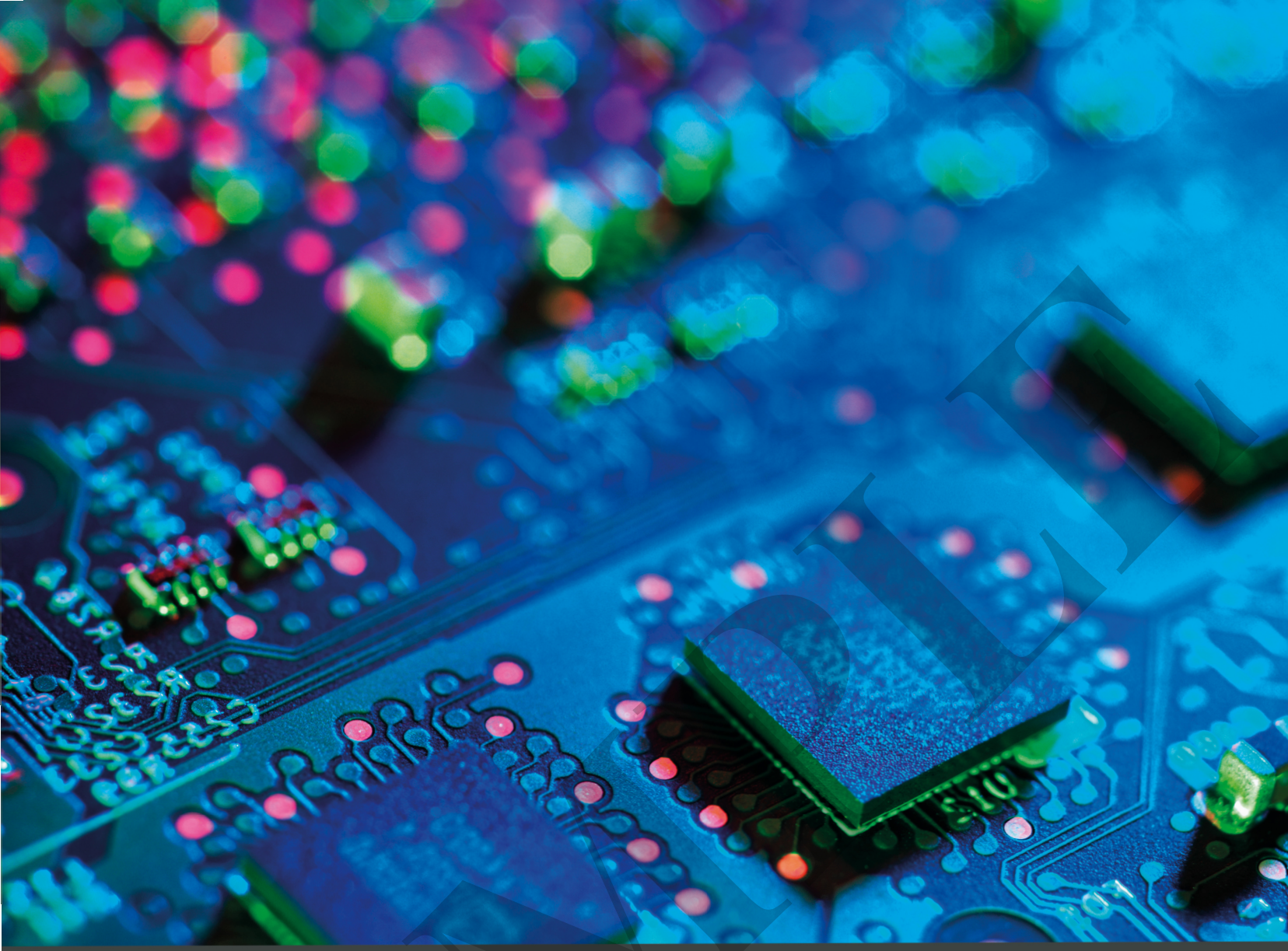

EDEXCEL INTERNATIONAL A LEVEL

INFORMATION TECHNOLOGY

TEACHER RESOURCES

Pearson

Topic 2: Networks

Specification links:
2: 2.1.1 to **2.3.2**

Resources:
- Worksheet 2
- Range of scenarios for components and network types
- Network components to show students
- Client-server and peer-to-peer students instructions

Learning objectives:
- Understand the purpose and function of a range of network devices
- Understand the function of a client-server and peer-to-peer networks
- Understand the purpose and functions of a range of protocols
- Understand the need to keep data and systems secure
- Understand how to keep data and systems secure

Success criteria:
Students should be able to:
- Describe the purpose and function of network devices
- Identify appropriate devices for a situation
- Explain the differences between a client-server and peer-to-peer networks
- Describe the role of protocols in a network
- Identify appropriate security measures for a network

Possible misconceptions and barriers:
- Students often confuse the purpose of MAC and IP addresses.
- Students often think an IP gives the location/address of a computer in the world, but it does not give a physical address, it only gives its location on the Internet.

Starter
Give students a list of network components. Ask them to write down, or guess if they don't know, what each component does.

Discussion – starter
Work through each component and ask students what they think it does. Correct any misconceptions, fill in the information about any component that no one knows and give more detail on the functionality of the other components. Show students examples of the components if you have them.

Task – devices
Ask students to create a glossary of network components and their purpose and function.

Task – devices
Give students a series of network images and ask them to identify the components that are used. Extend this by giving students a description of a network and ask them to draw the network with all of its components labelled.

Activity – devices
Ask the school network manager (or equivalent, or a network manager from another organisation) to describe the school/organisation network. Ask them to show the students the individual components,

how they connect and why they use those devices in that location.

Activity – types of network
Set students up to act as a client-server network. Give them a document that describes their roles, i.e. the actions they can complete. The student acting as the server should be able to perform actions, while the clients can only request data and receive data. Give students a series of actions to perform. Repeat this with a peer-to-peer network where all computers can perform their own actions.

Discussion – types of network
Ask students to describe the client-server and peer-to-peer network based on the activity. Question students to identify the benefits and drawbacks of each.

Activity – types of network
Put students into groups and give each group a scenario. The group should decide whether a client-server or peer-to-peer would be most appropriate for their scenario. Ask them to justify their choice. Ask students to present their scenarios and justification.

Activity – protocols
Put students into pairs. Tell them that they need to send each other a message and ask them to send the message without speaking.
Tell students that this is the equivalent of two computers communicating, except they can only send current. Ask students to represent the current with two cards, black and white (black for on, white for off) and now send a message to each other.

Discussion – protocols
Ask students what they learnt from the activity. Were there any problems? Did they know who was sending a message, when, when it started, when it stopped, etc. Tell students that these are the equivalent of protocols. The computers need to decide what language to use, when to start, stop, etc. Introduce different protocols and their purpose.

Discussion – protocols
Show students the characteristics of IPv4 and IPv6. Show students how a URL is converted to an IP – and how you can ping a URL using command prompt (or equivalent) to see its IP.
Explain the need for both dynamic and static IPs.

Activity – security
Give students a list of threats to a network and ask them how they could prevent these threats.

Discussion – security
Ask students for their answers. For each answer, ask students to define the method and describe what it does – if they don't know, fill in the missing knowledge for them. Afterwards, provide any missing methods of securing the network.

Task – security
Ask students to write a document to the school's network manager telling them what they can do to secure the school network and how each method will help.

Plenary
Give students a scenario and ask them to identify the network type, components and security measures that should be used.

Differentiation

Lower-ability students:

- Use images and videos to demonstrate the functions of networks.
- Act out activities performed by devices, so students can experience the actions.

Higher-ability students:

- Ensure students are fully justifying their decision, e.g. why that specific component is used in that situation.
- Ask students to find a range of other protocols that are used online, e.g. email standards.
- Ask students to find out about the layers within TCP/IP and how these work.

Homework

Ask students to complete Worksheet 2. Discuss their answers to Task 2 in the next lesson.

Worksheet 2

Topic 2: Networks

1. Complete the glossary, giving a definition for each of the network terms.

Term	Definition
Client-server network	
Peer-to-peer network	
Ad hoc network	
Tether	
Wireless	
ZigBee®	
Bluetooth®	
Cellular	
Infrared	
Ethernet	
Switch	
Bridge	
Gateway	
Router	
Modem	
Repeater	
Server	
Network interface card	
Wireless access point	
Hub	

2. For each of the scenarios, suggest appropriate security measures to keep the network and data secure.

a) A student has a home laptop and keeps their data on a memory stick to transport it from school to home.

b) A school stores data about its students and staff, and their schoolwork.

c) A multinational organisation stores data about its clients, products and sales.

Topic 19: Database solutions

Specification links:
19: 19.1.1 to **19.4.2**

Resources:

- Example database and features to add to it
- Files to import data from
- Worksheet 19

Learning objectives:

- Understand the need to import and export data into and from other file formats
- Understand the purpose of queries
- Understand the use of macros
- Understand the range of techniques that can be used to create an effective user interface
- Understand the need for testing a system

Success criteria:

Students should be able to:

- Import data from a file into a database
- Export data from a database into a file
- Create a query
- Create a range of macros that perform a variety of tasks
- Add a range of features to the user interface
- Test a database to prove it is functional
- Evaluate a database suggesting points for improvement

Possible misconceptions and barriers:

- Students often test databases superficially. They need to make sure that this is done thoroughly, and they can be encouraged to try and break the systems through testing.

Starter – finding information

Give students a scenario about a company/organisation and its database. Ask them to identify the information that they want to obtain from the database.

Discussion – queries

Ask students for their answers to the information. Discuss what they learnt about SQL queries in Unit 1, Topic 5. Show students how to create queries in the DBMS.

Activity – queries

Give students a database (or use the database created in Topic 18), and give them a list of information that they need to retrieve. Ask students to create the queries to find the required information.

Discussion – importing data

Show students a text/csv file with a large amount of data within it. Ask them how they could put this data into a database (e.g. typing) and the problems associated with it.

Show students how to import data into a database.

Activity – importing data

Provide students with a range of different files for a pre-made database and ask them to import the data into the database.

Demonstration – exporting data

Show students how to export data into a variety of formats. Discuss the need for exporting data and the benefits it brings, e.g. over copying and pasting.

Activity – exporting data

Give students a variety of requirements for exported data and ask them to produce these files.

Activity – conditional response

Give students a range of tasks that involve using 'if' statements, e.g. if they are 18 years old then jump up and down. Show a range of 'if' statements increasing in complexity.

Demonstration – macros

Explain the purpose of a macro and show students how to create one. Discuss the range of macros that can be added to a database and how these can be used. Show a range of macros and how they can be linked to buttons and events.

Activity – macros

Give students a pre-existing database and a set of macros that they need to create.

Activity – appropriate use of techniques

Ask students to either create a new database to a specification or open a pre-existing database. Ask students to load their database and then move to another student's. They need to write one positive feature and one area to improve on a piece of paper for each other person's database. There can be a specific focus, e.g. user interface, functionality, or it can be generic.

Activity – techniques

Give each student one tool or technique. Ask them to create an A5 crib sheet to describe the technique and its use. Collate the sheets and give each student a copy so they have a quick reference guide for all the relational database tools and techniques they need.

Discussion – testing

Ask students why testing is important and what should be tested within a database. Show students how to create a test table, and how to complete it for the different aspects within a

database.

Activity – testing

Ask students to test a database they have created – this could be one they have fully created or one they have edited. Then get them to test each other's databases for ease of use and to compare it to its original requirements or objectives.

Ask students to review their database after testing by themselves and others.

Activity – presentation

Ask students to present their database to the class, describing the key features and explaining how they could improve it further. Ask other students to comment on the database, identifying benefits and possible improvements.

Plenary

Ask students to create a list of the different features available in a database, and to write the purpose of each beside it. Collate the answers on the board.

Differentiation

Lower-ability students:

- There are a large number of tools that students need to learn how to use, and students may need reminders of how to do past tasks, e.g. crib sheets.

Higher-ability students:

- Ask students to investigate additional macros and features that they can introduce into their database.
- Ensure students are thoroughly testing all aspects of the database with a range of test data.
- Ask students to justify the enhancements and improvements identified.

Homework

Ask students to complete the tasks on Worksheet 19. They will need the database they completed for Worksheet 18 and will add further features to this.

Worksheet 19

Topic 19: Database solutions

You will need your database from the Topic 18 worksheet to complete these tasks.

1. Create forms as appropriate to allow users to enter data. You need at least the following:

- enter a new customer
- enter a new order
- enter new stock.

2. Add features to your forms to improve the interface, e.g. action buttons, drop-down boxes.

3. An order can only be made if there are enough items in stock. Add functionality to your form to check that there are sufficient items in stock before allowing an order.

4. When an order has been made, the number of items in stock needs to be decreased. Add functionality to your form to decrease the number of items in stock when they are ordered.

5. When more items of stock come in, the name of the item and the quantity that has been delivered are entered. This quantity needs to be added to the amount currently in stock. Create a form to update the stock quantity.

6. Create a range of queries to produce meaningful data for the owner of the company, for example:

- all orders created on one date
- all orders for one customer
- customers who have a loyalty card.

7. Convert your queries into appropriate reports.

8. Create a menu, or dashboard, to allow the owner to choose what they would like to do in the database.

9. Test your database is fully functional. Create a test table and prove that all aspects of your database work.

10. Evaluate your database. Suggest **three** improvements that you could make to your database.

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Information Technology

International Advanced Level

Unit 1, Summative Test 1

1. What is an embedded system?

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2. Give **three** examples of embedded systems.

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3. Convert the binary number 10011101 into denary.

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4. What is the difference between a single-user and institutional software licence?

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5. What are the disadvantages of transmitting data using infrared?

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6. Which protocol will be used to transmit a video conference?

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7. Name **two** wireless network transmission media.

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8. Network efficiency can be measured in many ways. Describe each of these ways:

(a) Throughput

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(b) Latency

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(c) Error rate

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9. Why does a website need a static IP?

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10. How can a MAC address be used to increase the security of a network?

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11. How does encryption protect your data?

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12. What is the difference between client-side and server-side scripting?

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13. How can an advertiser make use of people's digital footprints?

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14. What is an IT system made up of?

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15. Draw the main shapes used in a flow chart and label their purpose.

16. Give **one** example of data and **one** example of information.

Data:

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Information:

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17. What is the relationship between fields, records and tables in a database?

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18. Give an example of a many-to-many database relationship.

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19. A database has the following table, Book:

BookID	Title	Author	Cost ($)	NumberInstock
123754	Diving for beginners	Frank Freddie	12.99	2
847372	Gardening green fingers	Sally Storm	10.50	1
008475	Skydiving	Benny Bird	5.00	5

Write an SQL query to show the titles of all books over $10.00

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20. Why is it important to act ethically?

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