                  Frequently Asked Questions for Schools

Status of This Memo

   This memo provides information for the Internet community. This memo
   does not specify an Internet standard of any kind. Distribution of
   this memo is unlimited.

Abstract

   The goal of this FYI document, produced by the Internet School
   Networking (ISN) group in the User Services Area of the Internet
   Engineering Task Force (IETF), is to act as an introduction to the
   Internet for faculty, administration, and other school personnel in
   primary and secondary schools. The intended audience is educators who
   are recently connected to the Internet, who are accessing the
   Internet by some means other than a direct connection, or who are
   just beginning to consider Internet access as a resource for their
   schools. Although the Internet Engineering Task Force is an
   international organization and this paper will be valuable to
   educators in many countries, it is limited in focus to
   internetworking in the United States.

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1. Introduction

    As more and more schools begin using technology to achieve
    educational goals, access to the worldwide network of computer
    networks known as the Internet is expanding. Help for schools in the
    form of printed materials, electronic resources, and people is also
    expanding. The Internet School Networking (ISN) group of the Internet
    Engineering Task Force (IETF) remains committed to articulating the
    advantages of Internet connections for schools and providing
    solutions to the challenges schools face in getting connected. The
    FYI (For Your Information) series, which is a subset of the IETF-
    produced RFCs (Requests for Comments) is one way to achieve these
    goals. (See Appendix A, "Glossary of Terms Used in This Document" for
    further explanation of "FYI" and "RFC.")

    While the IETF and ISN are international groups, the authors of this
    document are experienced only in bringing the Internet to schools in
    the United States. We are aware that culture and the national economy
    effect how one views the issues surrounding school networking. (To
    give just one example, in the United States, educational reform is an
    important reason for schools to get connected to the Internet. Other
    countries may not have the same incentive to transform the teacher's
    role to more of a guide toward knowledge and less of a sole provider
    of information.) So, while this document may have a U.S. flavor, we
    feel that the focus will not prevent it from being useful to those in
    other countries!

    Some of the questions educators have about the Internet are of a more
    general nature, and for those we recommend reading FYI 4, "Answers to
    Commonly Asked 'New Internet User' Questions." (For information on
    how to get this and other IETF documents of interest to the general
    Internet user, See Appendix B, "Ways to Get RFCs.")

    Remember that the Internet is a changing environment. Although we
    have tried to include only the most stable of network services and
    contacts, you may still find that something listed is unavailable or
    has changed. The positive side of this constant change is that you
    will discover much on your own, and some of what you discover will be
    new since the writing of this document.

    This is an update of an earlier document (FYI 22/RFC 1578, "Answers
    to Commonly Asked 'Primary and Secondary School Internet User'
    Questions"), and renders that document obsolete. If future updates
    are produced, the RFC number will change again, and the FYI number
    (22) will remain the same.

2. Acknowledgments

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3. Questions About the Internet in an Educational Setting

3.1 What is the Internet?

   The Internet is a large and rapidly growing worldwide network
   comprised of smaller computer networks, all linked by a common
   protocol, that enables computers of different types to exchange
   information. The networks are owned by countless commercial,
   research, government, and education organizations and individuals.
   The Internet allows the almost 5 million computers [1] and countless
   users of the system to collaborate easily and quickly either in pairs
   or in groups. Users are able to discover and access people and
   information, distribute information, and experiment with new
   technologies and services. The Internet has become a major global
   infrastructure used for education, research, professional learning,
   public service, and business.

   There is a confusing variety of types of Internet access. These types
   of access are distinguished either by the services one can use
   (telnet, Gopher, FTP or File Transfer Protocol, World Wide Web) or by
   the technology underlying the access (the protocol, or rules the
   computers must follow in order to communicate with one another). The
   Internet is most clearly defined by its technology, but other
   technologies now offer access to many of the same Internet services,
   most notably electronic mail and the World Wide Web. The most
   important question for a user today is probably not "Am I on the
   Internet?" but "Do I have access to the Internet services I want?"
   See Section 5, "Questions About Using Internet Services," for further
   discussion of telnet, Gopher, FTP, the World Wide Web, and electronic
   mail.

   While there is no official governing body of the Internet, the
   Internet Society serves as the international organization for
   Internet cooperation and coordination. See Section 9, "Resources and
   Contacts" for Internet Society contact information.

For a more complete basic introduction to the Internet, see FYI 20,
"What is the Internet?" cited in Section 8, "Suggested Reading." For
information on how to retrieve FYI documents produced by the Internet
Engineering Task Force, see Appendix B, "Ways to Get RFCs."

3.2 What are the benefits of using the Internet in the classroom?

The Internet is an exciting classroom resource. It expands the
classroom dramatically by delivering information, data, images, and
even computer software from places otherwise impossible to reach, and
it does this almost instantly. This access to up-to-the-minute
information can make a student's education more relevant. Some of
these materials are original sources which are too expensive or in
other ways difficult for schools to own. Some information is news
unfiltered by mass media, requiring students to critically assess its
content and value.

But the Internet is not strictly a place from which to gather
something. It is also a place to communicate, to make contact with
people all over the world. The Internet brings into the classroom
experts in every content area, new and old friends, and colleagues in
education. And it allows students and teachers to leave the classroom
by sharing ideas with people far away. The isolation inherent in the
teaching profession is well-known among educators. By having Internet
access to colleagues in other parts of the world, as well as to those
who work outside of classrooms, educators are not as isolated.

Your site can become a valuable source of information as well.
Consider the expertise in your school which could be shared with
others around the world. For guidance in finding schools with a
presence on the Internet, see Section 9, "Resources and Contacts."

Use of the Internet shifts focus away from a teacher-as-expert model
and toward one of shared responsibility for learning, making it a
vital part of school reform. Many reform efforts attempt to move away
from teacher isolation and toward teacher collaboration, away from
learning in a school-only context and toward learning in a life
context, away from an emphasis on knowing and toward an emphasis on
learning, away from a focus on content and toward a focus on concepts
[2]. The Internet can play an integral part in helping to achieve
these shifts, since it is well-suited for use as a project resource.
Information on the Internet, as in the rest of the world outside the
classroom, is not divided into separate disciplines such as geometry,
writing, geography, or painting.

As a hands-on classroom tool, the use of the Internet encourages the
kind of independence and autonomy that many educators agree is
important to the learning process. Internet use itself can also be a

motivator for students. Additionally, because class, race, ability,
and disability are removed as factors in communication while using
the Internet, it is a natural tool for addressing the needs of all
students.

There are a number of resources you can use to convince others of the
benefits of the Internet in the classroom. The NASA IITA (National
Aeronautics and Space Administration Information Infrastructure
Technology and Applications) K-12 Internet Initiative has produced an
11-minute video describing the benefits to schools in using the
Internet. Its title is "Global Quest: The Internet in the
Classroom." Another video appropriate for a mixed audience of
stakeholders is "Experience the Power: Network Technology for
Education," produced by the National Center for Education Statistics
in the U.S. Department of Education. Several articles appearing in
various periodicals make a strong case for using the Internet in the
classroom. A particularly good one by Al Rogers of the Global
SchoolNet Foundation is called, "Global Literacy in a Gutenberg
Culture." Student essays can also give compelling testimony. For
information on the Rogers article, see Section 8, "Suggested
Reading." Some student essays can be found on NASA's Quest server
listed in Section 9, "Resources and Contacts," as can information on
the videos.

3.3 Will using the Internet replace teachers?

Just as textbooks, periodicals, videos, guest speakers, and field
trips are often used to support a curriculum, the Internet can be
used as a tool for teaching and learning. This does not mean that it
must be the sole instructional method in a classroom. Teachers will
remain responsible for making educated and informed decisions about
the best way to use the Internet as a tool, just as they do with
other materials used in the classroom. They can also use the Internet
to individualize student learning, making a student's classroom
experiences more relevant.

3.4 Will this technology replace books?

There is room in any school for all kinds of materials and resources.
Books and other print materials will certainly continue to be
important. Internet resources have the advantage of tying together
information from all over the globe, making them useful research
tools. As mentioned before, they can also provide up-to-the-minute
information and are therefore particularly relevant. In addition, you
may be able to engage an expert in a dialog that clarifies or updates
what you find in published materials.

One factor to consider is that much of the material published on the
Internet lacks the authority imputed by an established publishing
house or a reputable author, and may therefore be viewed as less
reliable than books. For example, an encyclopedia or almanac found in
a school library might reasonably be accepted as valid without
question, while a source found on the Internet may require a more
critical look. However, lack of authority is not always a negative.
Reading an account of the fall of the Berlin Wall by a student in the
local region the day it happened can be valuable even if the student
is not a reputable author. Moreover, while it's true that with
Internet materials it becomes increasingly important to evaluate
where they came from, one of the hallmarks of a good education is the
ability to assess information critically, whether the source be
print, television, or some other media.

3.5 How can use of the Internet be integrated into the existing
     curriculum?

This is a key question. In order for the Internet to be used
successfully in schools, it must be employed as a tool to teach
content and to reach educational goals that have already been
established. It cannot be seen as an end in itself.

Individual teachers will first need to become familiar enough with
the Internet to know how to do at least two things: find information
on topics they consider important and locate people with like
educational goals. Sections 5 and 6, "Questions About Using Internet
Services" and "Questions About Classroom Resources, Projects, and
Collaboration" will give you some ideas about how to begin.

Once they are familiar with how to find content on the Internet, most
teachers can decide how to use Internet resources to help their
students meet goals. For example, science teachers often teach about
hurricanes and other weather phenomena in the normal course of
instruction. With Internet access they can use information and
satellite data pertaining to the most recent storm to make their
points, rather than outdated examples from textbooks.

When teachers become familiar with finding other people on the
Internet, some of them already grouped into network "communities" of
interest, they can gain experience in using the Internet from
educators who have been using it longer; they can join existing
projects, contribute to the evolution of proposed projects, and
propose their own projects; and they can ask for and give help to
solve problems in the classroom ranging from the content they teach,
to addressing students as individuals, to mastering effective
discipline.

Internet access supports project-based learning. A teacher in an
individual classroom can use the data and information available on
the Internet as a resource for classroom projects, and there are also
a variety of projects which take place over the Internet in more than
one classroom at a time. A project may be initiated by any educator
with an idea. A popular example of an educator-initiated project is
one which requires data to be collected from diverse sites around the
world or at least around the country. For example, together students
in various locations have tracked butterfly and bird migrations,
compared bodies of water, and measured the north-south circumference
of the Earth. Various organizations also run projects in which
schools can participate. Among the many groups which have invited
schools to participate in projects with a focus on a specific topic
are the Global SchoolNet Foundation, The European Schools Project,
the International Educational and Research Network (I*EARN), and
groups associated with such federal agencies as the Department of
Energy, the United States Geological Survey, and the National
Aeronautics and Space Administration.

The Internet can also be used for peer review of student materials;
as a medium for publishing student newspapers, art exhibits, and
science fairs; and in a global email pen-pal program for the
discussion of classroom topics.

It cannot be stressed enough that the key factor these Internet uses
have in common is that they are supporting classroom curriculum, not
defining it.

Learning about the Internet and how to use it is an important goal
for any school's Internet program, but in the classroom, the message
needs to be emphasized over the medium.

There are several sources of material for discussing curriculum
infusion, including mailing lists, World Wide Web sites, and archives
of sample lesson plans. Most of the mail lists, Internet computers,
and organizations in Section 9, "Resources and Contacts," address
infusion of technology into the curriculum. See also Appendix C,
"Examples of Educational Projects Using the Internet."

4. Questions About Getting the Internet into the School

4.1 How much does it cost to connect to the Internet, and what kind of
     equipment does my school need to support the Internet connection?

   The cost of an Internet connection varies tremendously with the
   location of your site and the kind of connection that is appropriate
   to your needs. In order to determine the cost to your school, you
   will need to answer a number of questions. For help in learning what

the questions are and getting answers to them, begin asking at local
colleges, universities, technology companies, government agencies,
community networks (often called "FreeNets"), local electronic
bulletin board systems (BBS), Internet access providers, or
technology consultants. See also Question 4.6.

To give you an idea of possible cost and equipment needs, think of
four groups of Internet users. We will call them basic individual
users, advanced individual users, school networks, and school
district networks.

How you approach acquiring service depends on which category you feel
best describes your needs. This discussion is based on experiences in
the United States. (For more information on the Internet services
you'll be reading about in this section, see Section 5, "Questions
About Using Internet Services.")

Basic users are individuals who want to access common Internet
services such as the World Wide Web, Gopher, and email. There are two
types of basic users: those who plan to be online for a few hours per
week, and those who plan to be online for many hours per day.

Basic individual users who require access to common Internet services
such as Web pages, FTP sites, and email for only a few hours per week
may be best served by one of the nationwide online services such as
America Online, CompuServe, or Prodigy. These services have the
advantage of providing the user with a simple setup and easy,
graphics-based access screens which hide the complex commands
required by some Internet services. They also provide value-added
services not available via the general Internet, such as access to
news magazines and encyclopedias. Hardware required is generally a
standard Windows-based PC or Macintosh and a 14.4 kilobits per second
(Kbs) or higher modem. At the time of this writing, prices typically
run around $10 per month for the first 5 hours of connect time, and
$2-4 per hour thereafter.

Basic individual users who access common Internet services for many
hours per day should consider a "shell" account from a local Internet
Service Provider (ISP). Shell accounts generally provide access to a
Unix computer which is connected to the Internet, so those choosing
this option should be prepared to learn a few Unix commands. Shell
account users will get all the standard Internet services but at a
cheaper rate, generally in the $30 per month range for 6 hours per
day access plus $1-2 per hour for extra hours. Most shell account
vendors do not provide nationwide access, and shell accounts do not
have graphical user interfaces, so you cannot use Web browsers such
as Netscape and Mosaic. While you may be able to use Lynx, a text-
based browser, some ISPs do not install it on their computer servers.

Many FreeNets also offer shell account access gratis, but they may
not be able to offer much support.

In the United States, there are a number of statewide educational
networks, most of them with access to the Internet. To find out if
there is a state education network in your area which gives basic
user accounts to educators and/or students, contact the Consortium
for School Networking (CoSN) or consult the document "Getting US
Educators Online" by Linda Conrad, listed in Section 8, "Suggested
Reading."

Advanced individual users are those who want graphical user
interfaces to Internet services and who may want to use their
computers to offer services to other Internet users. For example,
they may want to create Web pages for others to access or put files
online for others to retrieve. If you are an advanced user, you might
consider getting a Serial Line Internet Protocol (SLIP) or Point to
Point Protocol (PPP) account from an Internet Service Provider. The
interface is similar to that of nationwide online services available
to basic users, but the performance is better and the cost is less
for someone who wants to use the service for more than just a few
hours per week.

Setting up a SLIP or PPP account requires configuration and
installation of Internet and SLIP/PPP software. Some ISPs only
provide the software, some will install the software for you, and
some preconfigure the software and send it on disk, with instructions
to the user, via postal mail. Again, hardware required is generally
a standard Windows-based PC or Macintosh and a 14.4 Kbs or higher
modem. Costs are generally comparable to basic shell accounts, but
for 24-hour connections expect to pay $100 or more per month.

If in your school you plan to have more than a few individual
Internet users, you will need to consider a network with a high-speed
dedicated line connected to the Internet. This school network is
probably a small- or medium-sized network in a single building or a
very few geographically close buildings. It may include only one or
several LANs.

Most high speed connectivity is provided through a dedicated leased
line, which is a permanent connection between two points. This allows
you to have a high quality permanent Internet connection at all
times. Most leased lines are provided by a telephone company, a cable
television company, or a private network provider and cost $200 per
month or more. Typically the connection from your LAN or LANs is a
digital leased line with a Channel Service Unit/Data Service Unit
(CSU/DSU) which costs between $600 and $1000. Less frequently, the
connection is an analog leased line with a modem which costs between

$200 and $800. You will also need a router which costs roughly $1500.
This is a substantially more difficult setup to manage. After you
have determined the ways in which you believe you will use Internet
access, you should contact several ISPs in your area and compare
prices and services.

School district networks are even more complex. If you have several
locations which require connectivity, you should contact several ISPs
and get bids for the service.

The ISP world is changing very rapidly, especially at the low end. At
the time of the first edition of this document, local ISPs were rare,
small, and fairly expensive. At the time of this writing ISPs abound,
offering a wide variety of services at reasonable prices.
Additionally, several groups are working on low-cost solutions to
school networking. Subscribe to the mail lists in Section 9,
"Resources and Contacts," to keep abreast of new developments.

"Getting US Educators Online" and "Connecting to the Internet: An
O'Reilly Buyer's Guide" by Susan Estrada are both listed in Section
8, "Suggested Reading." Other books about the Internet and how to get
connected to it are available and new ones are being published. Check
libraries, bookstores, and booksellers' catalogs. Two lists of
Internet providers available via the World Wide Web can be found in
Section 9, "Resources and Contacts" along with the Consortium for
School Networking. The global regional Network Information Centers
(NICs) such as the Reseaux IP Europeens Network Coordination Centre
(RIPE NCC) in Europe can also provide a list of service providers.
The Asia Pacific Network Information Center (APNIC) in the Pacific
Rim will have a similar list in the near future. These two NICs are
listed in Section 9, "Resources and Contacts."

4.2 What are the other costs associated with having Internet access?

When budgeting for your school's Internet connection there are a
number of factors to consider that might not seem immediately
obvious. Technical support and training will incur additional ongoing
costs, even if those costs show up only as someone's time. Equipment
will need to be maintained and upgraded as time passes, and even when
all teachers have received basic Internet training, they will most
likely have questions as they explore and learn more on their own. A
general rule for budget planning is this: for every dollar you spend
on hardware and software, plan to spend three dollars to support the
technology and those using it.

It will be necessary for your school to have some technical expertise
on-site. (See also Question 4.4.) Your network access provider may
offer training and support for technical issues, and other groups

also offer formal classes and seminars. If your school has designated
technical personnel, they will be good candidates for such classes
and seminars. If your school does not have designated technical
personnel, a teacher or other staff member with a strong interest may
take on the task of becoming the local expert, but a better solution
is to have someone dedicated to this at least part time. Students can
help local experts maintain equipment and do other tasks, which
allows them to learn new skills at the same time.

Training is an equally significant component to deployment of the
Internet in schools. Most teachers learn about the Internet during
the time they use to learn about any new teaching tool, which often
means they "steal" time at lunch, on weekends, and before and after
school to explore resources and pursue relationships via the
Internet. When a school is committed to providing the Internet as an
educational resource, the administration will make in-service time
available. It will also ensure that someone at the school is
sufficiently knowledgeable to field questions and help people as they
risk trying new ways of teaching using Internet resources. Again,
some students make excellent tutors.

Some technical support and a variety of training materials can be
found by using the Internet itself. You can send questions to people
in the know and join discussion lists and news groups that discuss
and answer questions about support and training. The Edtech mail list
is one such list. Some World Wide Web sites offer technical support
information. Videos also help bridge the information gap. See
Section 9, "Resources and Contacts," for a preliminary listing of
these resources. Your local community may also have resources. These
include colleges and universities, businesses, computer clubs and
user groups, technology consultants, and government agencies.

4.3 How can my school afford access to the Internet?

Although school budgets are impossibly tight in most cases, the cost
of an Internet connection can be squeezed from the budget when its
value becomes apparent. Costs for a low-end connection can be
reasonable. (See the next question.) The challenge facing those
advocating an Internet connection sometimes has less to do with the
actual cost than it has with the difficulty of convincing
administrators to spend money on an unfamiliar resource.

In order to move the Internet connection closer to the top of your
school's priority list, consider at least two possibilities. First,
your school may be in the process of reform, as are many schools. As
mentioned earlier, use of the Internet supports reform efforts, so
framing Internet access as a component to systemic reform may help to
persuade some people. Second, to convince people of the value of a

connection, an actual Internet demonstration can be more useful than
words. While this may sound like a chicken-and-egg situation (I need
Internet access to get Internet access), some organizations will
provide guest accounts on an Internet-connected computer for people
in schools who are trying to convince others of the value of an
Internet connection. Another way to begin using Internet services is
to sign up for one of the popular online services such as America
Online, CompuServe, or Prodigy. Once subscribed, you can use these
services either from home or from school. This method is recommended
only as way to introduce yourself and others in your school community
to the value of the Internet. It is not a good long-term solution to
providing Internet access for a lot of users at one site such as a
school.

Contact local colleges, universities, technology companies, service
providers, community networks, and government agencies for both guest
accounts and funding ideas. For alternatives to your own school's
budget or for supplements to it, look for funding in federal, state,
and district budgets as well as from private grants. Work with
equipment vendors to provide the hardware needed at low or no cost to
your school, and consider forming a School/Community Technology
Committee, or a joint School District/School/Community Technology
Committee. Also investigate the possibility of a back-door connection
to a local college or university. Service providers often allow
schools to connect to higher education sites at a lower cost.

A number of sites on the Internet provide more information about
grants and organizations that offer them. Two in particular that you
may find useful are Grants Web, for grant information of all kinds,
and the Foundation Center, for information on private and nonprofit
organizations. For information on where to find these sites on the
Internet, see Section 9, "Resources and Contacts."

4.4 What organizational structure needs to be in place in order for my
     school to have Internet access?

Schools and school districts have devised structures that vary
widely, depending on a school's particular requirements. In many
schools, the librarians/media specialists guide the development of
the network and policies on its use and serve as the top of the
structure within the school. In other schools, an interested teacher
becomes the driving force behind getting the Internet into the school
and may be the most appropriate person to see the project through.
The school administration, if not the guiding force, needs to be
behind the plan to bring the Internet into the school. And all other
parties who might have a stake in the development should be brought
in as early as possible, whether or not they are knowledgeable about
the Internet. These might include area businesses, community leaders,

teachers with Internet access at home, the librarian or media
specialist, parents, and anyone in the school who finds the idea of
bringing the Internet into the school appealing. In short, any
organizational structure will do as long as it is clear and simple
and includes the people who might have a stake in the process of
bringing the Internet into the school.

One way to ensure that an organizational structure develops and that
the right people become involved is to invite a wide variety of
people to create a technology plan for the school. The by-product of
technology planning can be the development of an organizational
structure, but of course the planning is useful in itself to help
your school define and meet goals for Internet and other technology
use. The National Center for Technology Planning hosts a collection
of technology plans and planning aids for people who need help, new
ideas, or solutions as they tackle technology planning in their
schools or districts. Information on the National Center for
Technology Planning can be found in Section 9, "Resources and
Contacts."

No matter what the structure, there should be someone at the school
who can take the lead in working with vendors and Internet Service
Providers (ISPs). This person should be knowledgeable about - or
willing to learn about - the technical aspects of connecting to the
Internet, including knowledge about any networks the school already
has in place. The lead person should have an alternate so that the
school is not completely dependent on one person. If your school
hires an independent consultant, someone at the school should be
aware of everything the consultant does and should receive at least
some training in the areas of the consultant's work.

Another role that must be filled is that of in-house network
administrator. Having an already busy teacher take on this role as an
extra duty is a bad idea; a greater time commitment is needed.

4.5   What questions do I need to ask people who are selling network
      services?

There are a number of questions you should ask. Anything you hear
that you don't understand must be questioned. If a vendor knows the
product and the process well, he or she should be able to explain in
terms you can understand.

You should also ask any kind of vendor how available they are and at
what point they either stop helping you or begin charging by the
hour. Get references from other customers, preferably including at
least one school which has requirements similar to yours.

Questions for LAN vendors:

If the school has not yet purchased a Local Area Network (LAN),
ask the LAN vendor how the product will interact with TCP/IP.
(TCP/IP stands for Transmission Control Protocol/Internet
Protocol, the technology which forms the basis of the Internet.)
If necessary, arrange a meeting with the LAN vendor, the ISP, and
any consultants that may be involved.

Make a list of the school's requirements, including security, the
number of computers on the LAN which will have Internet access,
and the Internet services you want students and teachers to be
able to use. (See Section 5, "Questions About Using Internet
Services," for an introduction to the services.) Ask the vendors
if they can provide services that will meet your requirements.

Questions for Internet Service Providers:

In general, ask the ISP what services are included with your
purchase of Internet connectivity.

Will they terminate the circuit in a router and leave you to your
own resources to take care of the "LAN side" of the connection?

Will they provide a primary domain name server for you?

Will they register your domain name with the InterNIC?

Are they providing you with all the IP addresses you need?

Will they help you with security issues?

Do they provide a newsfeed or a newsreading service? (Do you know
the difference?)

If they agree to do some work on the LAN side, what is the extent
of that work? (Configure individual computers? Handle subnetting
and routing issues?)

Will they answer questions from your network administrator?

Will a dedicated computer be needed as an Internet server for such
things as domain name service, the World Wide Web, Gopher, and
FTP?

Do they provide any training sessions for your staff and are these
sessions included in the connectivity price?

Do they offer any other classes or seminars and are these included
in the connectivity price?

Does the ISP do their own training or do they contract to someone
else, and if the latter, who is it? Check references on any
contractors.

Questions for Internet Service Providers furnishing dial-in
service:

There are some specific questions you should ask of an ISP who is
providing dial-in connections. (See Question 4.7 for a further
discussion on dialing in from home.)

What is the charge per minute for connectivity?

Is SLIP or PPP connectivity available?

Will the ISP be providing software which allows you to use
Internet services such as email and the World Wide Web or will
they help you obtain it?

Will they help you install it?

Ask for references of other clients using dial-in service and when
you check them, one of the questions to ask other customers is if
they encounter lots of busy signals. (You can also check this
yourself by trying the access provider's dial-in number at various
times during the day. Just dial it by phone and see how many busy
signals you get.)

4.6 How many of our computers should have Internet access and where
     in the school should they be located?

You should make Internet access possible for as many of your school's
computers as possible. Ideally, you have computers located throughout
the school - in classrooms, the library, and laboratories - and they
are all connected together with printers and other peripherals in one
or more LANs. In that case, you acquire one dedicated Internet
connection of 56 Kbs (Kilobits per second) or higher to serve the
whole school.

If your budget and existing computer equipment are both limited, you
can use a dial-up service and a modem to access the Internet, but in
most cases that will only be viable for one computer at a time. As
use of the Internet catches on in your school, it will eventually be
more effective for you to create the LAN with Internet access
mentioned above than to keep adding modems in classrooms.

If you must choose between Internet access in one lab in the school
or Internet access for the same number of computers throughout the
school, in order to get teachers to use the access you must make it
available where they can most easily take advantage of it. This
usually means that you make access available throughout the school.
Although a computer lab is an easier maintenance set-up for the
person in charge of keeping the equipment running and allows each
individual (or pair) in an entire class to be using a computer at the
same time, a computer located in the classroom is more convenient for
both the teacher and the class. Internet resources can be more easily
integrated into a classroom lesson, and the emphasis remains on using
the Internet as an instructional tool. Since only one or two
computers can usually be placed in each classroom, teachers will
learn to allocate computer time creatively. And if you are able to
provide only a few computers throughout the school, make sure that at
least one of them is in the library where all students will have the
chance to be exposed to the Internet as a resource.

Networking all computers campus-wide can be expensive. You may want
to investigate initially giving one lab, the library, and a few
classrooms dial-up access, assuming phone lines are available. Even a
connection to only one classroom as a demonstration may help you to
garner more support for creating a campus-wide local area network
that is routed to the Internet through a dedicated line.

4.7 Can people get on the Internet from home?

This depends on your network access provider. It is certainly a
possibility and is definitely desirable for the educators at your
school. To make it possible for teachers and other staff to dial in
to the school network (and then out to the Internet) from home, you
will need to employ, at the least, multiple phone lines and modems.
Talk to your service provider about other technical requirements.

Many teachers like to be able to learn at home as well as on school
grounds, and having the ability to explore when they have the time is
invaluable. One school district we know of made low-interest loans
available to teachers so that they could buy home computers. When the
technology was later made available in their classrooms, they already
had some experience and were comfortable beginning to use it in day-
to-day instruction.

The question of whether or not to make the option to dial in from
home available to students is more difficult. On one hand, a school
may not be able to escape the idea that it is responsible for how
students use the Internet access it provides, even though the school
has no control over the home environment. On the other hand,
particularly in high school, much schoolwork is done at home. Since

most classrooms don't have enough computers for all students to
access the Internet at once, it is even more likely that work will
not be completed during class time. Having Internet access from home
becomes more important.

Discussion of whether or not you want to make this option available
to students - even if it is technically possible - should involve as
many school partners as possible, including faculty, administration,
parents, and other community members. It might take place in a public
forum such as a school/community meeting.

5. Questions About Using Internet Services

The way to find people, information, software, and anything else on
the Internet is generally to use either printed or electronic guides
and Internet services. In this section we will concentrate on the
services. (See Section 6, "Questions about Classroom Resources,
Projects, and Collaboration," for information on guides.) We answer
more questions about the World Wide Web than about other online
services for three reasons. First, the World Wide Web is the
Internet tool coming into most prominence at the time of this
writing. Second, many (if not all) of the other services are included
seamlessly in the Web; that is, they're there, but you may or may not
realize you're using them. Third, making your way around the Internet
using the World Wide Web is easy; for people not interested in
computers, access to the Internet and has become less frustrating.

This is not to say that finding what you want is always simple. The
Internet is like a vast library without a comprehensive card catalog.
New ways to do indexing and searching are being devised and employed,
and you'll need some time to learn how to use them.

5.1 What is the World Wide Web?

The World Wide Web (WWW) is a project initiated by the European
Laboratory for Particle Physics (CERN) located in Geneva, Switzerland
and currently driven by the World Wide Web Consortium. When exploring
the World Wide Web, users navigate through documents by selecting
highlighted text that leads to another document or location. The
highlighted text can be called a "pointer," a "link," or an "anchor."
This navigation results in a three-dimensional exploration of
documents instead of a flat text document. The World Wide Web
incorporates different media into its documents, including text,
sound, graphics, and moving images.

The World Wide Web presents either a graphical or a text interface to
numerous Internet resources. Not only can users access documents
specifically designed for the Web, they can also view documents on

Gopher servers, use FTP to download files, and launch a telnet
session. Some World Wide Web clients also allow for the use of email
and Usenet news. This is an easy-to-use, nonthreatening way to
approach the Internet, and does not require in-depth technical
knowledge. (See Question 5.5 for a discussion of these other
services.)

5.2 How do I connect to the World Wide Web?

First, you will need at least a SLIP or PPP connection. (See Question
4.1 for more information; SLIP or PPP is the "advanced individual
user" solution described there.) Accessing the Web is like using any
other service on the Internet: you run a client on your computer
which accesses a server, in this case a Web server, running on
another computer. In Web terms, the client is called a browser. The
browser retrieves and reads documents from Web servers. Information
providers establish Web servers for use by network users, and when
you become proficient at using the Internet, you may want to become
exactly that kind of information provider.

Most Web browsers share common features. One feature is the hotlist,
or bookmark. This allows you to mark your favorite sites. Your
browser will store these sites and their addresses and allow you to
revisit them later by simply selecting the name of a site from a
menu. Another feature common to most browsers allows you to save the
current file to your local disk. Some browsers keep a tally of the
sites you've visited recently and allow you to revisit them without
typing in the location again. Every browser is different, so it pays
to explore your own client software and learn its features through
practice. Most people, even those with little computer experience,
find that it's easy to learn to use a browser just by exploring on
their own.

Each document contained on Web servers across the Internet has a
unique address. This is called a URL, a uniform resource locator.
Browsers negotiate URLs just like mail software negotiates email
addresses. Users can type in the URL for the browser to access. URLs
are also embedded in a Web document's text, providing a seamless link
to another location or document.

5.3 How is the World Wide Web linked?

The Web functions as a distributed hypermedia system. The purpose of
this system is to allow the exchange of information across the
Internet in the form of hypertext documents called Web pages or home
pages. Hypertext is text with pointers or links to further
information in various formats (text, graphic, video), allowing you
to branch off to another document for more information on a given

topic, and then return to the same location in the original document
with ease. Pointers in a Web document are analogous to HyperCard
stacks or Microsoft help files in which you click on an option (a
pointer or a link) and the program moves you to another document, or
location.

Documents published on the Web are constructed in hypertext markup
language, or HTML. This is a simple language that allows you to
format text, insert images and sound, and create links in a document.
Tutorials on creating Web services are available at the NCSA Mosaic
Home Page, the automatic starting place for Web exploration when
using the Mosaic client. There are also Web page creation resources
listed in Section 9, "Resources and Contacts."

5.4 Where do I get a World Wide Web browser?

The two most common graphical Web browsers at the time of this
writing are Netscape and Mosaic. Netscape is a commercial product but
is currently free for educational use. Mosaic is free. Both of these
packages are available for Macintosh, PC, and Unix platforms through
the Internet. See Section 9, "Resources and Contacts," for details.

For those users with lower-speed connections that cannot accommodate
full graphical browsers, there is a text-based browser available for
Unix systems called Lynx. A public-access Lynx client is accessible
through telnet at the server of the World Wide Web Consortium, which
is listed in Section 9, "Resources and Contacts."

Many commercial online services, such as CompuServe, Prodigy, and
America Online, include a Web browser as part of their offerings.
More and more often, Web browsers are being included as part of the
standard connection software provided by the Internet Service
Provider.

5.5 What are the other services on the Internet?

There are a number of other services to help you get around on the
Internet. The most common ones are described here. For more
information, see "EFF's (Extended) Guide to the Internet" by the
Electronic Frontier Foundation, and "The Whole Internet User's Guide
and Catalog" by Ed Krol, both of which are listed in Section 8,
"Suggested Reading," in addition to the Glossary entries mentioned
for each tool.

Email. Email is probably the most basic tool on the Internet. It is
short for electronic mail and may be used in a couple of ways. You
can send messages back and forth with just one person, or you can
participate with a group of people who discuss topics of common

interest. These groups are called mail lists. You join and leave the
lists by sending email to one address, and you post messages to all
the people on the list by sending email to a slightly different
address. Sometimes a human does the list registration and sometimes a
software program does it. For more information see the entries for
email and mailing lists in the Glossary. A list of mail lists
related to primary and secondary education can be found in Section 9,
"Resources and Contacts."

Network News. Also known as Usenet News or Net News. Reading news is
similar to joining an email list, but instead of the messages coming
to your mailbox, you use news reader software to read messages on a
computer where they are accumulated. For more information see the
entry for Usenet News in the Glossary.

FTP. FTP stands for File Transfer Protocol, and just as the name
implies, it allows you to transfer files from one computer to
another. It is the name for both the protocol and the program. A
special kind of FTP, Anonymous FTP, allows you to access the many
public archives on the Internet. FTP is not used by itself as much as
it used to be, since people often use Web browsers and Gopher clients
which incorporate FTP when they want to retrieve files. For more
information see the entries for Anonymous FTP and FTP in the
Glossary.

Telnet. Telnet allows you to log into a computer somewhere else on
the Internet and use the services there. For example, if you don't
have a Gopher client or a Web browser, there are some public access
sites that you can telnet to in order to use a Gopher client or a
text-based Web browser.

Gopher. Gopher is a tool that lets you browse for information on the
Internet using menus. If you know what you're looking for and have an
idea about where to find it, Gopher can make your search easier. And
when you have located something of interest, whether it's a document,
a data set, or a picture, Gopher will retrieve it for you. For more
information see the entry for Gopher in the Glossary.

Searching and Indexing Tools. Archie is a tool for searching FTP
sites; Veronica (Very Easy Rodent-Oriented Network Index to
Computerized Archives, which works the same way Archie does) is a
tool for searching Gopherspace; WAIS (Wide Area Information Service;
pronounced "wayz") is a tool for searching indexed databases, whether
the databases are full of numbers, text, or graphics files; and
Yahoo, Lycos, and WebCrawler are some of the many searching and
indexing tools available on and for the World Wide Web. For more
information see the entries for Archie, Gopher, WAIS, WWW, and
Veronica in the Glossary.

Videoconferencing. At the time of this writing, schools are beginning
to participate in conferences, meetings, and collaborative activities
via video. The two services or applications used are Multicast
Backbone (MBONE) and CU-SeeMe, both of which allow for desktop
videoconferencing, or videoconferencing via computer.

MBONE is an option for videoconferencing using several operating
systems at the time of this writing: Unix, Windows NT, Windows 95,
and Mac Operating System 7.5.2. It requires that your Internet
service provider be a part of the MBONE, which depends on a
specialized routing strategy. Ask your service provider if they are
equipped to support MBONE traffic. If so, you will need to work
fairly closely with your provider to establish working configurations
for your network. More information on MBONE is available at the MBONE
Information Web. (See Section 9, "Resources and Contacts.")

CU-SeeMe, developed by Cornell University, also presents conferencing
capabilities over an IP network. You may participate in a CU-SeeMe
videoconference as a sender, a recipient, or both. Through use of
reflectors, multiple sites may participate in any given conference.
For any of these activities, you'll need a PC or a Macintosh with a
connection to the Internet and CU-SeeMe software. Additionally, if
you'd like to send video and audio, you will need a video camera and
a video board in your computer. Full information on the hardware
requirements is available at the CU-SeeMe Web site; there is also a
mailing list for CU-SeeMe information. For guidance and discussion
about using CU-SeeMe as an instructional tool, the Global SchoolNet
Foundation hosts a mail list called cu-seeme-schools which announces
opportunities for participation in CU-SeeMe events. For information
on the Web site and mailing lists, see Section 9, "Resources and
Contacts."

6. Questions About Classroom Resources, Projects, and Collaboration

6.1 How can I find specific projects using the Internet that are
     already developed?

When you have learned to use some of the Internet services discussed
in Section 5, "Questions About Using Internet Services," particularly
the search tools, you will be able to answer that question more fully
for yourself. In the meantime, since there are several resources on
the Internet that are directed specifically at the primary and
secondary school communities, here are some ideas to get you started.

Computer Information Servers:

Global SchoolNet. The Global SchoolNet Foundation's World Wide
Web site contains a wealth of valuable information and materials,
including help setting up projects by learning what has worked
best based on others' experience. The GSN site also contains a
landmark registry of projects in which schools can participate.

EdWeb. Andy Carvin's EdWeb is an excellent source of K-12
information.

CoSN. The Consortium for School Networking maintains an Internet
server.

NASA. NASA's Spacelink and Quest are directed at primary and
secondary school educators, and both house lesson plans,
Internet-based curriculum units, and interactive projects and
activities. Many NASA projects also maintain computer information
servers.

Empire Internet Schoolhouse. The New York State Education and
Research Network (NYSERNet) hosts the Empire Internet Schoolhouse,
an extension of its Bridging the Gap program.

K-12 Schools on the Internet. Gleason Sackman of North Dakota's
SENDIT network for K-12 educators maintains an active list of K-12
schools on the Internet.

National School Network Testbed. The Bolt Beranek and Newman
(BBN) project called the National School Network Testbed provides
links to numerous schools and projects.

Internet School Networking. The Web pages for the group which
brings you this paper contain a collection of documents and case
studies on projects.

Mail lists:

Many people on electronic mailing lists such as Ednet, Kidsphere,
and the Consortium for School Networking Discussion List post
their projects and ask for partners and collaborators.

News groups:

The K12 hierarchy of Usenet News has several groups where
educators post these invitations as well. For subscription to
these and other electronic lists and for names of news groups see
Section 9, "Resources and Contacts."

Conferences:

There are also a number of conferences worth looking in to. The
National Education Computing Conference (NECC) and Tel-Ed, both
held annually, are conferences sponsored by the International
Society for Technology in Education (ISTE). The Internet Society
(INET) conference is the annual conference for the Internet
Society. See Section 9, "Resources and Contacts" for contact
information for these organizations.

Specific computer information servers, mail lists, news groups,
and conference sponsors are listed in Section 9, "Resources and
Contacts." A number of Web sites also provide favorite
"bookmarks," or lists of sites for educators. Bookmarks are not
included in Section 9, but you will quickly find them if you begin
at any of the Web server entry points listed here.

6.2   What are some examples of how the Internet is being used in
      classrooms now?

Projects which use the Internet sometimes request sites from all over
the world to contribute data from the local area then compile that
data for use by all. Weather patterns, pollutants in water or air,
and Monarch butterfly migration are some of the data that have been
collected over the Internet. In Appendix C, "Examples of Educational
Projects Using the Internet," you will find several examples
collected from various online servers and electronic mailing lists
pertaining to education, each from a different content area and
representing different ways of using the Internet. Some of the
projects require only that you be able to use email, some require
that you have access to the most advanced Internet services, and some
offer varying levels of participation.

There are a number of specific projects you may find interesting:

KIDS. KIDS is a project managed by the nonprofit KIDLINK Society. It
includes discussion lists and services, some of them only for people
who are ten through fifteen years old.

Academy One. Academy One is part of the National Public Telecomputing
Network (NPTN) and usually has a number of projects running at a
time.

I*EARN. The International Education and Research Network (I*EARN), a
project of the nonprofit Copen Family Fund, facilitates
telecommunications in schools around the world.

Chatback Trust. Initiated to provide email for schools in the United
Kingdom and around the world with students who have mental or
physical difficulty with communicating, Chatback Trust and Chatback
International maintain a network server that you may want to
investigate.

ESP. The European Schools Project (ESP) involves approximately 200
schools in 20 countries and has as its goal building a support system
for secondary school educators.

Electronic Field Trips. The online interactive projects on NASA's
Quest server and the JASON Project are designed especially to provide
classroom contact with real science and scientists.

For contact information on these groups and computer information
servers refer to Section 9, "Resources and Contacts."

6.3 Are there any guides to using the Internet in schools that list all
     these resources in one place?

Printed guides to using the Internet in education are appearing along
with the new books on the Internet and you can expect to see more in
the near future. The problem with paper resource guides is that the
Internet is a changing environment so they become outdated quickly.
Most (like this document) try to list only the most stable resource
sites, and even if not everything you try is available, these guides
can be particularly helpful if you are new to the Internet. Try the
books entitled "Education on the Internet," "Teaching with the
Internet: Putting Teachers Before Technology," and "Brave New
Schools" listed in Section 8, "Suggested Reading," for a sampling of
those available at the time of this writing. Check bookstores,
libraries, and booksellers' catalogs for others.

One answer to the problem of printed Internet guides is the
newsletter. Two we recommend are specifically for primary and
secondary school educators interested in networking and contain
information on new services on the Internet that are of interest to
educators, projects for collaboration, conferences, new books and
publications, essays, and practical tutorials on using network tools
and services. NetTeach News is published ten times a year and is
available both hardcopy and via email. Classroom Connect is
published nine times a year. Information on subscribing and related
online services for both newsletters can be found in Section 9,
"Resources and Contacts."

Internet computers which act as guides to the Internet for educators
are, among others, BBN's Copernicus server, the Global SchoolNet
server, NASA's Quest server, the University of Illinois College of

Education's Learning Resource Server, and Web66. All are listed in
Section 9, "Resources and Contacts."

6.4 How can I add my own contributions to the Internet?

In addition to sharing your knowledge and expertise on the electronic
mail lists and news groups mentioned, as you gain experience you may
find you have the knowledge and inclination to put up a Web page for
your own site. Many K-12 schools are maintaining Web pages, either
on Web servers they set up at the school or on a computer at another
site, to publish student projects and information about their
schools. Gleason Sackman's Hot List of K-12 Internet School Sites and
Web66 offer a comprehensive listing of these schools and provide
links to their home pages. These pages may give you ideas about ways
your school can use the World Wide Web to contribute to the K-12
Internet community. There are also a number of sites which give
instruction in how to publish on the Web and how to maintain Web
sites, including Web66, the National Center for Supercomputing
Applications (NCSA), and the Geometry Forum. For the Internet
locations of these resources see Section 9, "Resources and Contacts."

7. Questions About Security and Ethics

7.1 I've heard that there is a lot of objectionable material on the
     Internet. How do I deal with that problem?

Because sensational media accounts tend to downplay the educational
uses of the Internet in favor of the more controversial material
available, this will almost certainly be an issue raised when you
discuss getting an Internet connection in your school. Concerned
educators should learn more about this issue and formulate a strategy
for resolving problems before they arise. One important point to
realize early is that students do not accidentally bump into
objectionable material in the course of most educational
explorations. Although we are not suggesting that people never run
across objectionable material by chance, most find this material only
because they're looking for it.

At the time of this writing the most important and effective action
schools can take is to develop clear policies to guide students' use
of the Internet and establish rules - and consequences for breaking
them - that govern behavior on the Internet. These policies, called
Acceptable Use Policies (AUPs), work best when they are in line with
rules governing other behavior at school. Additionally, schools
should integrate issues around technology and ethics into the
curriculum [3]. Schools need to exercise reasonable oversight while
realizing that it is almost impossible to absolutely guarantee that
students will not be able to access objectionable material. It may be

wise to make this clear to parents and students before a student is
given access to the Internet. To limit a school's liability, some
systems obtain signed releases from students and parents stipulating
that they have read the AUP and that the student agrees to abide by
it.

Several commercial software products are available which attempt to
address the problem of access to objectionable material. They block
access to controversial sites, look for specific text in email
messages, or do both. Some can be configured in the home or school
and some block a preconfigured collection of sites which is
maintained and configured by the company.

Some success has been achieved through the use of proxy servers. A
school hooks up all its computers to a single computer that has full
Internet access. This computer server then becomes the gateway to the
Internet for all of the school computers. The server can be
configured to mask away sites that have objectionable material,
including Web pages, Gopher and FTP sites, and network news and WAIS
servers. One further step can be taken by also installing a caching
server on the gateway machine. A caching server can hold Web pages
locally after they have been retrieved from other sites. Once a page
has been loaded into the server it can thereafter be fetched from the
cache, useful if a set of Web pages needs to be accessed frequently
from a site that is usually busy.

Although proxy and caching servers are relatively easy to set up by a
system administrator, entering all the sites that are objectionable
and keeping the cache up to date can be time consuming. Also, this
method does not stop teachers and students from receiving and sending
objectionable material as email attachments.

The store-and-forward method is one way to filter information to
which students are exposed. Usenet News and email (both described in
Section 5, "Questions About Using Internet Services") are "stored" on
a computer until the time appointed for that computer to contact the
next one along the path to the final destination, at which time it is
"forwarded" along its way. Most computers are set up to process
outgoing requests at least every 30 minutes. This method requires
quite a bit of management on the part of humans.

It is also possible to control the times and opportunities that
students have to access the Internet and only allow access under
supervision. Many teachers find that engaging their students in
meaningful, supervised learning activities operates as an effective
deterrent to unauthorized Internet exploration.

At the time of this writing none of the technical solutions discussed
above has proven wholly successful in addressing the problem of
student access to controversial material. However, this area is
currently the focus of intense development efforts. In the mean time,
these solutions may be used in combination with clear policies and
consequences for breaking them to ensure the integrity of the school,
its students, and its educators. No matter what option or combination
of options you choose, teaching the ethics of Internet access as a
matter of course is imperative.

There are resources for further exploration of the issue of students
and objectionable material available on the Internet. The National
Center for Missing and Exploited Children has produced a sensible and
practical brochure entitled, "Child Safety on the Information
Highway," written by Los Angeles Times columnist Lawrence J. Magid.
It is available both online and hardcopy. Another good document,
"Internet Parental Control Frequently Asked Questions," describes the
tools available at the time of this writing to help with issues of
children using the Internet, from guidance by parents to government
restrictions to rating and filtering systems. It is produced by the
Voters Telecommunications Watch and is available on the Internet.
There is also at least one mailing list which you may want to join
called Children Accessing Controversial Information (CACI). For
information on all of these, please see Section 8, "Suggested
Reading," and Section 9, "Resources and Contacts."

7.2 How do we keep our own and other people's computers safe from
     student "hackers"?

In the language of computer folks, a "hacker" is someone who is
excellent at understanding and manipulating computer systems. A
"cracker" is someone who maliciously and/or illegally enters or
attempts to enter someone else's computer system.

Computer security is unquestionably important, both in maintaining
the security of the school's computers and in ensuring the proper
behavior of the school's students (and others who use the network).
In this area, not only school policy, but also state and national
laws may apply. One source of information which you can read to help
you sort through security issues is the Site Security Handbook (FYI
8), which suggests to site computer administrators, Network
Information Centers, Network Operation Centers, and others how to set
up security policies and directs you to further information. A good
book available commercially is "Computer Security Basics" by Russell
and Gangemi. The full reference for these two sources of information
can be found in Section 8, "Suggested Reading."

Your school's AUP (see Question 7.4) should specify the consequences
for such activity, and it may also be prudent to require a signed
release from each student stating that he understands these
consequences and possible legal implications of intentional
exploitation of computer networks.

In the unlikely event that someone from outside your school breaks in
to a computer on your network, you should report the activity to the
CERT Coordination Center. Contact information for the center can be
found in Section 9, "Resources and Contacts."

7.3 How do we keep viruses from attacking all of our computers if we
     get connected to the Internet?

Even if you use the Internet to exchange only data (such as text or
pictures), virus infection can be a problem. This is because many
programs today allow data files to include commands which are run
when the data is loaded. Certainly when you download software
programs and run them on your own computer you should use caution.
Anything you download over the Internet or an electronic bulletin
board system could have a virus. For that matter, any program and
even some documents, whether on tape or a disk, including commercial
software still in its original packaging, might possibly have a
virus. Therefore there are two precautions you should take. First,
install virus protection software on all your computers. Second, use
only trusted sources from which to download software and files. If
you are uncertain about whether to download something, ask someone
first.

Virus checking software is available free over the Internet via
Anonymous FTP from the CERT Coordination Center. Your hardware or
software vendor, your network access provider, your technical support
resources, or your colleagues on network mailing lists should be able
to provide more specific information applicable to your site. Contact
information for the CERT Coordination Center can be found in Section
9, "Resources and Contacts."

7.4 What are the rules for using the Internet?

When your Internet connection is established, your access provider
should acquaint you with their Acceptable Use Policy. This policy
explains acceptable and unacceptable uses for your connection. For
example, it is in all cases unacceptable to use the network for
illegal purposes. It may, in some cases, be unacceptable to use the
network for commercial purposes. If such a policy is not mentioned,
ask for it. All users are expected to know what the acceptable and
unacceptable uses of their network are.

Remember that it is essential to establish a school-wide policy in
addition to the provider's AUP. A school's AUP is usually more
restrictive and specific than the one used by the service provider. A
repository of sample school AUPs can be found on the Armadillo Web
server, listed in section 9, "Resources and Contacts." As mentioned
earlier, some school systems have found it worthwhile to make
Internet access contingent upon a student's signed agreement to abide
by the school's AUP.

Beyond your service provider's AUP and the one you create for your
school, there are no overreaching rules for Internet use. There are,
however, community standards and conventions that should be observed.
You can review some generally agreed-upon guidelines at Arlene
Rinaldi's etiquette page and by reading FYI 28 (RFC 1855),
"Netiquette Guidelines." See Section 9, "Resources and Contacts," for
the location of the etiquette page, and Appendix B, "Ways to Get
RFCs" for instructions on obtaining FYI 28.

8.   Suggested Reading

Those items marked with an asterisk (*) are available free online.
For information on retrieving RFCs and FYIs, see Appendix B, "Ways to
Get RFCs."

* Connecting to the Future: A Guide For Building a Network
  Infrastructure for Education. NASA IITA, Department of Education
  NCES. 1995. Gopher: quest.arc.nasa.gov/How to Get Connected to and
  How to Use the Internet (Also available from NASA CORE with
  accompanying video. See NASA Central Operation of Resources for
  Educators in Section 9, "Resources and Contacts.")

* Conrad, L. B. "Getting US Educators Online"
  http://quest.arc.nasa.gov/online/table.html (State-by-state
  compilation of Internet service offerings especially for teachers.)

Cummins, J. and D. Sayers. Brave New Schools: Challenging Cultural
  Illiteracy Through Global Learning Networks. New York: St. Martin's
  Press, 1995.

Ellsworth, J. H. Education on the Internet: A Hands-on Book of
  Ideas, Resources, Projects, and Advice. Indianapolis, Indiana:
  Sams Publishing, 1994.

* Electronic Frontier Foundation. EFF's (Extended) Guide to the
  Internet.
  http://www.eff.org/pub/Net_info/EFF_Net_Guide/netguide.eff
  and from the EFF online archives at ftp.eff.org, gopher.eff.org,
  AOL keyword EFF, CIS EFFSIG forum.

Estrada, S. Connecting to the Internet: An O'Reilly Buyer's Guide.
   Sebastopol, California: O'Reilly and Associates, Inc., 1993.

* FYI 4 "FYI on Questions and Answers: Answers to Commonly asked
  'New Internet User' Questions," Marine, A., J. Reynolds, and
  G. Malkin. (fyi4.txt or rfc1594.txt)

* FYI 5 "Choosing a Name for Your Computer," Libes, D. (fyi5.txt or
  rfc1178.txt)

* FYI 8 "Site Security Handbook," Holbrook, J.P. and J.K. Reynolds.
  (fyi8.txt or rfc1244.txt)

* FYI 18 "Internet Users' Glossary," Malkin, G. and T. LaQuey Parker.
  (fyi18.txt or rfc1392.txt)

* FYI 20 "What is the Internet?" Krol, E. and E. Hoffman. (fyi20.txt
  or rfc1462.txt)

* FYI 26 "K-12 Internetworking Guidelines," J. Gargano, D. Wasley.
  November 1994. (fyi26.txt or rfc1709.txt)

* FYI 28 "Netiquette Guidelines," Hambridge, S. (fyi28.txt or
  rfc1855.txt)

Giagnocavo, G., et. al. Educator's Internet Companion (with diskette
   and video). Lancaster, Pennsylvania: Wentworth Worldwide Media,
   1995.

Harris, J. Way of the Ferret: Finding and Using Educational Resources
   on the Internet. Eugene, Oregon: International Society for
   Technology in Education, 1995.

Krol, E. The Whole Internet User's Guide & Catalog, Second Edition.
   Sebastopol, CA: O'Reilly & Associates, Inc., 1994. (Also available
   in textbook version)

* National Center for Missing and Exploited Children
  http://www.missingkids.org/information_superhighway.html (Online
  brochure "Child Safety on the Information Highway")
  Also available from
  National Center for Missing and Exploited Children
  2101 Wilson Boulevard
  Suite 550
  Arlington, VA 22201-3052
  1-800-THE-LOST (1-800-843-5678)

Protheroe, N. and E. Wilson. The Internet Handbook for School Users.

     Arlington, Virginia: Educational Research Service, 1994.

  * RFC 1480 "The US Domain," Cooper, A. and J. Postel. June 1993.
    (rfc1480.txt)
    [This document will also be useful to people not in the United
    States. See the sites listed under the FYI documents for the
    location nearest you from which to download the file.]

  * Rinaldi, A. "The Net: User Guidelines and Netiquette,"
    http://rs6000.adm.fau.edu/rinaldi/netiquette.html

  * Rogers, A. "Global Literacy in a Gutenberg Culture,"
    http://gsn.org/gsn/article.gutenberg.html

  Russell, D., and G. T. Gangemi, Sr. Computer Security Basics.
    Sebastopol, California: O'Reilly and Associates, 1991.

  * Safdar, S. J. "Internet Parental Control Frequently Asked Questions,"
    Voters Telecommunications Watch, 1995.
    http://www.vtw.org/pubs/ipcfaq, or email vtw@vtw.org and in the
    subject line type "send ipcfaq" without the quotes

  Steen, D.R., M.R. Roddy, D. Sheffield, and M.B. Stout. Teaching with
    the Internet: Putting Teachers Before Technology. Bellevue,
    Washington: Resolution Business Press, Inc., 1995.

9. Resources and Contacts

    CONFERENCES

    A list of other conferences, primarily in the United States, can be
    found at http://www.classroom.net/classroom/conf.htm

    NECC and Tel-Ed
       International Society for Technology in Education
       1787 Agate Street
       Eugene, Oregon 97403-1923
       USA
       Phone: 503-346-4414 or 1-800-336-5191
       Fax: 503-346-5890
       Email: iste@oregon.uoregon.edu
               (CompuServe: 70014,2117)
               (AppleLink: ISTE)

    See also "Internet Computers" in this section.

    INET
       Internet Society
       12020 Sunrise Valley Dr.
       Suite 210
       Reston, Virginia 22091
       USA
       Phone: 703-648-9888
       Fax: 703-620-0913
       Email: isoc@isoc.org

    ELECTRONIC MAIL LISTS

    Lists of electronic mail lists which you can search by category can
    be found via the World Wide Web at http://tile.net/listserv, at
    http://k12.cnidr.org:90/lists.html, and at
    http://catalog.com/vivian/interest-group-search.html.

    Classroom Connect mailing list
       To subscribe, send a message to...
       crc-request@wentworth.com
       Leave the Subject field blank and in the first line of the body
       of the message enter...
       subscribe

    CACI (Children Accessing Controversial Information)
       To subscribe, send a message to...
       caci-request@cygnus.com

       Leave the Subject field blank, and in the first line of the body
       of the message enter...
       subscribe

       To post, send a message to...
       caci@cygnus.com

    Cosndisc (Consortium for School Networking Discussion List)
       To subscribe, send a message to...
       listproc@list.cren.net

       Leave the Subject field blank, and in the first line of the body
       of the message enter...
       subscribe cosndisc YourFirstName YourLastName

       To post, send a message to...
       cosndisc@list.cren.net

      Cu-seeme-l (General CU-SeeMe discussion list)
         To subscribe, send a message to...
         listproc@cornell.edu

         Leave the Subject field blank, and in the first line of the body
         of the message enter...
         subscribe cu-seeme-l YourFirstName YourLastName

         To post, send a message to...
         cu-seeme-l@cornell.edu

      Cu-seeme-schools (Discussion about using CU-SeeMe as an instructional
         tool)
         To subscribe, send a message to...
         majordomo@gsn.org

         Leave the Subject field blank, and in the first line of the body
         of the message enter...
         subscribe cu-seeme-schools

         To post, send a message to...
         cu-seeme-schools@gsn.org

      Ednet
         To subscribe, send a message to...
         listproc@lists.umass.edu

         Leave the Subject field blank, and in the first line of the body
         of the message enter...
         subscribe ednet YourFirstName YourLastName

         To post, send a message to...
         ednet@lists.umass.edu

      Edtech (Educational Technology list)
         To subscribe, send a message to...
         listserv@msu.edu

         Leave the Subject field blank, and in the first line of the body
         of the message enter...
         subscribe edtech YourFirstName YourLastName

         To post, send a message to...
         edtech@msu.edu

      European Schools Project (ESP)
         To subscribe, send a message to...
         listproc@educ.uva.nl

      Leave the Subject field blank, and in the first line of the body
         of the message enter...
         subscribe bbs YourFirstName YourLastName

         To post, send a message to...
         bbs@educ.uva.nl

      Internet School Networking (List for the working group which produced
         this document)
         To subscribe, send a message to...
         listmanager@nasa.gov

         Leave the Subject field blank, and in the first line of the body
         of the message enter...
         subscribe isn-wg (NOTE: Do not add your name)

         To post, send a message to...
         isn-wg@nasa.gov

   Kidsphere
         To subscribe, send a message to...
         kidsphere-request@vms.cis.pitt.edu
         Type any message asking to subscribe.

         To post, send a message to...
         kidsphere@vms.cis.pitt.edu

   KIDLINK (Also KIDS-96, KIDS-97, etc.)
         KIDLINK operates 24 public mailing lists in English, Spanish,
         Portuguese, Japanese, Hebrew, and Scandinavian languages, and
         a private "chat" network for members.

         To learn about KIDLINK projects, subscribe to the news service by
         sending a message to...
         listserv@vm1.nodak.edu

         Leave the Subject field blank, and in the first line of the body
         of the message enter...
         subscribe KIDLINK YourFirstName YourLastName

         To receive a file of general information on KIDLINK, send email to
         the same listserv address, leave the Subject field blank, and in
         the first line of the body of the message enter...
         get kidlink general

K12admin (A list for K-12 educators interested in educational
   administration)
   To subscribe, send a message to...
   listserv@listserv.syr.edu

   Leave the Subject field blank, and in the first line of the body
   of the message enter...
   subscribe k12admin YourFirstName YourLastName

   To post, send a message to...
   k12admin@listserv.syr.edu

LM_NET (A list for school library media specialists worldwide)
   To subscribe, send a message to...
   listserv@listserv.syr.edu

   Leave the Subject field blank, and in the first line of the body
   of the message enter...
   subscribe LM_NET YourFirstName YourLastName

   To post, send a message to...
   LM_NET@listserv.syr.edu

NOVAE Group: Teachers Networking for the Future (Distribution list --
      not discussion list -- of projects and happenings of interest
      to educators)
   To subscribe, send a message to...
   listserv@idbsu.idbsu.edu

   Leave the Subject field blank, and in the first line of
   the body of the message, enter...
   subscribe novae YourFirstName YourLastName

UK-schools (for teachers and others interested in the use of the
      Internet in UK schools and for general discussion about
      anything concerning international classroom connections)
   To subscribe, send a message to...
   mailbase@mailbase.ac.uk

   Leave the Subject field blank, and in the first line of the body
   of the message enter...
   join uk-schools YourFirstName YourLastName

   To post, send a message to...
   uk-schools@mailbase.ac.uk

    WWWedu (the World Wide Web in Education list; pronounced "we do")
       To subscribe, send a message to...
       listproc@educom.unc.edu

       Leave the Subject field blank, and in the first line of
       the body of the message, enter...
       subscribe wwwedu YourFirstName YourLastName

       To post, send a message to...
       wwwedu@educom.unc.edu

    INTERNET COMPUTERS

    Academy One (National Public Telecomputing Network)
       via WWW:
       http://www.nptn.org/cyber.serv/AOneP/index.html

    Armadillo's WWW Server
       via WWW:
       http://riceinfo.rice.edu:80/armadillo/

    BBN National School Network Testbed
       via Gopher:
       copernicus.bbn.com

       via WWW:
       http://copernicus.bbn.com:70/testbed/

    Censorship/Freedom of Speech/Child Safety on the Internet Web page
       via WWW:
       http://www.voicenet.com/~cranmer/censorship.html

    Classroom Connect on the Net
       via WWW:
       http://www.classroom.net/

       via FTP:
       ftp.classroom.net/wentworth/Classroom-Connect/aup-faq.txt (for an
         FAQ document on Acceptable Use Policies)

    Chatback Trust and Chatback International network server
       via WWW:
       http://www.tcns.co.uk/chatback/welcome.html

    CERT Coordination Center
       via WWW:
       http://www.sei.cmu.edu/SEI/programs/cert/CERT.info.html
       http://www.sei.cmu.edu/technology/trustworthy.html

       via email:
       cert@cert.org

       via FTP: info.cert.org
       cd pub/

    Consortium for School Networking
       via Gopher:
       cosn.org

       via WWW:
       http://cosn.org/

    CU-SeeMe
       via WWW:
       http://cu-seeme.cornell.edu/

    Educational Resources Information Center (ERIC)
       via WWW:
       http://ericir.syr.edu/

       via Gopher:
       ericir.syr.edu

       via telnet:
       telnet bbs.oit.unc.edu
       login: launch
         (Follow directions on screen for registration. At the main menu,
         choose number 4, "Topical Document Search (WAIS)", and move to
         eric-digests. For help in WAIS, type a question mark.)

       via email:
       askeric@ericir.syr.edu
         (In your message ask for the topic you're interested in. A human
         will answer you.)

    Empire Internet Schoolhouse
       via Gopher:
       nysernet.org (port 3000)

    Electronic Frontier Foundation ("A non-profit civil liberties
       organization working in the public interest to protect privacy,
       free expression, and access to online resources and information.")

      via WWW:
      http://www.eff.org/

      via email:
      ask@eff.org

      via snailmail, telephone, and fax:
      The Electronic Frontier Foundation
      1550 Bryant Street
      San Francisco CA 94103 USA
      +1 415 668 7171 (voice)
      +1 415 668 7007 (fax)

   EdWeb
      via WWW:
      http://edweb.cnidr.org:90/

   European Schools Project
      via WWW:
      http://www.educ.uva.nl/ESP/

   Foundation Center
      via WWW:
      http://fdncenter.org/

   Geometry Forum
      via WWW:
      http://forum.swarthmore.edu/
      http://forum.swarthmore.edu/~steve/steve/wwwhtml.html ("Learning
        to Use the Web and Create Web Pages")

   Global SchoolNet Foundation
      via WWW:
      http://gsn.org/
      http://gsn.org/gsn/article.connect.levels.html ("Internet
        Connectivity Levels")
      http://gsn.org/gsn/article.design.project.html ("How to Design a
        Successful Project")
      http://gsn.org/gsn/article.gutenberg.html ("Global Literacy in
        a Gutenberg Culture")

   Grants Web
      via WWW:
      http://infoserv.rttonet.psu.edu/gweb.htm

   Hot List of K-12 Internet School Sites (Gleason Sackman, SENDIT)
      via WWW:
      http://www.sendit.nodak.edu/k12/

   International Education and Research Network (I*EARN)

      via WWW:
      http:// www.iearn.org/iearn/

      via Gopher:
      gopher.iearn.org (port 7008)

      via email:
      iearn@iearn.org

   Internet School Networking (ISN) working group home page (publishers
      of this document)
      via WWW:
      http://spider.lloyd.com/isn/index.html

   International Society for Technology in Education (ISTE)
      via WWW:
      http://isteonline.uoregon.edu/

      via Gopher:
      isteonline.uoregon.edu

   KIDLINK
      via WWW:
      http://www.kidlink.org/

      via Gopher:
      gopher.kidlink.org

   Learning Resource Server, University of Illinois College of Education
      via WWW:
      http://www.ed.uiuc.edu/
      http://www.ed.uiuc.edu/Activity-Structures/ (Judi Harris' Network-
         Based Educational Activity Collection)

      via Gopher:
      gopher.ed.uiuc.edu

   MBONE (Multicast Backbone)
      via WWW:
      http://www.mbone.com/techinfo/

   NASA Jason Project
      via WWW:
      http://seawifs.gsfc.nasa.gov/JASON/JASON_HOME.html

    NASA Online Educational Resources
       via WWW:
       http://quest.arc.nasa.gov/OER/

    NASA Quest
       via WWW:
       http://quest.arc.nasa.gov/
       http://quest.arc.nasa.gov/essay/essay-index.html ("Networks, Where
          Have You Been All My Life" student essay contest winners)

       via Gopher:
       quest.arc.nasa.gov (port 70)

       via FTP:
       ftp quest.arc.nasa.gov

    NASA Spacelink
       via WWW:
       http://spacelink.msfc.nasa.gov/

       via Gopher:
       spacelink.msfc.nasa.gov

    via telnet:
       telnet spacelink.msfc.nasa.gov
       login: guest

       via FTP:
       ftp spacelink.msfc.nasa.gov

    To find information on the NASA Teacher Resource Center Network,
    choose "Educational Services," then "Teacher Resource Center Network."
    For television schedules, follow the menu for "Educational Service"
    to nthe menu option, "Technology."

    National Center for Missing and Exploited Children
       via WWW:
       http://www.missingkids.org/
       http://www.missingkids.org/information_superhighway.html (Online
          brochure "Child Safety on the Information Highway)

    National Center for Supercomputing Applications (NCSA)
       via WWW:
       http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/NCSAMosaicHome.html
          (Mosaic Home Page)
       http://www.ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimer.html
          (A Beginner's Guide to HTML)

```
     via FTP:
     ftp ftp.ncsa.uiuc.edu (to download the Mosaic WWW browser)
```

   National Center for Technology Planning
```
     via Gopher:
     gopher.msstate.edu
```

   Choose "Resources Maintained at MS State University," then select
   "National Center for Technology Planning."

   National Science Foundation's (United States) Science and Technology
   Information System (STIS)

```
     via WWW:
     http://stis.nsf.gov/

     via Gopher:
     stis.nsf.gov

     via telnet:
     telnet stis.nsf.gov
     login:  public
     Follow instructions on screen.
```

   Netscape Communications
```
     via WWW:
     http://www.netscape.com/

     via FTP:
     ftp ftp.netscape.com
```

   Netscape's WWW browser can be downloaded from Netscape's FTP sites at
   ftp.netscape.com, ftp2.netscape.com, ftp3.netscape.com...through
   ftp7.netscape.com.

   Office of Educational Research and Improvement (U.S. Department of
   nEducation)

```
     via WWW:
     http://oeri.ed.gov/

      via Gopher:
      gopher.ed.gov
```

   Providers of Commercial Internet Access (for a list of Internet
   Service Providers)

      via WWW:
      http://www.celestin.com/pocia/

   THE LIST (for a list of Internet Service Providers)
      via WWW:
      http://thelist.com

   Voters Telecommunications Watch
      via WWW:
      http://www.vtw.org/
      http://www.vtw.org/pubs/ipcfaq [Internet Parental Control
         Frequently Asked Questions (FAQ) by Shabbir J. Safdar]

   World Wide Web Consortium
      via WWW:
      http://www.w3.org/pub/WWW/

      via telnet:
      telnet telnet.w3.org (public access Lynx client. Use "lynx"
         without the quotes if a login is requested.)

   Web66
      via WWW:
      http://web66.coled.umn.edu/
      http://web66.coled.umn.edu/schools.html (International WWW Schools
         Registry)
      http://web66.coled.umn.edu/Cookbook/contents.html (Classroom
         Internet Server Cookbook)

   NEWS GROUPS
   ----

      alt.algebra.help
      alt.comp.shareware.for-kids
      alt.education.distance
      alt.kids-talk
      bit.listserv.edtech
      comp.security.announce
      k12.chat.elementary
      k12.chat.junior
      k12.chat.senior
      k12.chat.teacher
      k12.ed.art
      k12.ed.business

```
   k12.ed.comp.literacy
   k12.ed.health-pe
   k12.ed.life-skills
   k12.ed.math
   k12.ed.music
   k12.ed.science
   k12.ed.soc-studies
   k12.ed.special
   k12.ed.tag
   k12.ed.tech
   k12.edu.life-skills (especially for school counselors)
   k12.euro.teachers (in Europe)
   k12.lang.art
   k12.lang.deutsch-eng
   k12.lang.esp-eng
   k12.lang.francais
   k12.lang.russian
   k12.library
   k12.news
   k12.sys.projects
   misc.education
   misc.education.language.english
   misc.education.multimedia
   misc.kids
   misc.kids.computer
   news.announce.newusers
   uk.education.misc
   uk.education.teachers
```

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   -----------------------
   NEWSLETTERS and JOURNALS
   -----------------------
```

Classroom Connect

    Published monthly during the school year, a subscription currently
    costs U.S. $39.00.

    Wentworth Worldwide Media
    1866 Colonial Village Lane
    P.O. Box 10488
    Lancaster, PA 17605-0488
    USA
    Phone: 1-717-393-1000
            1-800-638-1639
    Fax: 1-717-390-4378
    Email: connect@wentworth.com

       via WWW:
       http://www.wentworth.com/classroom/crcpub.htm (Classroom Connect
          homen page)
       http://www.wentworth.com/classroom/orderform.htm (order form for
          Classroom Connect Newsletter, books, software, and videos about
          the Internet for educators)

   Electronic Learning

       Published eight times per year, a current subscription to this
       magazine for technology and school change costs $23.95.

       Scholastic, Inc.
       2931 East McCarty Street
       P.O. Box 3710
       Jefferson City, MO 65102-3710

   Learning and Leading with Technology (Formerly "The Computing
   Teacher")

       Published monthly, the current U.S. $61.00 ISTE membership fee
       includes $36.00 for this journal.

       ISTE (International Society for Technology in Education)
       1787 Agate Street
       Eugene, OR 97403
       Phone: 1-503-346-4414

   MultiMedia Schools

       Published five times a year, a subscription currently costs
       U.S. $38.00.

       Online, Inc.
       462 Danbury Road
       Wilton, CT 06897-2126
       USA
       Phone: 1-800-222-3766

   NetTeach News

       Published ten times a year, subscription prices are as follows.

       Annual hardcopy subscription cost:
       U.S. $38.00 for individual subscriptions in the U.S.
       U.S. $45.00 for individual subscriptions in Canada and Mexico
       U.S. $60.00 for individual subscriptions outside North America

      Annual ASCII electronic copy cost:
      U.S. $22.00 for individual subscriptions worldwide

      Site licenses are available for the electronic version.
      Discounts are available for ten or more orders of the printed
      version for educational institutions.

      For subscription questions and submissions contact:

      Kathleen M. Rutkowski, Editor
      Chaos Publications
      13102 Weather Vane Way
      Herndon, VA 22071
      USA
      Phone: 1-703-471-0593
      Fax: 1-703-471-0596
      Email: netteach@chaos.com

      via WWW:
      http://www.chaos.com/netteach

   ORGANIZATIONS

   Asia Pacific Network Information Center
      c/o The United Nations University
      53-70 Jingumae 5-Chome
      Shibuya-ku, Tokyo 150
      Japan
      Phone: +81-3-5467-7014
      Fax: +81-3-5467-7015
      Email: hostmaster@apnic.net
      WWW: http://www.apnic.net

   AskERIC Project
      ERIC Clearinghouse on Information Resources
      Syracuse University
      4-194 Center for Science & Technology
      Syracuse, New York 13244-4100
      Phone: 315-443-3640
      Fax: 315-443-5448
      Email: AskERIC@ericir.syr.edu

   See also "Internet Computers" above.

    CERT Coordination Center (Formerly CERT, Computer Emergency Response
    Team)
       Software Engineering Institute
       Carnegie Mellon University
       Pittsburgh, PA 15313-3890
       USA
       Phone: 412-268-7090
       Fax: 412-268-6989
       Email: cert@cert.org

    See also "Internet Computers" above.

    Chatback International
       Dr. R. Zenhausern, Executive Director
       Psychology Department
       St. Johns University
       SB 15, Marillac
       Jamaica, NY 11439
       USA
       Phone: 718-990-6447
       Fax: 718-990-6705
       Email: drz@sjuvm.stjohns.edu

    The Chatback Trust
       Tom Holloway, UK Director
       6 St. Mary's Crescent
       Royal Leamington Spa
       Warwickshire, 1JL
       Phone: +44-926-888333
       Fax: +44-926-420204
       Email: t.holloway@warwick.ac.uk

    See also "Internet Computers" above.

    Consortium for School Networking
       P.O. Box 65193
       Washington, DC 20035-5193
       USA
       Phone: 202-466-6296
       Fax: 202-872-4318
       Email: info@cosn.org

    See also "Internet Computers" above.

      European Schools Project ("...a support system for secondary schools
            to explore applications of educational telematics.")
         University of Amsterdam
         Centre for Tele-Learning
         Wibautstraat 4
         1091 GM Amsterdam
         The Netherlands
         Contact: Dr. Pauline Meijer or Dr. Henk Sligte
         Phone: +31-20-5251248
         Fax: +31-20-5251211
         Email: risc@esp.educ.uva.nl
         WWW: http://www.educ.uva.nl/ESP

   FidoNet
         1151 SW Vermont Street
         Portland, OR 97219
         USA
         Contact: Janet Murray
         Phone: 1-503-280-5280
         Email: jmurray@psg.com
         WWW: http://bbs.owls.com/~jerrys/fidonet.html (A Fidonet Primer)

   Global SchoolNet Foundation (formerly FrEdMail)
         P.O. Box 243,
         Bonita, CA 91908
         USA
         Phone: (619) 475-4852
         Fax: (619) 472-0735
         Email: info@gsn.org

   See also "Internet Computers" above.

   International Education and Research Network (I*EARN)
         c/o Copen Family Fund
         345 Kear Street
         Yorktown Heights, NY 10598
         USA
         Contact: Dr. Edwin H. Gragert
         Phone: 914-962-5864
         Fax: 914-962-6472
         Email: iearn@iearn.org

   See also "Internet Computers" above.

     Internet Society
        12020 Sunrise Valley Dr.
        Suite 210
        Reston, Virginia 22091
        USA
        Phone: 703-648-9888
        Fax: 703-620-0913
        Email: isoc@isoc.org
        WWW: http://www.isoc.org/home.html

     KIDLINK Society
        4815 Saltrod
        Norway
        Phone: +47-370-31204
        Fax: +47-370-27111
        Email: kidlink-info@kidlink.org

     See also "Internet Computers" and "Electronic Mail Lists" above.

     K12Net
        1151 SW Vermont Street
        Portland, OR 97219
        USA
        Phone: 503-280-5280
        Contact: Janet Murray
        Email: jmurray@psg.com
        Gopher: gopher.psg.com
        WWW: http://arlo.wilsonhs.pps.k12.or.us/k12.html

     Reseaux IP Europeens Network Coordination Centre (RIPE NCC)
        Kruislaan 409
        NL-1098 SJ Amsterdam
        The Netherlands
        Phone: +31 20 592 5065
        Fax: +31 20 592 5090
        Email: ncc@ripe.net
        WWW: http://www.ripe.net/ripe/default.html

```
   ------
   VIDEOS
   ------
```

Master Communications Group
    7322 Ohms Lane
    Minneapolis, MN 55439
    Phone: 1-800-862-6164
    Fax: 1-612-835-9573

Titles:
    Experience the Power: Network Technology for Education (produced
      by the National Center for Education Statistics)
    Future Schools: Connected to the World (produced by MIT)

NASA Central Operation of Resources for Educators (CORE)
    Lorain County Joint Vocational School
    15181 Route 58 South
    Oberlin, OH 44074
    USA
    Phone: 1-216-774-1051, x293/294
    Fax: 1-216-774-2144
    Email: video-info@quest.arc.nasa.gov

Titles:
    Global Quest: The Internet in the Classroom
    Connecting to the Future: A Guide for Building a Network
       Infrastructure for Education
    Global Quest II: The Internet in the Curriculum
    Others

The fee for the videos is cost plus shipping and handling. You may
also make a copy yourself by taking a blank copy to the nearest NASA
Teacher Resource Center. For information on the NASA Teacher Resource
Center Network or on NASA Select, contact your nearest NASA facility
or consult NASA Spacelink, listed above in "Internet Computers."

Wentworth Worldwide Media
    1866 Colonial Village Lane
    P.O. Box 10488
    Lancaster, PA 17605-0488
    USA
    Phone: 1-717-393-1000
            1-800-638-1639
    Fax: 1-717-390-4378

Titles:
    The Amazing Internet
    Internet Email
    Searching the Internet
    Discovering the World Wide Web
    Others

10. References

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        http://www.nw.com/zone/WWW/report.html

    [2] "Restructuring Schools: A Systematic View," Action Line, the
        newsletter of the Maryland State Teachers Association, a National
        Education Association Affiliate. R. Kuhn, Editor. No. 93-6. June,
        1993.

    [3] Sivin, J. P. and E. R. Bialo, "Ethical Uses of Information
        Technologies in Education." Washington, D.C.: U.S. Department of
        Justice, Office of Justice Programs, National Institute of
        Justice. 1992.

11. Security Considerations

     General security considerations are discussed in Section 7 of this
     document.

12. Authors' Addresses

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     Herndon, VA 22070
     Phone: 703-742-4839
     EMail: julier@internic.net

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     700 13th Street, NW
     Suite 950
     Washington, DC 20005
     Phone: 202-434-8954
     EMail: sellers@quest.arc.nasa.gov

APPENDIX A: GLOSSARY OF TERMS USED IN THIS DOCUMENT

   The following is a short glossary of terms used in this document. For
   a more complete glossary of Internet terms, refer to FYI 18,
   "Internet Users' Glossary." These definitions are largely excerpted
   from that glossary. (See Section 8, "Suggested Reading," above for
   complete reference information.)

   Acceptable Use Policy (AUP)

   The policy which defines the uses of the network that the network's
   administrators consider appropriate. Enforcement of AUPs varies with
   the network.

   Anonymous FTP

   Accessing data via the File Transfer Protocol using the special
   username "anonymous." This was devised as a method to provide a
   relatively secure way of providing restricted access to public data.
   Users who wish to acquire data from a public source may use FTP to
   connect to the source, then use the special username "anonymous" and
   their email address as the password to log into a public data area.

   Archie

   A system to automatically gather, index and serve information on the
   Internet. The initial implementation of Archie provided an indexed
   directory of filenames from all anonymous FTP archives on the
   Internet. Later versions provide other collections of information.

   Client

   An application which requests information from, or requests a service
   of, a shared resource (a computer or "server"). See also Server.

   Cracker

   A person who uses computer knowledge to attempt to gain access to
   computer systems and/or maliciously damage those systems or data.

   Dial-in (also dial-up)

   A connection, usually made via modems, between two computers (or
   servers) over standard voice grade telephone lines.

Download

To copy data from a remote computer to a local computer. The opposite
of upload.

DSU/CSU (Data Service Unit/Channel Service Unit)

The digital equivalent of a modem. A Channel Service Unit connects to
a telephone company-provided digital data circuit, and a Data Service
Unit provides the electronics required to connect digital equipment
to the CSU. Paired together a DSU/CSU allows computer equipment to
be connected into the telephone digital service for highly
conditioned, high speed data communications.

Electronic Bulletin Board System (BBS)

A computer, and associated software, which typically provides
electronic messaging services, archives of files, and any other
services or activities of interest to the bulletin board system's
operator. Although BBSs have traditionally been the domain of
hobbyists, an increasing number of BBSs are connected directly to the
Internet, and many BBSs are currently operated by government,
educational, and research institutions.

Email (Electronic Mail)

A system whereby a computer user can exchange messages with other
computer users (or groups of users) via a communications network.

FidoNet

A network of computers interconnected using the FIDO dial-up
protocols. The FIDO protocol provides a means of "store and forward"
file transfer similar to UUCP.

FTP (File Transfer Protocol)

A protocol which allows a user on one host to access, and transfer
files to and from, another host over a network. Also, FTP is usually
the name of the program the user invokes to execute the protocol.

FYI (For Your Information)

A subseries of RFCs that are not technical standards or descriptions
of protocols. FYIs convey general information about topics related
to TCP/IP or the Internet. See also RFC (Request for Comments).

Gopher

A distributed information service that makes available hierarchical
collections of information across the Internet. Gopher uses a simple
protocol that allows a single Gopher client to access information
from any accessible Gopher server, providing the user with a single
"Gopher space" of information. Public domain versions of the client
and server are available

Hacker

A person who delights in having an intimate understanding of the
internal workings of a system, computers and computer networks in
particular. The popular media has corrupted this term to give it the
pejorative connotation of a person who maliciously uses computer
knowledge to cause damage to computers and data. The proper term for
this type of person is "cracker."

Home page

A form of Web page that serves as the introductory or main page for a
subject. The home page generally contains basic information about a
subject and hypertext links to other pages which contain more
detailed information. See also WWW and Web page.

Internet Engineering Task Force (IETF)

The IETF is a large, open community of network designers, operators,
vendors, and researchers whose purpose is to coordinate the
operation, management and evolution of the Internet, and to resolve
short-range and mid-range protocol and architectural issues. It is a
major source of protocol proposals and standards.

Internet Service Provider (ISP)

See Network Access Provider.

InterNIC

A Network Information Center (NIC), funded by the National Science
foundation, that provides information about the Internet. The
InterNIC offers support in the areas of Information Services (the
task most often cited in this document), Registration Services, and
Directory and Database Services.

Kbs (Kilo-Bits per Second)

A data transmission rate expressed in 1000 bit per second units. For example, 56 Kbs is 56*1000 = 56,000 bits per second.

LAN (Local Area Network)

A data network intended to serve an area of only a few square kilometers or less. Since such networks are relatively small, they can usually be directly controlled by the users and operate at relatively high speeds (up to 100 Mbs [10 million bits per second]) over inexpensive wiring.

Leased line

A leased line is a special phone company permanent connection between two locations. Leased lines are generally used where high-speed data (usually 960 characters per second and higher) is continually exchanged between two computers (in the Internet, generally between routers). A leased line is billed at the same rate per month independent of how much the line is used and can be cheaper than using dial modems depending on the usage. Leased lines may also be used where higher data rates are needed beyond what a dial modem can provide.

Listserv (mailing list server)

An automated program that accepts mail messages from users and performs basic operations on mailing lists for those users. In the Internet, listservs are usually accessed as "listname@host." For example, the list server for the hypothetical list "newsreports@acme.org" would be called "listserv@acme.org." Sending email to "newsreports@acme.org" causes the message to be sent to all the list subscribers, while sending a message (to subscribe or unsubscribe, for example) to "listserv@acme.org" sends the message only to the list server program. Not all mailing lists use list servers to handle list administration duties. More than one automated mailing program exists on the Internet, although the term "listserv" is sometimes confusingly used to refer to any such program.

Mailing Lists

A list of email addresses. Generally, a mailing list is used to discuss a certain set of topics, and different mailing lists discuss different topics. A mailing list may be moderated. That is, messages sent to the list are actually sent to a moderator who determines whether or not to send the messages on to everyone else. Many mailing lists are maintained by mail handling software such as

listserv, majordomo, or listproc, which are programs that
automatically handle operations such as adding new people to the
list. (See above.) In the Internet, for those mailing lists
maintained by a human, rather than by a program, you can generally
subscribe to a list by sending a mail message to: "listname-
REQUEST@host" and in the body of the message enter a request to
subscribe. To send messages to other subscribers, you will then use
the address "listname@host."

Modem (MODulator/DEModulator)

A device that converts the digital signals used by computers into
analog signals needed by voice telephone systems.

Network Access Provider (Network Service Provider, Internet Service
Provider)

Any organization that provides network connectivity or dial-up
access. Service providers may be corporations, government agencies,
universities, or other organizations.

Network News

Another name for "Usenet News."

NIC (Network Information Center)

A central place where information about a network within the Internet
is maintained. Usually NICs are staffed by personnel who answer user
telephone calls and electronic mail, and provide general network
usage information and referrals, among other possible tasks. Most
network service providers also provide a NIC for their users.

Port

A specific access point on an Internet computer, designated by a
number. Most common Internet services, such as the World Wide Web,
have specific port numbers associated with them, which makes it
easier for applications on the Internet to interact. Human users of
the Intern et normally do not need to worry about port numbers.

PPP (Point to Point Protocol)

A protocol used to establish TCP/IP connections using serial lines
such as dial-up telephone lines. Similar to SLIP (see below), PPP is
a later standard that includes features such as demand dial-up,
compression, and better flow control.

Protocol

A formal description of message formats and the rules two computers
must follow to exchange those messages. Protocols can describe low-
level details of machine-to-machine interfaces (e.g., the order in
which bits and bytes are sent across a wire) or high-level exchanges
between allocation programs (e.g., the way in which two programs
transfer a file across the Internet).

Protocol Stack

A series of protocols linked together to provide an end-to-end
service. For example, the File Transfer Protocol uses the
Transmission Control Protocol, which uses the Internet Protocol,
which may use the Point to Point protocol, to transfer a file from
one computer to another. The series FTP->TCP->IP->PPP is called a
protocol stack.

RFC (Request for Comments)

The document series, begun in 1969, which describes the Internet
suite of protocols and related experiments. Not all (in fact very
few) RFCs describe Internet standards, but all Internet standards are
written up as RFCs. The RFCs include the documentary record of the
Internet standards process.

Router

A computer which forwards traffic between networks. The forwarding
decision is based on network layer information and routing tables,
often constructed by routing protocols.

Server

A shared resource which provides information or services to user
applications or clients. See also Client.

SLIP (Serial Line Internet Protocol)

A protocol used to establish TCP/IP connections using serial lines
such as dial-up telephone lines. Small computers, such as PCs and
Macintoshes, can use SLIP to dial up to servers, which then allow the
computer to act as a full Internet node. SLIP is generally used at
sites with a few users as a cheaper alternative than a full Internet
connection. SLIP is being replaced by PPP at many sites.

TCP/IP (Transmission Control Protocol/Internet Protocol)

TCP/IP is named for two of the major communications protocols used within the Internet (TCP and IP). These protocols (along with several others) provide the basic foundation for communications between hosts in the Internet. All of the service protocols, such as FTP, Telnet, and Gopher, use TCP/IP to transfer information.

Telnet

Telnet is the Internet standard protocol for remote terminal connection service. The name "telnet" also is used to refer to programs that allow interactive access to remote computers, as well as the action of using said programs. For example, the phrase "Telnet to host xyzzy" means to interactively log into host "xyzzy" from some other host in the Internet.

Upload

To copy data from a local computer to a remote computer. The opposite of download.

Usenet News

An electronic bulletin board system created originally by the Unix community and which is accessible via the Internet. Usenet News forms a discussion forum accessible by millions of users in almost every country in the world. Usenet News consists of thousands of topics arranged in a hierarchical form. Major topics include "comp" for computer topics, "rec" for recreational topics, "soc" for social topics, "sci" for science topics, etc. Within the major topics are subtopics, such as "rec.music.classical" for classical music, or "sci.med.physics" for discussions relating to the physics of medical science.

UUCP (Unix-to-Unix CoPy)

This was initially a program run under the Unix operating system that allowed one Unix system to send files to another Unix system via dial-up phone lines. Today, the term is more commonly used to describe the large international network which uses the UUCP protocol to pass news and electronic mail.

Veronica (Very Easy Rodent-Oriented Network Index to Computerized Archives)

A utility which searches Gopher servers based on a user's list of keywords.

Virus

A program which replicates itself on computer systems by
incorporating itself into other programs which are shared among
computer systems. The term virus is also often used more generally to
refer to any unauthorized software intrusion into a computer, no
matter the type or behavior of the program.

Web

See WWW.

Web page

A document, usually containing hypertext links, which is available
through the World Wide Web. Web pages are composed in a special
language called Hypertext Markup Language (HTML), which allows basic
formatting such as font sizes, bold, underline, blinking text, and
inclusion of graphics images. Web pages usually contain hypertext
links to other Web pages. See also WWW and Home page.

WAIS (Wide Area Information Server)

A distributed information service which offers simple natural
language input, indexed searching for fast retrieval, and a
"relevance feedback" mechanism which allows the results of initial
searches to influence future searches. Public domain implementations
are available.

WWW (World Wide Web)

A hypertext-based, distributed information system created by
researchers at the European Laboratory for Particle Physics (CERN) in
Switzerland. The Web information system may be used to create, edit,
or browse hypertext documents. The Web protocol interlinks
information in such a way that a user can traverse the Web from any
starting point. The protocol also interacts with many other Internet
services, such as Gopher, to provide one consistent, transparent user
interface to the Internet. Client and server software is widely
available via a number of methods: as free software, as client
software often included as part of an Internet connection package, or
as a commercial product.

APPENDIX B: WAYS TO GET RFCs

   FYI documents such as the one your are reading are a subset of the
   Internet Engineering Task Force's RFC documents.

   Note that the latest version of the following file may be found on
   the World Wide Web at http://www.isi.edu/in-notes/rfc-editor/rfc-info

   For more information on Internet Engineering Task Force publications,
   visit the RFC Editor's home page on the World Wide Web at
   http://www.isi.edu:80/rfc-editor/rfc-sources.html

   RFC-Info Simplified Help

   Use RFC-Info by sending email messages to RFC-INFO@ISI.EDU.

   1. To get a specific RFC send a message with text as follows:

           Retrieve: RFC
            Doc-ID: RFC1500

   This gets RFC 1500. All RFC numbers in the Doc-Id are 4 digits (RFC
   791 would be Doc-ID: RFC0791).

   2. To get a specific FYI send a message with text as follows:

           Retrieve: FYI
            Doc-ID: FYI0004

   3. To get a list of available RFCs that match a certain criteria:

           LIST: RFC
            Keywords: Gateway

   Returns a list of RFCs with the word Gateway in the title or specified
   as a keyword.

   4. To get the Index of all RFCs published:

           HELP: rfc_index

   5. To get information about other ways to get RFCs, FYIs, STDs, or
       IMRs.

           HELP: ways_to_get_rfcs
           HELP: ways_to_get_fyis
           HELP: ways_to_get_stds

        HELP: ways_to_get_imrs

    6. To get help about using RFC-Info:

        HELP: help

      or

        HELP: topics

APPENDIX C: EXAMPLES OF EDUCATIONAL PROJECTS USING THE INTERNET

   The following examples of projects using the Internet appeared on
   various online computers and electronic mailing lists pertaining to
   education during the 1995-96 school year. The messages have been
   edited in the interest of space and because many of the details about
   how to participate will become dated, but the information presented
   can give you a feel for the types and range of projects that are
   happening at the time of this writing.

   A good source for project examples is "Judi Harris' Network-Based
   Educational Activity Collection" and other World Wide Web sites
   listed above in Section 9, "Resources and Contacts."

   Example One: Interdisciplinary, Grades 2-4

   From> KIDSPHERE Mailing List <kidsphere@vms.cis.pitt.edu>
   Subject> interdisciplinary project - grades 2-4

   Project description: This interdisciplinary data collection activity
   will enable students to answer the question: Does our community size
   and location affect the types and numbers of pets we own?

   For grades 2,3,4

   Timeline: January 29-March 4

   Our classes will collect and share information about our communities
   and will then collect and share data about the types and numbers of
   pets we own. Students will be able to use the collected information
   to draw conclusions.

   To participate, please send me your:
   Name and grade level
   School address
   community size generalization: rural, urban or suburban

Example Two: Science, Engineering, and Careers, Levels K-12

NASA is pleased to announce another exciting opportunity for K-12
classrooms to interact with our scientists, engineers and support
staff.

This time, the men and women of the Galileo project will provide a
behind-the-scenes look at what it's like to be part of the flight team
on a pioneering interplanetary expedition through the ONLINE FROM
JUPITER project.

Galileo scientists and mission engineers are opening their notebooks
to classrooms, museums and the public via the Internet to share their
observations and experiences working on the NASA spacecraft mission to
Jupiter.

From now through January 1996, members of the flight team will write
brief field journal entries describing the scientific puzzles,
engineering challenges and excitement of discovery as the Galileo
orbiter and atmospheric entry probe begin their scientific
investigation of Jupiter. The atmospheric probe is set to descend
into Jupiter's atmosphere on Dec. 7, the same day the Galileo orbiter
begins circling the giant planet for a two-year mission.

"For the first time, we're providing a window on the inner workings
and interactions of a scientific deep space mission," said Dr. Jo
Pitesky, member of the Galileo Mission Planning Office. "In sharing
the journal entries, we hope to give readers, particularly students,
an idea of the tremendous efforts that go into controlling and
collecting data from a robot spacecraft a half-billion miles away."

After reading background material and the journals, kindergarten
through 12th grade students and their teachers can ask project members
questions -- via E-mail -- starting in late November and running
through January 1996. They will receive personal responses,
corresponding with experts on subjects ranging from atmospheric
science to spacecraft systems. An archive of all questions and answers
will be available online.

In addition, students will be able to take part in online experiments
that will use actual probe data. Another activity will challenge
students to predict the exact timing of the Galileo probe's first-ever
plunge into the Jovian atmosphere. Additionally, students will be
invited to create Stumpers (riddles and puzzles) to share with one
another. Other curriculum resources will help teachers integrate the
Galileo project into their classrooms. As well, mechanisms will be

provided to help like-minded teachers connect with each another to
pursue collaborative projects of their own.

Other than your own time, there is no cost to get involved. Please
consider joining us on this learning adventure. To participate, you
must sign up for the ONLINE FROM JUPITER maillist. To do this, send an
email message to listmanager@quest.arc.nasa.gov. In the message body,
write only these words: subscribe updates-jup

For more information, make a webstop at our "continuous construction"
site: http://quest.arc.nasa.gov/jupiter.html

These projects are part of the "Sharing NASA with the Classroom"
series. They are made possible by funding from the NASA Information
Infrastructure Technology and Applications (IITA) program. IITA is
part of the High Performance Computing and Communications program
authorized by Federal legislation passed in December 1991.

Example Three: MathMagic; Math at Various Grade Levels

[Note: The MathMagic World Wide Web home page is located at
http://forum.swarthmore.edu/mathmagic/]

What is MathMagic?

MathMagic is a K-12 telecommunications project developed in El Paso,
Texas. It provides strong motivation for students to use computer
technology while increasing problem-solving strategies and
communications skills. MathMagic posts challenges in each of four
categories (k-3, 4-6, 7-9 and 10-12) to trigger each registered team
to pair up with another team and engage in a problem-solving dialog.
When an agreement has been reached, one solution is posted for every
pair.

MathMagic has received wide ideological acceptance by hundreds of past
FidoNet users because it addresses most of the National Council of
Teachers of Mathematics standards. A modified format has now expanded
into the Internet and is available via regular e-mail or via the World
Wide Web (WWW).

Who can participate?

K-12 teachers and students, but higher education teachers, librarians,
technology coordinators, computer teachers, and even home-schoolers
are joining to act as facilitators.

What is needed?

Any teacher with access to electronic mail via the Internet can
participate. Several net service providers and most of the commercial
boards (America Online, Genie, CompuServe, Delphi, The Well, etc.) now
offer e-mail gateways and other Internet services. MathMagic is best
suited to schools that use computers with modems and have direct
Internet access.

In some areas, a local Bulletin Board System (BBS) or a Net user (such
as a parent with net access) may have to act as a go-between. Please
ask about special arrangements.

[Example challenge for grades 10-12:]

****

MathMagic Cycle 18: Level 10-12 Regular

****

Using the numbers 1 9 9 2 in a "locked" position, can you develop a 31
day calendar for the month of October? You can use addition (+),
subtraction (-), multiplication (*), division (/) exponents (^)
factorial (!) square root (sqrt) and, naturally, parenthesis ( ).

Example: Friday the 13th could be: (1+sqrt(9))!-9-2 (Scary, isn't it?)
(Notice that the numbers appear in the "locked" sequence)

****

MathMagic Cycle 18: Level 10-12 Advanced

****

What 6 digit number, with 6 different digits, when multiplied by all
integers up to 6, circulates its digits through all 6 possible
positions, as follows:

                    ABCDEF * 1 - ABCDEF
                    ABCDEF * 3 - BCDEFA
                    ABCDEF * 2 - CDEFAB
                    ABCDEF * 6 - DEFABC
                    ABCDEF * 4 - EFABCD
                    ABCDEF * 5 - FABCDE

```
********
```
Good luck
MrH

[Example challenges for grades K-3:]

```
***********************************
```

MathMagic Cycle 16: Level K-3 Regular

```
***********************************
```

When two straight lines meet, they form an angle. Some angles are easy
to recognize. For instance, a RIGHT ANGLE is any of the four angles
formed by a piece of paper (like typing or computer paper) that has
sharp corners.

Using a clock and "talking" with your partners, try to figure out how
many times in a day (24 hours) the hour hand and the minute hand form
a right angle. You may want to do a chart and watch the hour hand move
between the numbers, as you move the minute hand...

```
***********************************
```

MathMagic Cycle 16: Level K-3 Advanced

```
***********************************
```

One of the better known works of architecture of the Roman Empire was
the Coliseum. For a few months, at its maximum splendor (before the
senate began cutting its funding... yes, old problem) there stood an
Imperial Roman Guard in each of its 1000 arches. Imagine the splendor!
(Not too cool if you were the entertainment.)

The first budget conscious cut called for the removal of every other
Imperial Guard. Imagine, one stayed, the next went. The second senate
cut called for the removal of every third guard (from the original
count). So, the order went out that guards of gate 1 and gate 2 (if
there was one) could stay, while guard of gate 3 (and every other
third one) had to go... Naturally, what the senate was doing was
getting rid of some guards, but also getting the credit for a lot of
"cuts" of gates that had no guard.

The "cuts" continued number after number, until a diligent member of
the opposition party cried foul. He said, "Only some of the cuts are
actually getting rid of guards. A lot of them are not!" Can you build
an argument for this senator?

Also, if you were a Roman Imperial Guard that every week had to choose
a different gate you had to look after (and run the risk of loosing
your job), which gates would be your choice?

Good luck MrH

Example Four: Various Projects Announced by Global SchoolNet

Hi,

Our teachers have been doing K12 projects over the Internet for the
past 12 years.

There is NO CHARGE for schools to participate in the projects. Global
SchoolNet organizes, manages, and facilitates collaborative learning
projects for schools with any level of connectivity . . . from email
only . . . to desktop videoconferencing.

To access these projects go to:
 http://gsn.org/gsn/gsn.projects.html

Sample of Projects you will find

The Global Schoolhouse (Featuring Desktop Video-Conferencing)

Today's "school of the future" uses the most powerful Internet tools,
including live video, to link K12 classrooms to their communities and
to other children around the world.

CALREN: Building the California Global Schoolhouse

Education leader (Global SchoolNet) partners with business leader
(Aldea Communications) to discover and document how schools,
businesses, and the community can network to share resources.

CyberStars: Number Ones of Tomorrow

For the first time ever, children around the globe can share their
musical talents with the world via the Internet.

PAACE: Personal Achievement And Career Awareness

Students learn and practice important career skills, including those
dealing with education, attitude, manners, grooming, and fashion.

Scientist-on-Tap

Scientists from the Jet Propulsion Laboratory demonstrate the power of
distance learning, by interacting with students around world, from the
comfort of their own offices!

Projects that Require Email Access Only

Ask a Geologist (AAG)

Have you ever wondered about why California has so many earthquakes
and New York does not? Why is there so much oil in Texas but not in
Wisconsin? What are the deepest canyons in the United States? (The
answer might surprise you!) While the answers to many of these
questions might be as close as an encyclopedia, some questions are
difficult to answer without checking many sources. Beginning Monday,
October 3, 1994, the USGS will offer a new, experimental Internet
service - Ask-A-Geologist. General questions on earth sciences may be
sent by electronic mail

Family Tree-Mail: Language Translation

In this pilot project, children use Globalink's language translation
software to share family histories via email in their native languages
of Spanish, French, German, and Italian.

Field Trips

Join other classes on their live field trips. In turn, you take other
classes with you when you visit local places of interest. Our
FIELDTRIPS-L mailing list manages this "exchange" of classroom field
trips and excursions.

Geogame

This perennially favorite project will excite your students as they
immerse themselves in atlases, maps, almanacs, and other references in
order to solve a geography puzzle. Your students help create the
puzzle by answering 8 questions about your community: latitude,
typical weather, land formations, time zone, points of interest, etc.
We combine their responses with other classes to create a geography
puzzle your students will love to solve. A simple first project for
beginning telecommunicators.

Global Grocery List

Your students visit their local grocery stores and record the prices
of items on the grocery list, then share their prices with other
participating classes all over the world. The result is a growing
table of current, peer-collected data that can be used in math, social
studies, science, and health classes (and others). This project is
especially good for telecomputing beginners: it has very little
structure and no timeline.

Jane Goodall Institute

Students learn about the interconnectedness of all life on earth as
they observe the world around them and become involved in
environmental and humanitarian issues. Explore Gombe and Kibira
National Parks, ChimpanZoo, and the Roots & Shoots Program.

The Jason Project

The Jason Project brings the thrill of exploration and discovery live
to students around the world as they participate in an amazing
electronic field trip. In 1995 they trekked to Hawaii to study
volcanoes. The Global SchoolNet Foundation manages the Jason Project
Listservs and features them in our Global SCHLnet Newsgroup Service.

LOGO Foundation

The Logo Foundation, in cooperation with the Global SchoolNet
Foundation, is now managing a Logo listserv discussion group available
to anybody on the Internet.

Newsday

Your students write articles and post them on the Newsday Newswire for
the whole world to see! Then they read and choose articles from other
schools to download and include in their own newspaper! Finally... you
share your newspaper with other classes... and they in turn share
theirs with you. Your students' reading and writing skills will
improve while they learn about current local, national, and global
issues.

Where on the Globe is Roger?

Children are invited to learn about history, culture, geography, and
the environment, while they electronically travel around the world
with Roger Williams - in his quest to promote world peace!

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Example Five: Professional Development
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          THE WEATHER UNDERGROUND ANNOUNCES "DISASTER IN THE CLASSROOM"
          A *LIVE* TELEVISION PROGRAM TO ILLUSTRATE USES OF REAL-TIME
          WEATHER AND ENVIRONMENTAL IMAGERY IN K-12 EDUCATION

Beginning in September 1995, Professor Perry Samson, University of
Michigan professor and Director of the Weather Underground, will host
an innovative, biweekly series of live, interactive, television shows
aimed at teachers, administrators, and parents interested in K-12
education, Internet resources, and the use of real-time weather
information in science. Aimed specifically at the professional
development of teachers, the programs create a model for teachers to
carry back into their classroom, a model that promotes project-based
student centered learning environments using new technology and
science ideas creatively.

The programs, interactive in design, allow participants to ask
questions and respond to information through a simultaneous e-mail
dialogue. A strength in the design of this series is its ability to
allow an interactive discussion of environmental issues (severe
weather, snowstorms, droughts, earthquakes, volcanic activity , El
Nino, etc.) in a timely manner, matching current news items to
science activities. The programs in the virtual classroom series are
uplinked to a satellite from the University of Michigan. Teachers,
administrators, parents or students can view the class either on
their own or in groups. Participants will be encouraged to use their
computer and modem to log into our server during the show. This
interactive virtual classroom will allow participants to pose or
answer questions live (or after the show).

Navigation on the Internet and pointers to information specific to
the science curriculum ideas presented on the show are emphasized and
made available to teachers for use in their classrooms. Participants
are shown where on the Internet to find imagery and activities
relevant to the topics discussed and are lead through a discussion of
new methods to utilize these data in their classroom activities.
Example activities utilizing current weather, climate and
environmental conditions are demonstrated.

If you are interested in participating in this series from your home
or school and would like to receive graduate credit for it, please
contact:

        The Weather Underground
URL: http://groundhog.sprl.umich.edu

[other contact information deleted]

First show is Sept. 18, contact us or look to URL above for more
information soon!!!!!!