**FIGURE 3.28** Inside a Cat 5 cable
Source: © Jason/Alamy

If you have an old Cat 5 cable (or are willing to spend a few dollars to buy cheap cable), it is simple to take the connector off. Simply take a pair of scissors and cut through the cable a few inches from the connector. Figure 3.28 shows the same Cat 5 cable with the connector cut off. You can see why twisted pair is called twisted pair: a single Cat 5 cable contains four separate sets of twisted pair wires for a total of eight wires.

Unfortunately, this picture is in black and white so it is hard to see the different colors of the eight wires inside the cable. Figure 3.29 lists the different colors of the wires and what they are used for under the EIA/TIA 568B standard (the less common 568A standard uses the pins in different ways). One pair of wires (connected to pins 1 and 2) is used to transmit data from your computer into the network. When your computer transmits, it sends the same data on both wires; pin 1 (transmit+) transmits the data normally and pin 2 (transmit–) transmits the same data with reversed polarity. This way if an error occurs, the hardware will likely detect a different signal on the two cables. For example, if there is a sudden burst of electricity with a positive polarity (or a negative polarity), it will change only one of the transmissions from negative to positive (or vice versa) and leave the other transmission unchanged. Electrical pulses generate a magnetic field that has very bad side effects on the other wires. To minimize this, the two transmit wires are twisted together so that the other wires in the cable receive both a positive and a negative polarity magnetic field from the wires twisted around each other, which cancel each other out.

Figure 3.29 also shows a separate pair of wires for receiving transmissions from the network (pin 3 (receive+) and pin 6 (receive–)). These wires work exactly the same way as transmit+ and transmit- but are used by the network to send data to your computer. You'll notice that they are also twisted together in one pair of wires, even though they are not side-by-side on the connector.

Figure 3.29 shows the pin functions from the viewpoint of your computer. If you think about it, you'll quickly realize that the pin functions at the network end of the cable are reversed; that is, pin 1 is receive+ because it is the wire that the network uses to receive the transmit+ signal from your computer. Likewise, pin 6 at the network end is the transmit- wire because it is the wire on which your computer receives the reversed data signal.

The separate set of wires for transmitting and receiving means that Cat 5 is designed for full-duplex transmission. It can send and receive at the same time because one set of wires is used for sending data and one set for receiving data. However, Cat 5 is not often used this way. Most hardware that uses Cat 5 is designed to operate in a half-duplex mode, even though the cable itself is capable of full duplex.

| Pin number | Color (EIA/TIA 568B standard) | Name |
|---|---|---|
| 1 | White with orange stripe | Transmit + |
| 2 | Orange with white stripe or solid orange | Transmit – |
| 3 | White with green stripe | Receive + |
| 4 | Blue with white stripe or solid blue | Not used |
| 5 | White with blue stripe | Not used |
| 6 | Green with white stripe or solid green | Receive – |
| 7 | White with brown stripe or solid brown | Not used |
| 8 | Brown with white stripe or solid brown | Not used |

**FIGURE 3.29** Pin connection for Cat 5 at the computer end

You'll also notice that the other four wires in the cable are not used. Yes, that's right; they are simply wasted.

## Deliverable

Find a Cat 5 or Cat 5e cable and record what color wires are used for each pin.