CHM 1321 (prof. S. Gambarotta) 2nd Midterm April 2– 2009

Your Name: _____ Student #: _____

Your course TA (Steve, Derek, Marc): _____

Exercise	key	Exercise	key
1		16	
2		17	
3		18	
4		19	
5		20	
6		21	
7		22	
8		23	
9		24	
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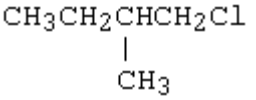
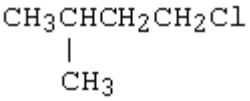
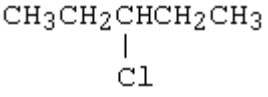
12		27	
13			
14			
15			

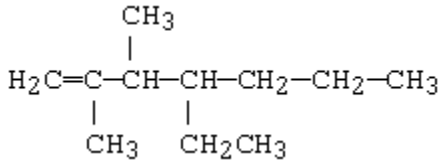
1. Please deliver only this page. You can keep the text. Scratch paper is at the end.
2. Solution key will be posted today.
3. Marks will be posted on Virtual Campus gradebook ASAP.
4. This is an Open BOOK exam. You can use your models and textbook.

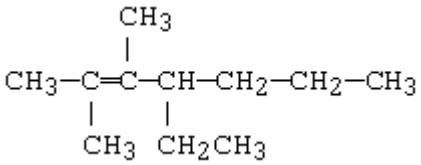
1. Heating tert-butyl chloride with 1.0 M NaOH in a mixture of water and methanol would yield mainly:
   A) $(CH_3)_3COH$ through an S_N1 reaction.
   B) $(CH_3)_3COCH_3$ through an S_N1 reaction.
   C) $(CH_3)_3COH$ through an S_N2 reaction.
   D) $(CH_3)_3COCH_3$ through an S_N2 reaction.
   E) $CH_2=C(CH_3)_2$ through an E2 reaction.

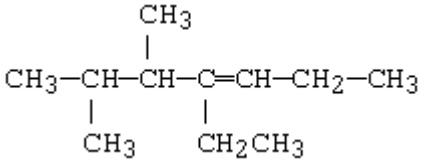
2. Which of these compounds would give the largest E2/S_N2 product ratio on reaction with sodium ethoxide in ethanol at 55°C?
   A) $CH_3CH_2CH_2CH_2CH_2Cl$
   B) 
   C) 
   D) 
   E) $(CH_3)_3CCH_2Cl$

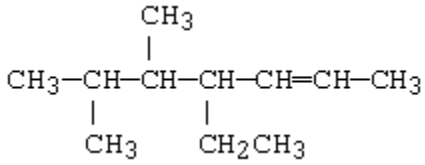
3. Elimination reactions are favored over nucleophilic substitution reactions:
   A) at high temperatures.
   B) when tert-butoxide ion is used.
   C) when 3° alkyl halides are used as substrates.
   D) when nucleophiles are used which are strong bases and the substrate is a 2° alkyl halide.
   E) in all of these cases.

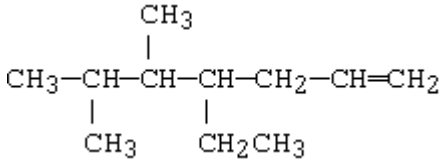
4. Select the structure of 4–ethyl-2,3-dimethyl-2-heptene.

A) 

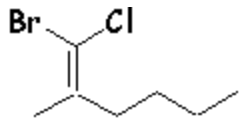
B) 

C) 

D) 

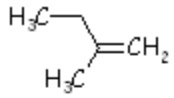
E) 

5. Which is a correct name for the following compound?

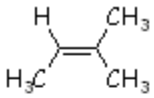


A) (E)-1-Bromo-1-chloro-2-methyl-1-hexene
B) (Z)-1-Bromo-1-chloro-2-methyl-1-hexene
C) (E)-2-Bromochloromethylenehexane
D) (Z)-2-Bromochloromethylenehexane
E) 2-(E,Z)-Bromochloromethyl-1-hexene

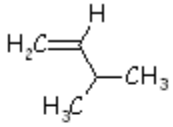
6. Neopentyl alcohol, $(CH_3)_3CCH_2OH$, cannot be dehydrated to an alkene without rearrangement. What is the chief product of dehydration?



I

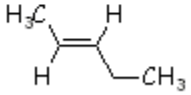


II



III

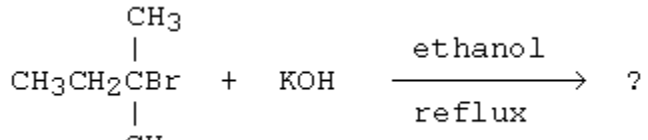
IV



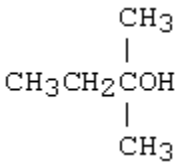
V

A) I
B) II
C) III
D) IV
E) V

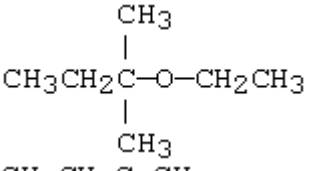
7. Which compound listed below would you expect to be the major product of this reaction?



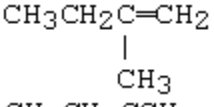
A)



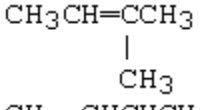
B)



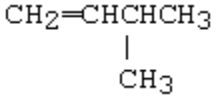
C)



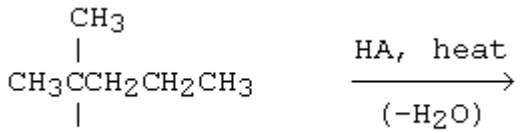
D)

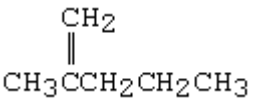


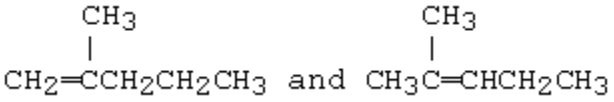
E)

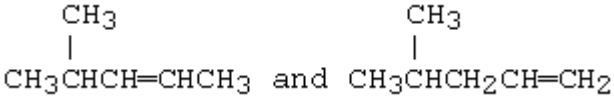


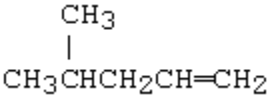
8. Which product(s) would be produced by acid-catalyzed dehydration of the following alcohol?

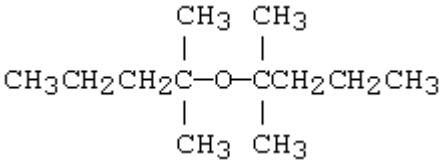


A) 

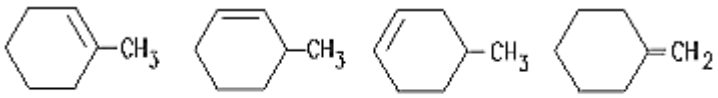
B) 

C) 

D) 

E) 

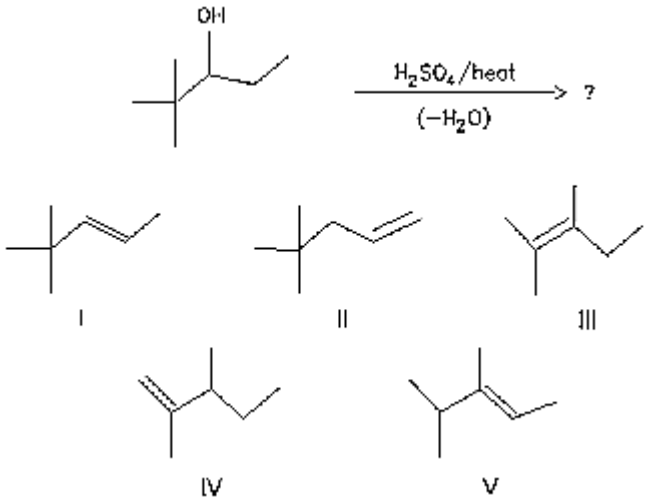
9. Which product (or products) would be formed in appreciable amount(s) when <u>trans</u>-1-bromo-2-methylcyclohexane undergoes dehydrohalogenation upon treatment with sodium ethoxide in ethanol?



I II III IV

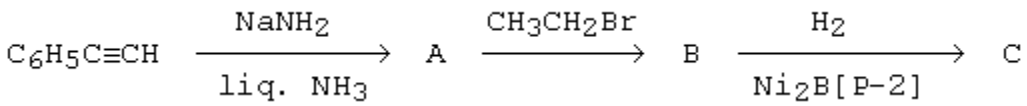
A) I
B) II
C) III
D) IV
E) More than one of these

10. Which alkene would you expect to be the major product of the following dehydration?



A) I
B) II
C) III
D) IV
E) V

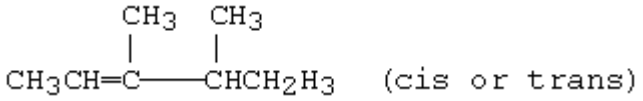
11. The structure of the product, C, of the following sequence of reactions would be:

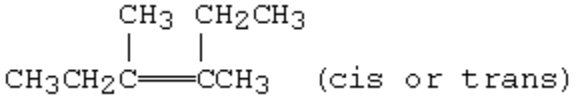


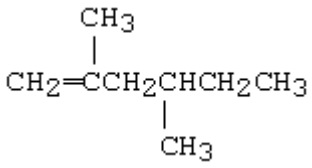
A) <u>cis</u>–$CH_3CH_2CH{=}CHC_6H_5$
B) <u>cis</u>–$CH_3CH{=}CHC_6H_5$
C) <u>trans</u>–$CH_3CH_2CH{=}CHC_6H_5$
D) $C_6H_5C{\equiv}CCH_2CH_2Br$
E) $C_6H_5C{\equiv}CCH_2CH_3$

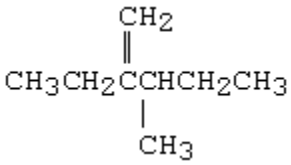
12. For which of the following is <u>cis</u>-<u>trans</u> isomerism impossible?
A) 2-Hexene
B) 3-Methyl-2-pentene
C) 3-Hexene
D) 2-Methyl-2-butene
E) 2-Pentene

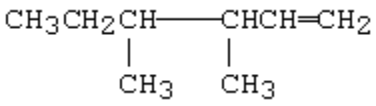
13. An alkene adds hydrogen in the presence of a catalyst to give 3,4-dimethylhexane. Ozonolysis of the alkene followed by treatment with zinc and acetic acid gives a single organic product. The structure of the alkene is:

A) 

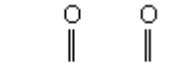
B) 

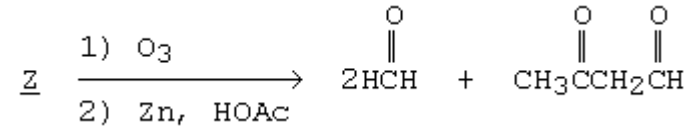
C) 

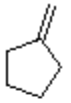
D) 

E) 

14.

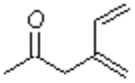
What is the structure of the compound Z that yields 2 mol of formaldehyde,  , and 1 mol of  upon ozonolysis followed by treatment with zinc in acetic acid?



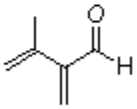


I

II



III

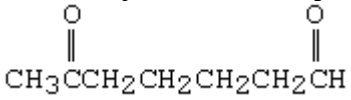


IV

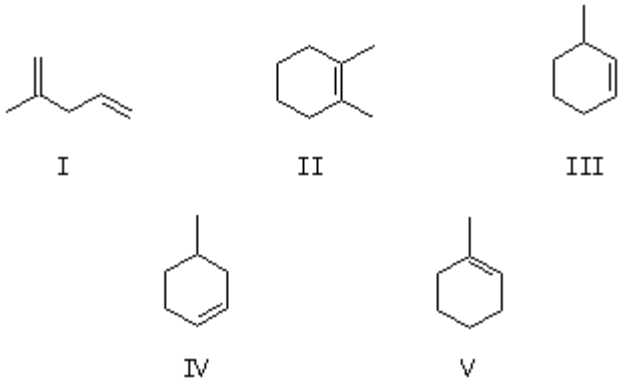
V

A) I
B) II
C) III
D) IV
E) V

15. Compound, C, has the molecular formula C_7H_{12}. On catalytic hydrogenation, 1 mol of C absorbs 1 mol of hydrogen and yields a compound with the molecular formula C_7H_{14}. On ozonolysis and subsequent treatment with zinc and acetic acid, C yields only:

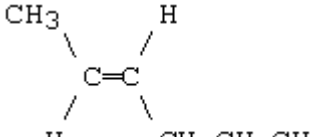


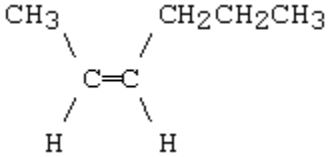
The structure of C is:

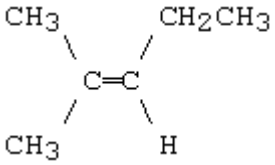


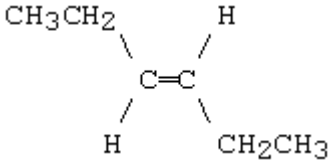
A) I
B) II
C) III
D) IV
E) V

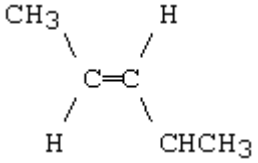
16. Which alkene would yield <u>only</u> CH_3CH_2COOH on oxidation with hot alkaline potassium permanganate?

A) 

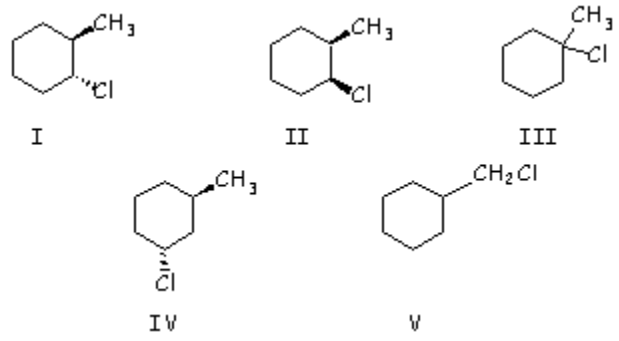
B) 

C) 

D) 

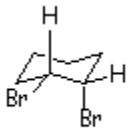
E) 

17. Treating 1-methylcyclohexene with HCl would yield primarily which of these?

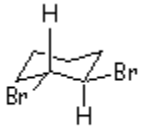


A) I
B) II
C) III
D) IV
E) V

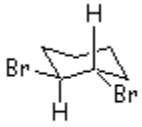
18. The addition of bromine to cyclohexene would produce the compound(s) represented by structure(s):



I



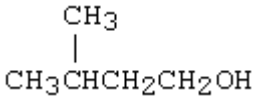
II

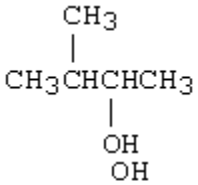


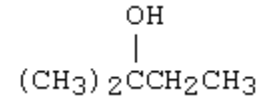
III

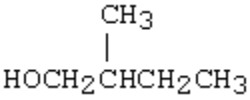
A) I alone
B) II alone
C) II and III
D) III alone
E) I and II

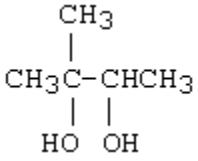
19. What is the chief product of the acid-catalyzed hydration of 2-methyl-2-butene?

A) 

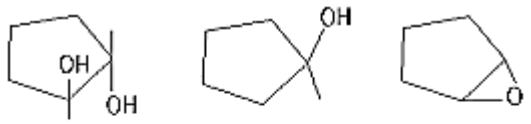
B) 

C) 

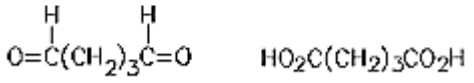
D) 

E) 

20. Which compound is reasonably anticipated as a byproduct in the hydroxylation of cyclopentene with cold alkaline permanganate?

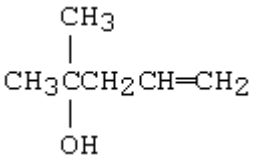


I II III



IV V

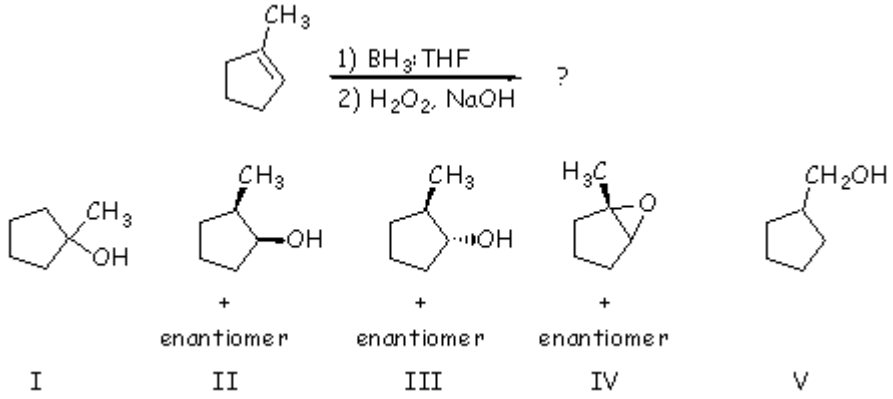
A) I
B) II
C) III
D) IV
E) V

21. 

The correct IUPAC substitutive name for is:

A) 4-Penten-2-methyl-2-ol
B) 4-Methyl-1-penten-2-ol
C) 2-Methyl-4-penten-2-ol
D) 4-Methyl-1-penten-4-ol
E) 4-Hydroxy-4-methyl-1-pentene

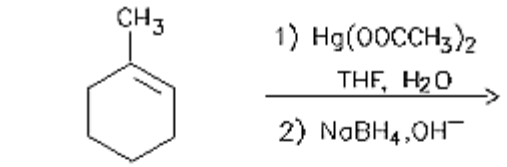
22. Which product(s) would you expect to obtain from the following sequence of reactions?

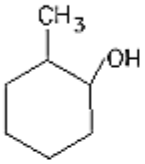


I II III IV V

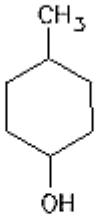
A) I
B) II
C) III
D) IV
E) V

23. Select the structure of the major product formed from the following reaction.

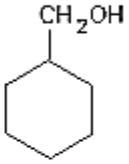




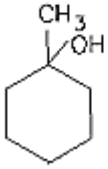
I



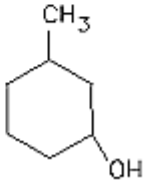
II



III



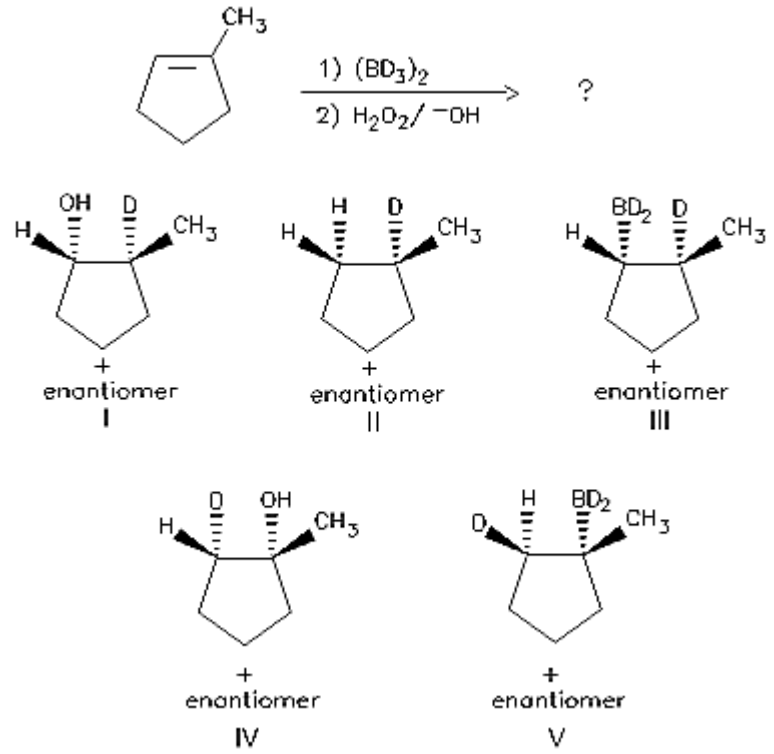
IV



V

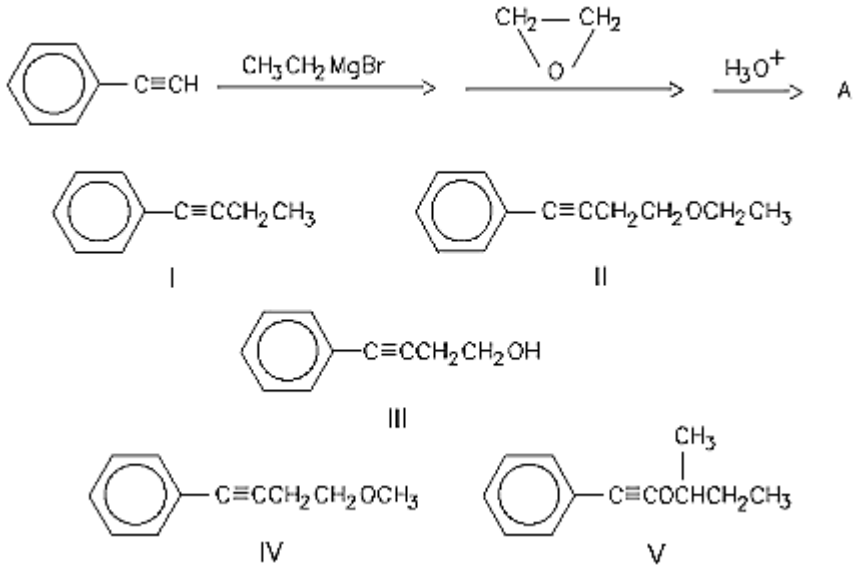
A) I
B) II
C) III
D) IV
E) V

24. What product would you expect from the following reaction?



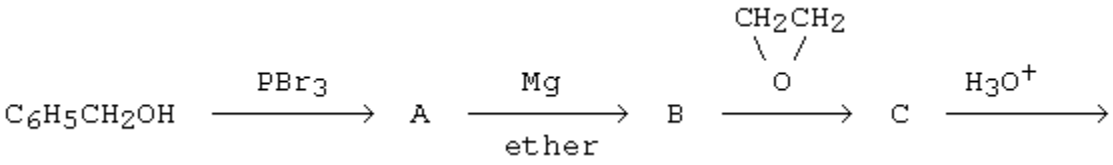
A) I
B) II
C) III
D) IV
E) V

25. What is the product, A, that would be obtained from the following reaction sequence?



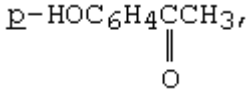
A) I
B) II
C) III
D) IV
E) V

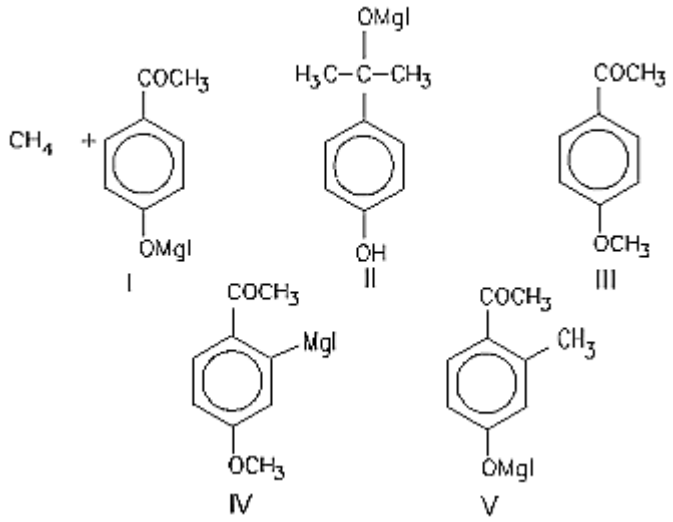
26. The final product, D, in the following reaction sequence,



would be?

A) $C_6H_5CH_2OCH_2CH_3$
B) $C_6H_5CH_2CH_2OH$
C) $C_6H_5CH_2CH_2CH_2OH$
D) $C_6H_5CHCH_2CH_2OH$ (Br on the CH)
E) $C_6H_5CH_2CH_2OCH_3$

27. The principal product(s) formed when 1 mol of methylmagnesium iodide reacts with 1 mol of p-hydroxyacetophenone, i.e.  is/are:



A) I
B) II
C) III
D) IV
E) V

Answer Key

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