Aim: To understand and create a working Ethernet cable (RJ-45 terminated) used for computer networking and study of network components.

Theory:

Apparatus/Requirements:
1. CAT-5 or CAT-6 cable (Twisted Pair): // write something about it.
2. RJ-45 connectors (2 pieces): // write something about it.
3. Crimping tool: // write something about it.
4. Wire stripper/cutter: // write something about it.
5. Network cable tester : // write something about it.

Ethernet cables are used to connect network devices such as PCs, routers, and switches. CAT-5 and CAT-6 cables consist of four twisted pairs of wires that reduce interference and allow data transfer. These cables are terminated using RJ-45 connectors following TIA/EIA 568A or 568B color-coding standards.

Precautions:
1. Do not strip or twist the wires excessively.
2. Ensure correct color code sequence on both ends.
3. Crimp the connector firmly but carefully.
4. Avoid bending or stretching the cable.

Steps to create a working Ethernet cable (RJ-45 terminated) :
1. Cut the cable to the required length using the cutter.
2. Strip about 1 inch of the outer insulation to expose the four twisted pairs.
3. Untwist and straighten the wires carefully.
4. Arrange the wires according to TIA/EIA 568B color code: Orange-White, Orange, Green-White, Blue, Blue-White, Green, Brown-White, Brown.
5. Trim the wires evenly and insert them into the RJ-45 connector, ensuring each wire goes to its correct pin.
6. Insert the connector into the crimping tool and press firmly to secure the wires.
7. Repeat the process for the other end of the cable (use straight-through or cross-over pattern).
8. Test the cable using a network tester to ensure all connections are correct.

Observation:
Check each wire connection using the cable tester. The LEDs on the tester should indicate proper continuity for all eight wires.

Identification of network components:
1) LAN card : // write something about it.
2) switch, : // write something about it.
3) hub, : // write something about it.
4) Router : // write something about it.
5) different types of network cables (straight cables, crossover cables, rollover cables) : // write something about it.

Conclusion: By you as per your understanding (3-4 lines)

Course Outcome Covered: Develop skill required for hardware maintenance.

Images Required:

Bulk Ethernet Cable - Category 5
or Cat-5

Bulk RJ45 Crimpable Connectors
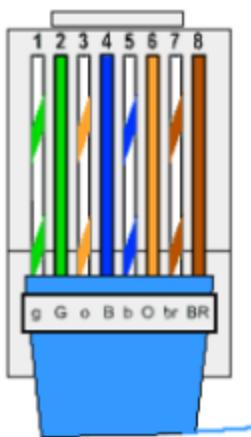
Cable Stripper Cutter

RJ-45 Crimping tool
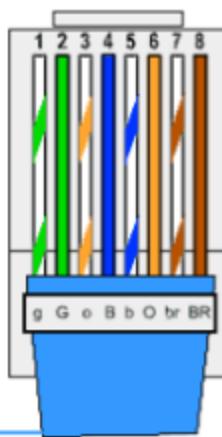
RJ-45 Plug

Pin 1
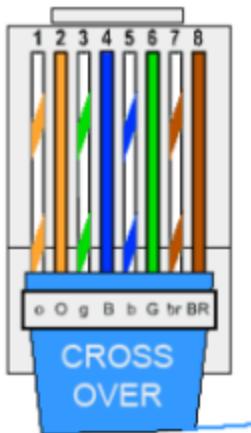
Clip is pointed away from you.

There are two kinds of Ethernet cables you can make. **Straight Through** and **Crossover**.

STRAIGHT THROUGH - Ethernet cables are the standard cable used for almost all purposes. It is highly recommend you duplicate the color order as shown on the left. Note how the orange pair is not side by side as are all the other pairs. This configuration allows for longer wire runs.
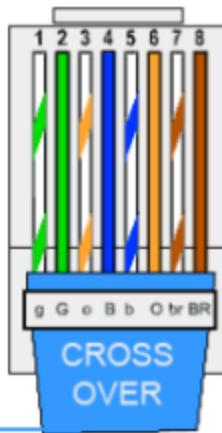

RJ-45 Plug
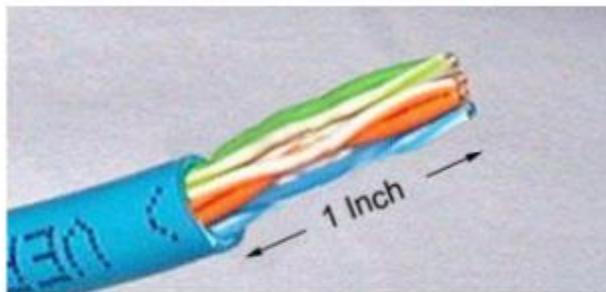
Pin 1

Clip is pointed away from you.

CROSS OVER
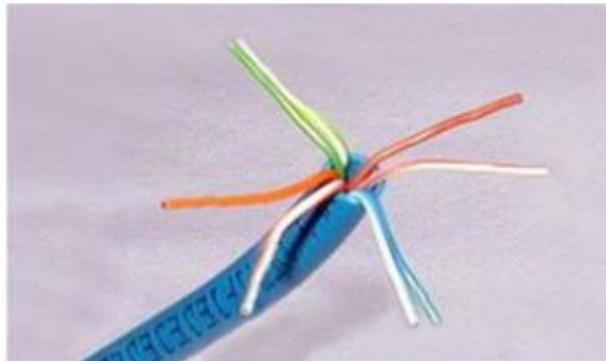
CROSS OVER

CROSSOVER CABLES - The purpose of a Crossover Ethernet cable is to directly connect one computer to another computer (or device) without going through a router, switch or hub.
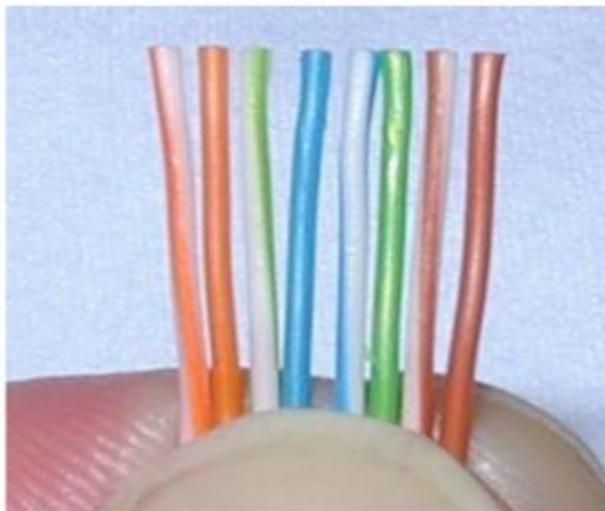

1 Inch

Here's how to make a standard cable:

cut into the plastic sheath **1 inch** from the end of the cut cable. The crimping tool has a razor blade that will do the trick with practice.

Unwind and pair of the similar colors.
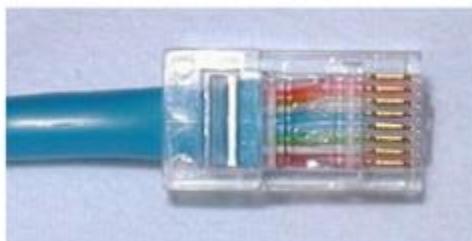
Pinch the wires between your
fingers and straighten them out as
shown.
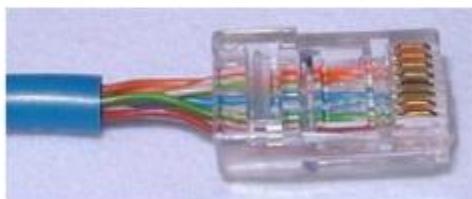
(The wire colors line up to form a
straight through standard cat 5
cable as described above)

Push the wires into the connector.
Note the position of the blue
plastic shielding. Also note how
the wires go all the way to the end.

A view from the top. All the wires
are all the way in. There are no
short wires.

WRONG WAY - Note how the
blue plastic shielding is not inside
the connector where it can be
locked into place. The wires are
too long. They should be 1/2 inch
from the sleeve.

WRONG WAY - Note how the
cables do not go all the way to the
end of the connector.

CRIMPING THE CABLE ... carefully place the connector into the Ethernet Crimper and cinch down on the handles tightly. The copper splicing tabs on the connector will pierce into each of the eight wires. There is also a locking tab that holds the blue plastic sleeve in place for a tight compression fit. When you remove the cable from the crimper, the cable is ready to use.

REPEAT STEPS OTHER END

Repeat all steps on the other end of the Ethernet cable exactly. There is no need to reverse any order of the wires.

Make sure to test the cables before installing them. An inexpensive Ethernet cable tester does this quite well.

NOTE - The maximum cable length of Cat-5E Ethernet cable is 328 feet or 100 meters.

HOW TO MAKE AN ETHERNET CABLE
Purchasing fully made Ethernet cables from the store can be quite expensive. It is far easier to simply buy a box of bulk Category 5 Ethernet cable and then attach your own RJ-45 connectors to the cut ends to your preferred length.

LAN Cable Tester with Led Display