NETWORKING ESSENTIALS

Grades 11-12

Credits: 5.0

ABSTRACT
This program is designed to teach students how to manage and maintain PCs and simple networks. Students will be able to identify computer components, take apart and reassemble personal computers, and set up basic networks. They will also build ethernet cables according to category 5 standards, and be able to explain networking protocols such as TCP/IP. The course will provide students with core strategies for acquiring and using technological knowledge and prepares them to become technological thinkers.

BOE Approved 08/21/2018
# Networking Essentials

## Unit of Study

<table>
<thead>
<tr>
<th>Title</th>
<th>Timeframe</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit # 1</td>
<td>Fundamental Computer Concepts/Critical Thinking</td>
<td>2.5 weeks</td>
</tr>
<tr>
<td>Unit # 2</td>
<td>How the Internet works/Network Topologies:</td>
<td>2.5 weeks</td>
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<tr>
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<tr>
<td>Unit # 3</td>
<td>Introducing Hardware:</td>
<td>7 weeks</td>
</tr>
</tbody>
</table>

## STAGE 1: Desired Results

### Established Goals:

**NJSLS:**

(include technology and 21st century standards)

<table>
<thead>
<tr>
<th>Technology</th>
<th>8.1.12.A.3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.2.12.C.1-7</td>
</tr>
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</table>

**21st Century Life and Careers**

9.3.IT.6-7
9.3.IT.12-13

### Enduring Understandings:

(students will understand . . .)

- There is a difference between the world wide web and the internet.
- Software and hardware need each other.
- Operating Systems run your computer.
- Applications accomplish specific tasks.
- Signals on a board can travel logically and physically.

### Essential (Guiding) Questions:

(What provocative questions will foster inquiry, understanding, and transfer of learning?)

- What is on the internet besides the World Wide Web?
- How does software support hardware and vice versa?
- Can I use an operating system to create a logo, document or PowerPoint presentation?
- What is the difference between the internet and the World Wide Web?
- What is DARPA?
- What special role did the @ sign play in Networking?
- Why is it important for nodes to be in a network?
- What is machine language, how does it work?
- What are input, output, storage and processing devices? Can you give examples?
- What devices do the ports on the back of your case correspond to?

### Technology

- 8.1.12.A.3
- 8.2.12.C.1-7

### 21st Century Life and Careers

- 9.3.IT.6-7
- 9.3.IT.12-13
- 9.3.IT. SUP.5, SUP.6

### Technology

- 8.1.12.A.3
- 8.2.12.C.1-7

### 21st Century Life and Careers

- 9.3.IT.6-7
- 9.3.IT.12-13
- 9.3.IT. SUP.5
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<thead>
<tr>
<th>MONTVILLE TOWNSHIP PUBLIC SCHOOL</th>
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<tbody>
<tr>
<td><strong>STAGE 2: Evidence</strong></td>
</tr>
<tr>
<td><strong>Assessments &amp; Evidence:</strong></td>
</tr>
<tr>
<td>(Through what authentic performance tasks will students demonstrate the desired understandings?)</td>
</tr>
<tr>
<td>(By what criteria will performance of understanding be judged?)</td>
</tr>
</tbody>
</table>
| - Article summaries or essays | Castro. *HTML for the World Wide Web*
| - Responses to discussion questions | Berkeley: Peachpit press 2003
| - Teacher evaluation of level of participation/comfort in games/cooperative learning and discussion Groups | Internet resources
| - Self and Peer assessments | **Ballew.** *Hardcore Windows XP*
| - Drawings and design activities which integrate costs and other considerations when necessary | Jean Andrews. *Guide to Managing, Maintaining and Troubleshooting Hardware.* Boston: Cengage course technology, 2010
| - Teacher’s Evaluation/Rubrics of projects and presentations | |
| - Midterm/Final Exam | **Benchmarks** |
| **STAGE 3: Learning Plan** |
| **Learning Activities:** |
| (What specific activities will students do and what skills will students know as a result of the unit?) | - Essay: Compare and contrast a vacuum cleaner to a computer
| - Build “roads” in the classroom and create signs for them | - Create networks with string, add labels to the string based upon what it must do (students can be nodes on the network)
| - Worksheet: given ten materials which conducts most to least? | - Come up with five different ways to string the network together
| - Read and write an article summary about semiconductors | - Watch video on networking
| * | - Class discussion in a circle: how would you know a computer is down in each configuration? |
| **Resources:** | | **Class discussions:** binary code, devices, ports, BIOS, chipset
| Berkeley: Peachpit press 2003 | **Worksheets:** name & define role of each component |
| Internet resources | **Hands on:** Assemble an old computer |
| | **Watch video:** Bloomberg Game changers documentary: Steve Jobs |
| | **Cookies vs computers** |
### MONTVILLE TOWNSHIP PUBLIC SCHOOL

<table>
<thead>
<tr>
<th>Interdisciplinary Connections:</th>
<th>Cross Curricular:</th>
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<td>(e.g. writing, literacy, math, science, history, 21st century life and careers, technology)</td>
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### Differentiation: (What type of differentiated instruction will be used for ELL, SP.ED. and G&T students?)

- **Special Education:**
  - Frequent monitoring & adjustments for learning environment with one on one support as needed
- **English Language Learners:**
  - ELL students will repeat instructions back to affirm understanding.
  - Worksheets and handouts with key terms distributed
- **Gifted and Talented:**
  - Frequent monitoring & adjustments for learning environment with one on one support as needed
  - ELL students will repeat instructions back to affirm understanding.
  - Worksheets and handouts with key terms distributed

### Internet resources


**Hardware:**
- Boston: Cengage course technology, 2010
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<th>Unit # 4</th>
<th>Unit # 5</th>
<th>Unit # 6</th>
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<tbody>
<tr>
<td></td>
<td>Proposing a system</td>
<td>Motherboard/RAM Form Factors</td>
<td>Cable Types</td>
</tr>
<tr>
<td></td>
<td>2.5 weeks</td>
<td>2.5 weeks</td>
<td>3 weeks</td>
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**STAGE 1: Desired Results**

- **Established Goals:**
  - NJSLs:
    - Technology
      - 8.1.12.A.3
      - 8.2.12.C.1-7
    - 21st Century Life and Careers
      - 9.3.IT.6-7
      - 9.3.IT.12-13
      - 9.3.IT- SUP.5
  - Technology
    - 8.1.12.A.3
    - 8.2.12.C.1-7
  - 21st Century Life and Careers
    - 9.3.IT.6-7
    - 9.3.IT.12-13
    - 9.3.IT- SUP.5
  - 21st Century Life and Careers
    - 9.3.IT.6-7
    - 9.3.IT.12-13
    - 9.3.IT- NET.2

- **Enduring Understandings:**
  - When you purchase a computer the key ratio is dollars vs performance
  - Purchasing your own parts allows you to get more of what you want from your computer
  - The parts in your system must be compatible
  - Product reviews are important when purchasing computer parts
  - Form follows function in the computer industry.
  - The CPU is the most expensive item in your case keeping it cool is important.
  - BTX allowed more air flow to the CPU
  - BTX MBs are easy to spot: the memory is parallel to the PCI slots.
  - BTX was Intel’s idea
  - BTX failed because other factors; chips which ran cooler made more of a difference.
  - BTX succeeded because many of today’s MBs follow the BTX standard.
  - BTX and ATX need different cases.
  - There are many types of cables which are chosen for particular uses because of their advantages, but they also have limitations.
  - Each generation of Ethernet cable is named category and a number; for example cat 5, based on its reduction of interference
  - Speed is acquired when interference is reduced
  - Signals are reprocessed when they are not received
  - Serial is faster than parallel because the packets are already in order
  - There is a proper way to roll up all cables

- **Essential (Guiding) Questions:**
  - Why would you buy a computer?
  - Who would you buy it from?
  - Why was BTX architecture born?
  - What was its main feature?
  - What happens when you change the order of the colors in cat 5 wires?
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<th>Assessments &amp; Evidence:</th>
<th>STAGE 2: Evidence</th>
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</table>
| (Through what authentic performance tasks will students demonstrate the desired understandings?) | Evaluate presentation with rubric  
Check accuracy of spreadsheet and component compatibility  
Teacher evaluation of explanation regarding component choices  
General class participation  
Tests and Quizzes  
Teacher’s Evaluation/Rubrics of projects and presentations  
Midterm/Final Exam  
Benchmark | Evaluate article summaries or essays & responses to discussion questions  
Teacher evaluation of designs  
Self and Peer assessments  
General class participation  
Formative assessments  
Teacher’s Evaluation/Rubrics of projects and presentations  
Midterm/Final Exam  
Benchmarks | Evaluate cat 5 cable  
Responses to discussion questions  
Assess student’s ability to identify cables  
Self and Peer assessments  
General class participation  
Drawings and design activities which integrate costs and other considerations when necessary  
Formative assessments  
Teacher’s Evaluation/Rubrics of projects and presentations  
Midterm/Final Exam |
| (By what criteria will performance of understanding be judged?) | STAGE 3: Learning Plan |
| Learning Activities: | |
| (What specific activities will students do and what skills will students know as a result of the unit?) | Write proposals  
Article summaries  
Reverse engineer computer design  
Prepare spreadsheets/ cost comparisons  
Presents to the class | Article summaries  
Reverse engineer BTX MB design  
Draw ATX and BTX designs  
Discussions  
Compare and contrast essays  
Identify actual BTX and ATX architecture when presented with motherboards | Class discussions: cat 5 wire, xlr cable, coaxial cable, resistance, line loss  
Draw the order of cat 5, and cat 5 crossover  
Worksheets: identify the type of cable given the cable.  
Learn safe and proper use of wire cutters, crimper, cable tester and rj45  
Create and roll a cat 5 cable  
Article summaries |
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<td>Social Science-Cultural aspects of integrated circuits</td>
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**Differentiation:** (What type of differentiated instruction will be used for ELL, SP.ED. and G&T students?)

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<tr>
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<th>Students can participate in mentoring and leadership roles, leading discussions and group efforts to solve problems</th>
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<tr>
<th>Unit of Study: (Title, timeframe, description)</th>
<th>Unit # 7 Electricity 4 weeks</th>
<th>Unit # 8 Operating Systems 5 weeks</th>
<th>Unit # 9 Creating a Network 5 weeks</th>
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## STAGE 1: Desired Results

### Established Goals:
- **NJSLS:** (include technology and 21st century standards)
- **Technology**
  - 8.1.12.A.3
  - 8.2.12.C.1-7

**21st Century Life and Careers**
- 9.3.IT.6-7
- 9.3.IT.12-13
- 9.3.IT- SUP.5
- 9.3.IT- NET.2

**Technology**
- 8.1.12.A.3
- 8.2.12.C.1-7

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- 9.3.IT.12-13
- 9.3.IT- SUP.5
- 9.3.IT- NET.1-5

**Technology**
- 8.1.12.A.3
- 8.2.12.C.1-7

**21st Century Life and Careers**
- 9.3.IT.6-7
- 9.3.IT.12-13
- 9.3.IT- SUP.5
- 9.3.IT- NET.1-5

### Enduring Understandings:
- Transformation refers to a change in size.
- Appliances in your home use DC.
- Power Supplies rectify the problem of AC and transform large charges into smaller ones which appliances can use.
- Volts, Amps, and Ohms measure different characteristics of electricity.
- A multi-meter can be used to measure volts, amps and ohms.

### Essential (Guiding) Questions:
- How does electricity come to your home?
- How does it come out of the wall?
- How does your power supply prepare electricity for your computer’s consumption?
- How do components get their electricity?
- What does a multi-meter do?

- Windows supports and manages network connections
- The operating system determines how computers are identified and addressed on a network.
- Windows uses several protocols and standards for networking.
- You connect a computer to a network through its operating system.
- The operating system provides you with troubleshooting tools.

- Hardware devices other than computers are necessary to create networks
- There are different types of networks
- Protocols are essential to all networks
- ARP is a protocol which resolves MAC addresses.

### Assessments & Evidence:
- Evaluate summaries or essays
- Responses to discussion questions
- Evaluate article summaries or essays
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- Responses to discussion questions
### MONTVILLE TOWNSHIP PUBLIC SCHOOL

**Through what authentic performance tasks will students demonstrate the desired understandings?**

**By what criteria will performance of understanding be judged?**

- Teacher evaluation of level of participation explanation regarding power supply selection
- Assessments of how well student uses multi-meter
- General class participation
- Formative assessments
- Teacher’s Evaluation/Rubrics of projects and presentations
- Midterm/Final Exam

- Assess student’s ability to identify cables
- Self and Peer assessments
- General class participation
- Drawings and design activities which integrate costs and other considerations when necessary
- Formative assessments
- Teacher’s Evaluation/Rubrics of projects and presentations
- Midterm/Final Exam

**STAGE 3: Learning Plan**

**Learning Activities:**

**What specific activities will students do and what skills will students know as a result of the unit?**

- Hands on: use a multi-meter
- Determine Watts from Volts and Amps
- Worksheet: given ten materials which conducts most to least?
- Create power point where you define and describe: transistor, capacitor, diode & resistor.
- Worksheet: select appropriate wattage for a power supply given 1 of four random systems

- Article summaries
- Reverse engineer BTX MB design
- Draw ATX and BTX designs
- Discussions
- Compare and contrast essays
- Identify actual BTX and ATX architecture when presented with motherboards

- Class discussions: cat 5 wire, xlr cable, coaxial cable, resistance, line loss
- Draw the order of cat 5, and cat 5 crossover
- Worksheets: identify the type of cable given the cable.
- Learn safe and proper use of wire cutters, crimper, cable tester and rj45
- Create and roll a cat 5 cable
- Article summaries

**Resources:**


Internet resources


Internet resources

Warriors of the internet video
Internet resources
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**Differentiation:** (What type of differentiated instruction will be used for ELL, SP.ED. and G&T students?)

Continuous assessment to address content, process, and product. Learning styles addressed through teaching methods

**Special Education:**
- Frequent monitoring & adjustments for learning environment with one on one support as needed

**English Language Learners:**
- ELL students will repeat instructions back to affirm understanding.
- Worksheets and handouts with key terms distributed

**Gifted and Talented:**
- Students can participate in mentoring and leadership roles, leading discussions and group efforts to solve problems

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<th>Unit of Study: (Title, timeframe, description)</th>
<th>Unit # 10</th>
<th>Unit # 11</th>
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<tbody>
<tr>
<td>The OSI Model</td>
<td>Security</td>
<td>3 weeks</td>
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**STAGE 1: Desired Results**

### Enduring Understandings:

**students will understand . . .**

- The OSI reference model, sets standards for LAN and WAN communications by showing communication between stacks when two computers are linked.
- The OSI model applies to all networking situations.
- Certain security compliance measures are required by law.
- There are many ways to protect computing resources.
- Once you’ve implemented security measures it’s important to maintain them.

### Essential (Guiding) Questions:

*What provocative questions will foster inquiry, understanding, and transfer of learning?*

- Why was the OSI model created by the ISO?
- Who did it help?
- What does the OSI show you?
- What advantages are there to using Ethernet in network designs?
- Why it is important to comply with established security policies?
- How can you authenticate and classify users so that you can control who has access to your resources and what users can do with them?
- What additional methods can you use to protect resources?
- How can you to monitor and maintain the security measures you have implemented?

### STAGE 2: Evidence

**Assessments & Evidence:**

*Through what authentic performance tasks will students demonstrate the desired understandings?*  
*By what criteria will performance of understanding be judged?*

- Evaluate summaries or essays
- Responses to discussion questions
- Teacher evaluation of level of participation explanation regarding power supply selection
- General class participation
- Formative assessments
- Teacher’s Evaluation/Rubrics of projects and presentations
- Midterm/Final Exam

- Evaluate article summaries or essays
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- General class participation
- Formative assessments
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- Midterm/Final Exam
### STAGE 3: Learning Plan

#### Learning Activities:

(What specific activities will students do and what skills will students know as a result of the unit?)

- Create PowerPoint on OSI
- Create acronym for the layers
- Think pair share: take turns: Describe a network problem, say what layer it is and why
- Play network card game cards with problems and layers
- Recreate the OSI model
- Compare and contrast the OSI model to TCP/IP
- Watch video on STUXNET
- Class discussion on Anonymous
- Video: Hackers wanted
- Read and summarize article on hacking
- Create a flowchart for hacking

#### Resources:


Internet resources

10 MOST POPULAR WAYS HACKERS HACK YOUR WEBSITE
Antivirus Software: avoiding social engineering and phishing attacks
Differences Among Viruses, Worms, and Trojan Horses
Documentary about Anonymous Hackers
Encryption
Hackers Wanted [Full Documentary]
How Firewalls Work
Larry Ellison Oracle malware
Password Myths and Tips: sharing files
Strong passwords
Stuxnet Cyber Warfare
Trusted Platform Module technology

#### Interdisciplinary Connections:

(e.g. writing, literacy, math, science, history, 21st century life and careers, technology)

- English-writing responses and discussion notes
- Social Science-Cultural aspects of integrated circuits

#### Cross Curricular:

- English-writing responses and discussion notes
- Social Science-Cultural aspects of computers, the world wide web, networking & internet

#### Differentiation:

(What type of differentiated)

Continuous assessment to address content, process, and product.

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**MONTVILLE TOWNSHIP PUBLIC SCHOOL**

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