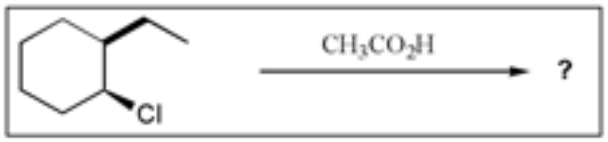
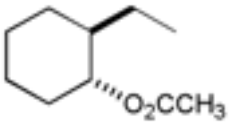
Quiz 4 Chem 109a [10%] of grade.
NOTE: C-D bonds are stronger than C-H bonds....ie. harder to break. This is a very useful fact to know in some of the following questions.

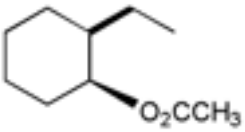
1. Which of the following would you expect to react fastest with the nucleophile I^- (iodide)?

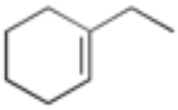
A) $CH_3CH_2CH_2Br$
B) $CH_3CH_2CH_2Cl$
C) $(CH_3)_2CHCH_2Br$
D) $(CH_3)_2CHCH_2Cl$
E) $(CH_3)_3CCH_2Br$

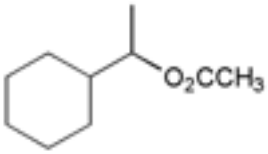
2. Predict the <u>MAJOR</u> product **IF** the following reaction went by the S_N1 pathway:

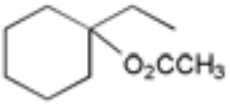


A) 

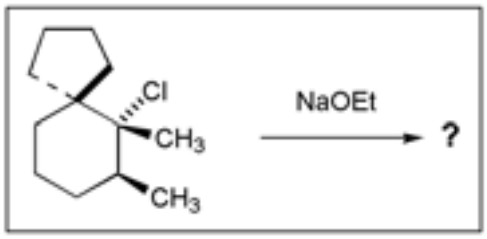
B) 

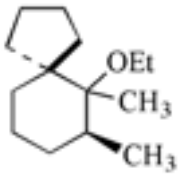
C) 

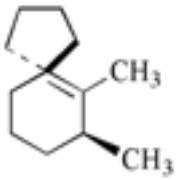
D) 

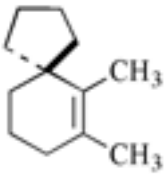
E) 

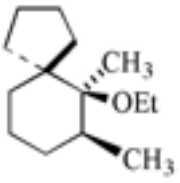
3. Indicate the expected <u>MAJOR</u> product of the following reaction:

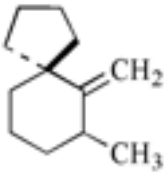


A) 

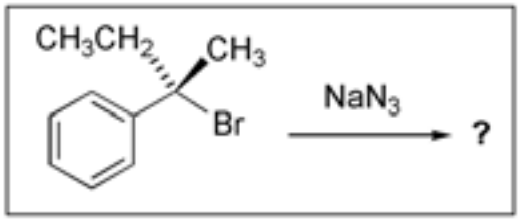
B) 

C) 

D) 

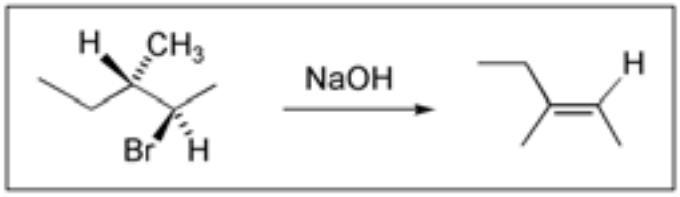
E) 

4. The <u>MAJOR</u> product of the following reaction conditions will result from:



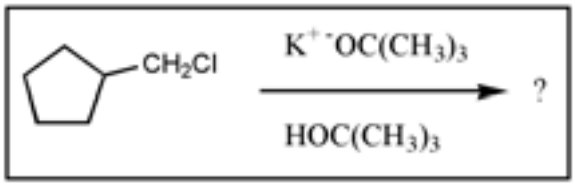
A) S_N2
B) S_N1
C) E2
D) E1
E) there is no way to know

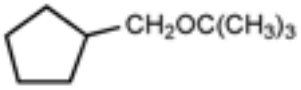
5. If the concentration of NaOH is doubled in the following reaction, what will happen to the reaction rate?

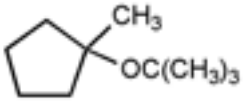


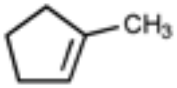
A) no change
B) double
C) quadruple
D) cut in half
E) none of these

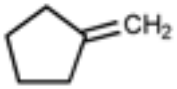
6. What would be the **major** organic product of the following reaction?

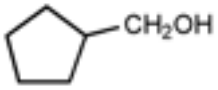


A) 

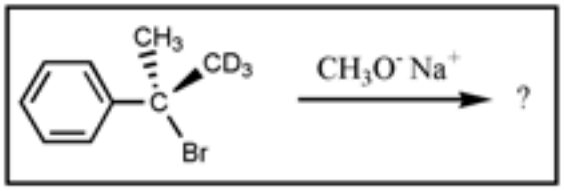
B) 

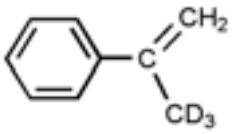
C) 

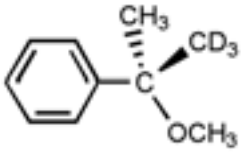
D) 

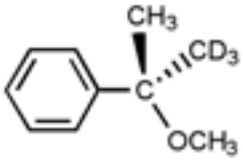
E) 

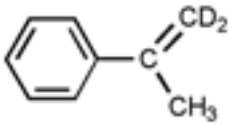
7. What would be the **major** organic product of the following reaction?

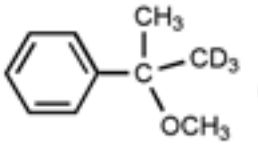


A) 

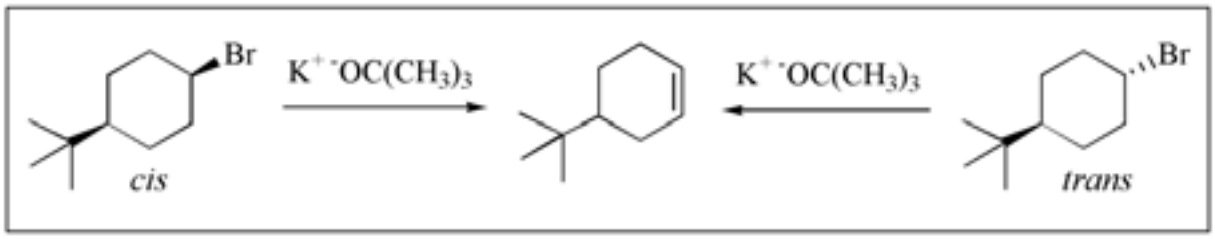
B) 

C) 

D) 

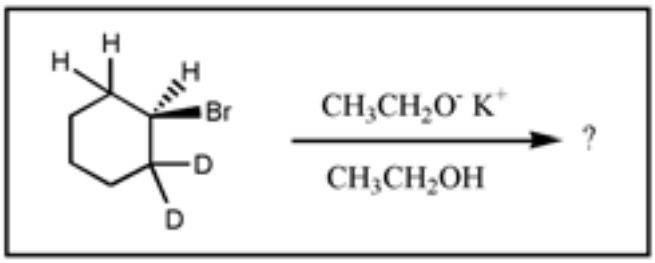
E)  (racemic)

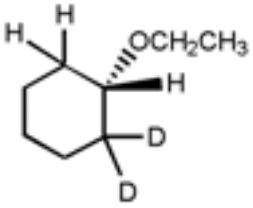
8. Which would be true of the following reactions?

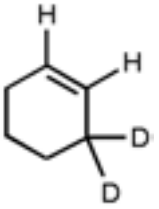


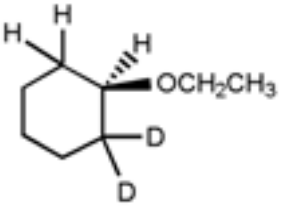
A) *cis* would react faster
B) *trans* would react faster
C) *cis* and *trans* would react at the same rates
D) no reaction is expected under these conditions
E) the product shown would not be formed

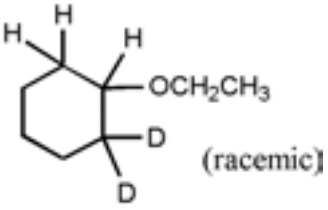
9. What **major** product would result for the following reaction?

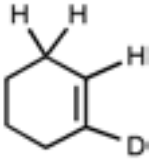


A)


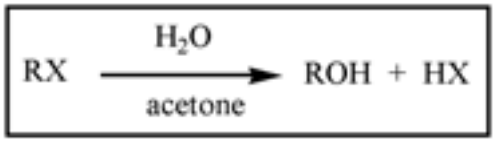
B)


C)


D)


E)


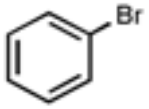
10. Which of the haloalkanes below would you expect to most rapidly undergo the reaction shown?



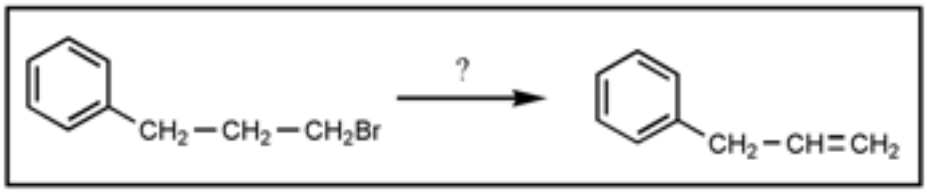
A) CH_3CH_2Br
B) CH_3Br

C) $(CH_3)_3CBr$

D) $CH_3CHBrCH_3$

E) 

11. Which of the bases below would be best to accomplish the following reaction?



A) $CH_3O^-\ Na^+$

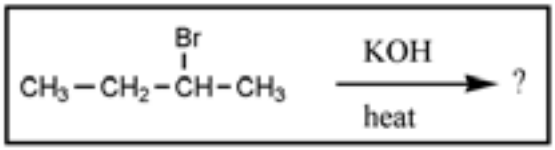
B) $CH_3CH_2O^-\ Na^+$

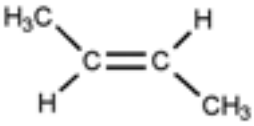
C) $(CH_3)_2CHO^-\ Na^+$

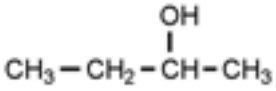
D) $(CH_3)_3CO^-\ Na^+$

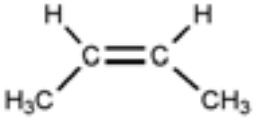
E) $Na^+\ ^-OH$

12. What would be the major product of the following reaction?

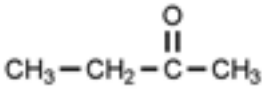


A) 

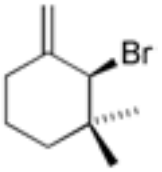
B) 

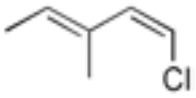
C) 

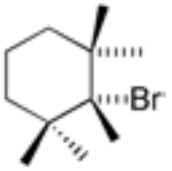
D) 

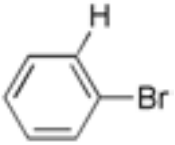
E) 

13. Which of the following molecules <u>WILL</u> readily undergo an elimination reaction when treated with $NaOCH_3$?

A) 

B) 

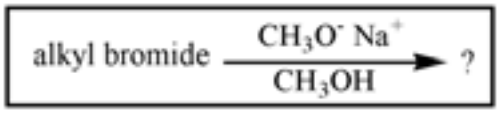
C) 

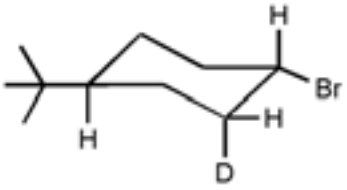
D) 

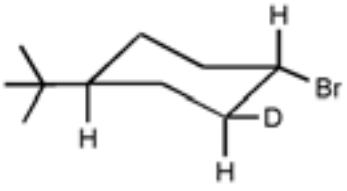
E) None of these would undergo elimination.

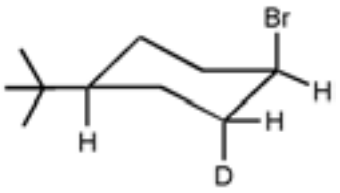
14. Which mechanism proceeds with inversion of configuration?
A) bimolecular elimination (E2)
B) unimolecular elimination (E1)
C) unimolecular substitution (S_N1)
D) bimolecular substitution (S_N2)
E) free-radical halogenation

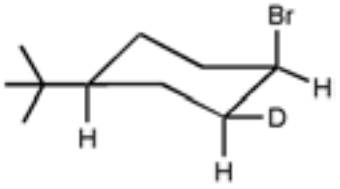
15. Which of the cyclohexyl bromides would you expect to react the **fastest** in the following reaction?



A) 

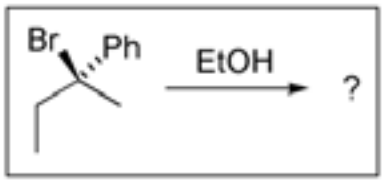
B) 

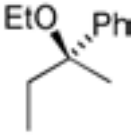
C) 

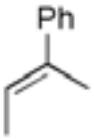
D) 

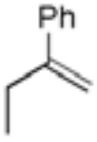
E) all would react at the same rate

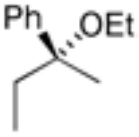
16. Predict the MAJOR product of the following S_N1 reaction:

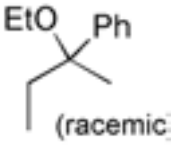


A) 

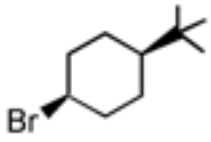
B) 

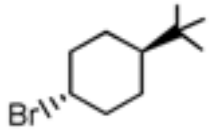
C) 

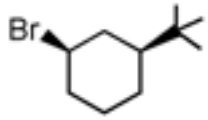
D) 

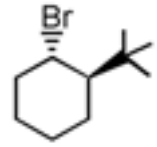
E) 

17. Which one of the following would undergo E2 elimination most rapidly?

A) 

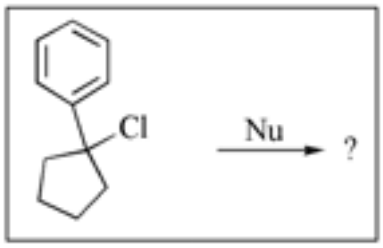
B) 

C) 

D) 

E) All would react at the same rate

18. Which of the nucleophiles shown below would NOT cause an E2 elimination as the predominant reaction?



A) N_3^-

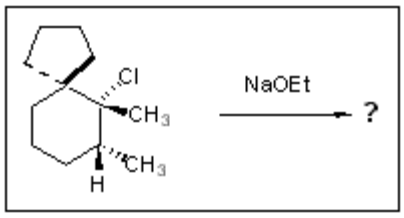
B) CH_3CH_2OH

C) ^-CN

D) ^-OH

E) CH_3O^-

19. How many alkene products are possible in the following reaction?

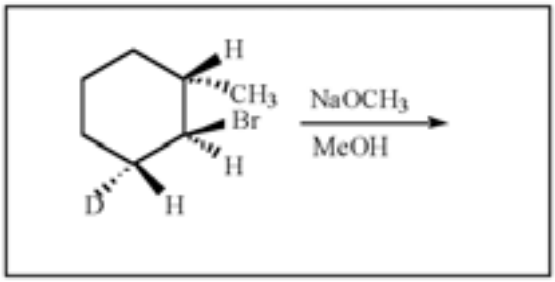


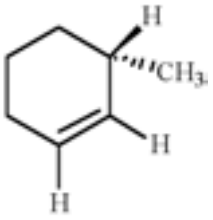
A) None; cannot eliminate

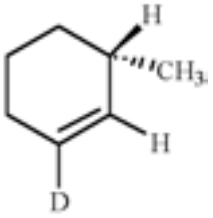
B) One

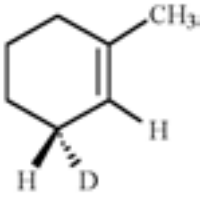
C) Two
D) Three
E) Four

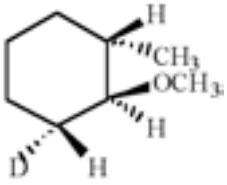
20. Predict the product of reaction of the following deuterated compound.

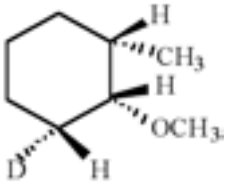


A) 

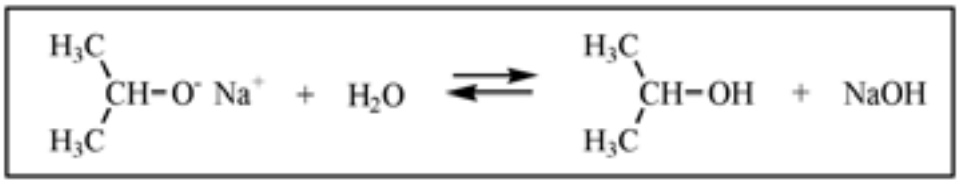
B) 

C) 

D) 

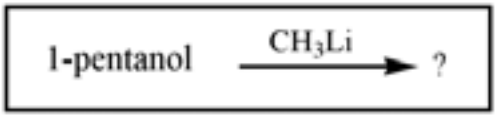
E) 

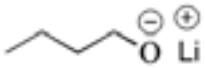
21. To which side (if any) would the following equilibrium lie?



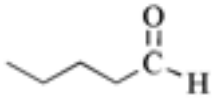
A) To the left
B) To the right
C) Equally to the right and left
D) There is no way to tell
E) This reaction cannot occur at all

22. What is the <u>major</u> product of the following reaction:



A) 

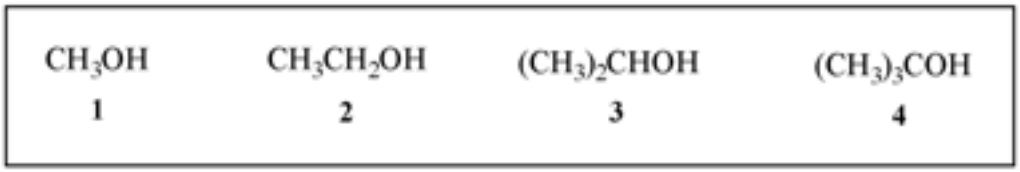
B) 

C) 

D) 

E) 

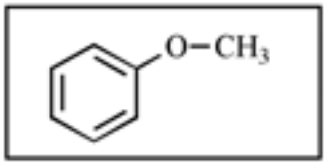
23. Rank the following alcohols in order of decreasing acidity in solution.

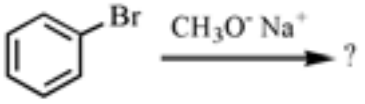


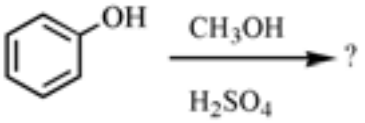
A) 1 > 2 > 3 > 4
B) 2 > 1 > 3 > 4
C) 4 > 3 > 2 > 1
D) 4 > 3 > 1 > 2
E) 1 > 3 > 2 > 4

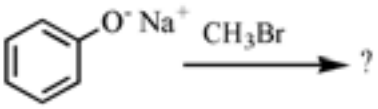
24. Which of the following reactions would be the best for the preparation of anisole

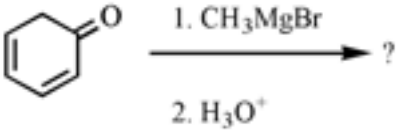
(methoxybenzene)?



A) 

B) 

C) 

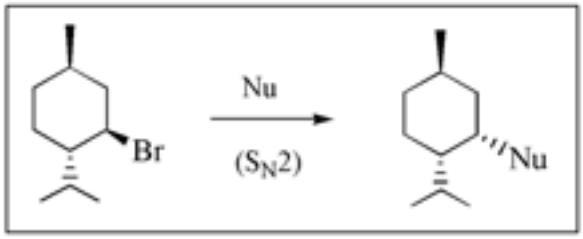
D) 

E) None of these would work.

25. Saytzev's Rule has to do with the following:
A) Free-radical substitutions
B) Hydration of double bonds
C) Bromination of double bonds
D) Products of elimination reactions
E) Hydrogenation of double bonds

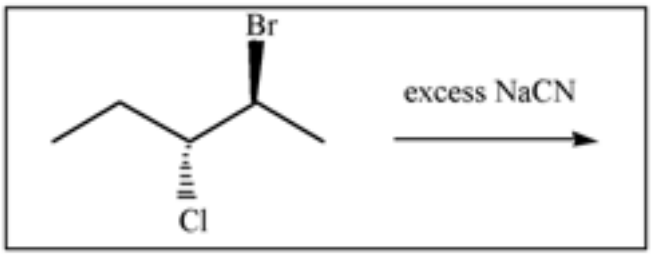
26. Which of the following can be used to synthesize (*R*)-2-cyanopentane from (*R*)-2-bromopentane?
A) NaBr
B) NaCN
C) NaI followed by KCN
D) NaCN followed by HI
E) This reaction cannot occur

27. S_N2 substitution at secondary halides and sulfonates is often complicated by competing E2 elimination. Which of the nucleophiles below would you choose to obtain the highest yield in an S_N2 reaction with menthyl bromide?



A) CH_3ONa
B) CH_3CO_2Na
C) $(CH_3)_3N$
D) $(CH_3)_3COK$
E) C_6H_5SNa

28. What is the correct stereochemistry of the product of the following reaction:



A) 3*R*,4*S*
B) 2*S*,3*R*
C) 2*R*,3*S*
D) 2*R*,3*R*
E) 3*R*,4*R*

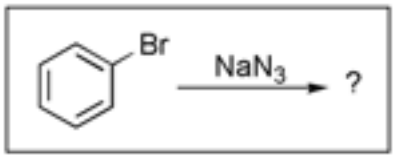
29. Which of the following is the best leaving group?

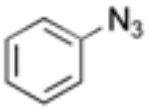
A) $I^{\ominus}$
B) $^{\ominus}NH_2$
C) $HO^{\ominus}$
D) $F^{\ominus}$
E) $CH_3O^{\ominus}$

30. Which of the following reagents would best accomplish a typical S_N2 reaction?

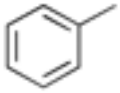
A) CH_3OH
B) H_2O
C) HCN
D) KCN
E) KO^tBu

31. Predict the major product of the following reaction:



A) 

B) 

C) 

D) 

E) no reaction occurs

32. Several alkyl halides, including iodomethane, are known carcinogens or cancer-suspect materials. To destroy these materials by conversion to non-electrophilic species, you can react them with nucleophiles. Which of the following would be the best for rapidly destroying methyl iodide (iodomethane)?

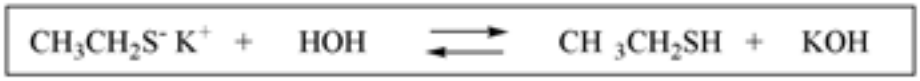
A) CH_3OH
B) NH_3
C) H_2O
D) NaI
E) CH_3CO_2H

33. Which of the following is **not** normally a good leaving group on carbon?

A) Br
B) OCH_3
C) Cl
D) OSO_2R

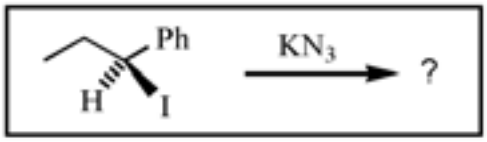
E) I

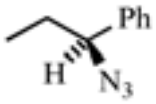
34. To which side (if any) would the following equilibrium lie?

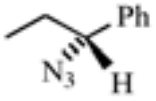


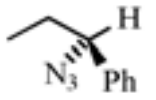
A) to the left
B) to the right
C) equally to the right and left
D) there is no way to tell
E) only S_N2, S_N1 and E2 reactions are possible

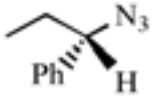
35. Predict the major product of the following reaction:



A) 

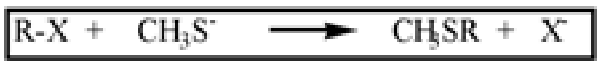
B) 

C) 

D) 

E) no reaction occurs

36. Which of the following haloalkanes would **not** undergo the reaction below?



A) $(CH_3)_2CHI$
B) CH_3Cl
C) $(CH_3)_3CBr$
D) CH_3CH_2Br
E) $CH_3CH_2CH_2I$

Answer Key - Ferret:Exam:Quiz4.qf.ef

1. A
2. E
3. E
4. C
5. B
6. D
7. A
8. A
9. B
10. C
11. D
12. A
13. C
14. D
15. D
16. E
17. A
18. B
19. C
20. A
21. B
22. E
23. A
24. C
25. D
26. C
27. E
28. C
29. A
30. D
31. E
32. B
33. B
34. A
35. B
36. C