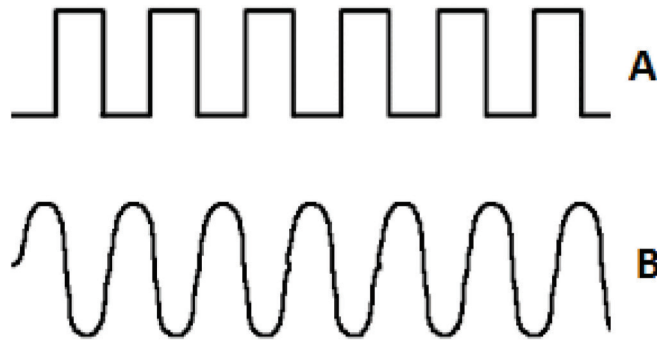
---

---

---

---

9 a) Identify the types of signals labelled A and B in Figure 5. (2 marks)



Source: <http://www.polytechnichub.com>

**Figure 5**

A \_\_\_\_\_

B \_\_\_\_\_

b) What type of waveform is displayed in B in Figure 5? (1 mark)

---

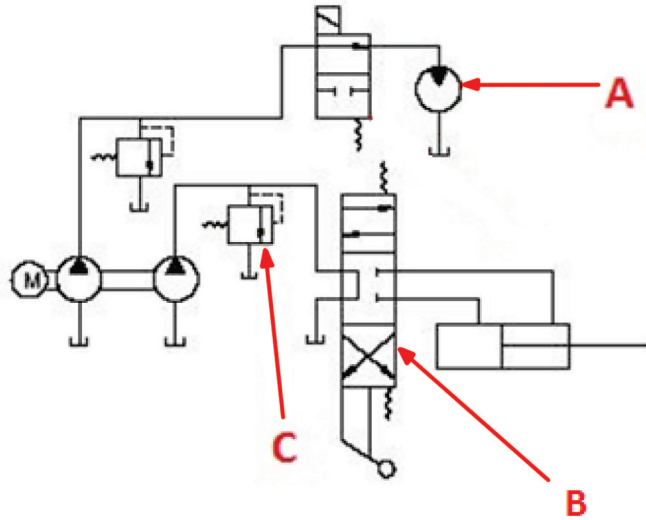






11 a) Identify the components labelled A, B and C in Figure 6.

(3 marks)



Source: <http://www.hydraulicstatic.com/>

**Figure 6**

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_

b) Referring to Figure 6, describe what would happen if the cylinder reached the end of its travel and flow continued?

(2 marks)

---

---

---





