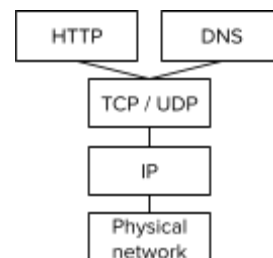Name(s)_____ Period _____ Date _____

Activity Guide - Layers of the Internet

Layers of the Internet
The internet is actually made up of many protocols that all work together to move information around a vast network of devices. These protocols are designed to work together and build upon each other like layers, with higher layers relying on the ones below them.

Together these layers and protocols solve all the different problems necessary for the computer to work at a scale where billions of devices can communicate with one another.

Protocol / Layer	What Problem Does It Solve?	How Does It Work?
Physical Network	Physically connecting devices to one another so that information can move through the network.	Fiber optic cables, wifi signals, or copper wires physically connect the computers, smart phones, servers, etc. that make up the Internet. Computers don't need to be directly connected to each other, just a single point on the network.
IP: Internet Protocol	Uniquely identifying people on the internet and routing messages between them.	Each device on the internet is given a unique IP address. Packets sent on the internet include to and from IP addresses. Routers along the way use this information to move data along a path of direct connections. Routing happens dynamically, meaning the path is unpredictable and changes based on network conditions.
TCP: Transmission Control Protocol	Send large messages over the Internet when accuracy is most important. You would either use TCP or UDP.	Messages are divided into packets and sent all at once. Packets are numbered so that they can be re-ordered and missing packets can be requested by the receiver. TCP is slower than UDP because error checking like this takes more time, but it is much more reliable.
UDP: User Datagram Protocol	Send large messages over the Internet when speed is most important. You would either use TCP or UDP.	Messages are divided into packets and sent all at once. There is no error-checking to ensure all packets arrive or that they're in order. UDP is faster than TCP but more errors are possible. This is useful for streaming video or online gaming because having the picture displayed quickly is more important than it being displayed with a perfectly clear picture.
DNS: Domain Name System	Translate human-readable domains like code.org or example.com into IP addresses that can be used by the Internet.	When you try to go to a domain like example.com, you computer first contacts a system of servers collectively called the DNS which keeps track of the IP addresses associated with each domain name. Communication with DNS servers happens over the Internet, meaning the request to and from servers are sent as TCP/IP packets.
HTTP: HyperText Transfer Protocol	Allow computers to request and share webpages, audio, images, videos, and other file types on the Internet, collectively known as the world wide web.	Computers communicate in plain text like GET to request files or send data. The server that receives the request responds with the files requested which are displayed by your browser. HTTP requests are sent between computers over the internet as part of TCP/IP packets. The world wide web is just files that are requested using HTTP and sent over the Internet.