

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use
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General Certificate of Education  
 June 2008  
 Advanced Subsidiary Examination



**COMPUTING**  
**Unit 3 Practical Systems Development**

**CPT3R**

Monday 12 May 2008 9.00 am to 10.30 am

**For this paper you must have:**  
 your completed Practical Exercise for CPT3.  
 You may use a calculator.

For Examiner's Use			
Question	Mark	Question	Mark
1		5	
2		6	
3		7	
4		8	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

Time allowed: 1 hour 30 minutes

**Instructions**

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. **Answers written in margins or on blank pages will not be marked.**
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

- The maximum mark for this paper is 65.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

**At the end of the examination**

- Hand in **both** this question paper **and** your Practical Exercise documentation to the invigilator.
- **Warning:** If you do not hand in both documents it may not be possible to issue a result for this unit.



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

Answer this paper using the documentation you have prepared for the Peter’s Petrol Pumps practical exercise as requested in the 2008 specification. A copy of the brief for this practical exercise has been included at the end of this paper if you need to refer to it.

Many of these questions require you to give the page number in your documentation, where the evidence for the answer may be found. You **must** write the question number and question part number in the margin of that page in your documentation.

At the end of this examination your documentation **must** be handed in with this question paper.

1 This question relates to the DESIGN process.

1 (a) (i) Give the page reference where you defined the data item/variable to record the amount of petrol sold.

Page ..... (1 mark)  
(Write Q1(a)(i) in the margin, in the correct place, on that page)

1 (a) (ii) Explain your choice of data type for this variable.

Data type .....  
Why? ..... (2 marks)

1 (b) (i) Give the page reference where you defined the data item/variable to record the amount to be paid for the petrol sold.

Page ..... (1 mark)  
(Write Q1(b)(i) in the margin, in the correct place, on that page)

1 (b) (ii) Explain your choice of data type for this variable.

Data type .....  
Why? ..... (2 marks)



1 (c) (i) Give the page reference where you defined the data item/variable to record whether the pump is currently in use.

Page ..... (1 mark)  
(Write Q1(c)(i) in the margin, in the correct place, on that page)

1 (c) (ii) Explain your choice of data type for this variable.

Data type .....  
Why? ..... (2 marks)

1 (d) (i) Give the page reference of your algorithm for the production of daily totals for money taken and petrol sold.

Page ..... (1 mark)  
(Write Q1(d)(i) in the margin, in the correct place, on that page)

1 (d) (ii) Give the steps in your algorithm.

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..... (4 marks)

Turn over for the next question



2 This question relates to the IMPLEMENTATION and CODING processes.

2 (a) (i) Give a page reference showing a screenshot that displays the amount to pay on the petrol pump.

Page ..... (1 mark)  
*(Write Q2(a)(i) in the margin, in the correct place, on that page)*

2 (a) (ii) Explain how your program displays the amount to pay on the petrol pump.

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(4 marks)

2 (b) (i) Give a page reference showing your **coding** that simulates the seven segment Liquid Crystal Display (LCD).

Page ..... (1 mark)  
*(Write Q2(b)(i) in the margin, in the correct place, on that page)*

2 (b) (ii) Explain how your program simulates the seven segment LCD.

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(3 marks)



2 (c) You were told to simulate the removal of the nozzle from the holster when the customer is going to buy petrol.

2 (c) (i) Where in your documentation is your **coding** of this simulation?

Page ..... (1 mark)  
(Write Q2(c)(i) in the margin, in the correct place, on that page)

2 (c) (ii) Explain how your solution simulates the removal of the nozzle from the holster when the customer is going to buy petrol.

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(4 marks)

2 (d) You were told to display the state of the pump on the console.

2 (d) (i) Where in your documentation is your **coding** to display the state of the pump?

Page(s) ..... (1 mark)  
(Write Q2(d)(i) in the margin, in the correct place, on the page(s))

2 (d) (ii) Explain how your solution displays the state of the pump.

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(3 marks)

Turn over ▶



3 You were asked to produce a clearly set out program listing.

3 (a) Give a page reference for a page of your program listing that is clearly set out.

Page ..... (1 mark)  
(Write Q3(a) in the margin, in the correct place, on that page)

3 (b) Describe **three** steps you took to ensure that your program listing would be easy to understand.

1 .....

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2 .....

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3 .....

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(3 marks)

4



4 This question relates to the TESTING and IMPLEMENTATION process.

4 (a) (i) Explain how your solution resets the pump after each purchase.

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(2 marks)

4 (a) (ii) Give the page reference of a test that shows the pump has been reset.

Page .....

(1 mark)

*(Write Q4(a)(ii) in the margin, in the correct place, on that page)*

4 (b) You were asked to test a day's operation of the petrol pump.

4 (b) (i) Give the page reference of your test plan showing test(s) demonstrating a day's operation of the petrol pump.

Page .....

(1 mark)

*(Write Q4(b)(i) in the margin, in the correct place, on that page)*

4 (b) (ii) Explain how you tested a day's operation of the petrol pump.

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(3 marks)

Turn over ►



4 (c) (i) How did you test the accuracy of your solution's calculations for the total money taken each day?

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(2 marks)

4 (c) (ii) Give the page reference giving evidence of this test.

Page .....

(1 mark)

*(Write Q4(c)(ii) in the margin, in the correct place, on that page)*

10





5 This question relates to the DESIGN of the OUTPUT.

5 (a) (i) On which page of your documentation is there a screenshot showing the console in use?

Page ..... (1 mark)  
(Write Q5(a)(i) in the margin, in the correct place, on that page)

5 (a) (ii) Give **one** criterion that you considered for the console design. State how you have used it.

Criterion ..... (1 mark)

How .....  
..... (1 mark)

5 (b) (i) On which page of your documentation is there a screenshot showing the petrol pump display in use?

Page ..... (1 mark)  
(Write Q5(b)(i) in the margin, in the correct place, on that page)

5 (b) (ii) Give a **different** criterion that you considered for the design of the petrol pump display. State how you have used it.

Criterion ..... (1 mark)

How .....  
..... (1 mark)

Turn over for the next question

6

Turn over ►



6 This question relates to the ANALYSIS process.

Peter wants to extend his computerised petrol pump system. Explain **two** methods a systems analyst might use to investigate how his current system works and why this method would be appropriate.

Method 1 .....

Why appropriate? .....

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(3 marks)

Method 2 .....

Why appropriate? .....

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(3 marks)

6

7 This question relates to the HARDWARE for the computer system.

Apart from the computer, console and petrol pump, Peter will require other hardware. Suggest **one** other piece of hardware he will need and explain the reason for your choice.

Choice of hardware .....

Reason .....

.....

.....

(2 marks)

2



8 In this question, consider how you might EXTEND your solution.

8 (a) Peter has decided, following requests to buy diesel, he would like to offer both petrol and diesel.

Explain how you would modify your solution to manage sales of petrol and diesel from the same pump.

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(3 marks)

8 (b) Once your modifications are complete, give **two** items of documentation that you would need to update.

Item 1 .....

Item 2 .....

(2 marks)

**END OF QUESTIONS**

5

**Turn over** ►



This question paper has been based on the Practical Exercise – Peter’s Petrol Pumps – which was given in the 2008 specification. A copy of this exercise is given below for reference purposes only.

### AS Practical Exercise (CPT3) – Peter’s Petrol Pumps

#### Background

Petrol stations selling petrol usually show prices and amount of petrol dispensed on each petrol pump and also have a console in the office showing information about each sale from each petrol pump on the garage forecourt.

Each petrol pump shows how much petrol has been sold, the price per litre in pence to one decimal place and the total amount to pay. The console also displays this information for each pump.

Peter owns a small petrol station with **one** petrol pump. Every day Peter needs to know the number of litres of petrol that are sold and the total amount of money taken for the pump.

You have been asked to write a **PROGRAM** to simulate the display on the pump and on the console.

The system you are to develop is simplified and should not include details about taking money from the customers but just assume that the amount displayed is the amount of money received. Also you are **not** required to test for the customer’s petrol tank overflowing when the petrol is being dispensed.

#### Specification

1.

You have been asked to write a program to simulate the display of **one** petrol pump only and the console. The program needs to record the amount of petrol sold in tenths of a litre and the amount to be paid in pounds and pence every time the pump is used.

The display on the petrol pump uses seven segment LCDs (Liquid Crystal Displays). As part of your programming you will need to write and test a procedure to display a number as a seven segment figure. The console must also display the total amount of money taken but does not need to use an LCD.

XXX.XX Amount to Pay (£ p)

XX.X Litres

XXX.X Pence per litre

Note to teachers: if a candidate is unable to successfully write a procedure to simulate a seven segment LCD display, a simplified display could be programmed but the candidate may be unable to provide appropriate evidence to answer some questions set in the examination.



2. Peter at the console can:
- set and change the price per litre
  - zero the petrol dispensed (this will also automatically zero the amount paid)
  - view the total takings and total petrol sold
  - set the total takings and total petrol sold to zero at the beginning of each day.

3. The customer buying petrol can:
- remove nozzle from holster to indicate they are ready to buy petrol
  - squeeze the nozzle to put petrol in the tank
  - stop squeezing the nozzle to stop putting petrol in the tank
  - replace the nozzle to finish putting petrol in the tank.

Each of the above can be simulated by keystrokes or the use of a button or similar.

4. The petrol pump displays:
- the current price in pence per litre to 1 decimal place as a seven segment LCD
  - the amount of petrol dispensed at any time as a seven segment LCD showing the number of litres to one decimal place. This display remains after the petrol has been displayed until zeroed by Peter
  - the amount to pay at any time as seven segment LCDs showing the amount in pounds and pence. This display remains after the petrol has been dispensed until the number of litres of petrol dispensed has been zeroed by Peter.

The pump can dispense between 0.5 and 100 litres in tenths of a litre. The price per litre can be up to 199.9 pence per litre.

5. The console displays:
- the state of the pump:
    - ready for use (display set to zero customer can start putting petrol in tank)
    - in use
    - out of use (waiting for Peter to zero the display)
  - the amount of petrol being dispensed by the pump when it is in use, showing the number of litres to one decimal place. This display remains after the petrol has been dispensed until zeroed by Peter

**Turn over ►**



- the amount to pay when the pump is in use in pounds and pence. This display remains after the petrol has been dispensed until the number of litres of petrol dispensed has been zeroed by Peter.

When the nozzle is replaced in the holster the amount of petrol dispensed is added to the total amount, and the amount paid is added to the total amount paid. The pump is flagged as out of use until the number of litres dispensed is zeroed on the pump and the console, it is then set ready for use by the next customer.

### Testing 6.

Candidates will need to design and use test data, including boundary values, to test the following:

- the correct working of the seven segment LCDs on the petrol pump
- the correct working of the console display
- a day's operation of the petrol pump that includes at least **seven** customers buying petrol
- that the displays on the console and the LCDs on the petrol pump must match
- resetting the pump after each purchase
- setting the daily totals on the console to zero at the start of the day
- changing the price of a litre of petrol.

The console display and the LCDs for the pump can appear on the same screen for testing purposes.

### Requirements of the Practical Exercise

Candidates will need to design and implement an appropriate computing system and provide sufficient documentation to demonstrate the following practical skills.

- Design.
- Implement/Test.

The task may be undertaken by writing a program in a chosen high level language.

Candidates are expected to produce brief documentation including some or all of the following, as appropriate.

#### Design

- Definition of data storage requirements.
- User interface design for console and petrol pumps.



- Algorithms for:
  - pump operation
  - console operation
  - simulating the seven segment LCD display
  - production of daily totals.

**Implementation/Testing**

- Details of test plan with explanation, and evidence of testing having been carried out.
- Clearly set out and commented, where appropriate, program listing.

This documentation is to be brought to the examination and handed in with the candidate's answer script for Unit 3 (CPT3) at the end of the examination. A Cover Sheet, signed by the teacher and the candidate, authenticating the work of the candidate, must be attached to the documentation (see Appendix B of the specification).



**There are no questions printed on this page**

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ANSWER IN THE SPACES PROVIDED**

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