



STUDY GUIDE

REGISTERED EXTERIOR WALL CONSULTANT EXAM

Prepared By

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REWC STUDY GUIDE

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STUDY GUIDE REWC[®] EXAMINATION RCI, Inc.

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INTRODUCTION

One early goal of RCI was to develop a nationally recognized registration program. The Registered Exterior Wall Consultant (REWC) Designation was developed and added to RCI's registration program in 2010. RCI is working toward national recognition of its registration program and hopes to achieve this goal in the future. The primary beneficiaries of this program are the public, the exterior wall industry, and those individuals who become registered.

Registration is a two-part program based on verifiable minimum levels of education, ethics, experience, and satisfactory performance on a comprehensive computer-based examination.

This application for registration allows RCI to verify certain aspects of your education and exterior wall systems experience. The written examination confirms minimum levels of education, training, and experience by testing your knowledge in the assessment and evaluation of moisture and air penetration resistance and thermal performance of exterior wall systems.

This study guide outlines subjects that are addressed in the examination; however, the study guide is not intended to be an inclusive listing of every topic addressed on the examination. This document is strictly a guide.

Please understand that the examination is not tailored to any one particular area of exterior wall systems or to the design and construction practices unique to your geographic area. The examination deals with exterior wall consulting in general as indicated by the references listed in this study guide. It may include all phases of exterior wall consulting such as: evaluation, design, testing, and construction of all exterior wall systems.

In order to receive a passing score on the examination you must be thoroughly familiar with a broad spectrum of principles related to exterior wall systems.

The competent REWC candidate should possess knowledge and skills with the following:

- Building HVAC systems
- Building science (corrosion resistance, heat, air, water and vapor transmission, etc.)
- Climates science and meteorological data
- Code and industry standards
- Construction administration
- Construction project design
- Construction sequencing
- Construction techniques

- Energy efficiency
- Historical construction systems
- Identification of products and systems
- Interrelationship of the trades (trade coordination)
- Material science and durability
- Site condition evaluation
- System integration
- Safety requirements (e.g., hazardous material awareness, building access, construction safety)
- Structure of design documents and specification
- Testing protocols and standards
- Use of building science and hygrothermal analysis software
- Wall cladding interface with building structure
- Window systems

Education and training in these areas are extremely important. However, practical application under the guidance of a qualified mentor may be even more important because it reinforces the formal education and training and provides a sound foundation over a broad spectrum. It pulls everything together. The weakness most often identified with exam failure is a narrow focus in the industry.

The examination is offered in conveniently located computer-based testing centers. Any required formulas, charts, tables, or other reference material will be provided with the examination.

Each question in the examination carries equal weight and a passing score must be attained for the total exam.

The following are recommended for someone to prepare for the REWC examination:

- AIA/RAIC approved / accredited building envelope courses
- ASTM symposiums
- Building science courses
- CSI/CSC courses
- Drafting or design courses
- Engineering and/or architectural courses related to exterior walls
- Exterior wall system repair courses
- General courses on materials and mechanics of construction
- ICC/NBCC courses
- International Masonry Institute seminars
- Material sciences courses
- RCI Exterior Concrete Wall Systems course
- RCI Exterior Walls Technology & Science course
- RCI Masonry Wall Systems course
- RCI Stucco & Exterior Finish Cladding Systems course
- SWR Institute seminars

A sample of references used to develop the questions for this exam includes the following:

	Title	Author	Pub. Date
1	AAMA 501.2-03, Quality Assurance and Diagnostic Water leakage Field Check of Installed Storefronts, Curtain Walls and Stopped Glazing Systems	AAMA	2003
2	AAMA 502-08, Voluntary Specification for Field Testing and Newly Installed Fenestration Products	AAMA	2008
3	<i>GANA Glazing Manual</i>	Glass Association of North America/GANA	2009
4	<i>International Building Code</i>	International Code Council	2012
5	<i>Masonry's Designers Guide</i> (Seventh Edition)	The Masonry Society	2013
6	<i>Masonry Design and Detailing</i> (Fifth Edition)	Christine Beall/McGraw Hill	2004 McGraw Hill
7	<i>RCI Exterior Technology and Science</i>	RCI, Inc.	2014
8	<i>RCI Manual of Practice</i>	RCI Inc.	2010
9	<i>RCI Masonry Wall Systems Manual</i>	RCI Inc.	2015
10	<i>Sealants: The Professionals' Guide</i>	Sealant, Waterproofing & Restoration Institute	2013
11	<i>Using Coatings Inspection Instruments</i>	Corbett	2006 KTA Taylor, Inc.

As part of the exam revision process, the committee of subject matter experts systematically compiled a list of objectives that relate to the responsibilities, knowledge, and skills associated with acceptable

performance within the exterior wall consulting profession. This list provided the organizational framework for the exam and is attached below. The percentage of questions on the exam from each section is indicated.

Sections	Section/Objective Title	Percentage of questions from section on exam
Section 1	Design	26%
Objective 1.1	Demonstrate knowledge of exterior wall movement consideration	
Objective 1.2	Describe wall drainage systems	
Objective 1.3	Identify different exterior wall cladding systems	
Objective 1.4	Describe various fenestration assemblies	
Objective 1.5	Describe masonry design requirements	
Objective 1.6	Describe proper selection of sealants	
Objective 1.7	Describe the forces imposed on exterior wall systems.	
Section 2	Materials	14%
Objective 2.1	Describe wall system materials	
Section 3	Investigations	18%
Objective 3.1	Demonstrate knowledge of wall system failures	
Section 4	Codes and Standards	9%
Objective 4.1	Describe building code or industry standards related to wall systems	
Section 5	Testing	16%
Objective 5.1	Describe test methods for exterior wall systems	
Section 6	Installation and Repair	17%
Objective 6.1	Demonstrate knowledge of installation methods for exterior wall systems	
Objective 6.2	Demonstrate knowledge of strategies used for remediation of exterior wall systems	
	Total	100%

SAMPLE QUESTIONS

Design

You are reviewing the condition of two condominium towers that are side by side located in Los Angeles, CA. One tower is 25 stories high and the taller tower is 40 stories high. You notice a 6 to 8 inch wide joint between the towers.

1. In this scenario, what would cause the joint?
 - A.* seismic and wind consideration in the design
 - B.* thermal expansion and contraction consideration in the design
 - C.* coastal moisture expansion and contraction consideration in the design
 - D.* fire and noise separation consideration in the design

2. What is the minimum width of the drainage cavity between the back of the brick and the face of the cavity wall sheathing?
 - A.* 1 inch [25 mm]
 - B.* 2 inches [50 mm]
 - C.* 1/2 inch [12.5 mm]
 - D.* 2.5 inches [63 mm]

Refer to Exhibit #1.

3. Which type of exterior wall cladding system is being installed as shown in the exhibit?
 - A.* EIFS
 - B.* DEFS
 - C.* hard board siding
 - D.* stucco

4. In which way does a storefront assembly differ from a curtainwall assembly?
 - A.* Storefronts are used for one or two story buildings.
 - B.* Curtainwalls are usually designed to be self supporting directly on the foundation, and support the perimeter of the structural framing system.
 - C.* Curtainwalls are always glass and aluminum.
 - D.* Storefronts are highly engineered systems with interior drainage.

5. Brick masonry expansion joints must resist which two types of infiltration? (Choose two.)
- A.** water infiltration
 - B.** insect infiltration
 - C.** air infiltration
 - D.** vermin infiltration
6. According to SWRI, what is the minimum width of a sealant joint?
- A.** .375 inches [9 mm]
 - B.** .25 inches [6 mm]
 - C.** .5 inches [13 mm]
 - D.** .125 inches [3 mm]
7. Drying shrinkage of materials should be considered when using which two materials in exterior wall construction? (Choose two.)
- A.** stucco
 - B.** concrete masonry
 - C.** clay masonry
 - D.** porcelain tile
8. The temperature of a sealed container of moisture laden air is decreased. Which result does the temperature drop have on the air?
- A.** The absolute humidity is decreased.
 - B.** The absolute humidity is increased.
 - C.** The relative humidity is decreased.
 - D.** The relative humidity is increased.

Materials

9. A builder wants to prevent a galvanic reaction when anchoring an aluminum termination bar securing a self adhering membrane to a CMU wall.

In this scenario, which type of fasteners should be used?

- A. zinc
 - B. copper
 - C. galvanized steel
 - D. stainless steel
10. The specifications require a dry film thickness of 30 mils [0.75 mm]. The coating manufacturer states that the solids content of the coating at the time of application is 60% by volume.

Which wet film thickness would be minimally acceptable in this scenario?

- A. 18 mils [0.45 mm]
- B. 32 mils [0.80 mm]
- C. 50 mils [1.27mm]
- D. 54 mils [1.35 mm]

Refer to Exhibit #2.

11. The vertical ribbon coursing of clay brick veneer noted in this exhibit photo is commonly referred to as which type of coursing?

- A. sailor course
- B. stretcher course
- C. soldier course
- D. header course

Investigations

Refer to Exhibit #3.

12. You are asked to investigate widespread water leaks through an EIFS wall system as shown in the exhibit. The building is a three-story care facility located in Boston, MA. Your initial investigation is limited to non-destructive testing, including thermography. You extend your investigation to include wall openings.

Which two additional issues should be investigated in this scenario? (Choose two.)

- A.* system thermal resistance
- B.* damage to the steel studs
- C.* mold in the sheathing
- D.* locations of air leakage

Refer to Exhibit #4.

13. You are asked to investigate unsightly cracks in a stucco wall assembly. The property just received a fresh coat of paint, and the cracks are telegraphing through.

Referring to the exhibit, which type of cracking is shown?

- A.* spider web
- B.* dynamic
- C.* delamination
- D.* static

Refer to Exhibit #5.

14. The exterior wall sheathing of an urgent care walk-in facility is constructed of oriented strand board (OSB). When installed, the OSB had a moisture content of 15% to 20%. The facility has experienced moisture migration issues for a long time. Forensic investigation has isolated the moisture intrusion issues and provided a repair scope. The OSB sheathing shown in the exhibit has been determined to be structurally sound, assuming that moisture infiltration has been stopped.

In this scenario, what is the maximum percentage of moisture content allowed?

- A. 25%
 - B. 13%
 - C. 28%
 - D. 40%
15. You are performing a thermographic survey to determine areas and mechanisms of heat loss, through the wall assembly of an EIFS-clad health care facility in Calgary, Alberta.

What are two important steps in performing this survey? (Choose two.)

- A. Conduct the thermographic work during periods of at least 9 degrees F [5 degrees C] temperature difference between the interior and the exterior.
- B. Limit the pressure difference between the interior and the exterior to a maximum of 0.1 psf [5 Pa].
- C. Restrict the thermographic work to daylight hours only.
- D. Reverse the building pressurization and repeat the thermographic survey to differentiate air leakage locations from the thermal bridge areas.

Codes and Standards

16. What is included in AAMA testing?
- A.** testing of installed windows and doors for water and air penetration
 - B.** testing of the insulation properties of masonry units
 - C.** testing of the polyurethane foam in the insulated metal wall panel cladding
 - D.** wind tunnel testing of wood wall assemblies
17. A two-story wood frame school building has plywood shear walls, exterior insulation, drainage cavity, and sheet metal wall panel cladding fastened to the wood studs.
- According to the building code, in which two scenarios would a thermal barrier be required on the exterior of the plywood wall? (Choose two.)
- A.** When stone wool is used for the insulation in the wall cavity behind the metal cladding.
 - B.** When plastic foam insulation is used in the wall cavity behind the metal cladding.
 - C.** When spray polyurethane foam is used on the outside of the plywood to insulate the wall.
 - D.** When stone wool insulation is used in the wall cavity behind the metal cladding, and 2 inches [50 mm] of spray polyurethane foam is used in the stud cavity.

Testing

18. According to AAMA 511, "Voluntary Guideline for Forensic Water penetration Testing of Fenestration Products", what does the sill dam test of a window system determine?
- A.** The sill dam test finds leaks at the corners of the windows.
 - B.** The sill dam test determines if the window sill has leaks.
 - C.** The sill dam test verifies that sealant is in place.
 - D.** The sill dam test verifies that the weep holes are working.

Refer to Exhibit #6.

19. You are investigating moisture penetration into a masonry wall. You decide to perform the RILEM tube test to aide in determination of the absorption rate of this specific masonry wall system.

Using a basic wind speed of 90 mph [145 km/h], to which level should you fill the tube?

- A.* 0 ml
 - B.* 1.0 ml
 - C.* 1.5 ml
 - D.* 2.0 ml
20. Which nondestructive test methods are used for evaluating the sources of leaks through an exterior wall?
- A.* infrared testing and capacitance testing
 - B.* smoke powder testing and nuclear moisture testing
 - C.* tape lift test and infrared testing
 - D.* Delmhorst moisture probes and tape lift testing
21. A brick masonry wall was tested for water absorption using RILEM tubes by two separate Registered Exterior Wall Consultants (REWC). Their respective test results varied widely.

In this scenario, which two statements explain the difference? (Choose two.)

- A.* One test may have had a partial blockage of the brim from the putty application.
- B.* The water temperature was different between the two tests.
- C.* Distilled water was used in one test and tap water was used in the other test.
- D.* One test included a mortar joint, the other test did not.

Installation and Repair

22. A flanged aluminum window is set into the rough opening with a liquid applied pan and a head flashing. The metal stud and gypsum board sheathing are covered with a liquid applied air barrier which also acts as a weather resistant barrier. The air barrier turns into the rough opening, and also turns up the L metal installed as a back dam.

In this scenario, where should the air barrier sealant joint be located?

- A.** between the back of the window and the back dam, and the back edge of the head and jambs
- B.** underneath the bottom of the window and onto the rough opening
- C.** on the sides and head of the window, leaving the bottom open for drainage
- D.** on all four sides at the front face of the window frame

Refer to Exhibit #7.

23. A building owner called you to look at an existing EIFS wall constructed in 1986, consisting of EPS adhered to the gypsum board with cementitious base coat, and coated on the outside with base coat, lamina reinforcing, and top coat. The two-story tall wall is above the sidewalk and porte cochere for the hotel. You notice that the sealant joints are open, and there is an extended bow in the EIFS wall panel indicating detachment from the wall.

In this scenario, what should you tell your client?

- A.** After obtaining a history of the construction, and the understanding that the hotel is responsible for maintenance of the sealant joint, you suggest that the sealant joints should be replaced. You document your observations and discussions.
- B.** You recommend that the sidewalk and access be closed to allow for emergency securement of the EIFS. You document your observations and discussions.
- C.** You recommend further investigation of the condition by coming back the next day with a lift, to sound the bowed EIFS panel. You document your observations and discussions.
- D.** You call the city building department and notify them of your observations, then you call the owner. You document your observations and discussions.

24. You are restoring failed sealant joints in an existing exterior insulation and finish system (EIFS).

In this scenario, which two methods would be used to restore the failed joint?
(Choose two.)

- A.* reconstruction method
- B.* skim coat method
- C.* bridge-joint method
- D.* bond-breaker method

Refer to Exhibit #8.

25. A consultant is asked to perform a limited condition assessment on a twenty-two story high rise condominium property. During the condition assessment, the consultant identified that 65% of the head and bed joints of the cast stone on the bottom three floors have deteriorated.

In this scenario, which action would solve this problem?

- A.* Caulk over the mortar joints with sealant.
- B.* Coat the cast stone with an elastomeric coating.
- C.* Repoint the head and bed joints.
- D.* Pin the head and bed joints.

Exhibit #1



Exhibit #2

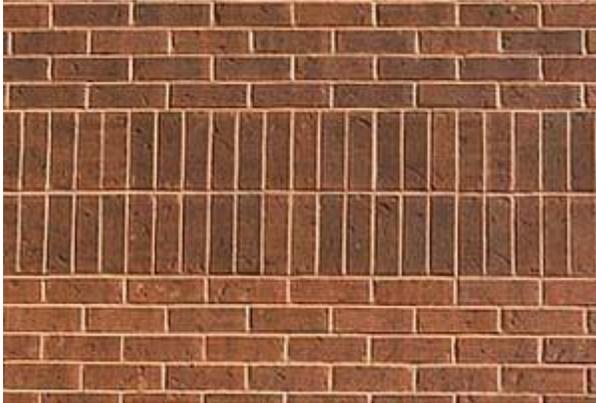


Exhibit #3

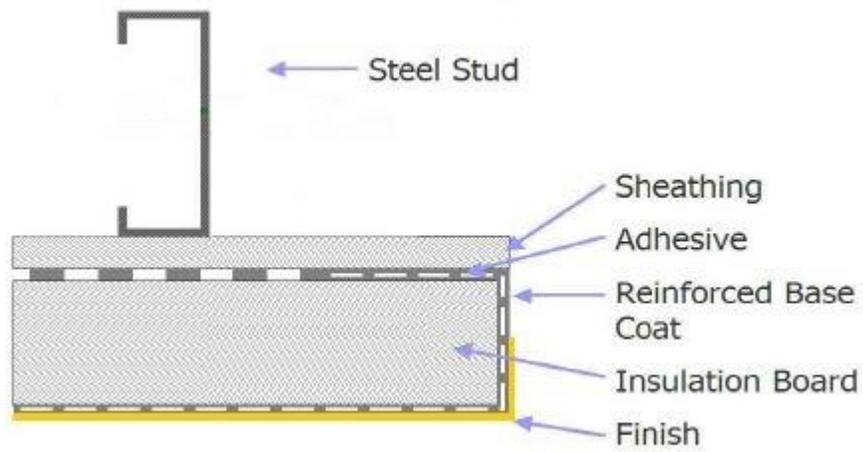


Exhibit #4



Exhibit #5



Exhibit #6

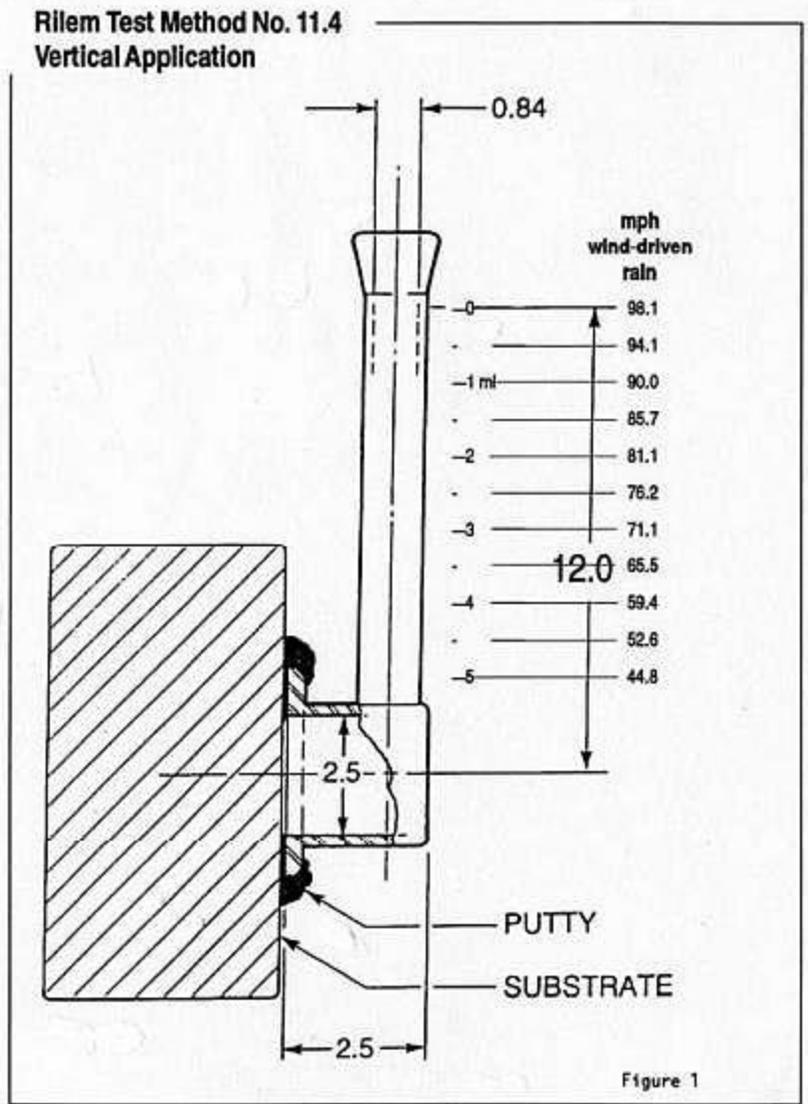


Exhibit #7

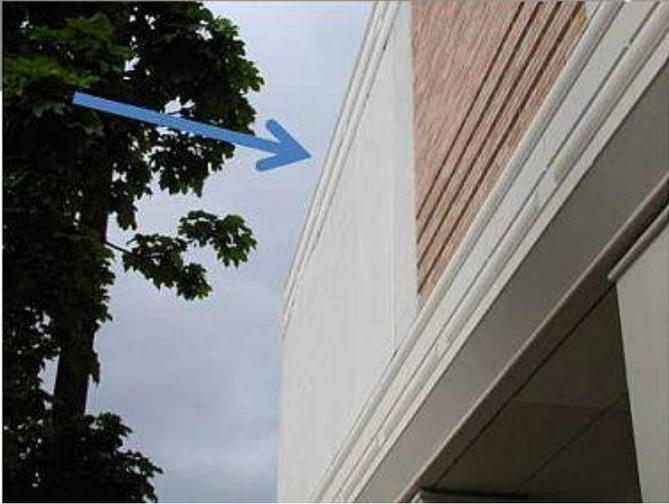
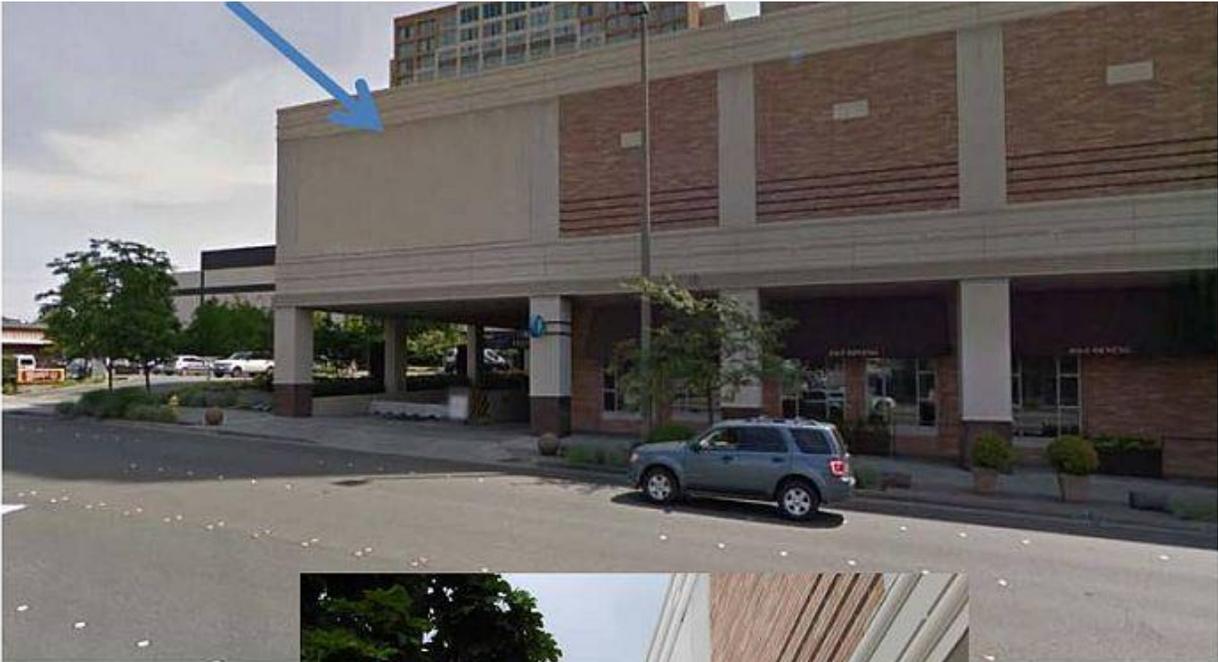


Exhibit #8



Answers to Sample Questions

Note your answers. Review the appropriate document(s) in those areas to better understand the rationale behind the indicated correct answer.

Take advantage of the programs provided by RCI which are specifically recommended for those pursuing the REWC designation: Exterior Walls Technology and Science, Exterior Concrete Wall Systems, Masonry Wall Systems, and Exterior Finish Cladding Systems.

1. A
2. A
3. D
4. A
5. A and C
6. B
7. A and B
8. D
9. D
10. C
11. C
12. B and C
13. D
14. C
15. A and D
16. A
17. B and C
18. B
19. B
20. A
21. A and D
22. A
23. B
24. A and C
25. C