Online Searchers and Surfers: How the Internet Works

National Curriculum

Understand computer networks, including the Internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration.

Aim

To understand how the Internet works.

Lesson Duration

It is estimated that this lesson will take approximately 60 minutes.

60 mins

Success Criteria

I can explain how data is transferred from one point to another when using the Internet.
I can understand what packets of data are.
I can explain what an IP address is.
I can explain what routers are and their function.

Key Vocabulary

Internet Protocol address (IP address), packets of data, fibre-optic, packet switching, protocols, routers, submarine cables, web page, website.

Resources

Lesson Pack

PC devices, such as laptops, Chromebooks and/or tablets

String, tape or chalk
Pencils and colouring pencils
Scissors
Plain A4 paper

Preparation

Differentiated Submarine Cable Map Activity Sheet - one per child
Differentiated Packet Switching Activity Sheet- one per child

It would be beneficial to access the following website before the lesson begins:

Prior Learning: In the previous lesson, the children will have learnt about what the Internet is and how it travels from the home, to a web server across the world and back home again. They should understand the differences between the Internet and the World Wide Web, as well as knowing which devices connect the Internet and what we use it for.

Learning Sequence

Remember It: Using the Lesson Presentation, display the questions and give the children time to think about the answers. Ask children to offer their definitions and explanations from what was learnt in the previous lesson.

Submarine Cable Map: Using the Lesson Presentation, demonstrate how to navigate around the Submarine Cable Map website. Model how to access this using this link _____

Exploring Submarine Cable Map: Using the differentiated Submarine Cable Map Activity Sheets, children should use the website to search and fill in the missing information.

★ Children will complete the table. They will need to access the submarine cable map website and use the search bar to type in the cable names provided, noting who it is owned by and using a coloured pencil to identify which coloured cable it is.

★★ Children will complete the table, extending the skills by expecting the children to use the zoom tool, find the UK and the connecting country provided. They should be able to identify the cable which connects these two countries, hovering over the cable and noting its name down on the sheet.

★★★ Children will complete the table with submarine cables to find using the search bar. There is space for the children to then find some of their own cables, being mindful that some cables have more than one owner and share their colour with other cables around the world. They will then have the opportunity to use the zoom tool and find different countries, identifying which cables connect them together. There is an additional cable to find on this sheet.

IP Addresses: Using the **Lesson Presentation**, explain to the children what the term IP address (Internet Protocol address) means.

How Are Packets of Data Sent?: Using the **Lesson Presentation**, explain what happens when a search request is made.

Changing Routes: Using the **Lesson Presentation,** discuss with the children what happens when packets of data get sent from the computing device via different routes.

Let's Represent How the Data Travels: For this activity, the children can role-play how data packets travel from a computing device to a web server. It is suggested that the class be split into two large groups or large groups suited to the class size. Using one piece of A4 plain paper per group, cut this into pieces and label each piece with a letter: A, B, C, D, etc. This represents how the image being requested started as a large piece of paper, cut down into smaller, more manageable pieces to pass along the network. Each child will pick up a small piece of paper with a letter on it and move their way via a route to the web server. They may choose different routes, arrive at different times and in any order. When at the web server, they must rearrange and stand in the correct order. To establish a route between the computing device and web server, children could use tape, string or chalk. You could use items to represent routers, such as pencils, bean bags or chairs. This will allow them to see how they can travel along a route effectively. **Can the children explain what an IP address is?**

Packet Switching: Using the **Lesson Presentation**, demonstrate how data packets can travel along different routes from one point to another. Highlight the blockage and how to overcome this. **Can the children explain what a router is and what its job is?**

Packet Routes: Using the differentiated **Packet Switching Activity Sheets,** the children will have the opportunity to look at the many different routes that packets of data can take from one server to another.

The children will use the diagram to answer questions, asking the children to find the quickest and slowest routes from point A to H.

The children will use the diagram to answer the questions, asking them to find the quickest and slowest routes. They will also be asked to find alternative routes.

The children will use the diagram, to answer the questions asking them to find the quickest and slowest routes. They will also be asked to find alternative routes and routes avoiding particular routers.

Exploreit

Debugit: Create a diagram like the ones from the Think of some questions, asking about the quickest or slowest routes between two points. Then, show the quickest route from A to K which is deliberately incorrect. Ask somebody to check this and write down the correct route instead.

Findit: Children can find more submarine cables that connect around the world using the They can take this a step further by creating questions for their friends, asking them to find cables that connect to other countries, finding more owners of cables and identifying cable colours. Some cables share the same colour, so children need to be mindful of this when completing this task.

Routeit: Children require access t where they can play the _ . The children will have the opportunity to identify the shortest and longest routes for packets of data to travel from one point to another.

Assessment Notes:

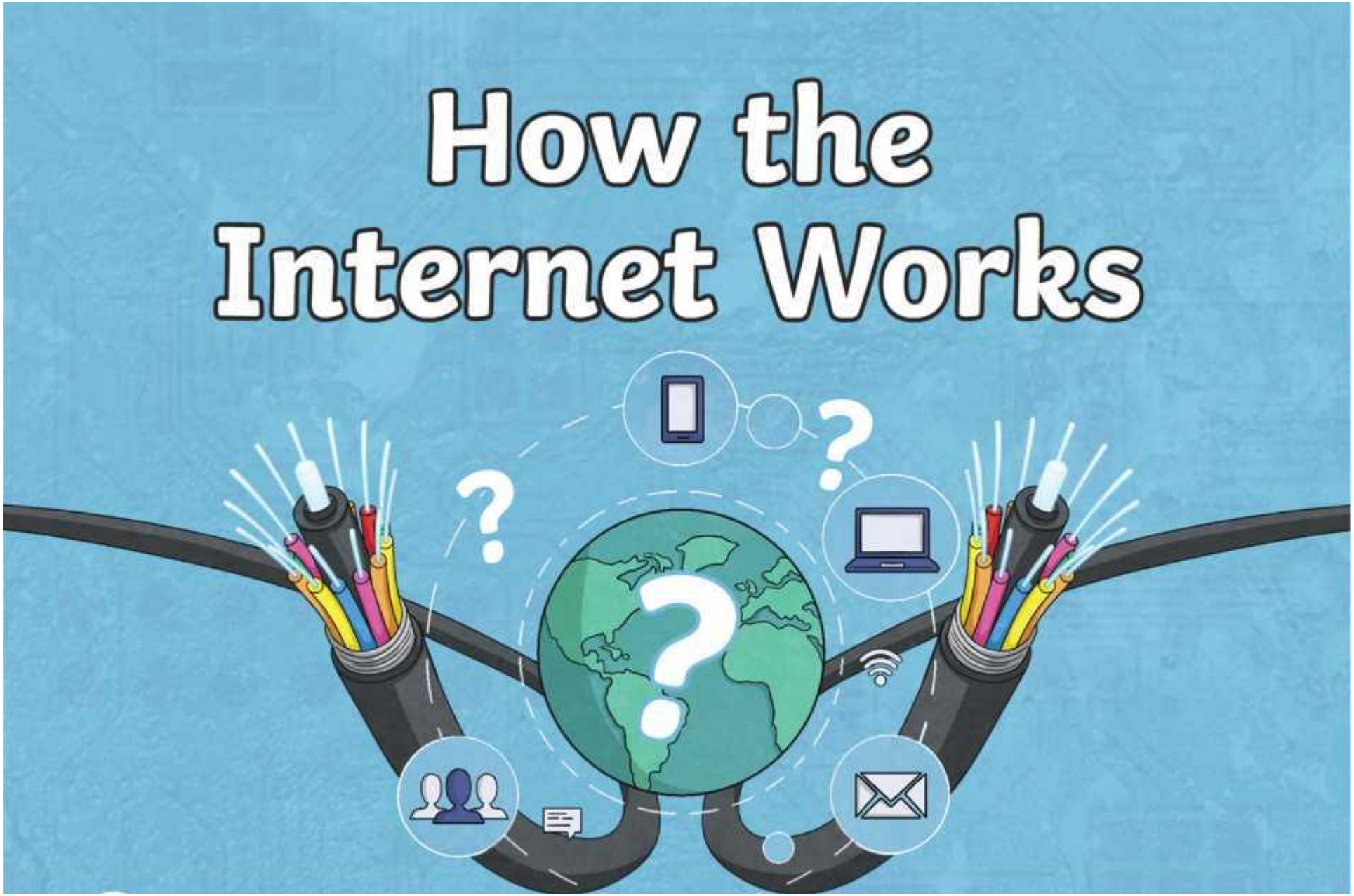
Disclaimers

This resource contains links to external websites and/or external apps. Please be aware that the inclusion of any link in this resource should not be taken as an endorsement of any kind by Twinkl of the linked website and/or app, or any association with its operators. You should also be aware that we have no control over the availability of the linked pages and/or apps. If the link is not working, please let us know by contacting TwinklCares and we will try to fix it although we can assume no responsibility if this is the case. We are not responsible for the content of external sites and/or external apps.

We hope you find the information on our website and resources useful. This resource refers to the use of scissors. You are responsible for the safe use of these resources including following any manufacturer's instructions or guidance. We are not responsible for the health and safety of your group or environment and so, insofar as it is possible under the law, we cannot accept liability for any loss suffered by anyone due to the use of this resource. Activities listed within the resource (including, but not limited to, using sharp items such as scissors or other tools) should always be supervised by an appropriate adult. By using this resource, you acknowledge that it is the responsibility of supervising adults to ensure the safety of children in their care and that we will accept no liability as a result of the activity.

Computing

Online Searchers and Surfers


How the
Internet Works

Question Marks

This is Quizby.

He is a question mark who loves to ask questions.

When you see a question mark icon like this in the **Lesson Presentation**, it can be clicked on to reveal one of Quizby's questions.

The questions that appear next to these question marks will help you to think about the key learning throughout the lesson.

Aim

- To understand how the Internet works.

Success Criteria

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- I can understand what packets of data are.
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- I can explain what routers are and their function.

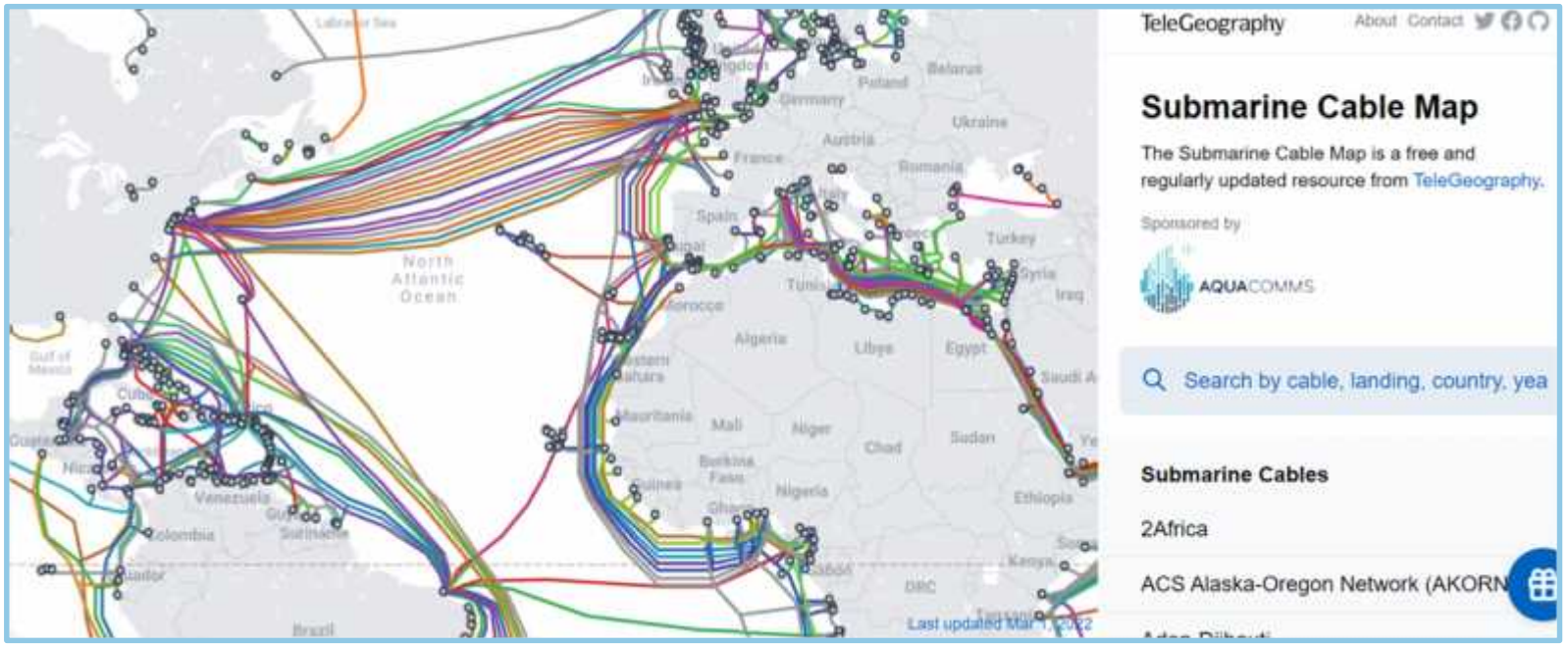
Remember It

Let's see what you remember from the last lesson.

1. What is the Internet?
2. What is the World Wide Web?
3. Who was involved in the creation of the Internet?
4. Can you identify the different connection types?
   Hint: There are three.

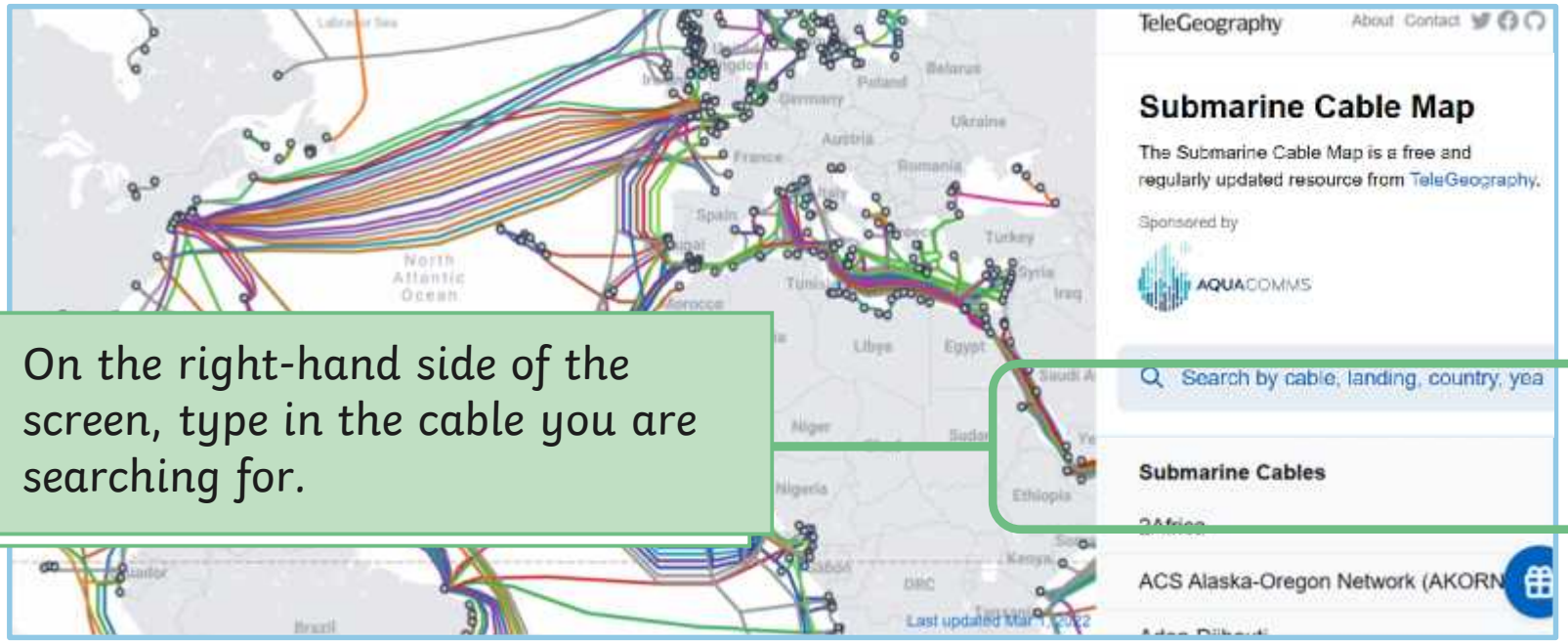
The Submarine Cable Map

The Submarine Cable Map by TeleGeography shows where all of the submarine cables connect around the world. These cables are fibre-optic cables which use light to increase speed and are installed on the ocean bed.



The Submarine Cable Map

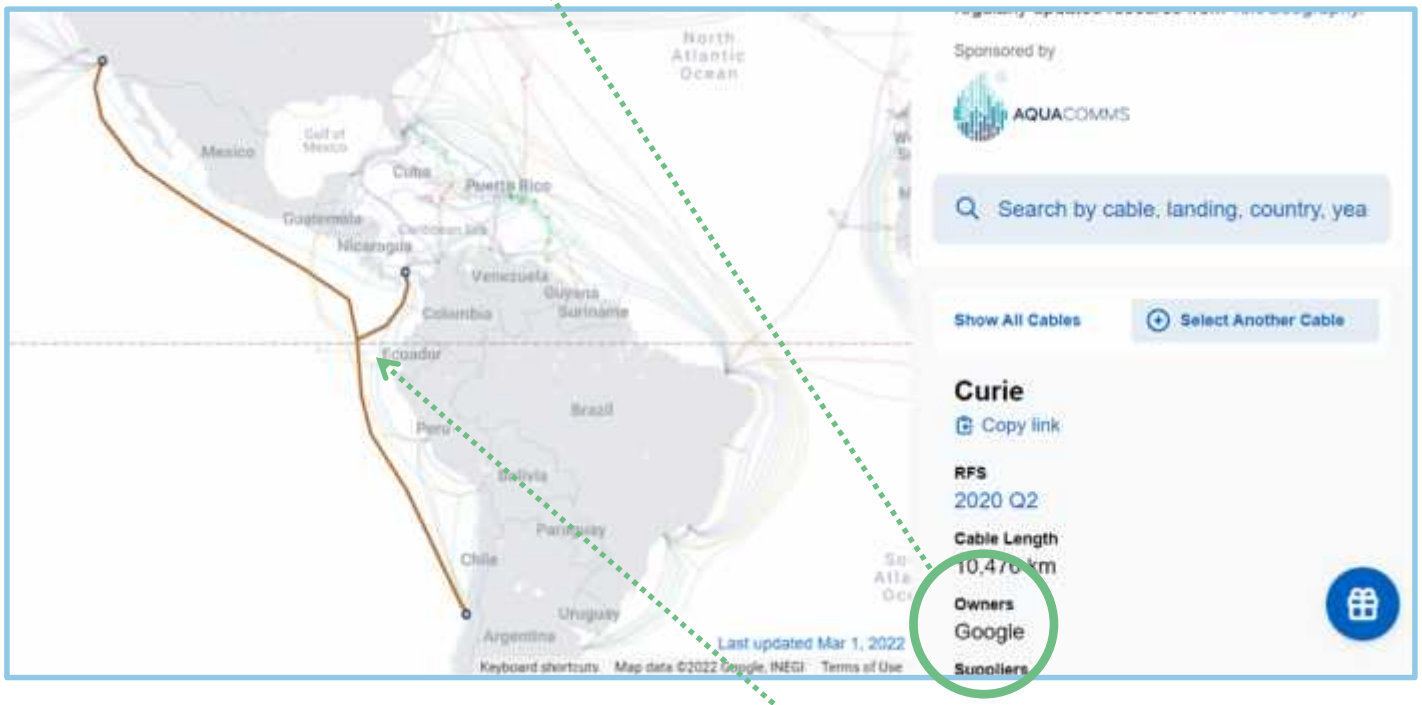
Let's have a look closer at how you can search for a cable.



On the right-hand side of the screen, type in the cable you are searching for.

The Submarine Cable Map

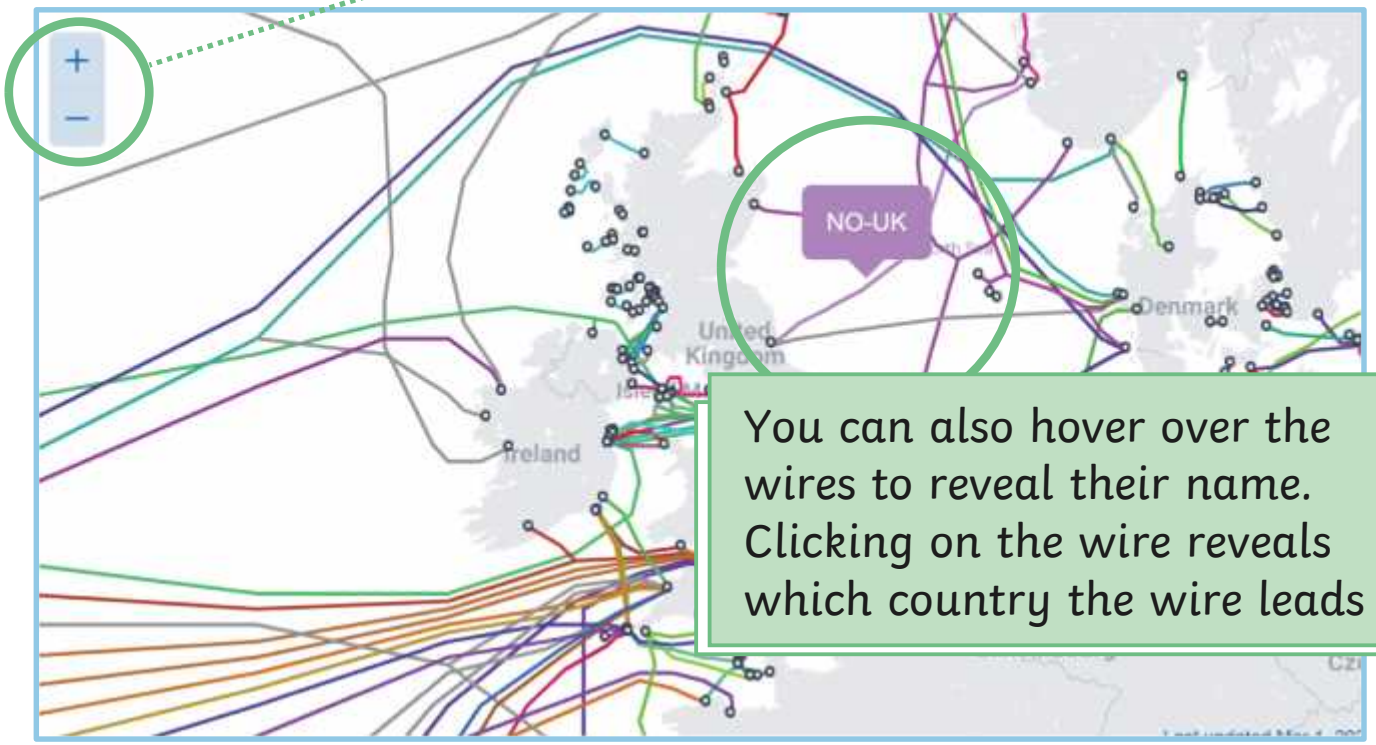
After you have typed in the cable name and clicked 'search', look here to see the owner.



The coloured wire will be displayed here.

The Submarine Cable Map

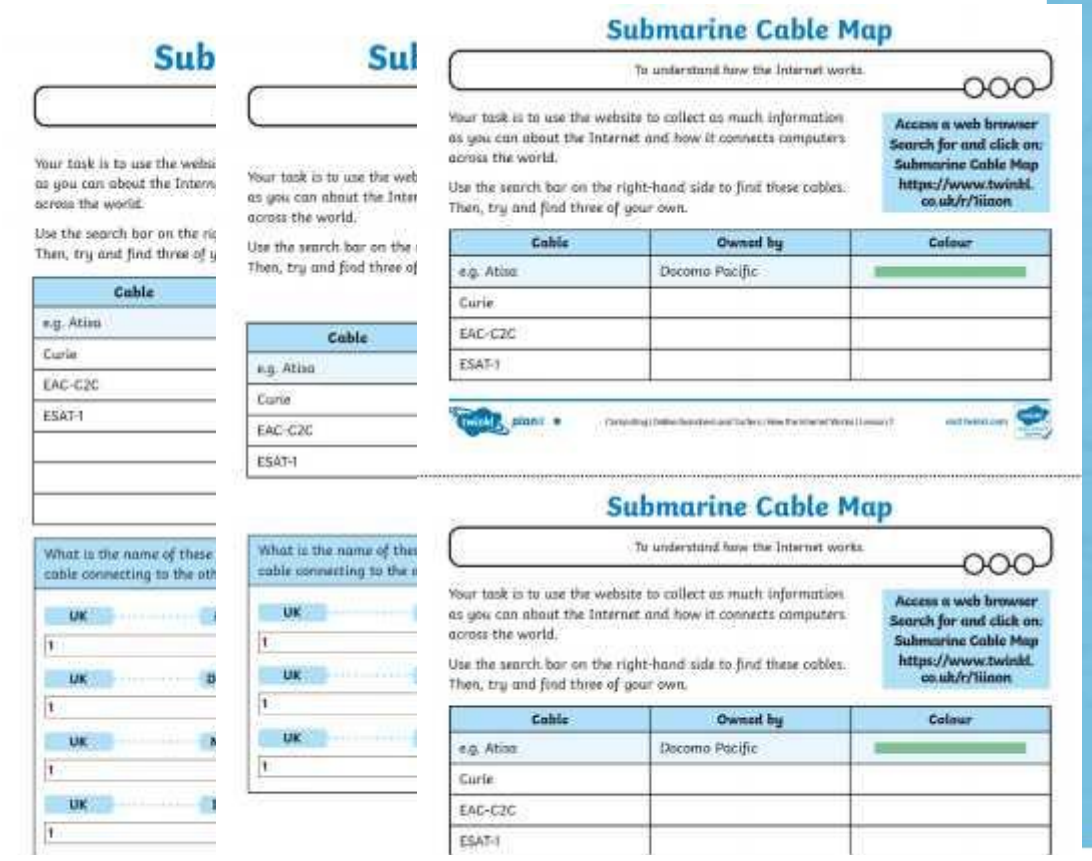
When looking on the map, you click on the + and – buttons to zoom in and out on the map.



You can also hover over the wires to reveal their name. Clicking on the wire reveals which country the wire leads to.

Exploring the Submarine Cable Map

It's your turn to have a go and explore. Identify different cables that connect the UK to other nearby countries. Remember to use the zoom tool to zoom in and out.



Submarine Cable Map

To understand how the Internet works

Your task is to use the website to collect as much information as you can about the Internet and how it connects computers across the world.

Use the search bar on the right-hand side to find these cables. Then, try and find three of your own.

Access a web browser
Search for and click on: Submarine Cable Map
https://www.twinkl.co.uk/r/1iinon

Cable	Owned by	Colour
e.g. Atisa	Docomo Pacific	
Curie		
EAC-C2C		
ESAT-1		

Submarine Cable Map

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Your task is to use the website to collect as much information as you can about the Internet and how it connects computers across the world.

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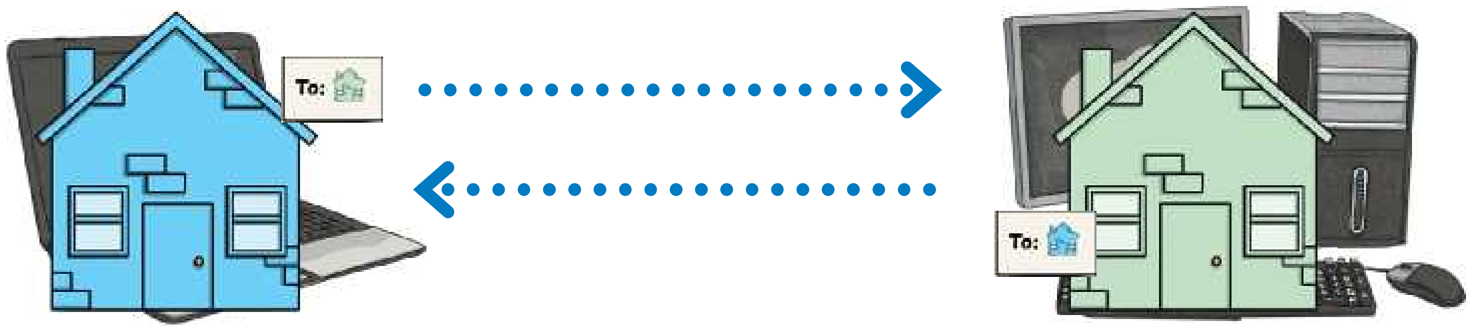
Cable	Owned by	Colour
e.g. Atisa	Docomo Pacific	
Curie		
EAC-C2C		
ESAT-1		

IP Addresses

We have looked at how the Internet travels around the world. Now we will look at what happens when you search for something online, such as an image or video online, using a computing device.



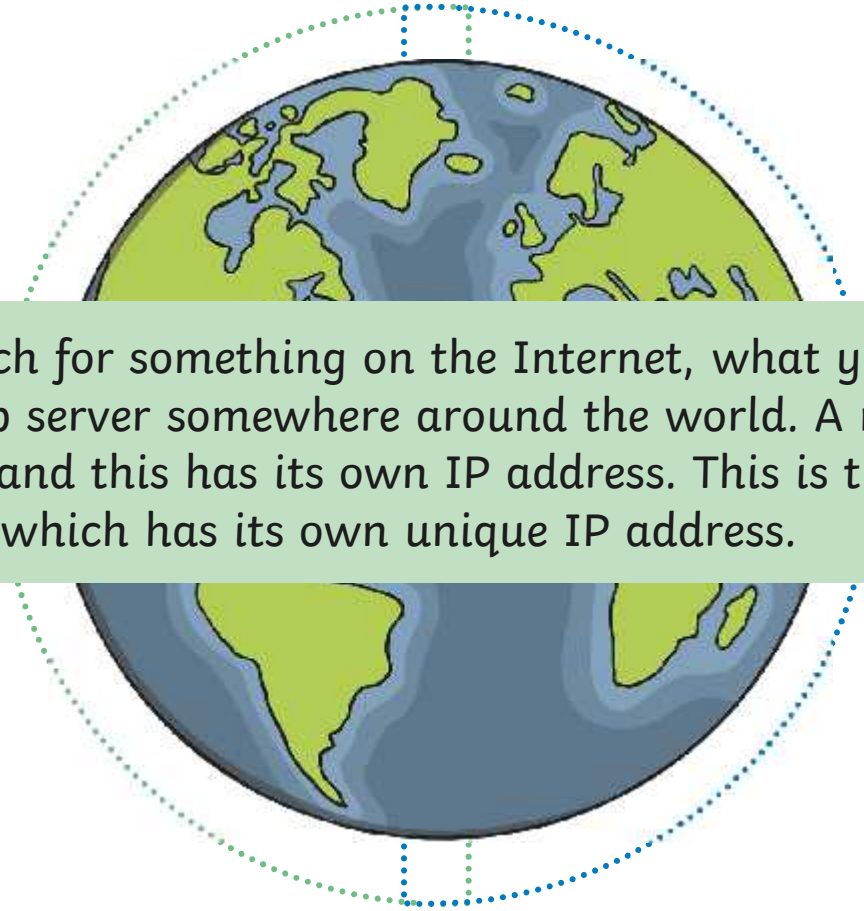
IP address: 192.159.3.44

IP address: 223.142.234.84

Each computing device that connects to the Internet has something called an **Internet Protocol address (IP address)**.

Think of this like sending a letter to somebody's home address and them replying to your home address. Both of these addresses are different.

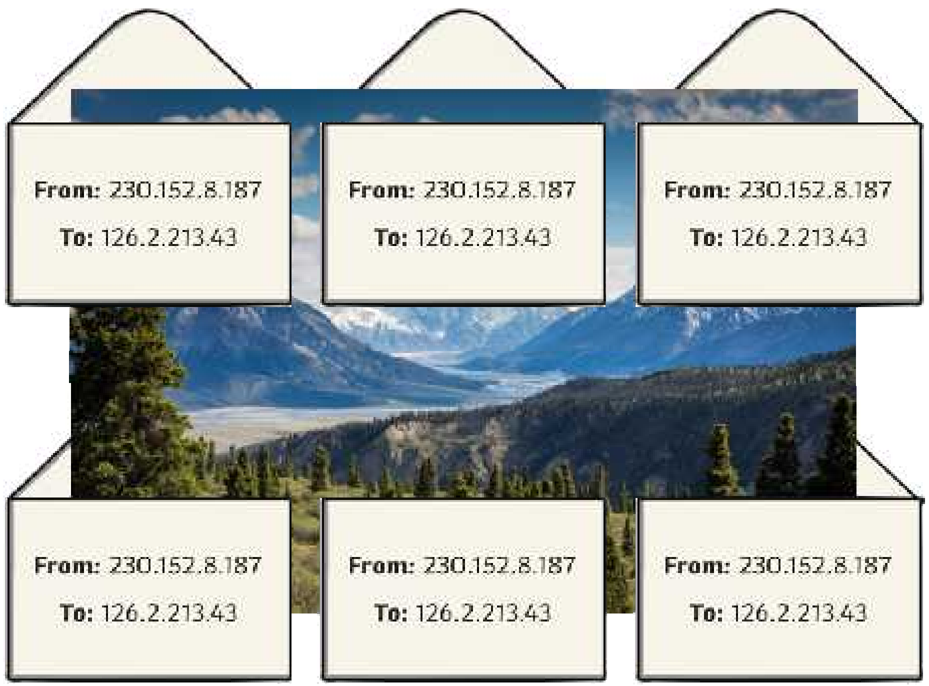
IP Addresses



When you search for something on the Internet, what you ask for is stored on a web server somewhere around the world. A request is made to the web server and this has its own IP address. This is then sent back to your computer which has its own unique IP address.

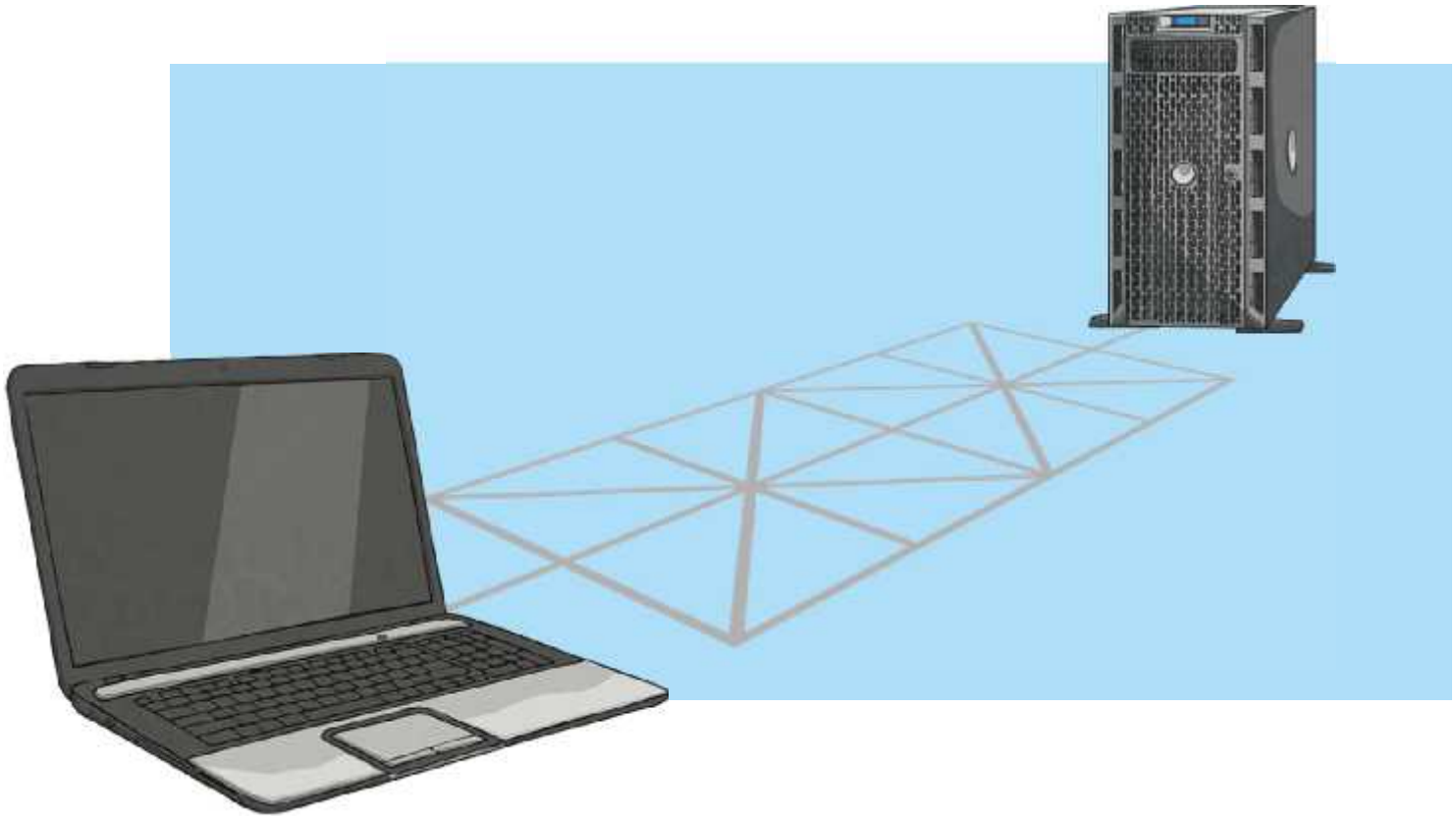
How Are Packets of Data Sent?

When you search and request an image, the image is broken up into packets. Each piece of the jigsaw puzzle is the IP address of your computer and the IP address where the image is stored, as it is too large to be sent in smaller pieces.



How Are Packets of Data Sent?

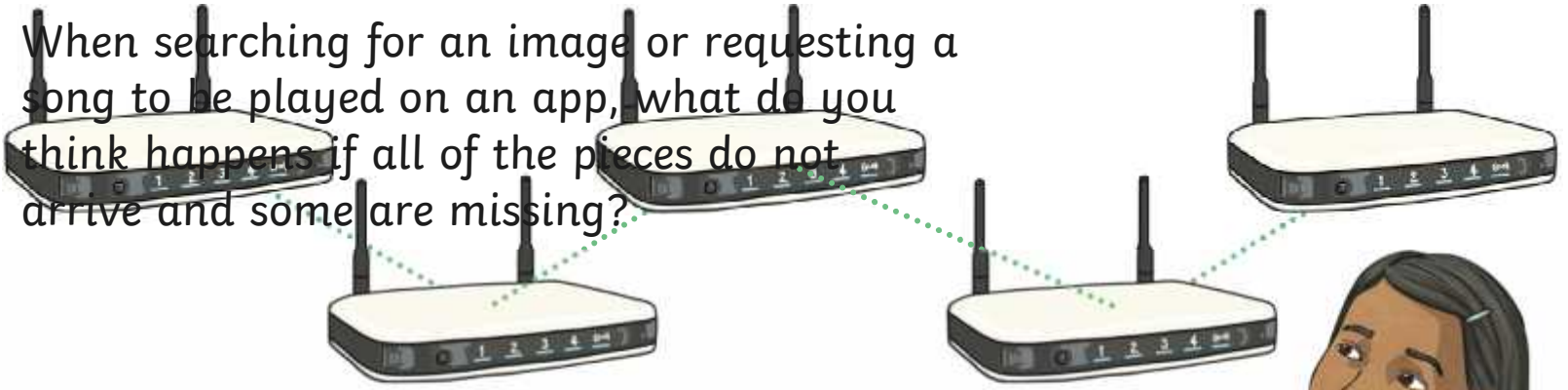
These packets travel virtually along a route until they finally reach the destination, which is a **web server.** The pieces are then put back together.



Changing Routes

As packets travel, they pass through many different routers.
Routers are computers on the Internet which keep the packets in a network moving to their destination as smoothly and quickly as possible.

When searching for an image or requesting a song to be played on an app, what do you think happens if all of the pieces do not arrive and some are missing?



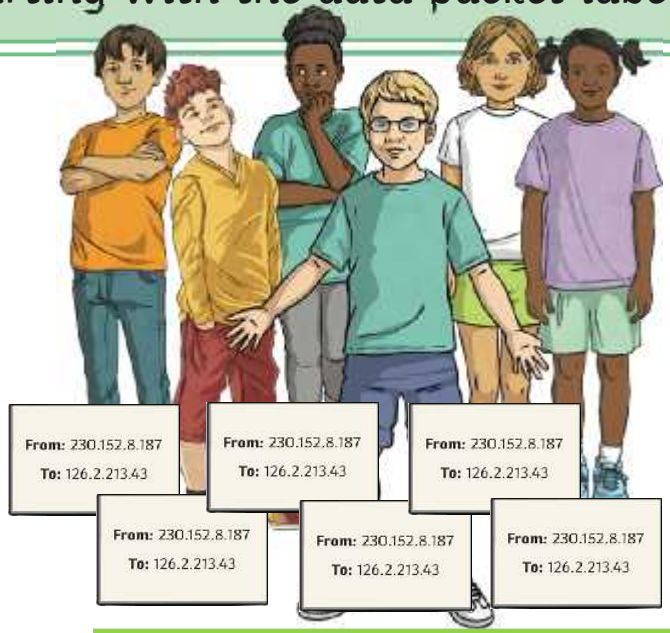
The packets may arrive at different times and are then finall
back together. The more routers that are added to a netv
reliable the Internet is.

may be taken.

Let's Represent How Data Travels

As a class, you will represent how data packets are sent from one place to another. You will need to move along different routes until you get from the computing device to the web server. Make sure you are all stood in order, starting with the data packet labelled A first.

One person as a **web server**



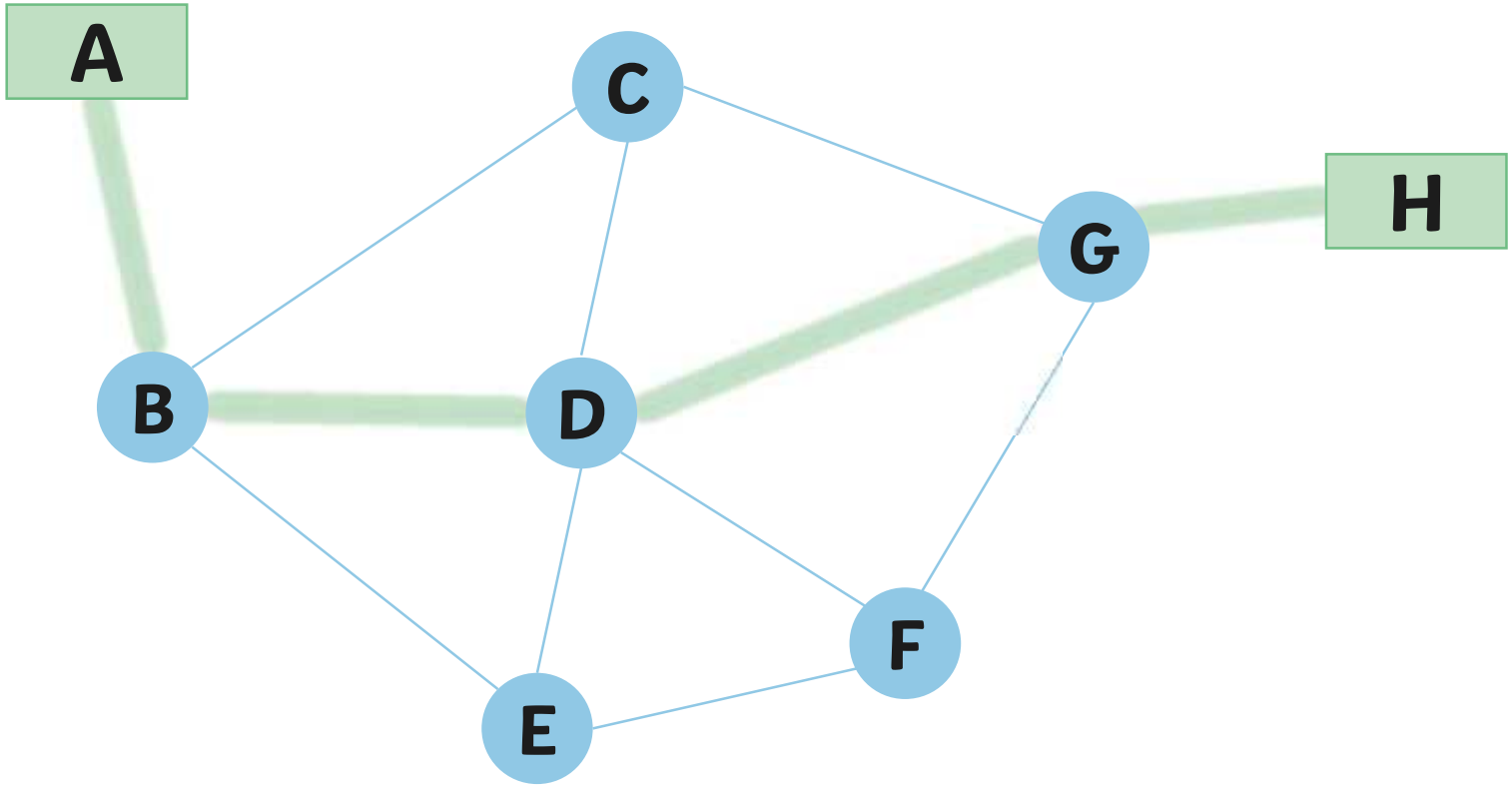
A group of people who will move as **data packets**

One person sat at a **computing device** (requesting an image)

X Can you explain what an IP address is?

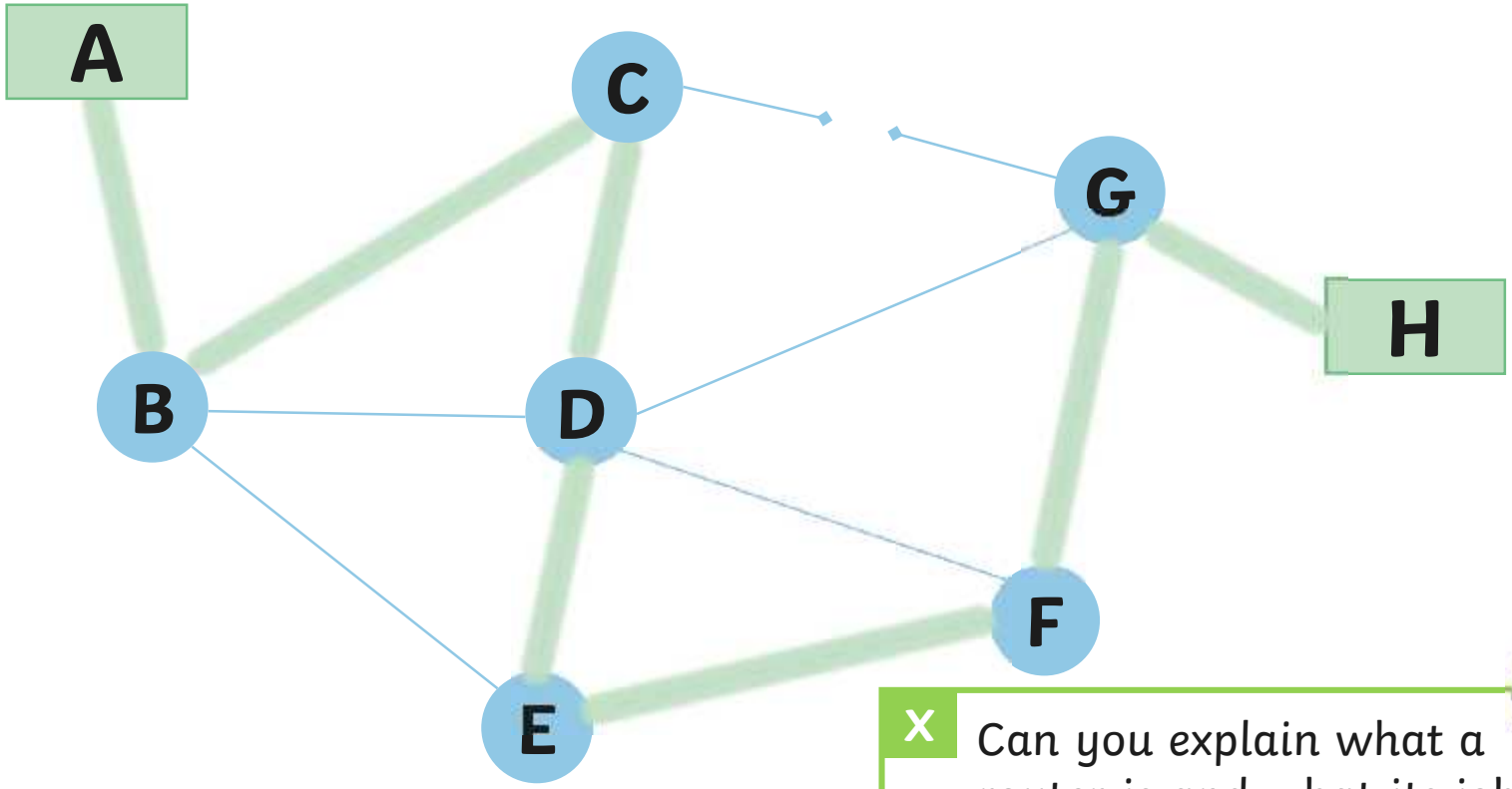
Changing Routes

Take a look at this diagram.
Can you work out the quickest route from A to H?



Packet Switching

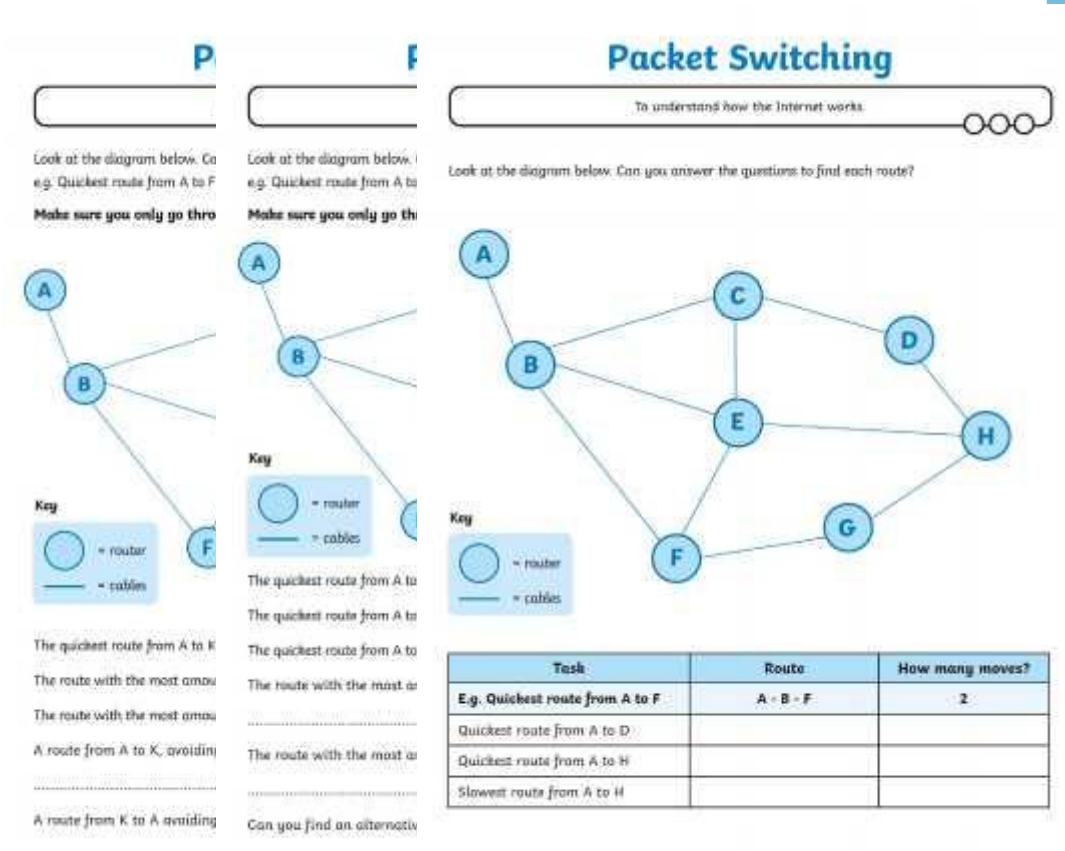
The longest route may be the cheapest route to take in some cases.
Can you work out the longest route from A to H?



X Can you explain what a router is and what its job is?

Packet Routes

Now you understand how packets of data are sent from one IP address to another, complete the Packet Switching Activity Sheet.



Packet Switching

To understand how the Internet works

Look at the diagram below. Can you answer the questions to find each route?

Task	Route	How many moves?
E.g. Quickest route from A to F	A - B - F	2
Quickest route from A to D		
Quickest route from A to H		
Slowest route from A to H		

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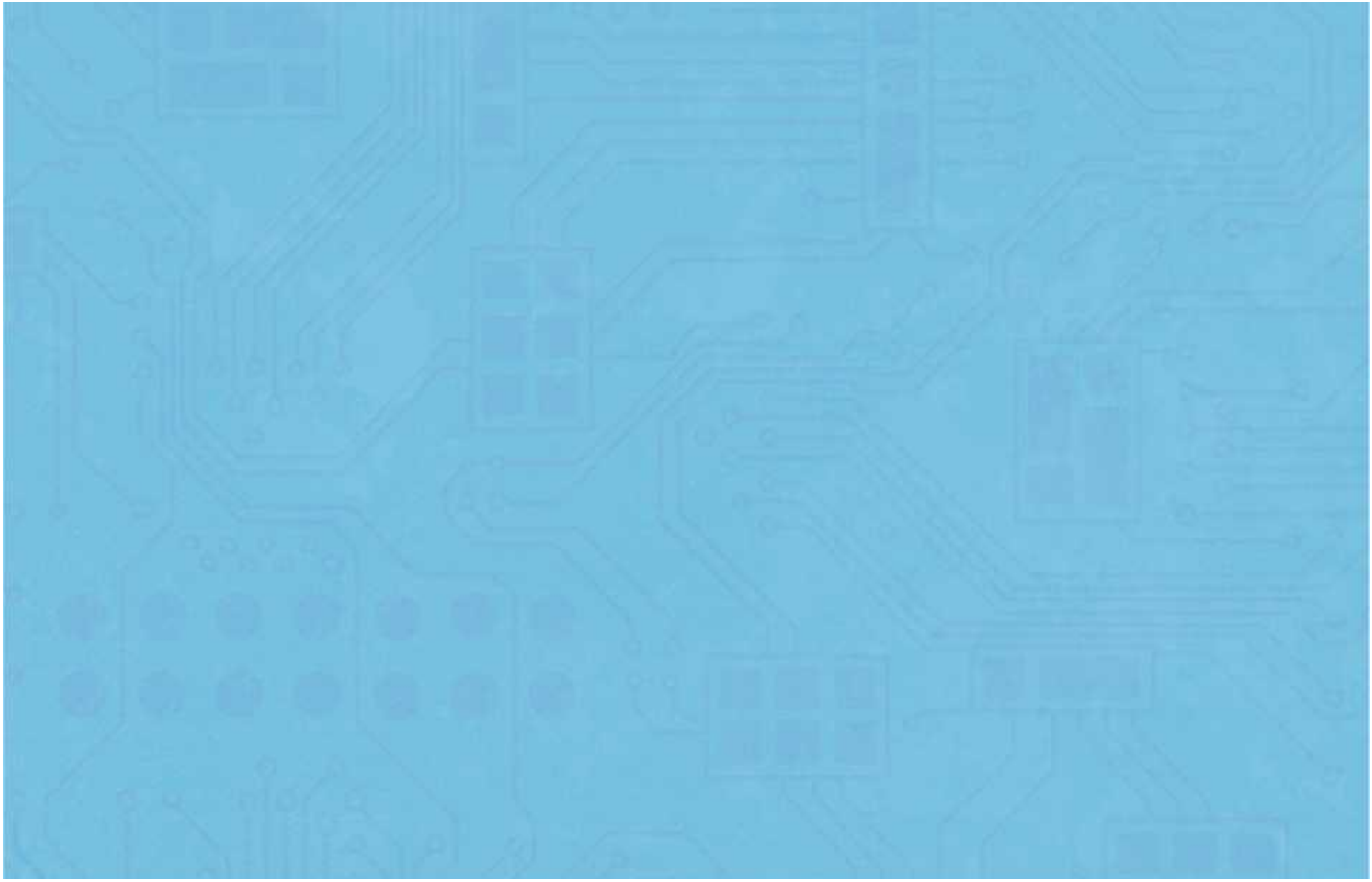

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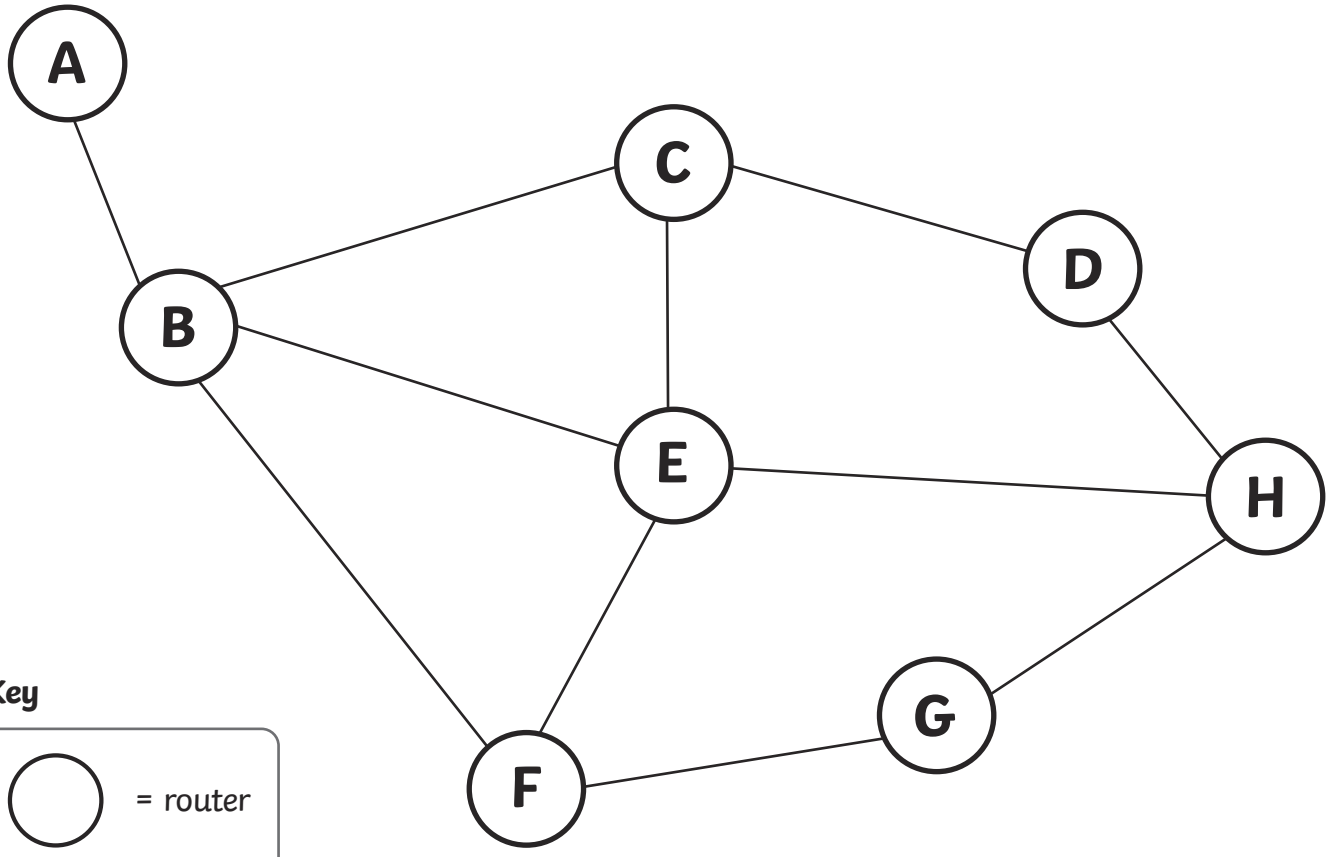


Key

= router

= cables

Task	Route	How many moves?
E.g. Quickest route from A to F	**A - B - F**	**2**
Quickest route from A to D		
Quickest route from A to H		
Slowest route from A to H		

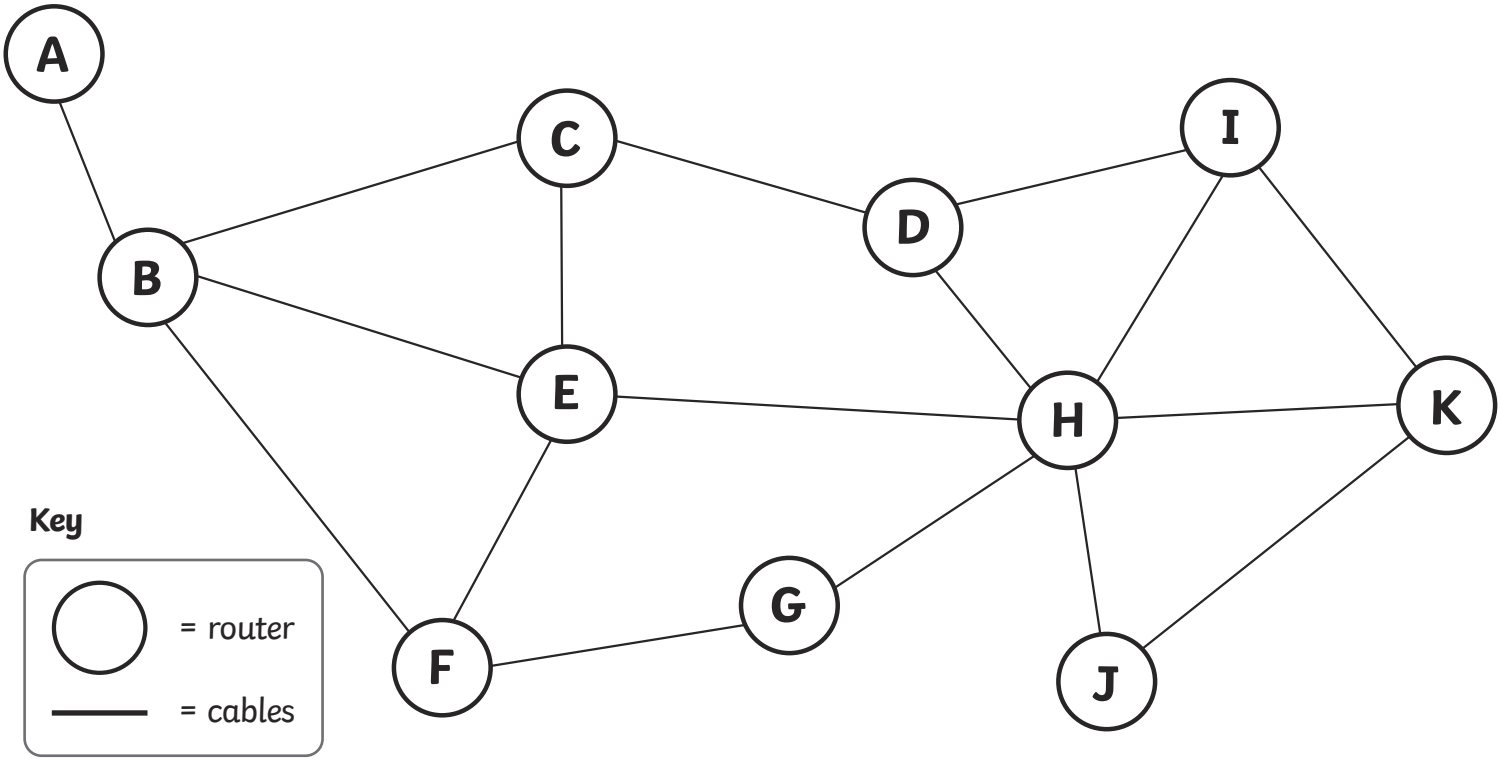
Packet Switching

To understand how the Internet works.

Look at the diagram below. Can you answer the questions to find each route?

e.g. Quickest route from A to F = A - B - F

Make sure you only go through each point once.



The quickest route from A to D =.....

The quickest route from A to H = ...

The quickest route from A to K = ...

The route with the most amount of moves from A to H = ...

.....

The route with the most amount of moves from A to K = ...

.....

Can you find an alternative route from A to K, using 8 moves?.....

.....

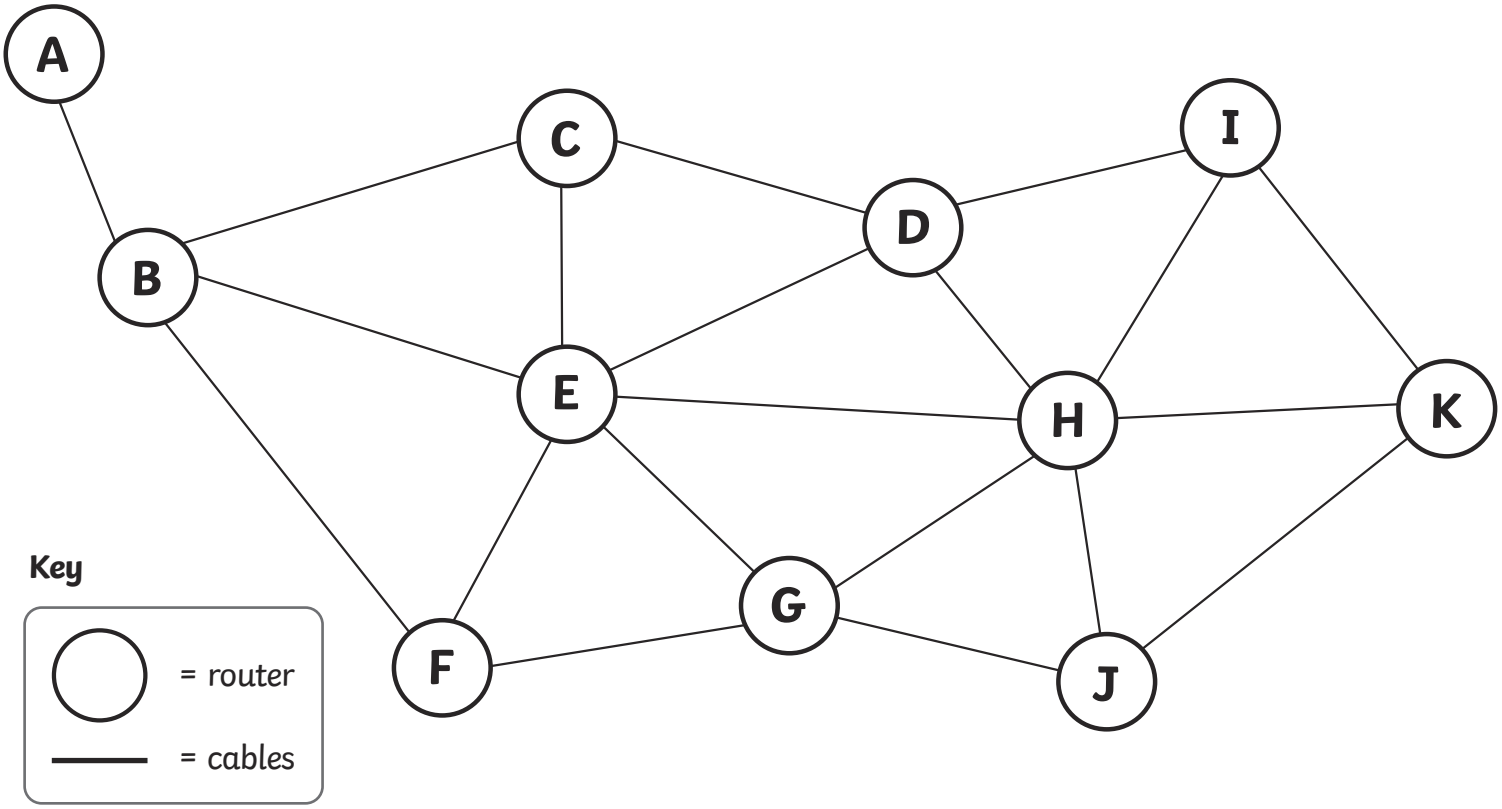
Packet Switching

To understand how the Internet works.

Look at the diagram below. Can you answer the questions to find each route?

e.g. Quickest route from A to F = A - B - F

Make sure you only go through each point once.



The quickest route from A to K = ...

The route with the most amount of moves from A to H = ...

The route with the most amounts of moves from A to K = ...

A route from A to K, avoiding points C, D, F, H = ...

.....

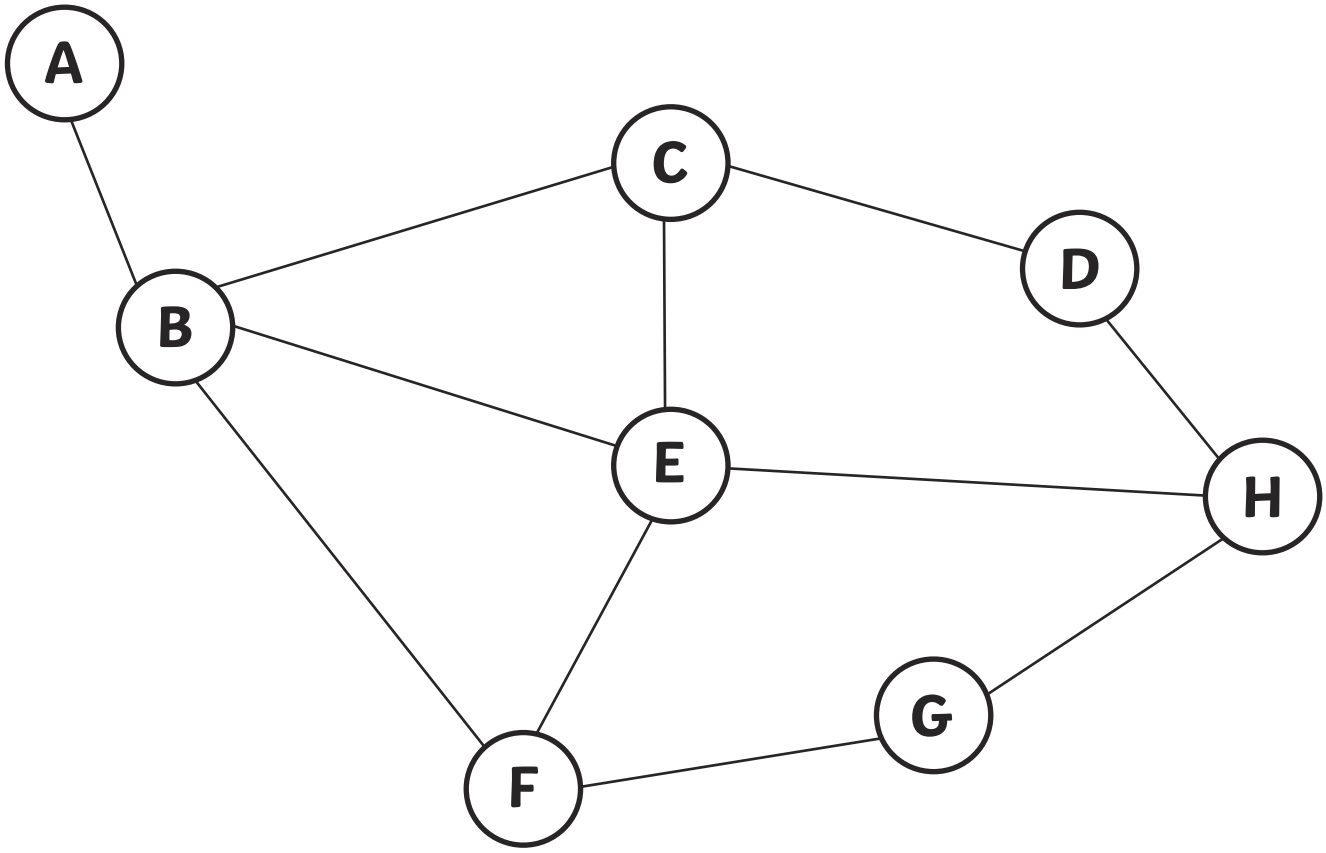
A route from K to A avoiding points D, H, F, C = ...

.....

Packet Switching **Answers**

To understand how the Internet works.

Look at the diagram below. Can you answer the questions to find each route?



Task	Route	How many moves?
E.g. Quickest route from A to F	**A - B - F**	**2**
Quickest route from A to D	A - B - C - D	3
Quickest route from A to H	A - B - E - H	3
Slowest route from A to H	A - B - C - E - F - G - H	6
	A - B - F - E - C - D - H	

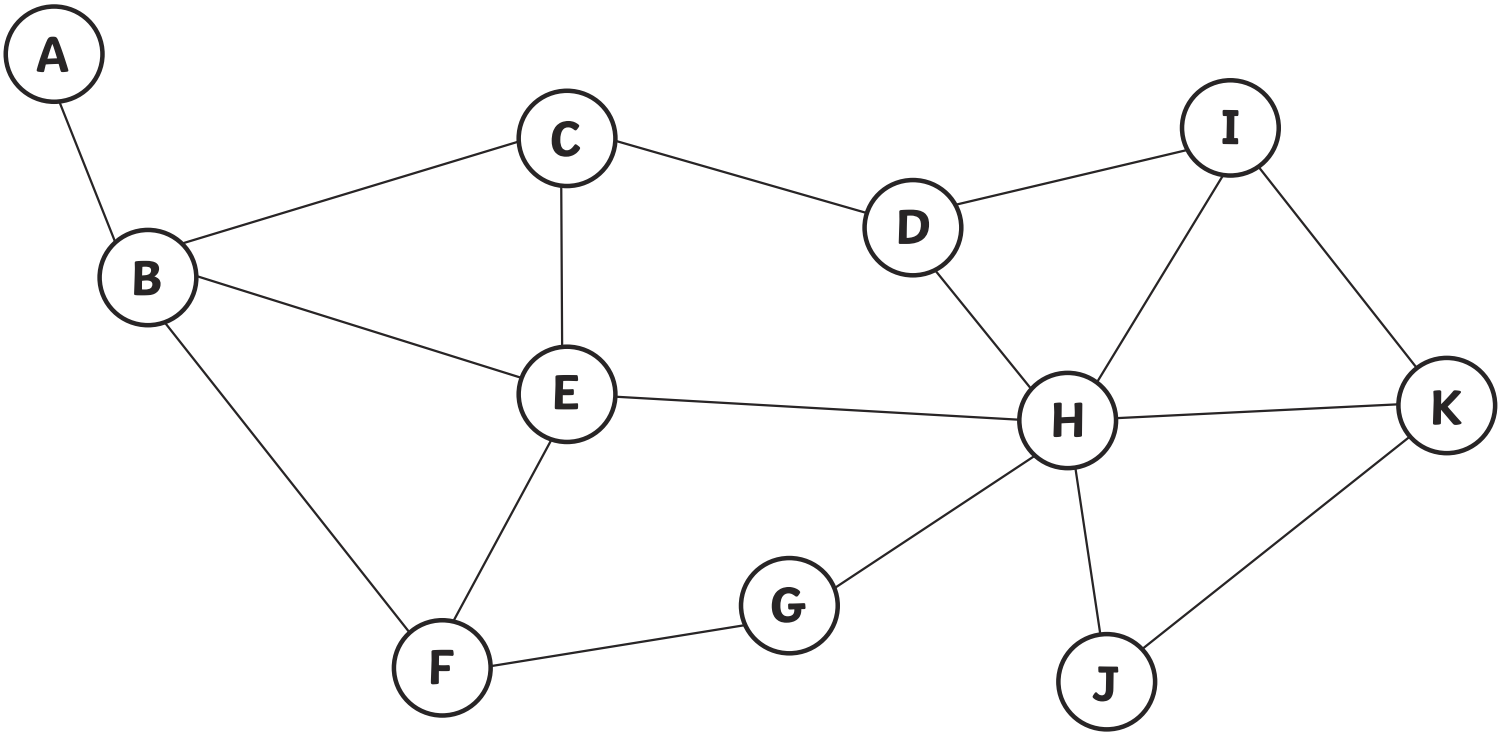
Packet Switching **Answers**

To understand how the Internet works.

Look at the diagram below. Can you answer the questions to find each route?

e.g. Quickest route from A to F = A - B - F

Make sure you only go through each point once.



The quickest route from A to D	A - B - C - D
The quickest route from A to H	A - B - E - H
The quickest route from A to K	A - B - E - H - K
The route with the most amount of moves from A to H	A - B - F - E - C - D - H
The route with the most amount of moves from A to K	A - B - F - E - C - D - H - J - K
Can you find an alternative route from A to K, using 8 moves?	A - B - F - E - C - D - H - I - K

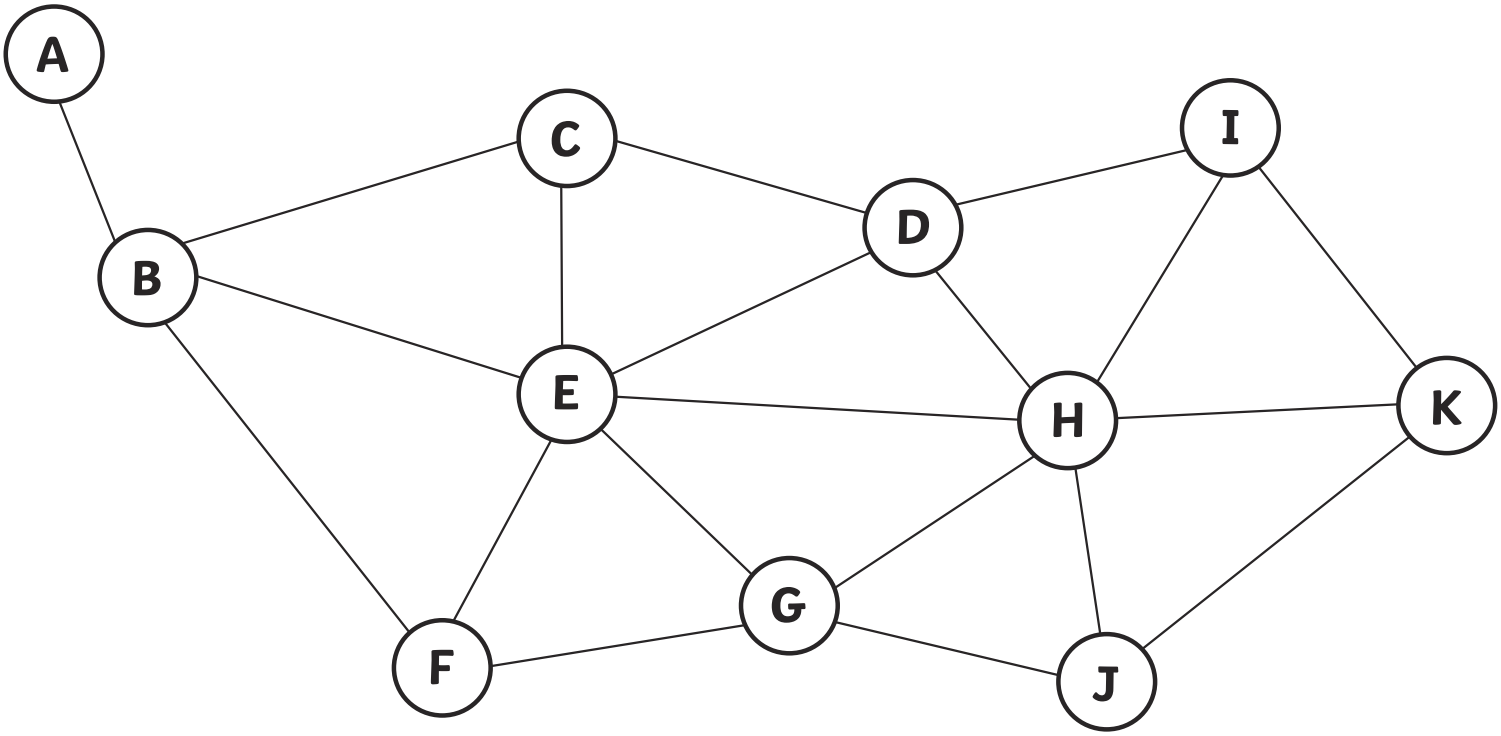
Packet Switching **Answers**

To understand how the Internet works.

Look at the diagram below. Can you answer the questions to find each route?

e.g. Quickest route from A to F = A - B - F

Make sure you only go through each point once.



The quickest route from A to K	A - B - E - H - K
The route with the most amount of moves from A to H	A - B - F - G - E - C - D - I - K - J - H
	A - B - C - D - E - F - G - J - K - I - H
	A - B - F - G - J - K - I - D - C - E - H
	A - B - C - D - I - K - J - G - F - E - H
The route with the most amounts of moves from A to K	A - B - F - G - J - H - E - C - D - I - K
	A - B - C - D - I - H - E - F - G - J - K
	A - B - F - E - C - D - I - H - G - J - K
A route from A to K, avoiding points C, D, F, H	A - B - E - G - J - K
A route from K to A avoiding points D, H, F, C	K - J - G - E - B - A

Packet Switching

To understand how the Internet works.

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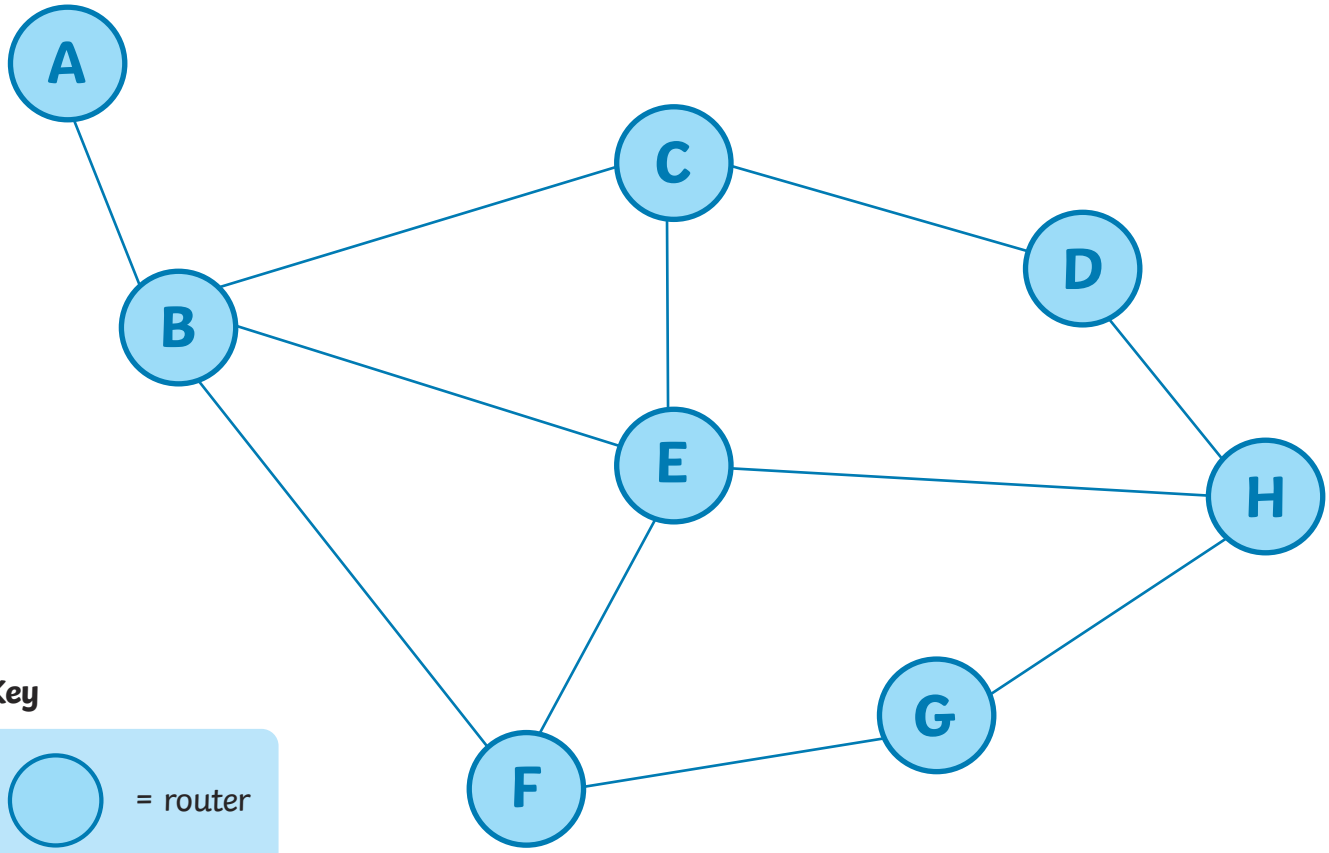

Key

= router

= cables

Task	Route	How many moves?
E.g. Quickest route from A to F	**A - B - F**	**2**
Quickest route from A to D		
Quickest route from A to H		
Slowest route from A to H		

Packet Switching

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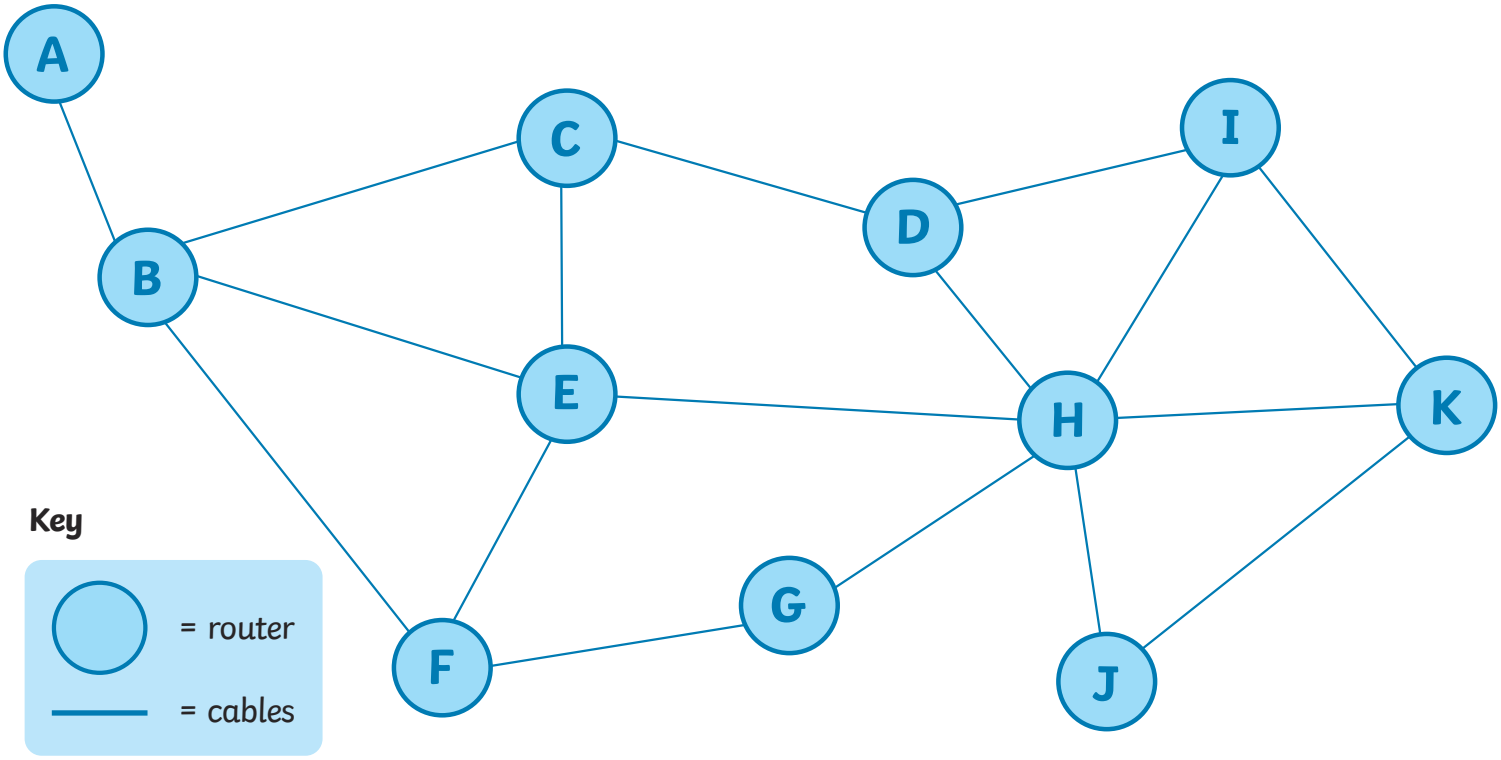
e.g. Quickest route from A to F = A - B - F

Make sure you only go through each point once.



The quickest route from A to D =.....

The quickest route from A to H = ...

The quickest route from A to K = ...

The route with the most amount of moves from A to H = ...

.....

The route with the most amount of moves from A to K = ...

.....

Can you find an alternative route from A to K, using 8 moves?.....

.....

Packet Switching

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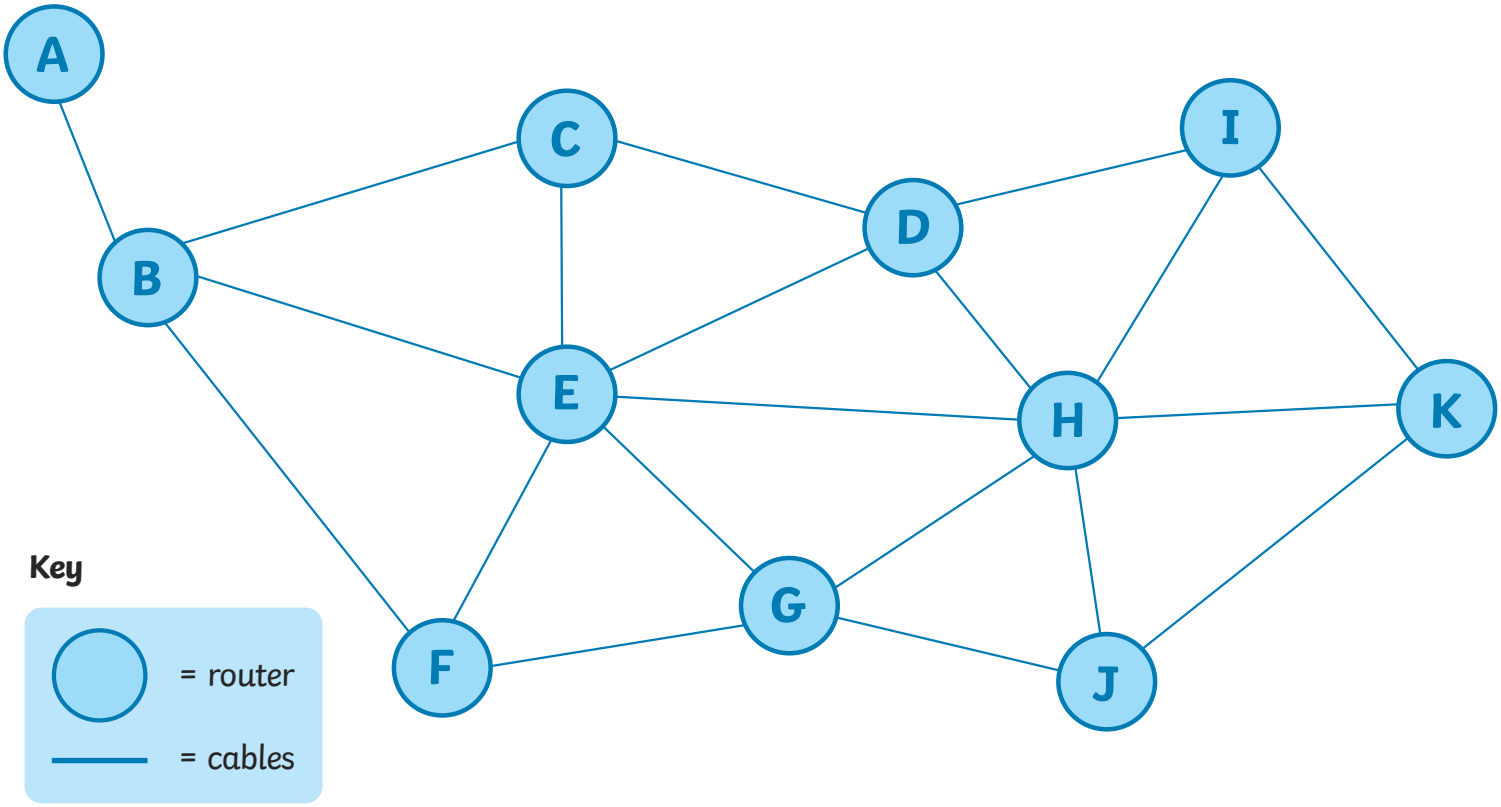


Key

= router

= cables

The quickest route from A to K = ...

The route with the most amount of moves from A to H = ...

The route with the most amounts of moves from A to K = ...

A route from A to K, avoiding points C, D, F, H = ...

.....

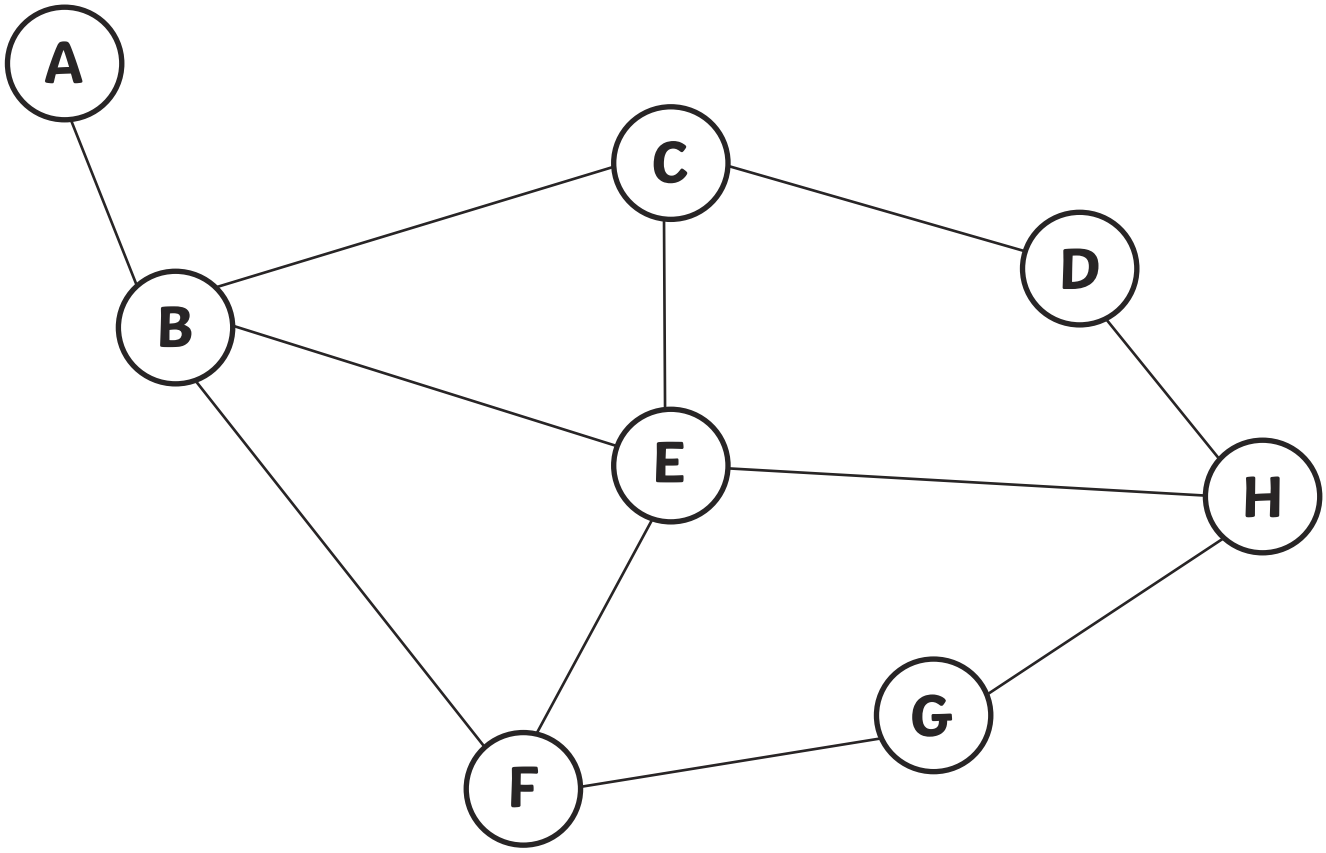
A route from K to A avoiding points D, H, F, C = ...

.....

Packet Switching **Answers**

To understand how the Internet works.

Look at the diagram below. Can you answer the questions to find each route?



Task	Route	How many moves?
E.g. Quickest route from A to F	**A - B - F**	**2**
Quickest route from A to D	A - B - C - D	3
Quickest route from A to H	A - B - E - H	3
Slowest route from A to H	A - B - C - E - F - G - H	6
	A - B - F - E - C - D - H	

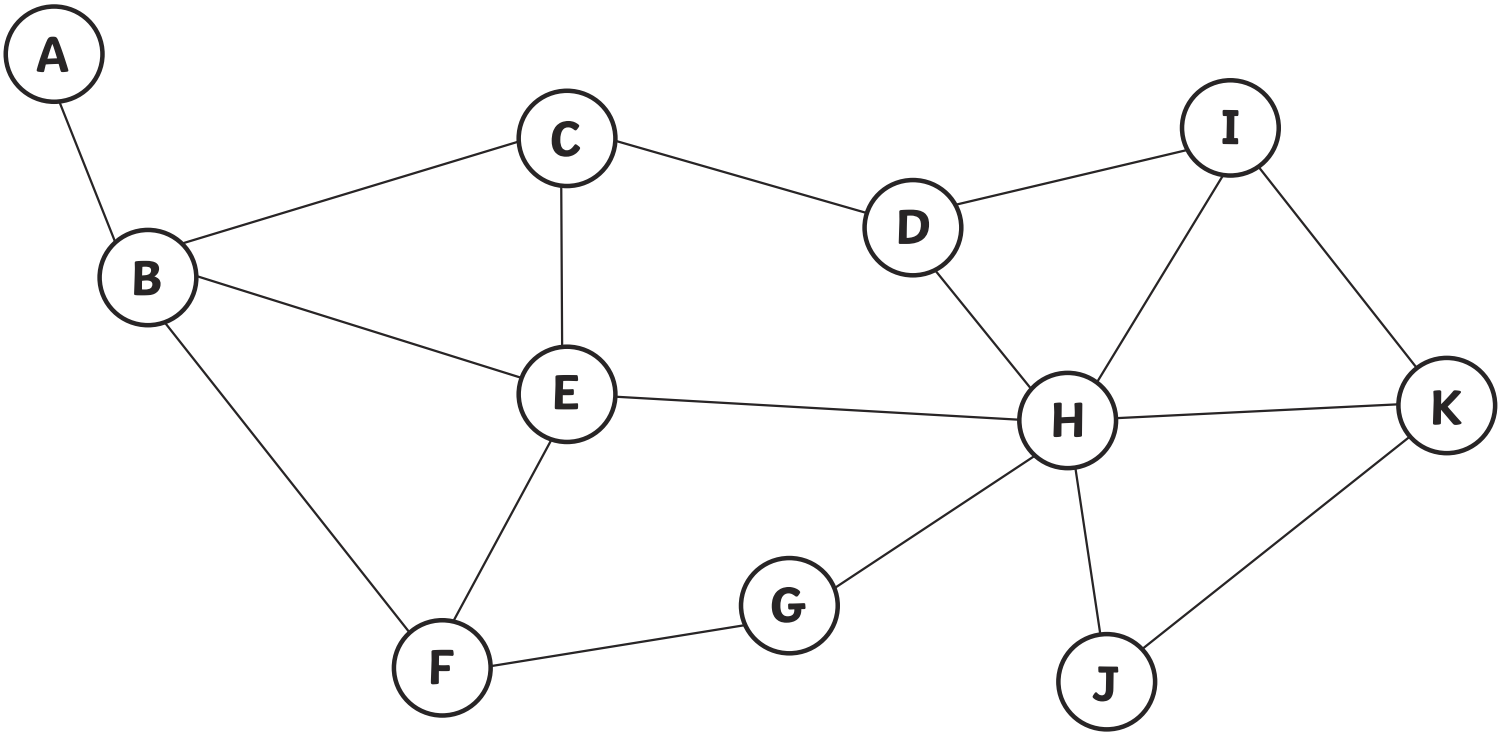
Packet Switching **Answers**

To understand how the Internet works.

Look at the diagram below. Can you answer the questions to find each route?

e.g. Quickest route from A to F = A - B - F

Make sure you only go through each point once.



The quickest route from A to D	A - B - C - D
The quickest route from A to H	A - B - E - H
The quickest route from A to K	A - B - E - H - K
The route with the most amount of moves from A to H	A - B - F - E - C - D - H
The route with the most amount of moves from A to K	A - B - F - E - C - D - H - J - K
Can you find an alternative route from A to K, using 8 moves?	A - B - F - E - C - D - H - I - K

Packet Switching **Answers**

To understand how the Internet works.

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e.g. Quickest route from A to F = A - B - F

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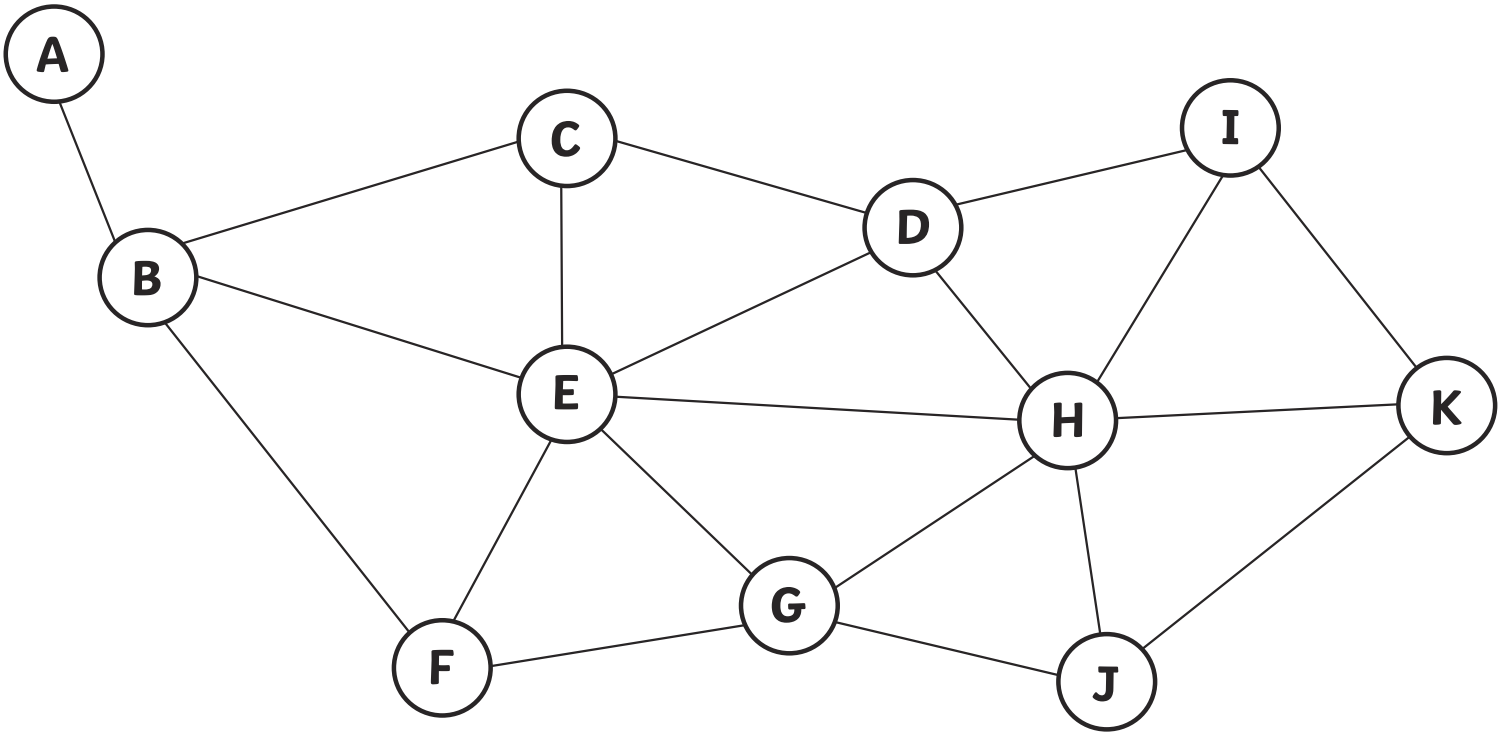

The quickest route from A to K	A - B - E - H - K
The route with the most amount of moves from A to H	A - B - F - G - E - C - D - I - K - J - H
	A - B - C - D - E - F - G - J - K - I - H
	A - B - F - G - J - K - I - D - C - E - H
	A - B - C - D - I - K - J - G - F - E - H
The route with the most amounts of moves from A to K	A - B - F - G - J - H - E - C - D - I - K
	A - B - C - D - I - H - E - F - G - J - K
	A - B - F - E - C - D - I - H - G - J - K
A route from A to K, avoiding points C, D, F, H	A - B - E - G - J - K
A route from K to A avoiding points D, H, F, C	K - J - G - E - B - A

Submarine Cable Map

To understand how the Internet works.

Your task is to use the website to collect as much information as you can about the Internet and how it connects computers across the world.

Use the search bar on the right-hand side to find these cables. Then, try and find three of your own.

Access a web browser
Search for and click on:
Submarine Cable Map
https://www.twinkl.co.uk/r/1iiaon

Cable	Owned by	Colour
e.g. Atisa	Docomo Pacific	
Curie		
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ESAT-1		

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What is the name of these fibre-optic cables? (find the UK first, zoom in, then click on the cable connecting to the other country to reveal its name)

UK ..... **France**

1

2

UK ..... **Denmark**

1

UK ..... **Norway**

1

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Online Searchers and Surfers| How the Internet Works

To understand how the Internet works.		
I can explain how data is transferred from one point to another when using the Internet.		
I can understand what packets of data are.		
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