

Manitoba Curriculum Framework of Outcomes

Networking & Cyber Security Grades 9 – 11

In order to give students the opportunity to earn certain industry certifications, most of the courses include some or all of the outcomes or content found in the documents that are associated with those certifications. Since these outcomes and content are proprietary to those organizations (such as Microsoft and Cisco) they cannot be included in this curriculum. Teachers will have to gain access to those industry documents and certifications in order to teach those outcomes.

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
Goal 1: Describe and apply appropriate health and safety practices.				
GLO 1.1: Describe and apply appropriate health and safety practices				
Maintain a safe, uncluttered and organized workspace.	→	→	→	→
Demonstrate awareness of health and safety issues related to lighting and glare, including monitors.	→	→	→	→
Describe and apply appropriate health and safety practices from the <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)	→	→	→	→

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
Goal 2 Demonstrate an awareness of the evolution, technological progression, and emerging trends in IT.				
GLO 2.1: Describe the evolution, technological progression and emerging trends in IT.				
Describe the evolution, technological progression and emerging trends in networking and cyber security.	Describe the evolution, technological progression and emerging trends in networking and cyber security.	Describe the evolution, technological progression and emerging trends in operating systems.	Describe the evolution, technical progression and emerging trend in IT from <i>Level 1 Introduction to Networks</i> (Cisco Networking Academy).	Describe the evolution, technological progression and emerging trends in cyber security. Explain trends in the cyber threat landscape.
Goal 3 Demonstrate understanding of hardware, operating systems, applications, networking and cyber security .				
GLO 3.1: Demonstrate understanding of concepts related to hardware .				
Demonstrate understanding of concepts related to hardware.	Demonstrate understanding of concepts related to hardware as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)	Demonstrate understanding of concepts related to hardware as described in the <i>Microsoft Technology Associate Certification Exam Review Kit: 98-349 Windows Operating System Fundamentals</i> , Course 10753	Demonstrate understanding of concepts related to hardware as described in the first half of the <i>Cisco Level 1 Introduction to Networks</i> .	

<p>9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M</p>	<p>9103 Hardware & Software Essentials 20S / 20E / 20M</p>	<p>9104 Operating Systems 30S / 30E / 30M</p>	<p>9105 Networking Technologies 30S / 30E / 30M</p>	<p>9106 Cyber Security Essentials 30S / 30E / 30M</p>
<p>GLO 3.2: Demonstrate a theoretical understanding of operating systems.</p>				
<p>Demonstrate a theoretical understanding of operating systems.</p>	<p>Demonstrate a theoretical understanding of operating systems as described in the <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p>	<p>Demonstrate a theoretical understanding of operating systems as described in the <i>Microsoft Technology Associate Certification Exam Review Kit: 98-349 Windows Operating System Fundamentals</i>, Course 10753</p>		
<p>GLO 3.3: Demonstrate a theoretical understanding of applications.</p>				
<p>Demonstrate a theoretical understanding of applications.</p>	<p>Demonstrate a theoretical understanding of applications as described in the <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p>	<p>Demonstrate a theoretical understanding of applications as described in the <i>Microsoft Technology Associate Certification Exam Review Kit: 98-349 Windows Operating System Fundamentals</i>, Course 10753</p>		

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<p>GLO 3.4: Demonstrate a theoretical understanding of networking.</p>				
<p>Demonstrate a theoretical understanding of networking.</p>	<p>Demonstrate a theoretical understanding of networking.</p>	<p>Demonstrate a theoretical understanding of networking as described in <i>Microsoft Technology Associate Certification Exam Review Kit: 98-349 Windows Operating System Fundamentals</i>, Course 10753</p>	<p>Demonstrate a theoretical understanding of networking as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p> <p>Demonstrate a theoretical understanding of networking as described in <i>Cisco Level 1 Introduction to Networks</i>.</p>	

<p>9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M</p>	<p>9103 Hardware & Software Essentials 20S / 20E / 20M</p>	<p>9104 Operating Systems 30S / 30E / 30M</p>	<p>9105 Networking Technologies 30S / 30E / 30M</p>	<p>9106 Cyber Security Essentials 30S / 30E / 30M</p>
<p>GLO 3.5: Demonstrate a theoretical understanding of cyber security.</p>				
<p>Demonstrate a theoretical understanding of cyber security.</p>	<p>Demonstrate a theoretical understanding of cyber security as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p> <p>Demonstrate understanding of the importance of local user account security and security policies.</p> <p>Demonstrate understanding of the importance of using strong passwords.</p>	<p>Demonstrate a theoretical understanding of cyber security as described in <i>Microsoft Technology Associate Certification Exam Review Kit: 98-349 Windows Operating System Fundamentals</i>, Course 10753</p> <p>Demonstrate understanding of the importance of security software.</p>		<p>Demonstrate understanding of malware, viruses, trojans, worms, key loggers and rootkits.</p> <p>Demonstrate understanding of the importance of regular software and hardware updates.</p> <p>Demonstrate understanding of social engineering.</p> <p>Demonstrate understanding of services and processes and how they affect cyber security.</p>

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
GLO 3.5: Demonstrate a theoretical understanding of cyber security . <i>(continued)</i>				
<div style="text-align: right; padding-right: 20px;"> <p>Demonstrate understanding of logging and auditing as they relate to cyber security.</p> <p>Demonstrate understanding of ports as they relate to cyber security.</p> <p>Demonstrate understanding of shared folders as they relate to cyber security.</p> <p>Demonstrate understanding of user management as it relates to cyber security.</p> <p>Demonstrate understanding of file and folder permissions as they relate to cyber security.</p> <p>Demonstrate understanding of computer security policies and group policies.</p> </div>				

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GLO 3.5: Demonstrate a theoretical understanding of cyber security . <i>(continued)</i>				
				<p>Demonstrate understanding of virtual machines as they relate to cyber security.</p> <p>Demonstrate understanding of security journals.</p> <p>Demonstrate understanding of firewalls.</p> <p>Demonstrate understanding of User Account Control (Windows O. S.).</p>

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Goal 4: Install, configure, manage, secure and troubleshoot **devices**, operating systems and applications.

GLO 4.1: Install devices, operating systems, and their associated software.

Demonstrate the ability to install devices, operating systems, and their associated software.

Demonstrate the ability to install devices, operating systems, and their associated software as described in *IT Essentials 5.0 curriculum* (Cisco Networking Academy)

Demonstrate the ability to install security software.

<p>9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M</p>	<p>9103 Hardware & Software Essentials 20S / 20E / 20M</p>	<p>9104 Operating Systems 30S / 30E / 30M</p>	<p>9105 Networking Technologies 30S / 30E / 30M</p>	<p>9106 Cyber Security Essentials 30S / 30E / 30M</p>
<p>GLO 4.2: Configure devices, operating systems, and their associated software.</p>				
<p>Demonstrate the ability to configure devices, operating systems, and their associated software.</p>	<p>Demonstrate the ability to configure devices, operating systems, and their associated software as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p> <p>Configure control panel options, desktop settings, and native applications.</p> <p>Demonstrate awareness of local group policy settings.</p> <p>Demonstrate the ability to configure a printer.</p>	<p>Demonstrate the ability to configure devices, operating systems, and their associated software as described in <i>Microsoft Technology Associate Certification Exam Review Kit: 98-349 Windows Operating System Fundamentals</i>, Course 10753</p>	<p>Demonstrate the ability to configure devices, operating systems, and their associated software as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p>	

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
<p>GLO 4.3: Manage devices, operating systems, and their associated software.</p>				
<p>Demonstrate the ability to manage devices, operating systems, and their associated software.</p>	<p>Demonstrate the ability to organize and manage files and folders.</p> <p>Demonstrate the ability to manage devices, operating systems, and their associated software as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy).</p>			

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<p>GLO 4.4: Secure devices, operating systems, and their associated software.</p>				
<p>Demonstrate the ability to secure devices, operating systems, and their associated software.</p>	<p>Demonstrate the ability to configure a BIOS password.</p> <p>Demonstrate understanding of security appliances. (i.e. biometrics, key fobs)</p> <p>Demonstrate the ability to configure and manage local user accounts.</p>	<p>Demonstrate the ability to secure devices, operating systems, and their associated software as described in <i>Microsoft Technology Associate Certification Exam Review Kit: 98-349 Windows Operating System Fundamentals</i>, Course 10753.</p> <p>Demonstrate the ability to secure file and folder permissions. (ITE 10.2.1.6)</p> <p style="text-align: right;">→</p>		<p>Demonstrate the ability to update and maintain operating systems, applications, and hardware.</p> <p>Demonstrate the ability to detect and eliminate malware, viruses, trojans, worms, keyloggers and rootkits.</p> <p>Demonstrate the ability to identify, stop and remove services and processes that affect cyber security.</p>

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
GLO 4.4: Secure devices, operating systems, and their associated software. <i>(continued)</i>				
	Demonstrate the ability to secure devices, operating systems, and their associated software as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)			Demonstrate the ability to set up logging and auditing to improve computer security. Demonstrate the ability to identify and secure ports that pose a threat to computer security. Demonstrate the ability to identify and secure shared folders. Demonstrate the ability to apply proper user management. Demonstrate the ability to apply file and folder permissions. Demonstrate the ability to apply computer security policies and group policies that improve security.

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
<p>GLO 4.4: Secure devices, operating systems, and their associated software. <i>(continued)</i></p>				
				<p>Demonstrate the ability to install an operating system on a virtual machine.</p> <p>Demonstrate the ability to create and effectively use a security journal.</p>
<p>GLO 4.5: Troubleshoot devices, operating systems, and their associated software.</p>				
<p>Demonstrate the ability to troubleshoot devices, operating systems, and their associated software.</p>	<p>Demonstrate the ability to troubleshoot devices, operating systems, and their associated software as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy).</p>			

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
<p>Goal 5: Design, configure, manage, secure and troubleshoot networks, operating systems and applications.</p>				
<p>GLO 5.1: Design networks and their associated software.</p>				
			<p>Demonstrate the ability to sketch a simple network.</p> <p>Demonstrate the ability to design networks and their associated software, as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p>	

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
GLO 5.2: Configure networks and their associated software.				
			<p>Demonstrate the ability to configure networks and their associated software, as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p> <p>Demonstrate the ability to configure networks and their associated software, as described in <i>Cisco Level 1 Introduction to Networks</i>.</p> <p>Demonstrate the ability to configure an ISR (small office / home office) router to a wired or wireless network.</p>	

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<p>GLO 5.3: Manage networks and their associated software.</p>				
	<p>Demonstrate the ability to manage wireless connections on devices.</p>	<p>Demonstrate the ability to manage networks and their associated software, as described in <i>Microsoft Technology Associate Certification Exam Review Kit: 98-349 Windows Operating System Fundamentals</i>, Course 10753.</p>	<p>Demonstrate the ability to manage networks and their associated software, as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p>	

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
GLO 5.4: Secure networks and their associated software.				
				<p>Demonstrate the ability to configure security settings for ISR device. (e.g. administrative passwords, MAC filtering, port forwarding, access control, content filtering)</p> <p>Demonstrate the ability to compare and contrast methods for securing mobile devices.</p> <p>Demonstrate the ability to use networking tools to identify and secure security threats on a network.</p> <p>Demonstrate the ability to secure routers and switches using best industry practices.</p>

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
<p>GLO 5.5: Troubleshoot networks and their associated software.</p> <p>Demonstrate the ability to troubleshoot Layer 1 connectivity problems. (e.g. network media malfunctions, link light activity)</p> <p>Demonstrate the ability to troubleshoot Layer 3 connectivity problems. (incorrect TCP/IP settings)</p> <p>Demonstrate use of IPconfig, Ping and Traceroute and Netstat.</p> <p>Demonstrate the ability to troubleshoot networks and their associated software, as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy)</p>				

<p>9102</p> <p>Exploration of Networking & Cyber Security</p> <p>15S / 15E / 15M 10S / 10E / 10M</p>	<p>9103</p> <p>Hardware & Software Essentials</p> <p>20S / 20E / 20M</p>	<p>9104</p> <p>Operating Systems</p> <p>30S / 30E / 30M</p>	<p>9105</p> <p>Networking Technologies</p> <p>30S / 30E / 30M</p>	<p>9106</p> <p>Cyber Security Essentials</p> <p>30S / 30E / 30M</p>
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Goal 6: Document the installation, design, configuration, management, security and troubleshooting of devices, networks, and their associated software.

GLO 6.1: Document the installation, design, configuration, management, security and troubleshooting of devices, networks, and their associated software.

Demonstrate the ability to create and upkeep an engineering journal.

Goal 7: Describe and demonstrate the transferable **cross-curricular** knowledge and skills relevant to IT.

GLO 7.1: Research, read, interpret and communicate information relevant to IT.

Demonstrate the ability to research the Internet to identify hardware compatibility and device drivers.

Demonstrate the ability to research the Internet to identify resources to assist in troubleshooting.

Demonstrate the ability to read, interpret and communicate information.

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
GLO 7.2: Apply the knowledge and skills from mathematics relevant to IT.				
Demonstrate the ability to convert to and from decimal and binary		Demonstrate understanding of the use of the binary numbering system as it applies to IP addressing. Demonstrate understanding of the application of Boolean logic		
GLO 7.3: Apply the knowledge and skills from the sciences relevant to IT.				
Demonstrate understanding of the four electrical quantities – voltage, current, resistance and power. Demonstrate understanding of Ohm’s Law.				

<p>9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M</p>	<p>9103 Hardware & Software Essentials 20S / 20E / 20M</p>	<p>9104 Operating Systems 30S / 30E / 30M</p>	<p>9105 Networking Technologies 30S / 30E / 30M</p>	<p>9106 Cyber Security Essentials 30S / 30E / 30M</p>
<p>Goal 8: Demonstrate awareness of sustainability as it pertains to networking and cyber security.</p>				
<p>GLO 8.1: Describe the IT industry's sustainability practices and impact on the environment.</p>				
	<p>Demonstrate understanding of the impact of the IT industry on the environment.</p>	<p>Demonstrate understanding of the impact of electronic waste on the environment.</p>		
<p>GLO 8.2: Describe the impact of human sustainability on the well-being of those employed in IT and the users of their services.</p>				
	<p>Demonstrate understanding of human sustainability.</p> <p>Demonstrate understanding of ergonomically appropriate procedures to avoid injury.</p>	<p>Demonstrate understanding of concerns related to hyper-connectivity.</p> <p>Demonstrate understanding of risk factors and treatments related to carpal tunnel syndrome.</p>		<p>Demonstrate understanding of the importance of cyber security to the global economy.</p>

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
GLO 8.3: Describe sustainable business practices within the IT industry.				
	Define and discuss the concept of sustainable business practices.	Demonstrate awareness of trends in society, technology, and social media, as they apply to networking and cyber security.	Demonstrate understanding of the types of business practices that promote the long-term viability of businesses such as those found in IT.	Demonstrate awareness of the need for lifelong learning during a career in cyber security.
Goal 9: Demonstrate awareness of the ethical and legal standards as they pertain to IT.				
GLO 9.1: Demonstrate an awareness of the ethical and legal standards as they pertain to IT.				
	Demonstrate awareness of the ethical considerations in the IT industry. Demonstrate an awareness of the ethical and legal standards as they pertain to IT as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy).	Demonstrate awareness of the consequences of unethical behaviour.	Demonstrate cyber etiquette. Demonstrate understanding of cyber bullying, and its effect on victims. Demonstrate understanding of safe browsing habits. Demonstrate safe browsing habits.	Demonstrate understanding of the role of cloud computing.

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
Goal 10: Demonstrate employability skills.				
GLO 10.1: Demonstrate fundamental employability skills.				
Demonstrate regular and punctual attendance.	→	→	→	→
Demonstrate respectful and effective communication with teachers, supervisors, co-worker, and students.	→	→	→	→
Demonstrate accountability by taking responsibility for their actions.	→	→	→	→
Demonstrate adaptability, initiative and effort.	→	→	→	→
Demonstrate teamwork skills.	→	→	→	→
Demonstrate the ability to stay on task and effectively use time in class and work environments.	→	→	→	→

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
GLO 10.1: Demonstrate fundamental employability skills. (continued)				
Demonstrate the responsible use of wireless communication devices.	→ Describe fundamental employability skills as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy).	→ →	→ →	→ →
GLO 10.2: Demonstrate an awareness of cultural proficiency, and its importance in the workplace.				
	Demonstrate awareness of culture. Demonstrate awareness of culture in the workplace.			
GLO 10.3: Demonstrate an understanding of the business operation of an IT organization.				
	Demonstrate an understanding of the work order process. Interpret and complete work orders.	Discuss the requirements for companies to generate profits in order to continue operating.		

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
GLO 10.4: Demonstrate critical thinking skills.				
	Demonstrate understanding of the need for critical thinking skills. Demonstrate understanding of the need for problem solving skills.		Demonstrate the ability to think critically while troubleshooting.	
Goal 11: Demonstrate understanding of the IT industry.				
GLO 11.1: Demonstrate an understanding of the scope of the IT industry.				
	Demonstrate understanding of the scope of IT.	Demonstrate understanding of the place of IT in the Canadian economy.		Demonstrate awareness of the characteristics of cyber warfare.

9102 Exploration of Networking & Cyber Security 15S / 15E / 15M 10S / 10E / 10M	9103 Hardware & Software Essentials 20S / 20E / 20M	9104 Operating Systems 30S / 30E / 30M	9105 Networking Technologies 30S / 30E / 30M	9106 Cyber Security Essentials 30S / 30E / 30M
GLO 11.2: Demonstrate understanding of the educational and career opportunities , as well as industry and professional associations .				
<div style="display: flex; justify-content: space-between;"> <div style="width: 20%; border-right: 1px solid black; padding-right: 10px;"> <p>Demonstrate understanding of the scope of careers in IT.</p> <p>Demonstrate awareness of the levels of technicians within the industry.</p> </div> <div style="width: 20%; border-right: 1px solid black; padding-right: 10px;"> <p>Demonstrate understanding of industry certification opportunities.</p> </div> <div style="width: 20%; border-right: 1px solid black; padding-right: 10px;"> <p>Demonstrate awareness of professions related to IT.</p> </div> <div style="width: 20%; padding-left: 10px;"> <p>Demonstrate awareness of the growth of cyber security.</p> <p>Demonstrate awareness of career opportunities related to network security certifications.</p> </div> </div>				
GLO 11.3: Demonstrate understanding of working conditions in IT.				
<div style="display: flex; justify-content: space-between;"> <div style="width: 20%; border-right: 1px solid black; padding-right: 10px;"> <p>Describe the working conditions related to different occupations in IT.</p> <p>Demonstrate understanding of working conditions in IT as described in <i>IT Essentials 5.0 curriculum</i> (Cisco Networking Academy).</p> </div> <div style="width: 20%; border-right: 1px solid black;"></div> <div style="width: 20%; border-right: 1px solid black;"></div> <div style="width: 20%;"></div> </div>				