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CCNAX Routing  
and Switching Boot  
Camp or ICND1  
and ICND2: Which  
Path Is Best for  
You?

# CCNAX Routing and Switching Boot Camp or ICND1 and ICND2: Which Path Is Best for You?

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## Introduction

In the spring of 2013, Cisco announced major updates to their Cisco Certified Network Associate (CCNA) Routing and Switching curricula and exams.

The new versions of the CCNA Routing and Switching exams are: Interconnecting Cisco Networking Devices: Accelerated (CCNAX) exam 200-120, Interconnecting Cisco Networking Devices Part 1 (ICND1) exam 100-101, and Interconnecting Cisco Networking Devices Part 2 (ICND2) exam 200-101. Passing either the CCNAX exam or both of the ICND1 and ICND2 exams will result in a CCNA Routing and Switching certification. (Note that passing only the ICND1 exam will result in a Cisco Certified Entry Network Technician [CCENT] certification; this certification is detailed on Cisco's website but not discussed further in this white paper.

Global Knowledge offers two preparation paths to the CCNA Routing and Switching certification: (1) a traditional track, with separate ICND1 and ICND2 courses and (2) an accelerated track with the CCNAX Routing and Switching Boot Camp, which contains a merge of the ICND1 and ICND2 course material. All three of these courses are at version 2.0.

This document first examines what you should already know before embarking on either of these paths, and then details the CCNA Routing and Switching certification requirements and recommended training. The exclusive resources included in the Global Knowledge courses are then described, including the extensive hands-on labs on real equipment.

## Are You Ready to Pursue the CCNA Routing and Switching Certification?

While the CCNA Routing and Switching certification is one of Cisco's associate certifications, it is not an entry-level certification. Candidates are expected to have some previous knowledge and experience with networking.

### What Should You Already Know?

Network administrators, network support engineers, and network support technicians with one to three years of experience are ideal candidates to embark on this certification path, because they would be familiar with basic installation, operation, and verification, of local area networks (LANs).

In particular, to get the most out of the CCNA Routing and Switching-level curriculum, you should have familiarity with the following concepts:

- the differences between LANs and wide area networks (WANs)
- the layers of the Open Systems Interconnection (OSI) model and the Transmission Control Protocol / Internet Protocol (TCP/IP) protocol suite
- ethernet cables, frames, and Media Access Control (MAC) addresses
- what switches are used for, and how they use MAC address tables
- what routers are used for, how they use routing tables, and what a routing protocol is
- binary, decimal, and hexadecimal, numbering schemes, and how to convert between them
- the format of an IP version 4 (IPv4) address
- what an IPv4 subnet mask is used for
- what the Address Resolution Protocol (ARP) is used for
- what the Internet Control Message Protocol (ICMP) is used for
- what IP version 6 (IPv6) is

These topics are all reviewed in the CCNA Routing and Switching-level curriculum, but if you are not familiar with or don't understand them, or you are new to networking, then it may be best for you to start your learning with a basic networking course. The following are recommended Global Knowledge courses:

- **Understanding Networking Fundamentals (UNF):** Gain real-world, practical skills by moving step-by-step through the basics of data networking, practicing with leading-edge technologies from Cisco, Juniper, ADTRAN, HP, Dell, and Microsoft. Course topics include: how switches and routers interconnect; IPv4 addressing and subnetting; how TCP/IP works; using a protocol analyzer; how Ethernet and various copper and fiber cables work; protocols including Network Address Translation (NAT), Routing Information Protocol (RIP), Enhanced Interior Gateway Routing Protocol (EIGRP), and Open Shortest Path First (OSPF); and WAN technologies.
- **TCP/IP Networking:** Gain the essential knowledge and skills required to set up, configure, support, and troubleshoot your TCP/IP-based network. Course topics include: IPv4 addressing and subnetting; protocols including ARP, IPv4, IPv6, ICMP, TCP, User Datagram Protocol (UDP), Dynamic Host Configuration Protocol (DHCP), Dynamic Domain Name Servers (DDNS), File Transfer Protocol (FTP), Hypertext Transfer Protocol (HTTP), and Telnet; routing protocols RIP and OSPF; and use of a protocol analyzer.
- **Network+ Prep Course:** Master essential data networking skills while preparing for the CompTIA Network+ certification exam, and gain essential networking skills in labs that feature networking equipment from Cisco, Linksys, Netgear, ZyXel, and others. Course topics include: Networking communication methods, media, hardware, and models; IPv4 and IPv6 addressing and services; LAN and WAN infrastructure; routing; security; management; and troubleshooting.

These courses are also recommended if you want more in-depth knowledge of the topics covered.

### Self-Assessment Questions

This section provides some self-assessment questions for you to test your current knowledge level. If you are new to networking, if you do not know the answers to these questions, or if you do not understand what is being asked, then the basic networking courses mentioned in the previous section may be a more appropriate place to start your learning path. (The answers to these questions are provided at the end of this white paper.)

1. Which of the following are characteristics of a WAN? (Choose two answers.)
  - a. Usually owned by a service provider
  - b. Usually used to connect buildings in the campus
  - c. Usually owned and operated by the enterprise
  - d. Usually connect wide geographic areas

2. End-to-end connectivity is the function of which OSI layer?
  - a. Internet
  - b. Data link
  - c. Application
  - d. Network
  - e. Transport
  
3. Determination of the best path is the function of which TCP/IP layer?
  - a. Internet
  - b. Data link
  - c. Application
  - d. Network
  - e. Transport
  
4. Which of the following is a characteristic of IP?
  - a. Connection oriented connectivity
  - b. Best effort delivery
  - c. Windowing
  - d. Flow control
  
5. How many wires do unshielded twisted pair (UTP) cables have?
  - a. 2
  - b. 4
  - c. 6
  - d. 8
  - e. 16
  
6. An Ethernet frame encapsulates an IP packet. Which field in the frame indicates this?
  - a. Data
  - b. Port
  - c. Protocol
  - d. Type
  
7. Which statement best describes MAC addresses?
  - a. They are 32 bits long and are usually written as dotted decimal numbers.
  - b. They are 48 bits long and are usually written as dotted decimal numbers.
  - c. They are 128 bits long and are usually written as dotted decimal numbers.
  - d. They are 32 bits long and are usually written as hexadecimal numbers.
  - e. They are 48 bits long and are usually written as hexadecimal numbers.
  - f. They are 128 bits long and are usually written as hexadecimal numbers.
  
8. By default, two interfaces on a Layer 2 switch are:
  - a. In different broadcast domains
  - b. In the same collision domain
  - c. In the same broadcast domain
  - d. In the same autonomous system
  
9. Which best describes the contents of a Layer 2 switch's MAC address table?
  - a. The table contains the MAC addresses of all of the switch's interfaces.
  - b. The table contains the MAC addresses of all of the attached switches.
  - c. The table contains the MAC addresses of all of the attached routers.
  - d. The table contains the MAC addresses of all of the attached PCs and servers.

- e. The table contains the MAC addresses of all of the devices directly connected to the switch.
  - f. The table contains the MAC addresses of all of the devices from which the switch has seen frames.
10. Switch A receives a frame addressed to a MAC address that does not appear in any of its tables. What does it do with this frame, by default?
- a. It sends it out of all its interfaces, except the interface on which it arrived.
  - b. It puts it in its frame buffer until it determines where to send the frame.
  - c. It drops the frame and informs the sender.
  - d. It sends a request to all of the other switches to determine where to send the frame.
11. By default, two interfaces on a router are:
- a. In different broadcast domains
  - b. In the same collision domain
  - c. In the same broadcast domain
  - d. In the same autonomous system
12. Router A's routing table contains entries for only subnets of network 10.0.0.0. It receives a packet for 172.16.1.1. What does it do with this packet?
- a. It sends it out of all its interfaces, except the interface on which it arrived.
  - b. It puts it in its packet buffer until it determines where to send the packet.
  - c. It drops the packet and informs the sender.
  - d. It sends a request to all of the other routers to determine where to send the packet.
13. Which statement best describes a routing protocol?
- a. How routers pass information belonging to multiple VLANs
  - b. How routers learn about networks connected to other routers
  - c. How routers ensure the quality of service (priority) for specific data
  - d. How routers avoid broadcast storms
14. Which is the hexadecimal number equivalent to the binary number 1100?
- a. 10
  - b. 11
  - c. 12
  - d. C
  - e. D
  - f. E
15. Which is the decimal number equivalent to the binary number 10101100?
- a. 128
  - b. 160
  - c. 172
  - d. 192
  - e. 256
  - f. 1011
16. Which statement best describes IPv4 addresses?
- a. They are 32 bits long and are usually written as dotted decimal numbers.
  - b. They are 48 bits long and are usually written as dotted decimal numbers.
  - c. They are 128 bits long and are usually written as dotted decimal numbers.
  - d. They are 32 bits long and are usually written as hexadecimal numbers.
  - e. They are 48 bits long and are usually written as hexadecimal numbers.
  - f. They are 128 bits long and are usually written as hexadecimal numbers.

17. An IPv4 subnet mask is used for which purpose?
- To indicate which class of IPv4 address is being used
  - To indicate if broadcast addresses can be used in the IPv4 network
  - To indicate if multicast addresses can be used in the IPv4 network
  - To indicate if classless subnetting can be used in the IPv4 network
  - To indicate which bits in the IPv4 address are being used for subnetting
18. Which of the following are characteristics of ARP? (Choose two answers.)
- An ARP request is sent to a multicast address.
  - An ARP request is sent to the broadcast address.
  - An ARP request is sent to a unicast address.
  - An ARP request is sent by a device needing the MAC address of a neighbor.
  - An ARP request is sent by a device needing the IPv4 address of a neighbor.
19. ICMP is *not* used in which of the following scenarios?
- When performing a ping
  - When a packet's destination is not reachable
  - When a packet's time to live field reaches zero
  - When a router's CPU is too busy to process a packet
20. Which are characteristics of IPv6? (Choose two answers.)
- IPv6 addresses are two times larger than IPv4 addresses.
  - IPv6 addresses are four times larger than IPv4 addresses.
  - IPv6 is replacing IPv4 because there are no more IPv4 addresses.
  - IPv6 is replacing IPv4 because newer routers only support IPv6.
  - IPv6 addresses have many more classes than IPv4 addresses.

## CCNA Routing and Switching Certification Requirements and Recommended Training

This section details the required exams and recommended training for the CCNA Routing and Switching certification.

### Required Exams

As mentioned earlier, passing either the CCNAX exam or both of the ICND1 and ICND2 exams will result in a CCNA Routing and Switching certification. On any of the exam pages mentioned in this section, click on the "Review the exam topics" link to see the related exam topics, and click on the "Review type of exam questions" link to view an exam tutorial that covers the various forms of questions you can expect to see on the exam.

### ICND1 Exam

The ICND1 exam is exam number 100-101. This ninety-minute exam includes forty-five to fifty-five questions. The ICND1 exam is also known as the CCENT exam. Detailed information about this exam can be found at:

<http://www.cisco.com/web/learning/exams/list/icnd1b.html>

### ICND2 Exam

The ICND2 exam is exam number 200-101. This seventy-five-minute exam includes fifty to sixty questions. Detailed information about this exam can be found at: <http://www.cisco.com/web/learning/exams/list/icnd2b.html>

### CCNAX Exam

The CCNAX Routing and Switching exam is exam number 200-120. This ninety-minute exam includes fifty to sixty questions and is a composite exam that includes questions related to both the ICND1 and ICND2 topics. Detailed information about this exam can be found at:

[http://www.cisco.com/web/learning/exams/list/ccna\\_composite2.html](http://www.cisco.com/web/learning/exams/list/ccna_composite2.html)

### Recommended Training

Global Knowledge offers two preparation paths to the CCNA Routing and Switching certification: the traditional track, with separate ICND1 and ICND2 courses, and an accelerated track, the CCNAX Routing and Switching Boot Camp.

Note that you can take either exam path after completing either training path; however, your Global Knowledge course includes an exam voucher for the exam related to the specific course that you take.

#### Traditional Training Path: ICND1 Course

ICND1 is a five-day course and has traditional hours (typically 8:30 a.m. to 4:30 p.m.). Topics include installing, operating, configuring, and verifying, a basic IPv4 and IPv6 network; configuring LAN switches and routers; establishing Internet connectivity; connecting to a WAN; and managing network device security.

The course includes fifteen hands-on labs on our exclusive topology (see the “Enhanced Lab Experience” section later for more details). The final lab is a “Super Lab” in which you build a network configuration from scratch; it is a great review of the course material.

Detailed ICND1 course information is available at:

<http://www.globalknowledge.com/training/course.asp?pageid=9&courseid=18173&country=United+States>

#### Traditional Training Path: ICND2 Course

ICND2 is also a five-day course that has traditional hours (typically 8:30 a.m. to 4:30 p.m.). Topics include installing, configuring, operating, and troubleshooting a small enterprise network; redundant topologies; troubleshooting common networking issues; configuring EIGRP and multi-area OSPF in both IPv4 and IPv6 networks; WAN technologies; device management; and Cisco licensing.

The course includes eighteen hands-on labs on our exclusive topology (see the “Enhanced Lab Experience” section later for more details). The first lab is an extensive ICND1 review lab, and the final lab is a “Super Lab” in which you enhance a basic configuration and troubleshoot various network problems; like its ICND1 counterpart, it is a great review of the course material.

Detailed ICND2 course information is available at:

<http://www.globalknowledge.com/training/course.asp?pageid=9&courseid=18175&catid=206&country=United+States>

#### Accelerated Training Path: CCNAX Routing and Switching Boot Camp

The CCNAX Routing and Switching Boot Camp is a five-day accelerated course that merges the ICND1 and ICND2 material. Some related sections are combined, resulting in a slightly different course flow than the separate classes, but all topics are covered.

This is an intensive, extended-hours Boot Camp. Class typically starts at 8:00 a.m., and you may be in class for up to twelve hours a day (the last day is typically shorter, but you likely will not finish before 5:00 p.m.).

The course includes twenty-nine hands-on labs on our exclusive topology. Most of the ICND1 and ICND2 labs are done in the Boot Camp. (The exceptions are the two Super Labs, the ICND1 review lab, and an optional HSRP lab. Note, however, that you will be able to perform any of these labs, or any other lab, using your own lab credits after the course is over.)

Detailed course information is available at:

<http://www.globalknowledge.com/training/course.asp?pageid=9&courseid=18181&country=United+States>

## The Global Knowledge Difference

Global Knowledge ICND1, ICND2, and CCNAX Routing and Switching Boot Camp courses include access to many great resources to help you understand and practice the concepts covered, and help you prepare to write and be successful on your certification exam.

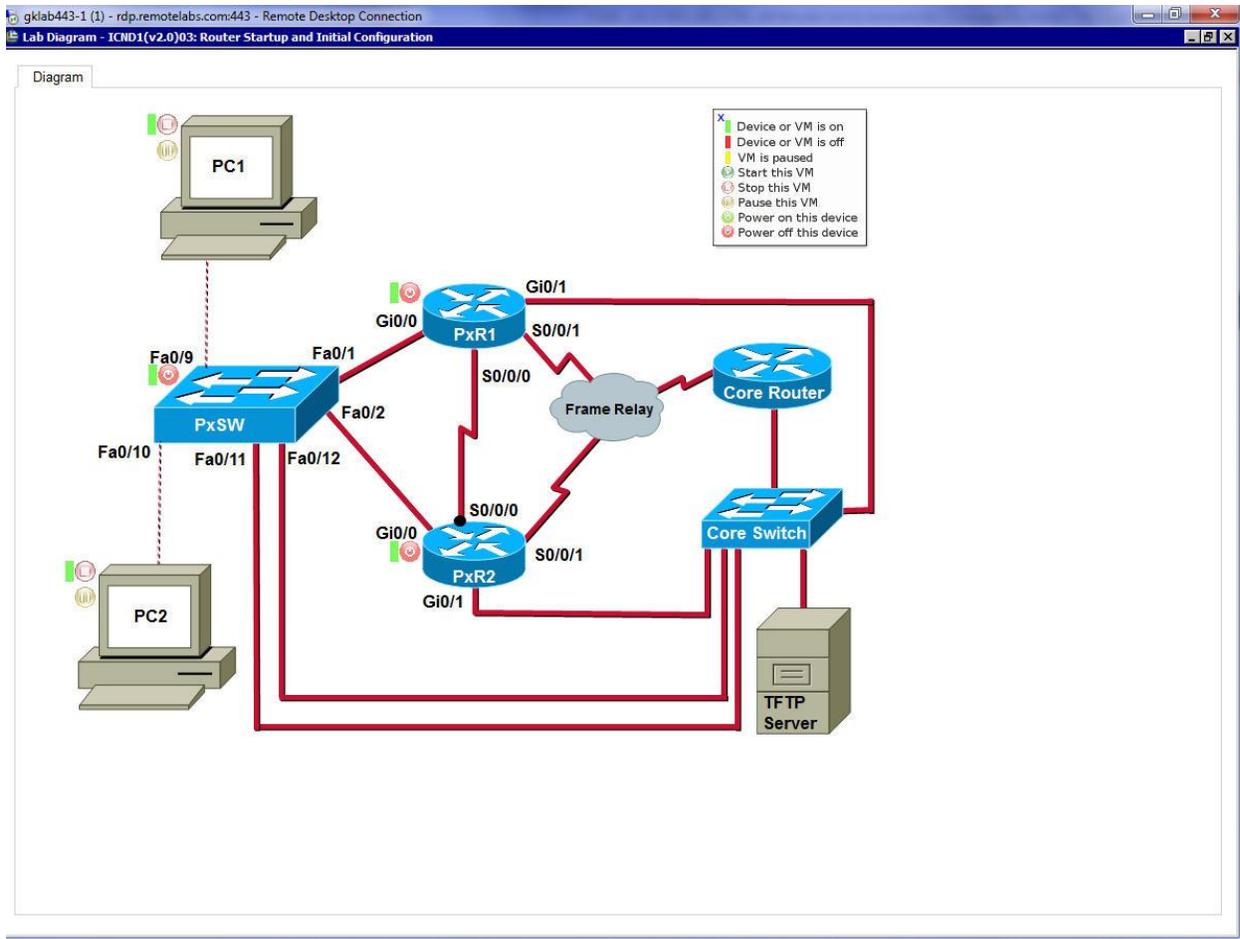
### Enhanced Lab Experience

Global Knowledge courses include extensive hands-on labs that allow you to practice the skills you learn in class, all on our real equipment (the labs are *not* simulations). You will access the equipment, situated in our data center, via our state-of-the-art remote lab interface.

The Global Knowledge lab guides include sample output and screenshots for each of the lab steps. This detail is a great reference for you, both when you are completing the lab and after class. For example, you may wish to review the lab steps when applying the skills learned to your current job or while preparing for the certification exam. Having the example output readily available also saves you time when you are completing your labs; you can focus on performing the labs rather than taking detailed notes.

### Global Knowledge Lab Topology

As shown in the following lab topology diagram, which is a screenshot of the remote lab user interface, the Global Knowledge enhanced lab environment represents a real-world network. You will access a “pod” of real equipment, which includes two PCs (known as PC1 and PC2), two routers (known as PxR1 and PxR2, or pod routers), and a workgroup switch (known as PxSW or pod switch). Six pods attach to a set of core devices (the core router, core switch, and Trivial File Transfer Protocol [TFTP] server), emulating a service provider.



The pod switch is a Cisco 2960-24 TTL switch, with twenty-four FastEthernet and two GigabitEthernet interfaces. The pod routers are Cisco 2901 routers with two GigabitEthernet and two Serial interfaces. The device interfaces are used as necessary in the various labs. All Cisco devices are running version 15 of the IOS, and the PCs are running Windows 8.

The labs are designed to be done by a team of two people; each of you will be responsible for configuring at least one device during each lab, and you will communicate with your teammate to ensure that the device configurations are synchronized.

### Convenient Delivery Options

Global Knowledge ICND1, ICND2, and CCNAX Routing and Switching Boot Camp courses are available via a variety of delivery options, so that you can choose the best fit for you:

- **1. Classroom Live:** held in a traditional classroom in one of our worldwide locations.
- **2. Virtual Classroom Live:** held in our virtual classroom that is accessible from anywhere.
- **3. Private Group Training** (either classroom or virtual classroom): you choose the time and place; Global Knowledge provides all of the elements necessary to train your team.

The Global Knowledge ICND1 and ICND2 courses are also available in our **Virtual Classroom Fit** format, where each course is spread out in two three-hour instructor-led sessions per week for four weeks (for a total of twenty-four hours of live online training). In this format you perform the hands-on labs on your own time, between sessions. Weekly instructor office hours are also included, so that you can get additional help if you desire.

## Global Knowledge Training Exclusives

In all of these delivery options, you will get access to the following Global Knowledge training exclusives:

- lab credits for thirty days of access to a pod of the same real lab equipment you used during class, for even more hands-on practice
- six months of anytime access to simulated Cisco practice labs
- six months of anytime access to Boson practice exams
- six months of on-demand access to searchable class recordings of your course
- six months unlimited retakes of your course
- Cisco certification exam voucher
- a Global Knowledge Post-Class Exam Preparation Reference Guide to help you while you are studying for the certification exam

Note: The Global Knowledge ICND1 and ICND2 courses are also available in the Self-Paced format, with the same topics. (These courses, however, do not utilize the Global Knowledge enhanced lab environment, and do not include the Global Knowledge training exclusives.)

## Conclusion: Which Path Is Best for You?

If you are familiar with the topics listed in the “What Should You Already Know?” section, and you understand and can answer the self-assessment questions correctly, then you are likely well positioned to start pursuing the CCNA Routing and Switching certification. If this is not the case, then you would be best to start with the basic networking courses.

An example learning path for someone new to networking would be the following:

- UNF or Network+ Prep
- TCP/IP Networking
- ICND1/ICND2 or CCNAX Boot Camp

If you are ready to embark on the path to your CCNA Routing and Switching certification, the Global Knowledge path you take depends on your availability, willingness to work long hours, and ability to absorb a lot of information in a short period of time.

If you feel you can commit to the long days and massive amount of material covered in one week, then the CCNAX Routing and Switching Boot Camp may be your best choice.

If you feel you would work best at a less-stressful pace with normal business hours, then the two separate ICND1 and ICND2 courses would be a better fit.

Don't forget the Virtual Classroom Fit option; you can take each of the ICND1 and ICND2 courses over four weeks, doing the labs on your own time. This could be an excellent strategy if you can't take a week or two at a time away from the office.

No matter which path you choose, you will have access to all of the Global Knowledge course features, including the enhanced real-equipment labs, convenient delivery options, and training exclusives. Be sure to take advantage of all of these resources to enrich your certification experience.

## Learn More

Learn more about how you can improve productivity, enhance efficiency, and sharpen your competitive edge through training.

The Global Knowledge “Critical Concepts of the 200-120 CCNA Routing and Switching Exam” document, available at

<http://www.globalknowledge.com/training/whitepaperlist.asp?pageid=502&wpcat=206&country=United+States>, provides a review of the CCNA Routing and Switching exam’s critical concepts. This document is an invaluable resource, no matter which certification path you choose to take: the separate ICND1 and ICND2 exams, or the CCNAX exam.

The courses related to the CCNA Routing and Switching certification are as follows:

CCNAX v2.0 - CCNA Routing and Switching Boot Camp

ICND1 v2.0 - Interconnecting Cisco Networking Devices, Part 1

ICND2 v2.0 - Interconnecting Cisco Networking Devices, Part 2

Not quite ready? Get the prerequisite knowledge you need with the following courses:

Understanding Networking Fundamentals

TCP/IP Networking

Network+ Prep

Next Step: One of the follow-on certifications to the CCNA Routing and Switching certification is CCNP Routing and Switching. Courses related to this certification are the following:

ROUTE - Implementing Cisco IP Routing v2.0

SWITCH - Implementing Cisco IP Switched Networks v2.0

TSHOOT - Troubleshooting and Maintaining Cisco IP Networks v2.0

Visit [www.globalknowledge.com](http://www.globalknowledge.com) or call **1-800-COURSES (1-800-268-7737)** to speak with a Global Knowledge training advisor.

## About the Author

Diane Teare is a professional in the networking, training, project management, and e-learning fields. She has more than thirty years of experience in designing, implementing, and troubleshooting network hardware and software, and has been involved in teaching, course design, and project management. Diane is the course director for CCNA and CCNP Routing and Switching courses with Global Knowledge, and teaches these and other Cisco and Project Management courses. Diane is a professional engineer, and has a bachelor’s degree in applied science in electrical engineering and a master’s degree in applied science in management science. She currently holds her Cisco Certified Network Professional (CCNP), Cisco Certified Design Professional (CCDP), and Project

Management Professional (PMP) certifications, and is a Cisco Certified Systems Instructor (CCSI). She authored or co-authored eleven Cisco Press titles, including the latest edition of the "Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide".

## Answers to Self-Assessment Questions

1. a, d
2. e
3. a
4. b
5. d
6. d
7. e
8. c
9. f
10. a
11. a
12. c
13. b
14. d
15. c
16. a
17. e
18. b, d
19. d
20. b, c