Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International Advanced Level

Tuesday 27 May 2025

Afternoon (Time: 2 hours)

Paper reference **WIT13/01**

Information Technology

International Advanced Level
UNIT 3

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- Calculators are **not** allowed.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Pearson

Answer ALL questions. Write your answers in the spaces provided.

1 A school uses a variety of information technology systems to carry out its work.

(a) The school collects and stores data about students and staff.

Maintaining strong data integrity allows the school to make informed decisions.

Users giving false, incorrect or inaccurate data causes weak data integrity.

Give **two other** causes of weak data integrity.

(2)

1 .....

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2 .....

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(b) The school stores data in a relational database.

(i) A data dictionary describes the fields in a database table.

Give **two** items a data dictionary holds about each field in a relational database.

(2)

1 .....

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2 .....

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(ii) A database management system (DBMS) can reduce data redundancy and maintain data integrity.

Give **two other** functions of a DBMS.

(2)

1 .....

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2 .....

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(c) The school has a management information system (MIS) to store, use and analyse data.

Complete the table, by adding **one** tick (✓) in **each** row to show what the MIS is being used for in each situation.

(2)

Situation	Record keeping	Decision making	Project management
Running a what-if scenario to find out the most cost-effective number of students per class			
Tracking the amount of photocopying paper used so it can be reordered just before running out			
Comparing the cost of paper textbooks to digital subscriptions			
Scheduling the annual electrical testing of the devices			

(d) The examinations officer at the school ensures that students, examination papers and staff are assigned free rooms at the correct date and time.

The awarding organisation:

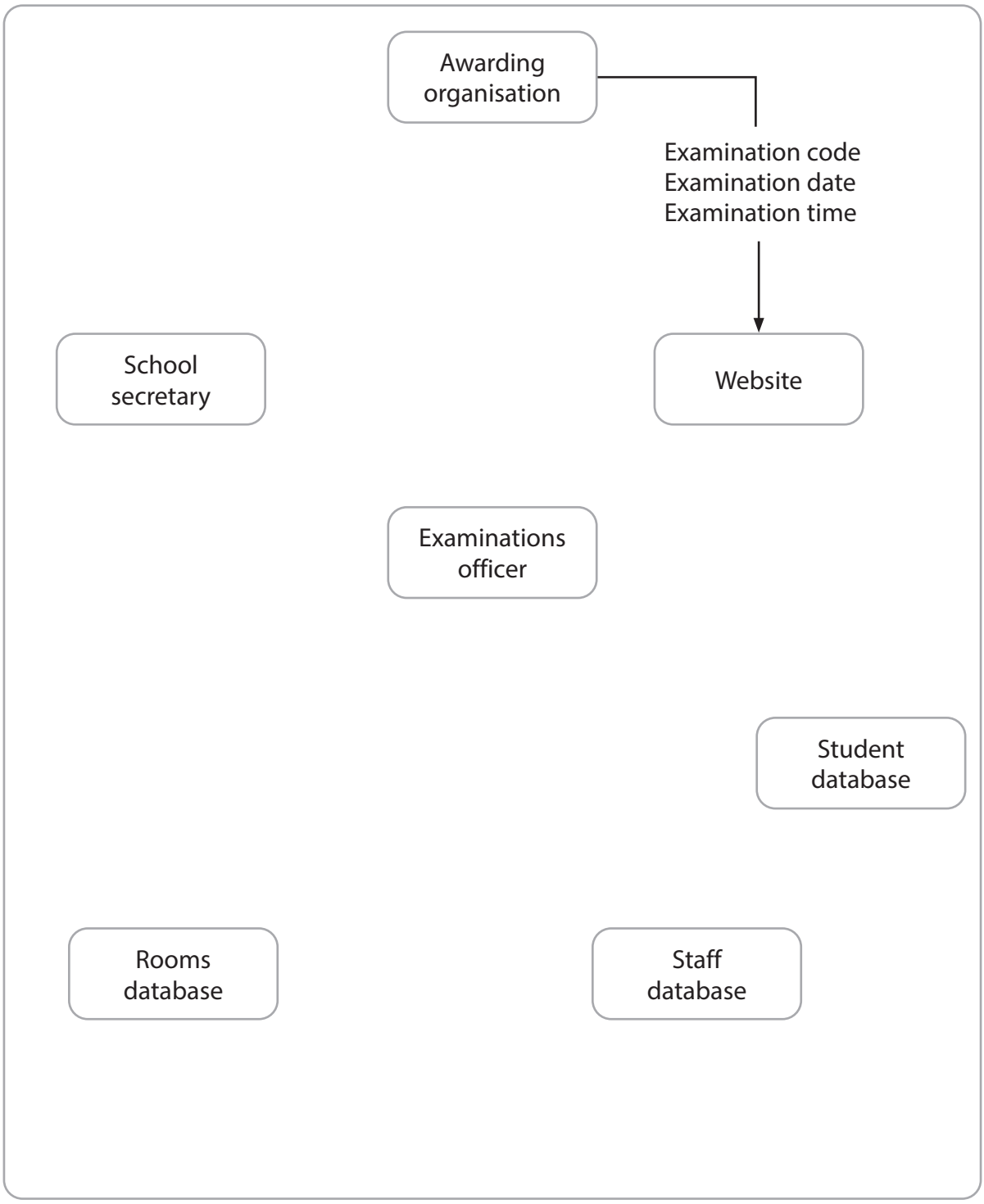
- publishes the code, date and time of each examination on a website
- sends examination papers to the school secretary.

The examinations officer:

- looks up the date and time of the examination on the website
- finds the numbers and names for all students taking the examination from the student database
- finds members of staff who are free at the examination time from the staff database so they can supervise the examination
- finds room numbers for free rooms on the examination date and at the examination time from the rooms database
- picks up the examination papers from the school secretary.

Complete the information flow diagram on the opposite page to describe the examination preparation process for a **single** examination.

(6)



(Total for Question 1 = 14 marks)

2 The Department for Transport collects and stores data about vehicles and the use of roads.

(a) The Department for Transport has a website where users find out about vehicles, by providing the vehicle registration number.

The website has passed tests for accessibility, so it is accessible for users.

Figure 1 shows one web page from the website.

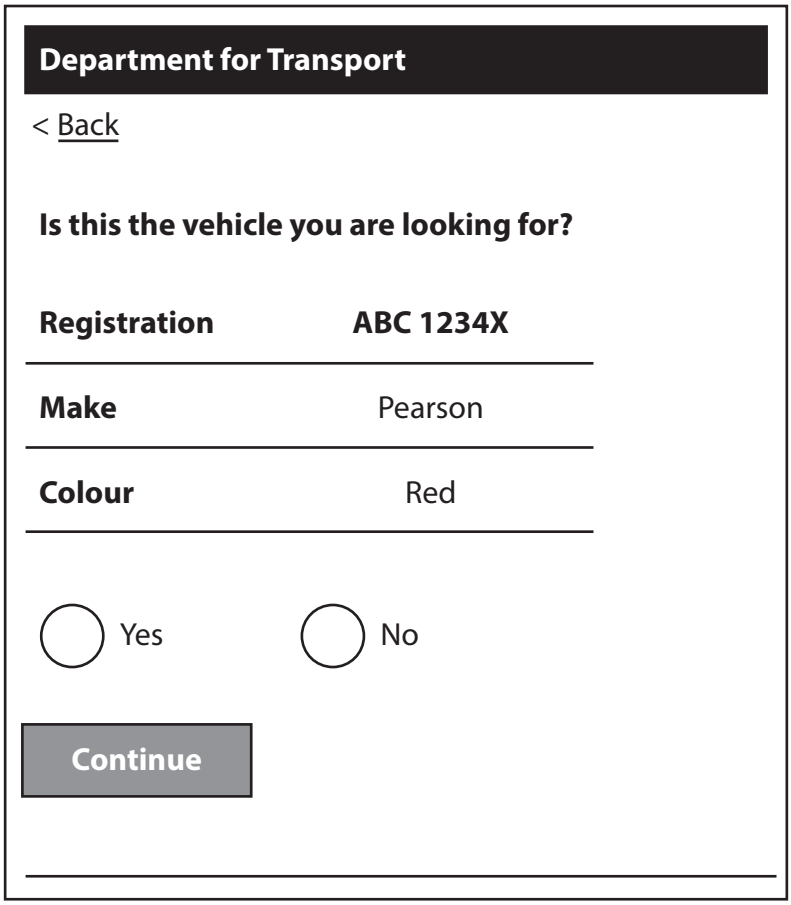


Figure 1

Explain **one** feature of the web page in **Figure 1** that makes it accessible.

(2)

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(b) **Value** is one of the issues associated with the collection of Big Data.

Complete the table to give the issue associated with **each** situation.

(4)

Situation	Big Data issue
The Department for Transport plans to collect more than 1024 tebibytes of data next year, so needs more cloud storage to store the data	
The Department for Transport collects data from traffic cameras, sensors in the road, the weather office and social media posts to predict traffic congestion	
The Department for Transport requires all vehicle owners to update their details using an online form once a year	
The Department for Transport collects real-time data from traffic cameras and sensors in the road for every vehicle entering and exiting motorways	

(c) Explain **one** way Big Data is used in fraud detection.

(2)

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(d) The Department for Transport has a fleet of vehicles.

Data about the vehicles needs to be loaded into a relational database.

Figure 2 shows part of the flat file of data.

AssetNum	Type	Lastname	EmpNum	StartDate (dd/mm/yyyy)	EndDate (dd/mm/yyyy)
DT009	Digger	Green	65936	11/10/2024	11/11/2024
AW671	Car	Brown	11147	24/08/2023	
PS133	Bus	White	71304	17/09/2024	24/09/2024
PS128	Van	Black	61085	13/09/2024	
DW653	Car	Gold	25526	28/10/2023	
DT045	Sweeper	Gray	50795	19/10/2022	19/11/2022
DT172	Dumper	Silver	74082	16/09/2022	16/10/2022
PS334	Van	Scarlett	49557	19/09/2023	19/12/2023
AW391	Van	Brown	48902	26/8/2024	26/10/2024

Figure 2

Some employees are loaned a vehicle to use in their job.

An employee is loaned one vehicle at a time.

Not every employee is loaned a vehicle.

Each vehicle has a unique asset number.

A vehicle is loaned to one employee at a time.

Not all vehicles have to be loaned.

Where the end date is blank, the employee is still loaned the vehicle.

Create a model for the data in third normal form.

Use single line, parenthetical notation. Do not draw a diagram.

Primary keys **must** be underlined.

Foreign keys **must** be indicated by an asterisk *****.

(6)

(Total for Question 2 = 14 marks)

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QUESTION 3 BEGINS ON THE NEXT PAGE.

3 A research centre studies marine mammals in the sea and in the centre.

These include whales, dolphins and porpoises.

Visitors come to the centre to see the marine mammals and to learn about the research.

(a) Image recognition and pattern recognition are both types of machine learning.

(i) Describe how image recognition identifies the species of a marine mammal photographed in the sea.

(2)

(ii) Explain **one** way researchers can use pattern recognition with data to study the behaviour of marine mammals.

(2)

(b) The researchers process Big Data datasets in the cloud.

Explain **one** benefit of processing data in the cloud.

(2)

(c) The research centre is developing an application for new interactive screens in the dolphin exhibit.

The application will have these resources:

- an audio commentary based on a text script
- images displayed on the screen.

The project manager has drawn up this task list for developing the application.

Task	Task description	Completed by	Notes
1	Application design handover meeting	5 July	5 July, 13:00, all team members
2	Write text script for commentary	7 July	
3	Select images to be used in application	11 July	Provide text script text to image librarian
4	Record commentary using text script	12 July	Needs text script Recording studio booked for 11 and 12 July
5	Create prototype application	12 July	Prototype can use boxes for images No commentary is required Needs five days, but can start two days early
6	Put images and commentary into prototype	15 July	Must start on 13 July
7	Test application using interactive screens	17 July	May overrun by 1 day

Create a Gantt chart in the grid on the opposite page for the tasks listed.

You should assume employees work seven days a week.

Your chart should indicate dependencies with directional arrows.

(6)

	July															
Task	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	X															
2		X	X													
3																
4																
5																
6																
7																

(Total for Question 3 = 12 marks)

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QUESTION 4 BEGINS ON THE NEXT PAGE.

4 A manufacturer of electric scooters has factories in several countries.

(a) The manufacturer has databases that are distributed across the factories.

Discuss the issues of failure, concurrency and performance of a distributed database system in the context of the factories.

(6)

(b) Each scooter factory uses robots and has a local area network (LAN).

Forklifts move pallets and crates around the factory.

Pallets hold raw materials and parts.

Crates hold partially completed scooters.

Engineers are designing a system to improve efficiency and ensure the safety of the workforce.

The system requires:

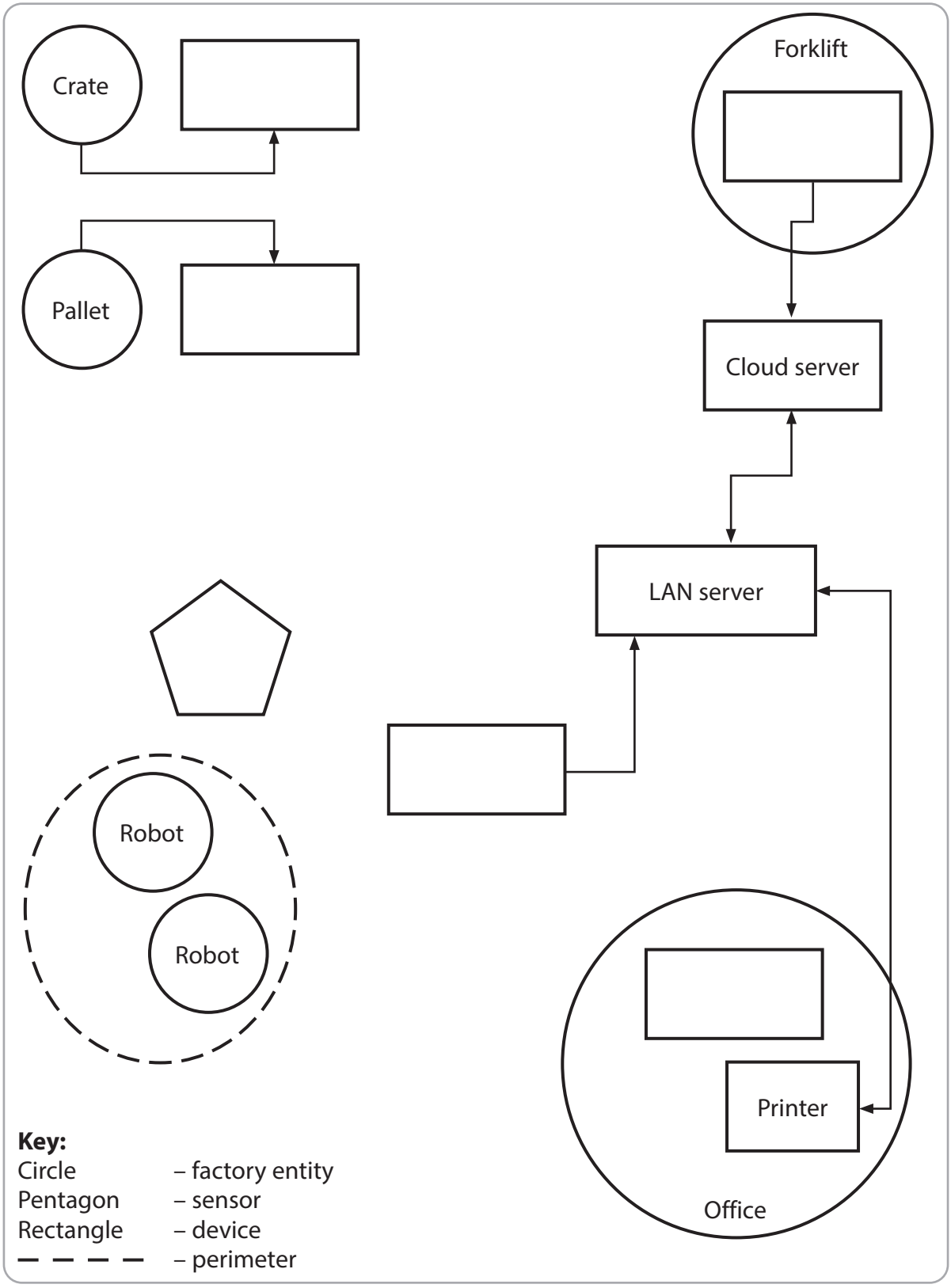
- forklifts equipped with GPS tracker devices that allow the location of each one to be known
- an application on the LAN server to update the location of the forklifts
- crates equipped with a radio frequency identification (RFID) tag
- RFID readers located on the assembly line
- each pallet to have a unique barcode
- barcode readers located throughout the factory
- each robot to have a cabled connection to the LAN
- programs for the robots to be downloaded from the LAN server and data from the robots to be uploaded to the LAN server
- a motion sensor placed at the perimeter around groups of robots
- all robots in a group to stop working when motion is detected inside the perimeter
- all data from the robots, forklifts, crates and pallets analysed in the office using spreadsheet software.

A partially completed high-level design for a system to meet the requirements is on the opposite page.

Complete the diagram by adding:

- six labels
- eight directional arrows.

(12)



(Total for Question 4 = 18 marks)

5 A university has computer rooms that students can use.

The number of computers varies from room to room.

An online application is required to help students find computers that are not being used.

The application will be developed by a group of final-year computer science students.

Evaluate the benefits and drawbacks of using an agile approach to develop the online application.

(12)

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(Total for Question 5 = 12 marks)

6 A new restaurant is opening.

Technicians are designing a transaction processing system for the restaurant.

No staff are involved with ordering and payment.

A unique quick response (QR) code identifies the table.

A customer reads the QR code with a smartphone and selects items using an online application.

Each order has a unique identification number.

Payment is made online by card.

When payment is successful:

- the restaurant income is updated
- the order is sent to the kitchen.

Staff deliver the completed order to the table.

Figure 3 shows the ordering and paying process.

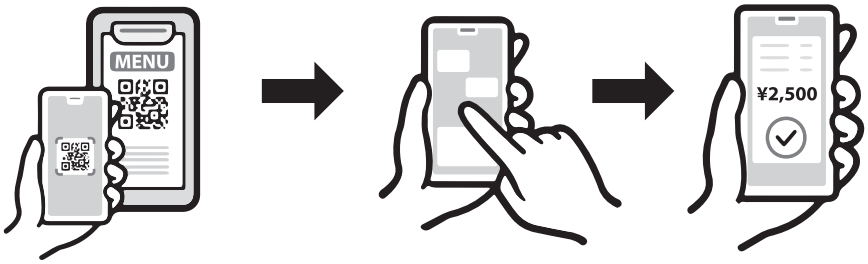


Figure 3

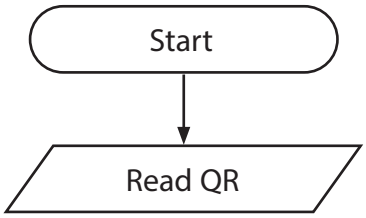
Figure 4 shows three tables in the database.

Database table	Contents
ORDER	• Order ID • Table code • Order items • Order total
KITCHEN	• Order ID
INCOME	• Transaction ID • Order ID

Figure 4

Draw a flowchart, in the space on the opposite page, to show how the ordering and payment system works.

You must include interaction with the three database tables.



(Total for Question 6 = 10 marks)

TOTAL FOR PAPER = 80 MARKS

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