

# MGF1106 ~ Topics in Mathematics

## Study Questions

*\*These multiple choice study questions are designed to help prepare students for the MGF1106 final exam.*

**Directions:** Read each question carefully. Select the best answer to each question and blacken the appropriate letter on the answer sheet. When you take the final, you may write on the test, but the answer sheet is the only paper that will be read and scored. Your official answers are whatever you bubble, or fail to bubble, on the answer sheet. If you prefer to work on separate paper, scratch paper will be provided.

Example: 0. Perform the indicated operation:  $\frac{1}{8} + \frac{3}{8} =$

a)  $\frac{4}{16}$

b)  $\frac{3}{64}$

c)  $\frac{1}{2}$

d)  $\frac{2}{8}$

e) None of the above

ANSWER SHEET:

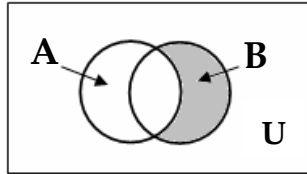
Ⓐ Ⓑ ● Ⓓ Ⓔ

1. Given  $A = \{1, 2, 3, 4, 5, 6\}$ , which of the following is true?
  - a)  $\{3, 4\} \in A$
  - b)  $\{\emptyset\} \subset A$
  - c)  $\{1, 3, 6, 7\} \subset A$
  - d)  $7 \notin A$
  - e) None of the above.
  
2. Given  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$  and  $A = \{1, 4, 5, 7, 8, 9\}$ , find  $A'$ 
  - a)  $\{1, 4, 5, 7, 8, 9\}$
  - b)  $\{2, 3, 6\}$
  - c)  $\{3, 4, 8, 9\}$
  - d)  $\emptyset$
  - e) None of the above.
  
3. Given  $U = \{1, 2, 3, 4, 5, 6\}$ , then  $\emptyset'$  is:
  - a)  $\{7, 8, 9, 10, \dots\}$
  - b)  $\{\emptyset\}$
  - c)  $\emptyset$
  - d)  $\{1, 2, 3, 4, 5, 6\}$
  - e) None of the above.
  
4. Given  $U = \{1, 2, 3, 4, 5, 6, 7\}$ ,  $A = \{1, 2, 5, 6, 7\}$  and  $B = \{1, 3, 4, 5, 6\}$ , find  $A \cup B$ .
  - a)  $\{3, 4\}$
  - b)  $\{1, 2, 3, 4, 5, 6, 7\}$
  - c)  $\{1, 5, 6\}$
  - d)  $\{2, 3, 4, 7\}$
  - e) None of the above.
  
5. If  $A = \{1, 3, 5, 7, \dots\}$  and  $B = \{2, 4, 6, 8, \dots\}$ , then  $A \cup B$  is what set?
  - a)  $\emptyset$
  - b)  $\{2, 4, 6, 8, \dots\}$
  - c)  $\{1, 3, 5, 7, \dots\}$
  - d)  $\{1, 2, 3, 4, \dots\}$
  - e) None of the above.
  
6. Given  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ ,  $A = \{1, 4, 5, 7, 8, 9\}$ , and  $B = \{1, 2, 5, 6, 7\}$ , find  $A \cap B$ :
  - a)  $\{1, 5, 7\}$
  - b)  $\{1, 2, 4, 5, 6, 7, 8, 9\}$
  - c)  $\emptyset$
  - d)  $U$
  - e) None of the above.
  
7. Given  $U = \{2, 4, 6, 8, 10\}$ ,  $A = \{2, 6, 10\}$ ,  $B = \{4, 8\}$  and  $C = \{4, 6, 8\}$ , then  $(A \cap C') \cup B$  is equal to which of the following?
  - a)  $\{2, 4, 8, 10\}$
  - b)  $\{4, 6, 8\}$
  - c)  $\{2, 6, 10\}$
  - d)  $\{6, 8, 10\}$
  - e) None of the above.

8. If  $U = \{1, 2, 3, \dots, 10\}$ ,  $A = \{2, 4, 6, 8, 10\}$  and  $B = \{3, 5, 8\}$ , then  $A' \cap B'$  equals:
- $\{3, 5\}$
  - $\{8\}$
  - $\{1, 2, 3, 4, 5, 6, 7, 9, 10\}$
  - $\{1, 7, 9\}$
  - None of the above.

9. The Venn diagram below is a representation of which one of the following:

- $(A' \cup B)'$
- $A \cap B'$
- $A' \cup B'$
- $A' \cap B$
- None of the above.

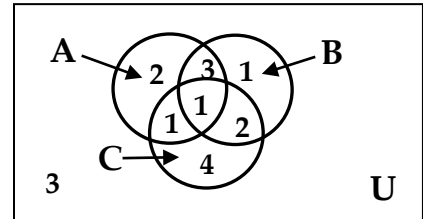


10. Which of the following is the Venn diagram for  $C' \cup (A' \cap B)$ ?

- - 
  - 
  -
- e) Answer not given.

11. In this Venn diagram, the numbers represent the number of individuals in that region. Which of the following statements is/are **true**?

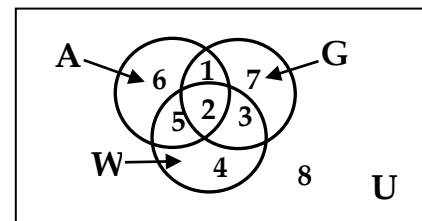
- Seven* individuals are members of exactly one set.
- Exactly *two* individuals are members of both B and C.
- There are exactly *two* individuals in set A.
- There are exactly *three* individuals in U.
- None of the above.



12. Suppose the following:

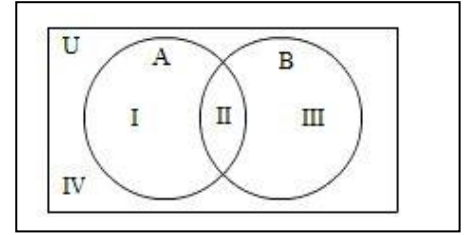
Set **A** is the set of apples. Set **G** is the set of green things.  
 Set **W** is the set of wormy things. Using the data in the Venn diagram to the right, how many green apples are there that are not wormy?

- 14
- 3
- 2
- 1
- 8



13. Are  $(A \cap B)'$  and  $A' \cup B$  equal for all sets A and B?

- a. Yes, the statements are the equal for all sets A and B because both statements correspond to region *IV*
- b. No, the statements are not equal for all sets A and B because the first set corresponds to regions *II, III* and *IV* but the second one only corresponds to region *III*.
- c. Yes, the statements are equal for all sets A and B because both statements correspond to regions *II, III* and *IV*.
- d. No, the statements are not equal for all sets A and B because the first corresponds to region *I* and the second corresponds to region *III*.
- e. Yes, the statements are equal for all sets A and B because both sets correspond to region *I* and *II*.



14. Given set  $A = \{a, b, c, d\}$  and set  $B = \{d, a, b, c\}$ , which of the following statements is true?

- a. Sets A and B are equal but not equivalent.
- b. Sets A and B are equal and equivalent.
- c. Sets A and B are neither equal nor equivalent.
- d. Sets A and B are equivalent but not equal.

15. Write in set builder notation: the set of natural numbers greater than 5.

- a.  $\{x|x \in \mathbb{N} \text{ and } x > 5\}$
- b.  $\{x|x \in \mathbb{N} \text{ and } x \geq 5\}$
- c.  $\{x|x > 5\}$
- d.  $\{x|x \in \mathbb{N} \text{ and } x < 5\}$
- e.  $\{x|x \in \mathbb{N} \text{ and } x = 5\}$

16. Suppose there are two sets A and B. How many elements are in set A if there are 9 elements in set B, 2 in  $A \cap B$  and 14 in  $A \cup B$ ?

- a. 25    b. 7    c. 5    d. 3    e. 21

17. Make a Venn diagram to answer the following question.

There are 40 students in a survey at SF College.

- 20 are taking English
- 15 are taking math
- 12 are taking dance
- 8 are taking math and English
- 6 are taking dance and English
- 5 are taking math and dance
- 3 are taking all 3 subjects

How many people are taking math or English, but not dance?

- a. 9    b. 14    c. 19    d. 5    e. 35

18. Write the following in roster form.  $\{x | x \in \mathbb{N} \text{ and } x \geq 11\}$

- a.  $\{12, 13, 14, 15\dots\}$
- b.  $\{11, 12, 13, 14\}$
- c.  $\{11, 12, 13, 14\dots\}$
- d.  $\{1, 2, 3\dots 11\}$
- e.  $\{1, 2, 3\dots 10\}$

19. Let **p** represent "It rains." and **q** represent "Jack mows the lawn." Write the following in symbols: "If it doesn't rain, then Jack will mow the lawn."

- a.  $p \rightarrow q$
- b.  $p \wedge q$
- c.  $\sim p \rightarrow q$
- d.  $\sim p \rightarrow \sim q$
- e.  $\sim p \vee \sim q$

20. Let I: I go.

Y: You go.

H: He goes.

Translate the following sentence into symbolic form: "If he does not go, then you or I go."

- a.  $(Y \wedge I)' \rightarrow \sim H$
- b.  $Y \vee (I \rightarrow \sim H)$
- c.  $(\sim H \rightarrow Y) \vee I$
- d.  $\sim H \rightarrow (Y \vee I)$
- e. None of the above.

21. Let **p** represent "I am busy" and let **q** represent "I will go out with you." Write the following in symbols: "I am not busy and I won't go out with you."

- a.  $\sim p \wedge q$
- b.  $\sim p \vee \sim q$
- c.  $\sim p \rightarrow \sim q$
- d.  $\sim p \wedge \sim q$
- e. Answer not given.

22. Let I: I am.

Y: You are.

H: He is.

Translate the following into an equivalent English statement:  $I \rightarrow \sim(\sim Y \wedge H)$

- a. It is not true that if you are not and he is, then I am.
- b. If I am, then it is not true that you are not and he is.
- c. If I am, then you are and he is not.
- d. If I am, then you are not and he is.
- e. None of the above.

23. If **p** is true and **r** is false, which of the following statements is true?

- a.  $p \wedge r$
- b.  $(\sim p \vee \sim r) \rightarrow r$
- c.  $p \wedge (r \vee \sim p)$
- d.  $r \rightarrow (p \wedge \sim r)$
- e. None of the above.

24. Given the truth table at the right, the truth table for  $(\sim p \vee q) \rightarrow q$  would be:

- a. T
  - b. T
  - c. T
  - d. T
  - e. T
- T F T T F
- T T F T F
- T T F F T

p	q
T	T
T	F
F	T
F	F

25. Which of the following statements are equivalent?
- A. If I pass the final, then I am happy.
  - B. If I did not pass the final, then I am not happy.
  - C. If I am not happy, then I did not pass the final.
- a. None are equivalent.
  - b. All are equivalent.
  - c. A and B are equivalent to each other but not to C.
  - d. A and C are equivalent to each other but not to B.
  - e. B and C are equivalent to each other but not to A.
26. Use De Morgan's laws to write an equivalent statement for the following sentence.  
The moon is bright and the stars are shining.
- a. It is false that the moon is bright and the stars are shining.
  - b. It is false that the stars are shining and the moon is bright.
  - c. It is false that the stars are shining or the moon is not bright.
  - d. It is false that the moon is not bright or the stars are not shining.
  - e. The stars are not shining or the moon is not bright.
27. The **negation** of the statement: "All dogs have fleas." is:
- a. Some dogs have fleas.
  - b. No dogs have fleas.
  - c. Some dogs do not have fleas.
  - d. All of the above.
  - e. None of the above.
28. The **inverse** of the statement: "If it is not broken, then you don't fix it." is:
- a. If you don't fix it, then it is not broken.
  - b. If it's broken, then you fix it.
  - c. If you fix it, then it's not broken.
  - d. If it's not broken, then you fix it anyway.
  - e. If it's not broken, then you break it.
29. The **converse** of the statement: "If it is not broken, then you don't fix it." is:
- a. If you don't fix it, then it is not broken.
  - b. If it's broken, then you fix it.
  - c. If you fix it, then it's not broken.
  - d. If you fix it, then it's broken.
  - e. If it's not broken, then you break it.
30. The **contrapositive** of the statement: "If it rains, then it pours." is:
- a. If it pours, then it rains.
  - b. It does not pour, if it does not rain.
  - c. If it does not rain, then it does not pour.
  - d. If it does not pour, then it does not rain.
  - e. None of the above.

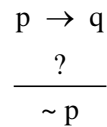
31. Use **inductive reasoning** to find the next three numbers in the list: {3, 6, 9, 12,...}
- 13, 14, 15
  - 4, 7, 10
  - 15, 18, 21
  - 15, 20, 25
  - None of the above.

32. Use inductive reasoning to choose the most appropriate conclusion for the given premises.

Biology is hard.  
 Chemistry is hard.  
Physics is hard.  
 $\therefore$

- Astronomy is hard.
- Science classes have labs.
- Science classes are hard.
- You should study science.
- Math is easy.

33. Which of the following expressions could be used on the second line of the diagram on the right to make the argument valid?



- $q$
- $\sim q$
- $p$
- $p \wedge q$
- None of the above.

34. Consider the following premises: All yellow things are bright.  
 All bright things are old.  
 Some ducks are old.

Which of the following conclusions makes the argument valid?

- Some ducks are yellow.
  - Some bright things are ducks.
  - All yellow things are old.
  - Some yellow things are ducks.
  - None of the above.
35. A box of tree lights contains 4 red lights, 6 green lights, 3 blue lights, 7 white lights, and 5 yellow lights. What is the probability that someone reaching into the box (in the dark) will pull out a blue light?
- $\frac{4}{25}$
  - $\frac{22}{25}$
  - $\frac{6}{25}$
  - $\frac{3}{25}$
  - Answer not given.

36. A coin is tossed and a 4-sided die is rolled. What is the sample space given that H = head and T = tail and the sides of the die are numbered 1, 2, 3 and 4?

- HH, HT, TH, TT
- H1, T1, H2, T2, T3, T4
- H1, H2, H3, H4, T1, T2, T3, T4
- H12345, T12345
- H1, H2, H3, H4

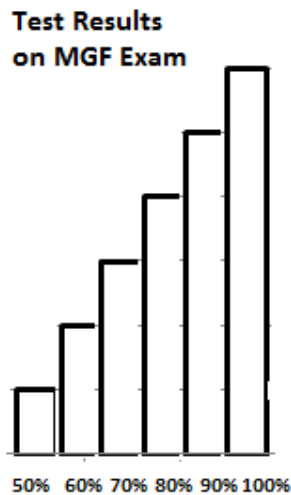
37. There are 4 balls in a bag. One is red, one is blue, one is green and one is yellow. Forty-one people are asked to reach in the bag, without looking and pull a ball out of the bag. Using the data in the table of results, what is the empirical probability of pulling out a green ball?

Red	Blue	Green	Yellow
15	10	9	7

- a.  $\frac{1}{9}$    b.  $\frac{9}{41}$    c.  $\frac{41}{9}$    d.  $\frac{9}{32}$    e.  $\frac{1}{4}$
38. If a club consists of 6 members, how many different arrangements of president, vice president and secretary are possible?  
 a. 6   b. 20   c. 120   d. 30   e. 216
39. Bill's rare coin collection consists of 5 quarters and 4 dimes. He plans to sell 5 of the coins at a trade show. Find the probability that he will sell 2 quarters and 3 dimes at the show.  
 a.  $\frac{20}{63}$    b.  $\frac{5}{9}$    c.  $\frac{3}{10}$    d.  $\frac{4}{5}$    e.  $\frac{3}{25}$
40. A coin is tossed and a 6-sided die is rolled. Determine the number of ways to obtain a tail on the coin OR roll an even number on the die by listing outcomes.  
 a. There are 12 ways. T1,T2,T3,T4,T5,T6,H1,H2,H3,H4,H5,H6  
 b. There are 6 ways. T2,T4,T6,H2,H4,H6  
 c. There are 8 ways. T2,T4,T5,T6,H2,H4,H5,H6,  
 d. There are 9 ways. T1,T2,T3,T4,T5,T6,H2,H4,H6  
 e. There are 4 ways. T,2,4,6
41. Make a tree diagram, where H represents heads and T represents tails, and use it to answer the question. What is the probability of getting exactly one head if you toss a coin 3 times?  
 a.  $\frac{1}{3}$    b.  $\frac{1}{2}$    c.  $\frac{3}{8}$    d.  $\frac{1}{8}$    e.  $\frac{5}{8}$
42. You pick a card from a deck of 52 cards. What is the probability of getting a black card OR a 10?  
 a.  $\frac{1}{4}$    b.  $\frac{17}{52}$    c.  $\frac{7}{13}$    d.  $\frac{1}{26}$    e.  $\frac{4}{13}$
43. In a bag of ten apples, you realize that three of them are rotten. If you pick two at random without replacement, what is the probability that both of the apples will not be rotten?  
 a.  $\frac{7}{10}$    b.  $\frac{1}{15}$    c.  $\frac{7}{15}$    d.  $\frac{49}{100}$    e.  $\frac{4}{5}$
44. A 6-sided die is rolled and then a coin is tossed. How many possible outcomes are there?  
 a. 8   b. 4   c. 12   d. 2   e. 18



45. How many combinations are there of 5 things taken 3 at a time?  
 a. 15                      b. 60                      c. 10                      d. 5!                      e. Answer not given.
46. How many different ways can 5 people all be seated in a row of 5 chairs?  
 a. 25                      b. 1                      c.  $5^5$                       d. 120                      e. Answer not given.
47. Calculate  ${}_4P_0$ .  
 a. 0                      b. 1                      c. 4                      d. 24                      e. Answer not given.
48. Evaluate  $5! - 3!$ .  
 a. 114                      b.  $2!$                       c.  $53!$                       d. 22                      e. Answer not given.
49. Find the **median** for the following set of data: {100, 90, 95, 61, 66, 80}  
 a. 66                      b. 75                      c. 80                      d. 82                      e. 85
50. Find the **mean** for the following set of data: {100, 90, 95, 61, 66, 80}  
 a. 66                      b. 75                      c. 80                      d. 82                      e. 85
51. A shopper bought gifts costing \$25, \$42, \$76, \$33, \$26, \$18, \$59, and \$71. What is the range of the cost of these gifts?  
 a. \$47.00                      b. \$44.00                      c. \$37.00                      d. \$58.00                      e. \$43.75
52. For a given set of normally distributed data, the mean is 110 and the standard deviation is 5. What percent of the data values would lie between 105 and 115?  
 a. 68%                      b. 95%                      c. 99%                      d. .05%                      e. 81.5%
53. Using the graph below, which of the following statements is true?



- a. The mode is equal to the median.  
 b. The mode is equal to the mean.  
 c. The mode is greater than the mean.  
 d. The mode is less than the median.  
 e. The mode is less than the mean.

54. Find the standard deviation of the following data.

2 5 8 9 1 5

- a.  $\sqrt{10}$     b.  $\sqrt{5}$     c.  $\sqrt{7}$     d. 50    e. 5

55. If you are making a stem-and-leaf graph and you need to show 3 different 25's, which way would you display it?

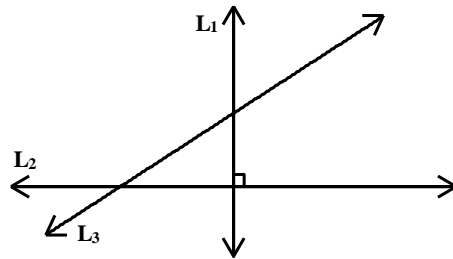
- a. Stem|Leaves    b. Stem|Leaves    c. Stem|Leaves    d. Stem|Leaves
- 2|5                      20|5 5 5                      20|5                      2|5 5 5

56. A geometric figure that has a measureable length is:

- a. A ray.  
b. A line.  
c. A line segment.  
d. An angle.  
e. None of the above.

57. For the figure at the right, which of the following is **true**?

- a.  $L_1$  is perpendicular to  $L_2$ .  
b.  $L_3$  intersects  $L_1$ .  
c.  $L_2$  intersects  $L_1$ .  
d.  $L_3$  is not parallel to  $L_2$ .  
e. All of the above are true.



58. The area of a square that is 3 feet on a side is:

- a. 12 ft.                      b. 9 sq. ft.                      c. 6 sq. ft.                      d. 27 sq. ft.                      e. Answer not given.

59. What is the area of a circle with a diameter of 10 m?

- a.  $10\pi$  m<sup>2</sup>                      b.  $100\pi$  m<sup>2</sup>                      c.  $50\pi$  m<sup>2</sup>                      d.  $25\pi$  m<sup>2</sup>                      e. Answer not given.

60. Find the area of a triangle having a base of 15 inches and a height of 8 inches.

- a. 120 sq. in.                      b. 60 sq. in.                      c. 60 in.                      d. 60 cu. in.                      e. Answer not given.

61. Find the length of a rectangle with a perimeter of 160 inches and a width of 25 inches.

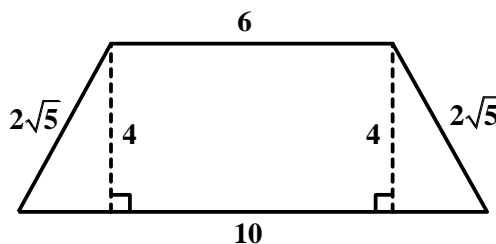
- a. 55 in.                      b. 67.5 in.                      c. 110 in.                      d. 185 in.                      e. 210 in.

62. Given an isosceles triangle with the unequal side equal to 20 cm, find the other two sides if the perimeter is 48 cm.

- a. 28, 28 cm                      b. 14, 14 cm                      c. 12, 16 cm                      d. 10, 18 cm                      e. Answer not given.

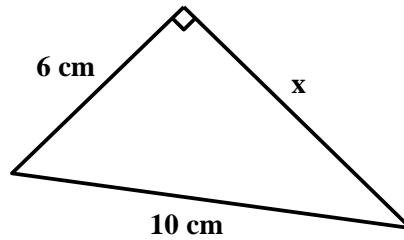
63. What is the **area** of the trapezoid pictured at the right?

- a. 8 sq. units  
b. 34 sq. units  
c. 26 sq. units  
d. 32 sq. units  
e. 40 sq. units



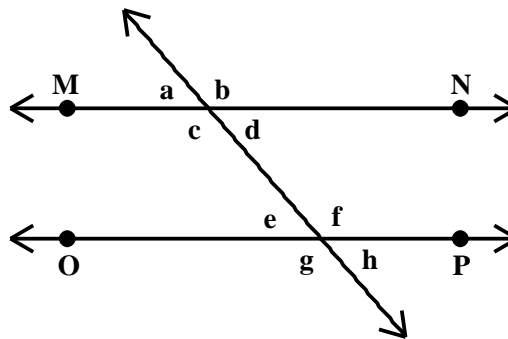
64. Find the **volume** of a tin can (right circular cylinder) that is 6 inches tall and that has a base with a radius of 2 inches.
- $24\pi$  cu. in.
  - $10\pi$  cu. in.
  - $12\pi$  cu. in.
  - $32\pi$  cu. in.
  - $72\pi$  cu. in.

65. Find the **length** of side  $x$  for the triangle pictured at the right:



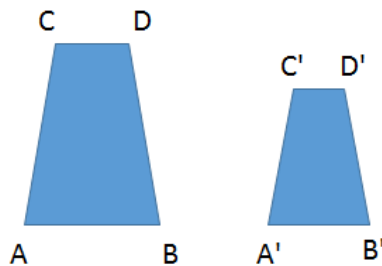
- 15 cm
- 4 cm
- 8 cm
- 30 cm
- None of the above.

66. Given that line **MN** is parallel to line **OP**, angles **d** and **h** are equal to what other pair of angles in the diagram pictured at the right?



- c and g.
- b and f.
- a and b.
- a and e.
- c and d.

67. Trapezoid ABCD below is similar to trapezoid A'B'C'D'.



Find side A'B' if side AB is 12 cm, side CD is 9 cm and side C'D' is 6 cm.

- 10 cm
  - 4.5 cm
  - 8 cm
  - 18 cm
  - 4 cm
68. Calculate the surface area of a cylinder which has radius of 4 inches and height of 6 inches.
- $80\pi$  square inches
  - $48\pi$  square inches
  - $32\pi$  square inches
  - $96\pi$  square inches
  - $40\pi$  square inches

69. The solution to the proportion:  $\frac{4}{x} = \frac{12}{9}$  is:

- $x = 2$
- $x = 3$
- $x = 4$
- $x = 5$
- $x = 27$

**Answers:**

1. D	21. D	41. C	61. A
2. B	22. B	42. C	62. B
3. D	23. D	43. C	63. D
4. B	24. D	44. C	64. A
5. D	25. D	45. C	65. C
6. A	26. D	46. D	66. D
7. A	27. C	47. B	67. C
8. D	28. B	48. A	68. A
9. D	29. A	49. E	69. B
10. D	30. D	50. D	
11. A	31. C	51. D	
12. D	32. C	52. A	
13. C	33. B	53. C	
14. B	34. C	54. A	
15. A	35. D	55. D	
16. B	36. C	56. C	
17. C	37. B	57. E	
18. C	38. C	58. B	
19. C	39. A	59. D	
20. D	40. D	60. B	