2.2 Direct data entry and associated devices

- Describe direct data entry and associated devices, e.g. magnetic stripe readers, chip and PIN readers, Radio Frequency Identification (RFID) readers, Magnetic Ink Character Reader (MICR), Optical Mark Reader (OMR), Optical Character Reader (OCR), bar code reader
- Identify the advantages and disadvantages of any of the above devices in comparison with others

2.2 Direct data entry and associated devices

Magnetic Strip Readers are used to read data found on magnetic stripes found on the back of cards.

USE:	
Bank Cards: Contains Account details **Arcade:** Contains balance **Security/Hotel Rooms:** Allows entry to specific room. **Gift Cards (Vouchers) –** amount of vouchers	
Advantages:	**Disadvantages**
• Fast data entry compared to keyboard • Secure/Error Free – No Typing • Not effected by water and robust if dropped • Easily Updated	• Stripe could become unreadable - scratched • Does not work at a distance • Easily Lost/misplaced

2.2 Direct data entry and associated devices

Chip and Pin Readers are used POS terminals to make a secure payment using a debit or credit card.

USE:	
Users can make payment at shops, restaurants by simply inserting their **credit/debit card into the chip and pin reader** and typing in their **pin**.	
Advantages:	**Disadvantages**
• Secure method of payment compared to swipe and contactless method. • Chip is less likely to be damaged compared to a magnetic swipe.	• The pin could be read by some one watching or use of mirrors. • Fraudulent machines can copy card details.

2.2 Direct data entry and associated devices

Contactless Cards Readers are used by customers to pay for products at the POS without the need to enter a PIN Number using **RFID technology**. Transactions are normally restricted to a small amount (up to £20)

How it works
The payment terminal picks up a **signal from the chip** to process and **complete the transaction** when the card is **within a few centimetres distance**. 

Advantages:	Disadvantages
• Quicker Transaction meaning less time spent at POS. • Don't have to use PIN • Transaction data (account details) is encrypted.	• Less secure than chip and pin method. • Anyone could use card if lost. • It is easer for thieves to copy details of the card. • Only small payments can be made

2.2 Direct data entry and associated devices

Compare the use of Contactless and Chip and Pin cards at the POS terminal?

Key Words: Secure, PIN, Replicate details, limited payments, speed of transaction, Overseen

Exam Question

The Chip and Pin is a more secure method of payment as the user would be required to enter a 4 digit pin to proceed with the transaction. The advantage of using the contactless method of payment is that it reduces the time taken by retailers to deal with each customer which increases the speed of the transaction. This will help reduce the queuing time at the POS. However only small/limited payments can be made on the contactless method which would restrict your purchase limit. Also it is easier for thieves to copy/replicate details of the contactless card by using a scanner at a short distance. On the hand the PIN could be overseen by other people once it has been entered into chip and pin reader. In conclusion the contactless method maybe a suitable method of payments if the customer is only purchasing items within the limit of the card.

2.2 Direct data entry and associated devices

RFID

Radio Frequency Identification

RFID reads information stored on tags (small silicon chip that can be placed on a sticker) using radio waves. RFID tags can be attached to objects or animals/people.

USE:

- **Track movement** of animals (livestock) or people
- **Stock Control:** Scan stock items for quantity
- **Airports: Track Luggage** to make sure nothing is lost
- **Contactless cards** to make a payment

Advantages:	Disadvantages
• Can read objects from a distance. • Can read in bulk • Very fast reading – quick response • Allows read/write operations to take place • Can read biometric readings	• Radio symbols can be jammed or hacked. • More expensive than a barcode • Tags could interfere with each other.

2.2 Direct data entry and associated devices

RFID

Radio Frequency Identification

An automatic washing machine contains a device to read RFID chips sewn into clothing. When an item of clothing is placed in the washing machine it is scanned. Describe how the data is read from the RFID chip.

Exam Question

The washing machine sends out (interrogation waves) radio signal to read the data from the RFID. They act as a passive transponder.

Explain the benefits of using RFID technology in a washing machine.

The benefit of using RFID technology is that it stops material being incorrectly washed. Also it stops coloured items of clothing being in the wrong wash. In addition it stops clothing of different material being washed with others. Furthermore it allows the wash cycle to be set automatically. RFID technology will know the amount of water to use so less water will be wasted.

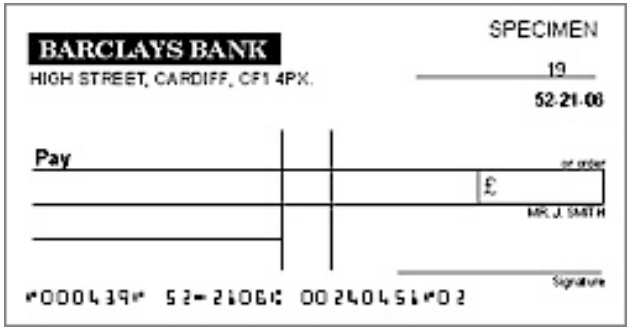
2.2 Direct data entry and associated devices

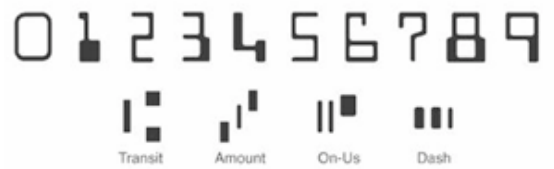
MICR

Magnetic Ink Character Reader

MICR is able to read characters printed in a special ink. These characters are then converted into a form which could be understood by the computer

USE:	
Used to **process bank cheques**. The characters at the bottom of cheque which are printed in a special ink are read by the **Magnetic Ink Character Reader.**	
Advantages:	**Disadvantages**
• No need to manually enter text – less chance of human error. • Characters can not be altered. • Characters can be read even if they have been written over.	• More expensive than using a keyboard to type manual data. • Limited amount of characters can be read.





2.2 Direct data entry and associated devices

MICR

Magnetic **I**nk **C**haracter **R**eader

Describe how MICR is used to read these details from the cheque.

Key Words: magnetic ink, magnet, signal, read, translated

Exam Question

The magnetic ink on the cheque passes over a magnet in the magnetic ink character Reader (MICR). The MICR then reads the magnetic signal given out by the magnetic ink characters on the cheque. Each character produces a unique signal which is read and translated by the MICR.

2.2 Direct data entry and associated devices

OMR

Optical Mark Reader

OMR is able to read marks written in pen or pencil. The position of the mark is stored in the computers memory.

USE:	
Used to scan in marks from **multiple choice exams, surveys,** and **lottery tickets.**	
Advantages:	**Disadvantages**
• Very fast method of inputting data as no user has to manually enter results. • More accurate than OCR • Less chance of errors	• Forms have to be completed correctly to avoid manual checks which would waste time.

OMR

Optical Mark Reader

A student exam answer sheet consists of boxes or lozenges which the student shades in to indicate their choice of answer. Describe the drawbacks of using Optical Mark Recognition

Exam Question

The drawbacks of using OMR are that if the marks don't fill the space completely or not in a dark enough pencil then they may not be read correctly. OMR is only suitable for recording one out of a selection of answers, not suitable for text input. Answer forms have to be prepared which may be expensive. The format of the question could be restricted to formats like multiple choice.

2.2 Direct data entry and associated devices

OCR

Optical Character Reader

OCR scans text from hardcopies and converts it into an editable form which can be used and edited in a range of software including word processors.

USE:	
Used in **Self-Immigration System** at Airports. Identity Cards Students **scanning text from books** which can be edited.	
Advantages:	**Disadvantages**
• Faster method of data entry compared to manually typing the data. • Less chance of errors.	• Not as accurate as the OMR reader • Unable to read handwriting.

2.2 Direct data entry and associated devices

Barcode Scanners are used to scan bar codes which contains unique information about a product including price.

USE:	
Barcode readers are typically used at **point-of-sale (POS)** in shops when customers are purchased goods.	
Advantages:	**Disadvantages**
• Far quicker and more accurate than typing in codes using a keypad. • Stock database can easily be updated with new prices – barcodes would not need to be replaced.	• Barcode could be unreadable or missing. • Barcode could be swapped. • Can be an expensive system.

2.2 Direct data entry and associated devices

Compare the use of MICR, OCR, OMR, Barcode scanner and a keyboard to enter data.

Exam Question

MICR (Magnetic Ink Character Reader) is used when processing cheques in a bank. The characters at the bottom of the check are written in a special ink. These characters are scanned by the MICR to identify the check to the account holder. OCR (optical character reader) is used to scan text into an editable form and is commonly used as immigration terminals to scan passports. Keyboards are used to enter data manually. However if a passport number had to be typed then it would take longer and perhaps there is also the chance of human error. OMR (Optical mark reader) is used when scanning in pencil marks on exam paper or school registers. However if pencil marks are not clear then again there is a chance of errors. Specialised equipment is required for OCR and OMR which could also be more expensive than a keyboard. A barcode scanner is used to scan items at the POS. The bar code is unique to each product and if the barcode scanner was not available then the code would have be typed manually again which would take more time and could lead to human error.

2.2 Direct data entry and associated devices

Recently mobile phones have been used to pay for goods in stores and supermarkets. One method of payment involves holding the phone close to a reader in the store. Discuss the advantages and disadvantages of this method of payment compared with other methods of credit/debit card transactions.

Exam Question

Mobile phones would be easier to use a method of payment because you would only be required to hold the phone next to the reader. As the credit card does not have to be physically present it cannot be stolen and will be less prone to damage as there is no need to swipe the card. In addition as there will be no need to remember a PIN code or use a signature. On the other hand a compatible phone would be required which could be expensive and stores would have to invest in new equipment. The mobile phone could run out of battery or there may be issues with signal and connectivity. In addition some users may not be familiar with using their phone as a payment option. Furthermore users will be restricted on how much can be paid. The phone signal may be intercepted by hackers or phones could be stolen and used as methods of payment with no authentication. Nevertheless many users now carry mobile phones and it doesn't matter if they forget their credit/debit cards. Consequently the credit/debit card number is not used in the transaction.