Meden School Curriculum Planning							
Subject	GCSE Computer Science	**Year Group**	10	**Sequence No.**	3	**Topic**	Networks

Tier 3 List:

LAN, WAN, bandwidth, latency, Wireless access points, routers, switches, NIC, Transmission media, DNS, Hosting, The Cloud, Web servers and clients, star network, mesh network, topology, IP address, web server, file server, wired network, wireless network, Ethernet, Wi-Fi, Bluetooth, encryption, IP addressing, MAC addressing, TCP/IP,FTP, POP, l, IMAP, SMTP, layers, IPv4, IPv6

Week Number	Retrieval	Core Knowledge	Student Thinking
-	What do teachers need to **retrieve** from students before they start teaching **new content**?	What **specific ambitious knowledge** do teachers need to teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to **develop our students' thinking, encouraging them to see the inequalities around them** and 'do something about them!'
1 U3: Networks, Internet and WAN	Students have studied computer science at KS3 – looking at networking and the advantages / disadvantages of sharing. Students understand the term network and wifi, as well as different types of AD-HOC networks. Students will be able to recall the meaning of hardware and components.	Define a Wide Area Network Describe the nature of the Internet as a worldwide collection of computer networks Explain the need for IP addressing of resources on the Internet and how this can be facilitated by the role of DNS services Understand the need for Network Interface Cards and the uses of MAC addressing Explain packet switching Networking computers brings many benefits to users. Without networking, many computing applications would not be possible.	Students will be able to pursue a career in networking, regarding further students at A-Level and university. Students will be able to choose the best network connection for purpose. Ie. Journey on a train, bus etc Students will be able to understand the network security issues with open wifi. Students will be able to design networks based on audience and purpose.

		A **wide area network (WAN)** is a network that is spread over a wide geographical area. It can cover more than one site, or be spread across a country, or even the world. Organisations that have more than one office or branch, such as banks, tend to use a WAN. The WAN allows the head office to communicate and share data with the sub-offices and branches. Communication is done through national telephone infrastructures or via wireless transmission. Each office or branch has its own LAN that is connected together using the WAN. **Packet Switching -** Transmissions over a network can be extremely large in size. To send a large message in one go would be impractical, as both the sending and receiving node would be tied up with one communication. Instead, a method called packet switching is used. With packet switching, messages are broken up into very small pieces, called packets. Each packet consists of two parts: • header - this includes the sender's and recipient's IP addresses, the packet number, the total number of packets the message contains, plus the details of any protocols used • payload - this is part of the actual message itself The packets are sent individually across the network and put back together to reform the message at the other end. Packets may or may not follow the same route - they are sent along whichever route allows the quickest transmission. Packets, therefore, may arrive out of sequence. The recipient takes each packet, makes a	

		note of its number and assembles them into the correct order. Sending small packets allows a node to send more than one message at the same time. It is rather like speaking to two people at the same time, saying one word to each person in turn. Packet switching also helps to ensure messages arrive complete without slowing down a network. If the recipient finds packets are missing, it can request that just those packets are re-sent. This saves having to resend the whole message, which is especially useful if the message is a large video file.	
2 U3: Networks, LAN	Students have studied computer science at KS3 – looking at networking and the advantages / disadvantages of sharing. Students understand the term network and wifi, as well as different types of AD-HOC networks. Students will be able to recall the meaning of hardware and components.	Describe the difference between a Local Area Network and a Wide Area Network Describe star and mesh network topologies Describe routers and switches needed to connect stand-alone computers into a Local Area Network Explain the use of Ethernet standards to transmit data over a wired network Explain the concept of virtual networks A **LAN** is a network that is geographically confined to one building or site. Examples include networks employed by small businesses, small organisations, schools, colleges, universities and in homes. A **wide area network** (**WAN**) is a network that is spread over a wide geographical area. It can cover	

		more than one site, or be spread across a country, or even the world. **Network Topology** A network's topology is the arrangement, or pattern, in which all nodes on a network are connected together. **virtual network** is a network that can securely connect geographically unrelated computers via the internet. Virtual networks form their connections through the internet. Virtual network servers create a network that has no direct physical connection, but one that allows file sharing and communication.	
3 U3: Networks, Wireless Networking	Students have studied computer science at KS3 – looking at networking and the advantages / disadvantages of sharing. Students understand the term network and wifi, as well as different types of AD-HOC networks. Students will be able to recall the meaning of hardware and components.	Understand wireless modes of connection, including: • Wi-Fi • Bluetooth Explain the need for Wireless Access Points to create wireless hotspots Understand how encryption is used to secure data across network connections **Bluetooth** communicates using radio frequencies and requires no physical cable connections. It was designed to enable a range of portable devices to connect both to each other and to other, less portable, hardware.	

4 U3: Networks, Client Server and P2P	Students have studied computer science at KS3 – looking at networking and the advantages / disadvantages of sharing. Students understand the term network and wifi, as well as different types of AD-HOC networks. Students will be able to recall the meaning of hardware and components.	Explain the role of computers in client-server and peer-to-peer networks Explain the advantages and disadvantages of client-server and peer-to-peer networks Describe what is meant by: • Hosting • The Cloud Explain the advantages and disadvantages of various transmission media Describe the factors that affect network performance In a **peer-to-peer (P2P) network**, all computers have equal status - no computer has control over the network. There are no servers or clients. Instead, each computer is known as a peer. Peers store their own files, which can be accessed by other peers on the network. Therefore, a peer is both a client and a server. **P2P networks** are best suited to smaller organisations that have fewer computers, or where fewer computers need access to the same data. **Cloud** - The cloud is a generic term for remotely accessed storage. This storage is accessed through the internet. Users do not actually know where their data is stored - the geographical location is unimportant. Users only need to know that their data is stored on a server connected to the internet.	

5 U3: Networks, Standards Protocols and Layers	Students have studied computer science at KS3 – looking at networking and the advantages / disadvantages of sharing. Students understand the term network and wifi, as well as different types of AD-HOC networks. Students will be able to recall the meaning of hardware and components.	Describe the uses of communications protocols including: • HTTP • HTTPS • FTP • POP • IMAP • SMTP • TCP/IP Explain the concept of layers in the TCP/IP protocol stack **Network Protocols** There are a wide range of protocols that cover all sorts of types of computer communication. The major ones are: • Ethernet - used in wired LANs. Ethernet covers a wide range of standards from types of cable to data transmission speed. • Wi-Fi - used in wireless LANs. • TCP/IP (Transmission Control Protocol/Internet Protocol) enables communication over the internet. • HTTP and HTTPS (Hypertext Transfer Protocol) governs communication between a web server and a client. HTTPS (secure) includes secure encryption to allow transactions to be made over the internet. • FTP (File Transfer Protocol) governs the transmission of files across a network and the internet.	

		<u>Email protocols</u> Email is widely used and protocols are needed to ensure that email from one system can be sent to another system and still be readable. The major protocols involved in sending and receiving emails are: • SMTP (Simple Mail Transfer Protocol) governs the sending of email over a network to a mail server. • POP3 and IMAP (Post Office Protocol and Internet Message Access Protocol) govern retrieving emails from email servers. POP is an older implementation, largely replaced by IMAP. A newer version of POP is POP3.	