2015-2016 Math League Contests, Grades 5-6

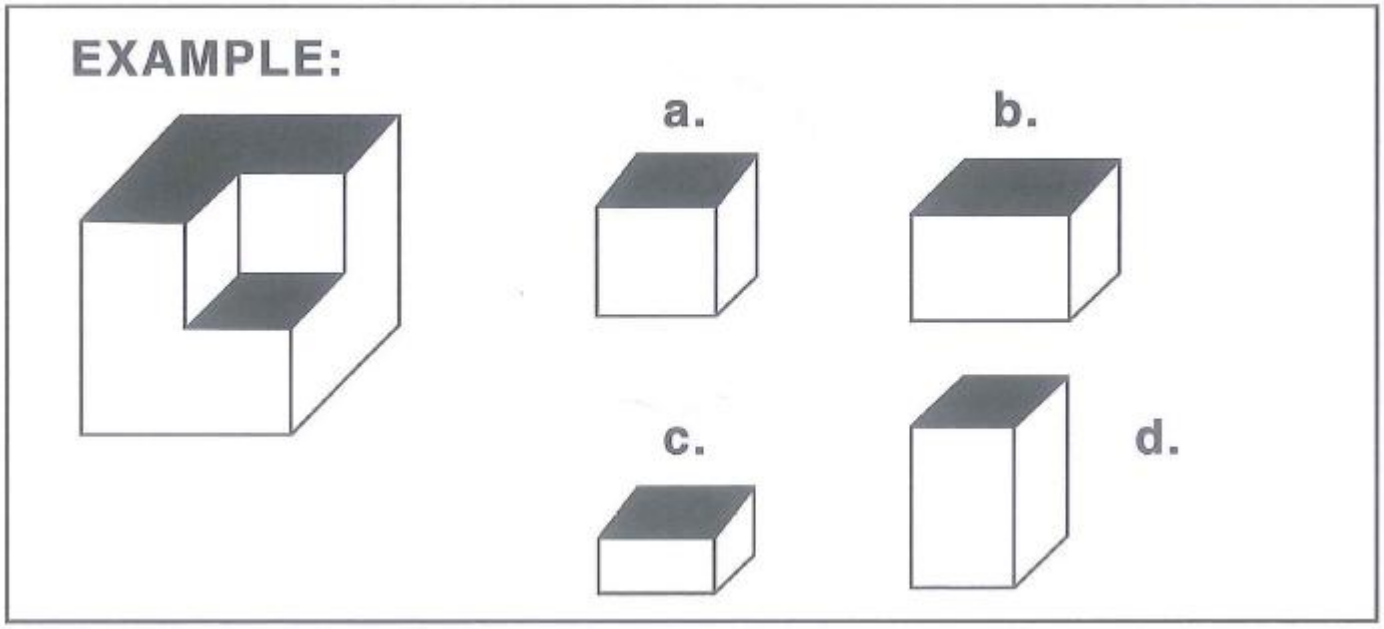
Second-Round, Jan – Feb 2016

Instructions:

1. This second-round contest (Grades 5-6) consists of 78 questions in total. Each question is worth 10 points. Unanswered questions or wrong answers get no credit. The perfect score is 780. These questions are designed to test your ability of math, figural in particular, and verbal.
2. For all the questions below, login to your account at http://www.mathleague.cn/, and enter your answers. Answers written on this document or any other place will NOT be credited.
3. **Don't be intimidated by the sheer number of questions and pages in this contest. They are not as hard as they may first appear. They are fun questions. No one is expected to answer all questions correctly. Students who can work out a few questions should be commended.**
4. The more questions you answered correctly, the more credit you will get. The total credit, or perfect score, is 780. The problems are ordered by content, NOT DIFFICULTY. It is to your advantage to attempt problems from throughout the test.
5. You can seek help by reading books, searching the Internet, asking an expert, and etc. But you can't delegate this to someone else and turn in whatever he/she wrote for you. To make it clear, the purpose of the second-round contest is to test your ability to read and research. You need to be the one who understand the topics and solve the problems. You will be caught if it is not the case during the interview.
6. If you have any questions regarding the contest, please contact us at once at INFO@LTHOUGHTS.COM
7. This document contains 79 pages in total, including this page.
8. Submission of your answers:
   a) For all the questions below, login to your account at http://www.mathleague.cn/, and enter your answers. Answers written on this document or any other place will NOT be credited.
   b) You need to submit your answers no later than 12:00AM, Feb 7, 2016, Beijing Time. Later submission will not be accepted.
9. Subjects tested:
   a) COMPLETE THE CUBE WITH ONE PIECE (QUESTIONS 1-5)
   b) RECOGNIZING VIEWS OF A SOLID (QUESTIONS 6-7)
   c) DIAGRAMMING CLASSES (QUESTIONS 8-13)
   d) DRAWING TESSELLATING PATTERNS (QUESTIONS 14-17)
   e) COMPLETING TRUE-FALSE TABLES (QUESTIONS 18-22)
   f) RECOGNIZING CONGRUENT PARTS (QUESTION 23)
   g) CONGRUENCE AND SIMILARITY (QUESTIONS 24-34)
   h) FOLLOWING DIRECTIONS (QUESTIONS 35 - 42)
   i) STACKING SHAPES (QUESTIONS 43-48)
   j) DESCRIBING LOCATIONS ON A GRID (QUESTIONS 49-52)
   k) DESCRIBING LOCATIONS AND DIRECTIONS WITH MAPS (QUESTIONS 53-58)
   l) DEPICTING DIRECTIONS (QUESTIONS 59 – 61)
   m) TIME SEQUENCE (QUESTIONS 62 – 65)
   n) DEGREE OF MEANING (QUESTIONS 66 – 69)
   o) DEDUCTIVE REASONING (QUESTIONS 70 – 78)

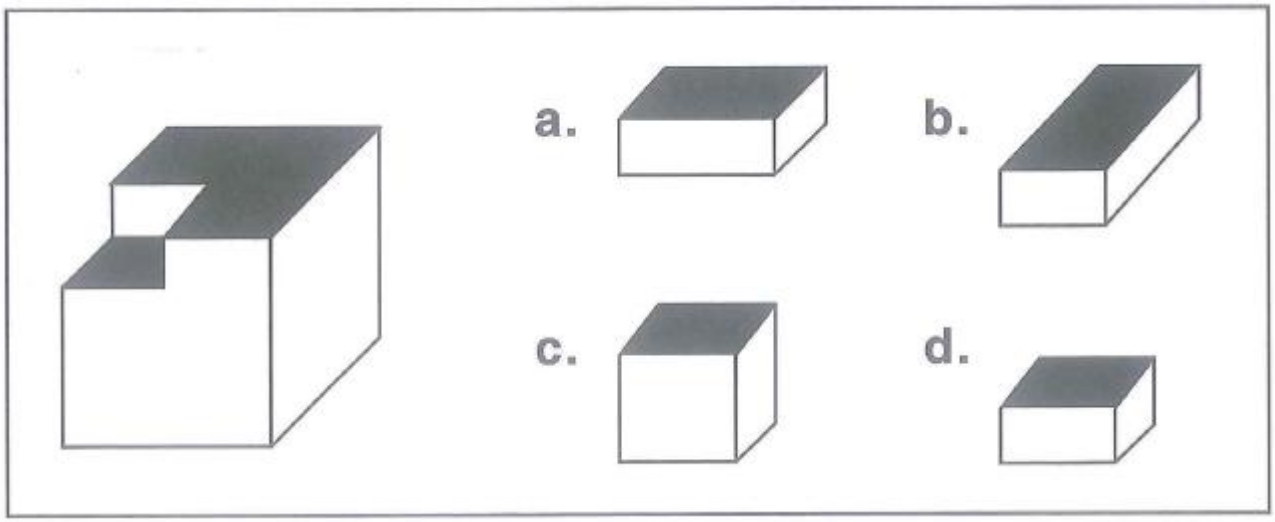
COMPLETE THE CUBE WITH ONE PIECE (QUESTIONS 1-5)

Each cube has a piece missing. Identify the piece that will fit the cube.

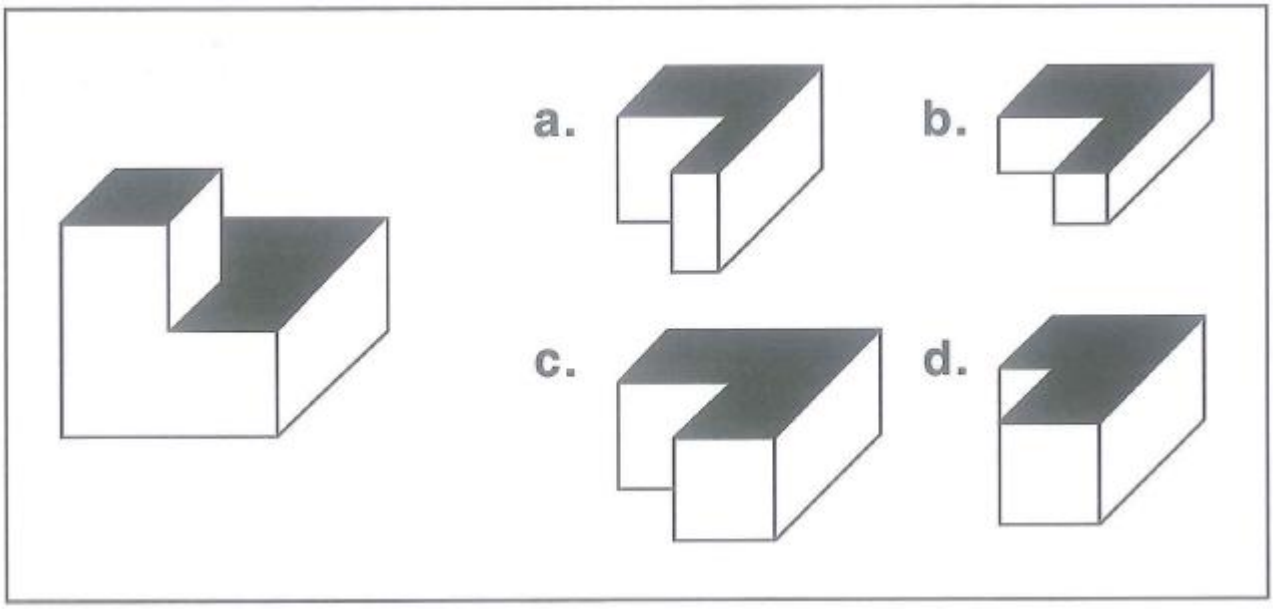


Answer: a.

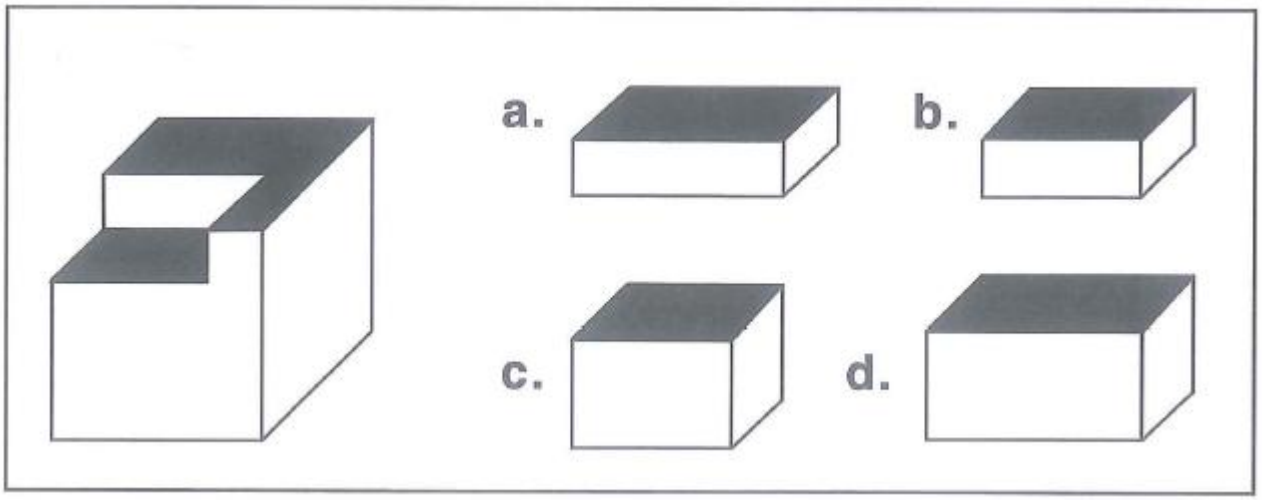
Question 1:



Question 2:



Question 3:



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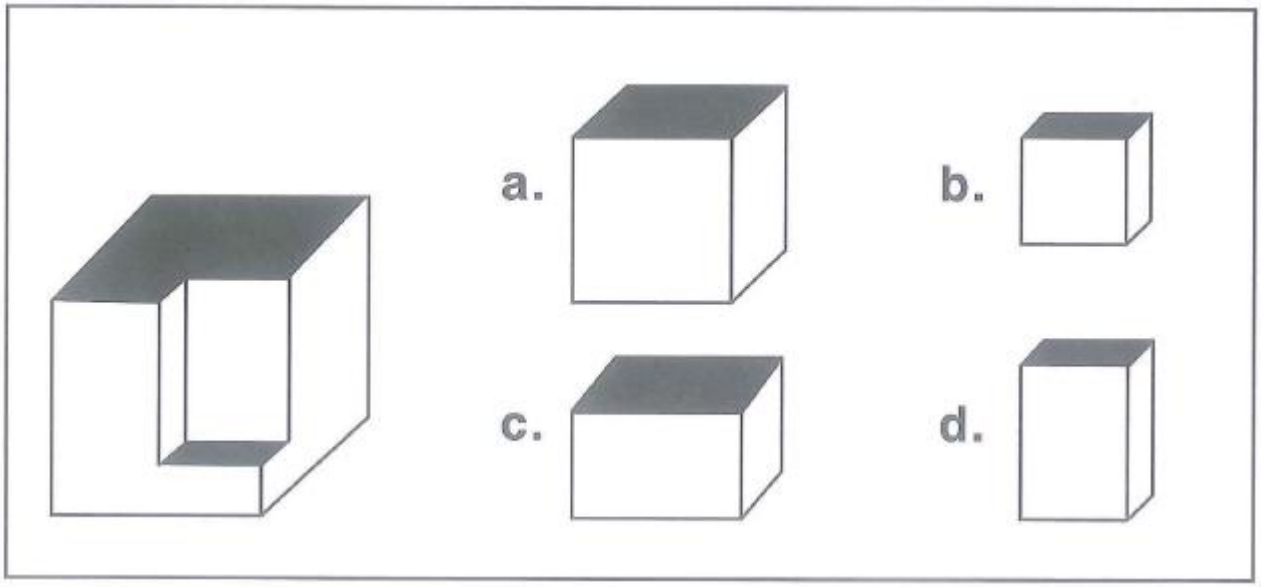
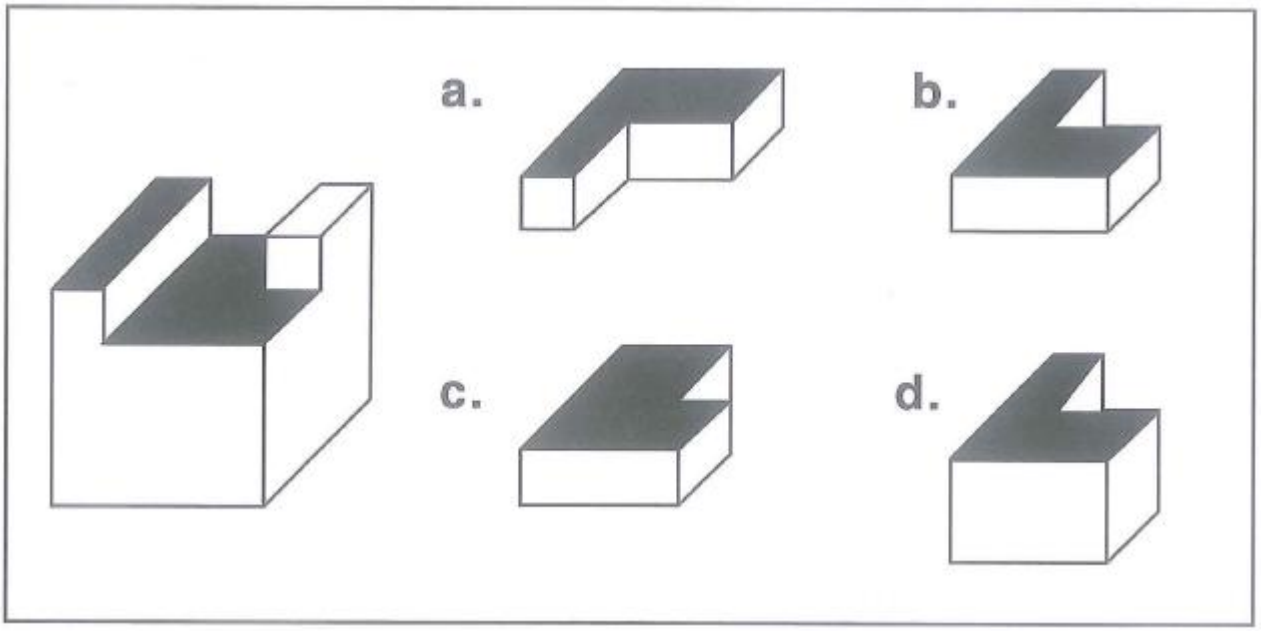
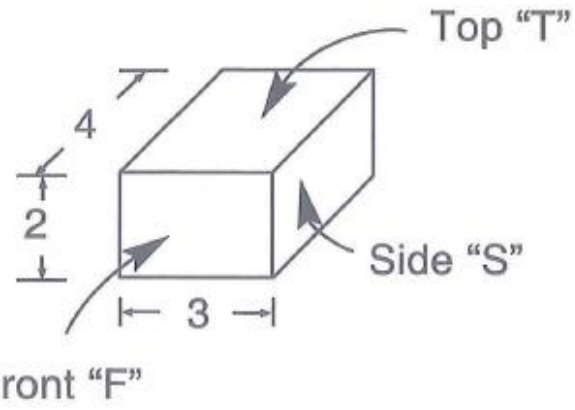


Question 5:



RECOGNIZING VIEWS OF A SOLID (QUESTIONS 6-7)

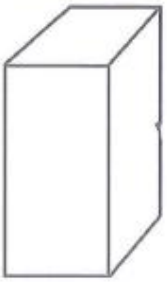
Imagine that you are drawing a pattern to cover each face of a solid.



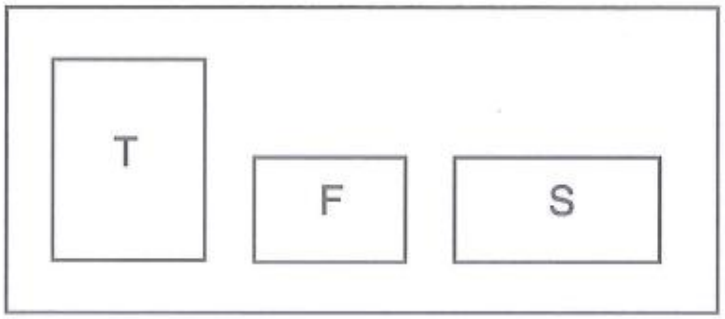
The top is 3 units by 4 units.
The side is 2 units by 4 units.
The front is 2 units by 3 units.

Example:
Which group of pattern pieces fit the following solid on the left?

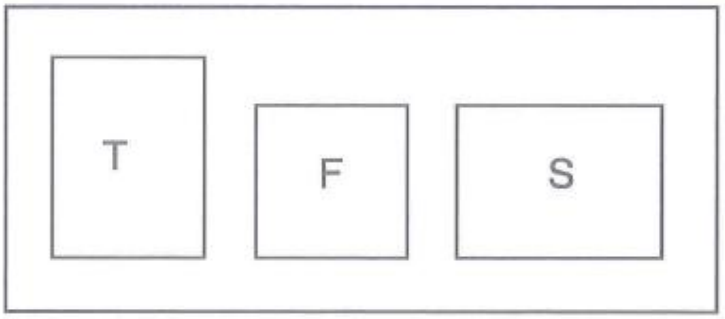
EXAMPLE:



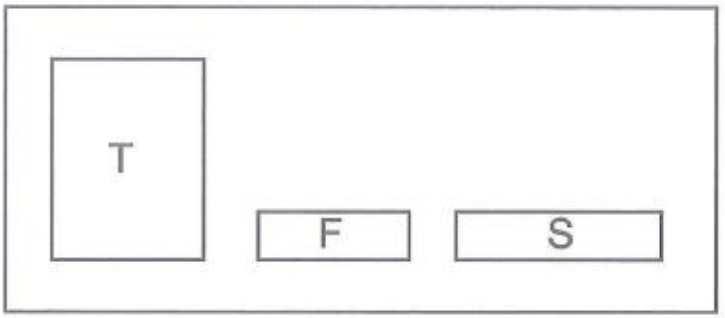
a.



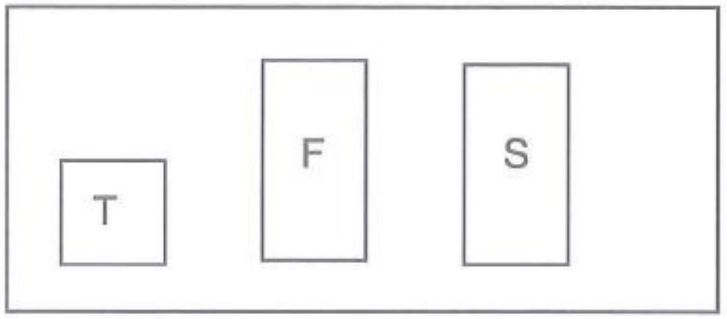
b.



c.



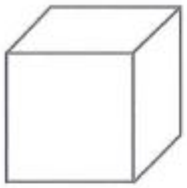
d.



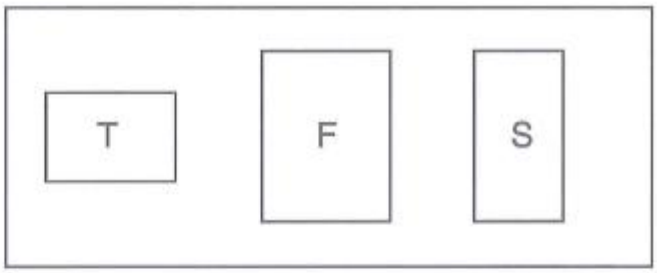
Answer: d.

Question 6:
Which group of pattern pieces fits each solid on the left?

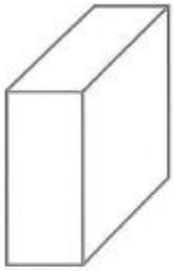
A-236



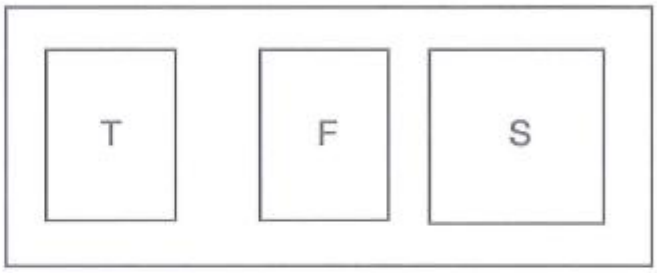
a.



A-237



b.



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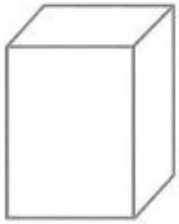
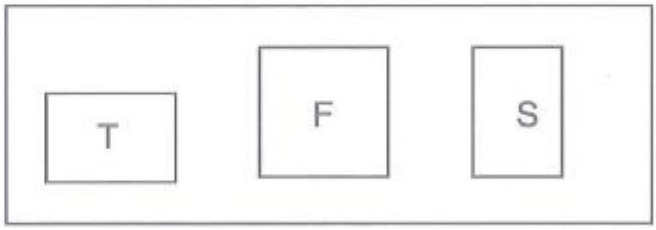
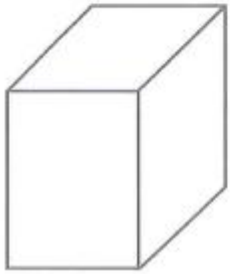


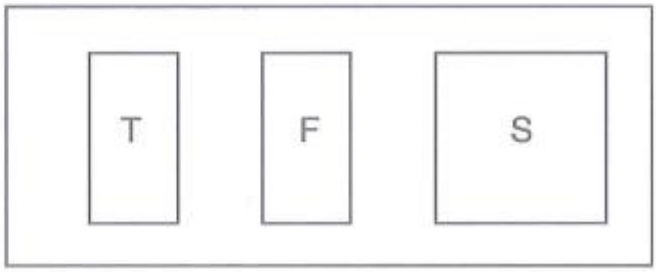
c.



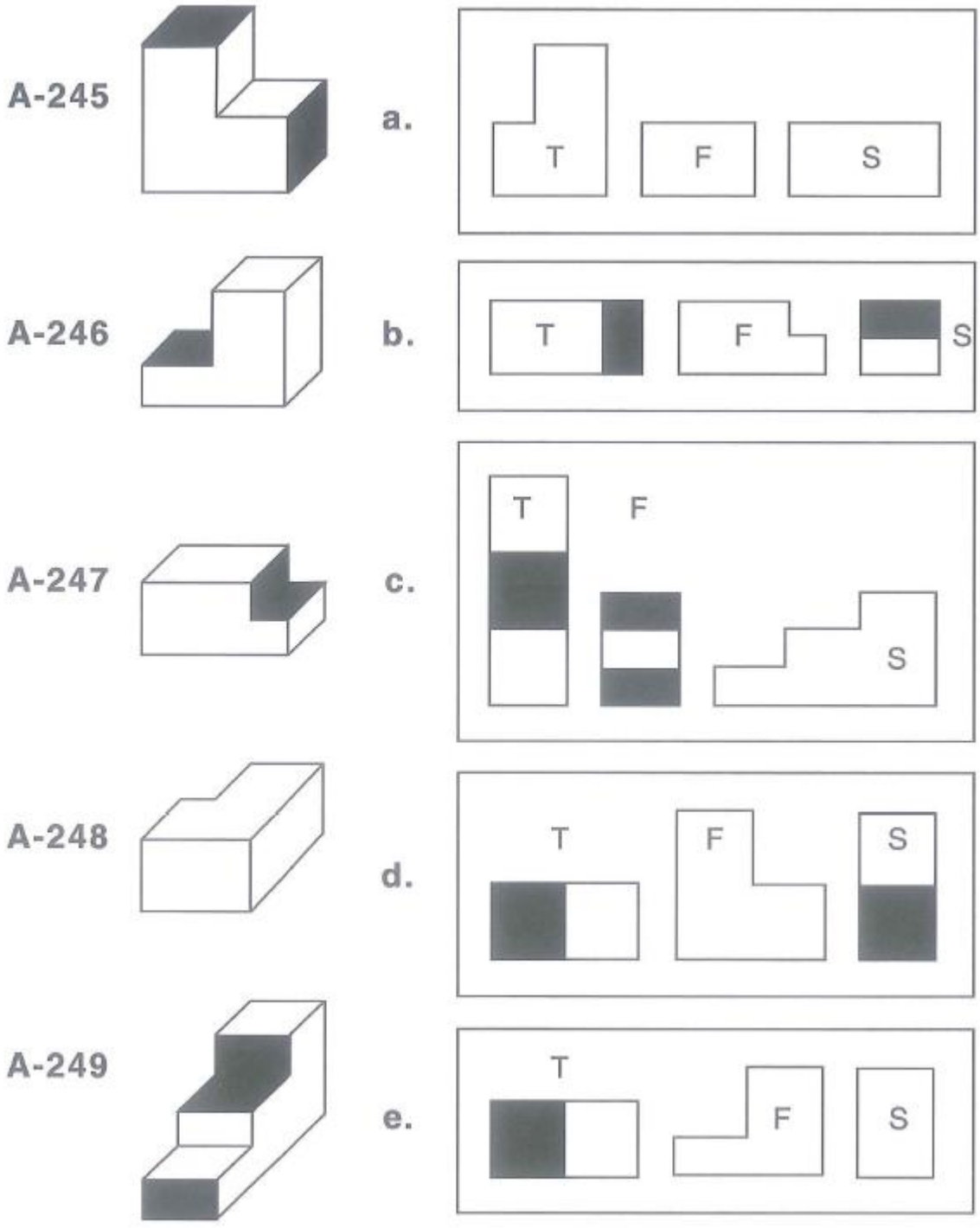
A-239



d.



Question 7:
Which group of pattern pieces fits each solid on the left?



(end of Question 7)

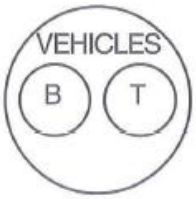
DIAGRAMMING CLASSES (QUESTIONS 8-13)

DIAGRAMING CLASSES

Diagrams can be used to show relationships.

EXAMPLE: bicycles, trucks, vehicles

The first diagram pictures two distinctly different subclasses within a common class. The large circle represents vehicles. The smaller circles represent bicycles and trucks.

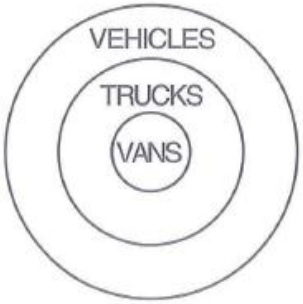


B = Bicycles
T = Trucks

A bicycle is a kind of vehicle, and a truck is a kind of vehicle. However, no truck is a bicycle.

EXAMPLE: truck, van, vehicle

The second diagram pictures a class-subclass-subclass relationship. All of the items in one subclass are members of a larger subclass.

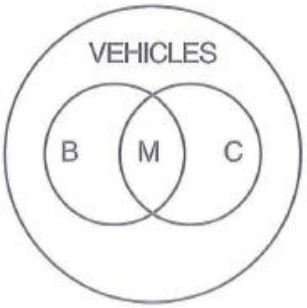


A truck is a kind of vehicle, and a van is a kind of truck. The circle representing trucks is inside the large circle representing vehicles because all trucks are vehicles. The smallest circle representing vans is inside the circle representing trucks because all vans are trucks.

EXAMPLE: bicycles, mopeds, motorcycles, vehicles

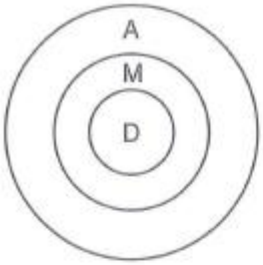
The third diagram pictures subclasses that overlap to form a third subclass.

Is there a form of bicycle that is also a form of motorcycle? A moped can be operated by peddling like a bicycle. A moped can also be powered by its engine like a motorcycle. This relationship can be shown by an overlapping diagram like this one.



B = Bicycles
C = Motorcycles
M = Mopeds

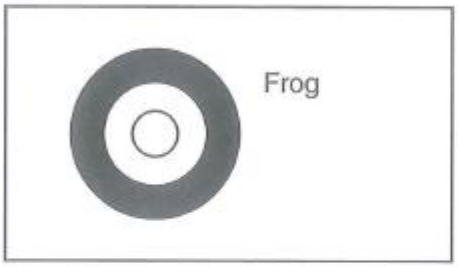
Question 8:

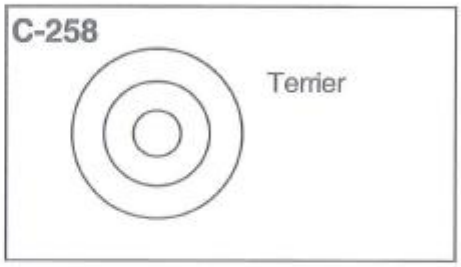


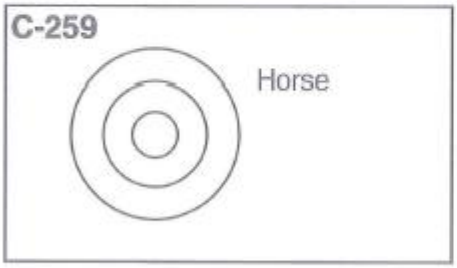
A = Animals
M = Mammals
D = Dogs

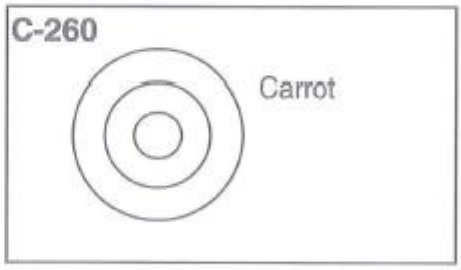
This diagram illustrates the relationship of the classes "Animals," "Mammals," and "Dogs." Decide how each word below is related to these three classes and darken the appropriate region of the corresponding diagram. If the word does not fit in any of these three classes, label it "O" for "Outside."

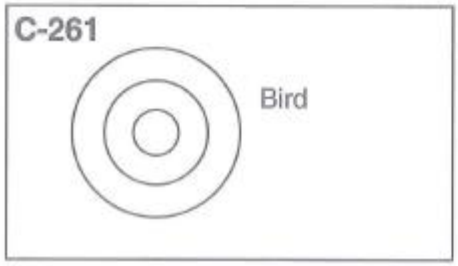
EXAMPLE:

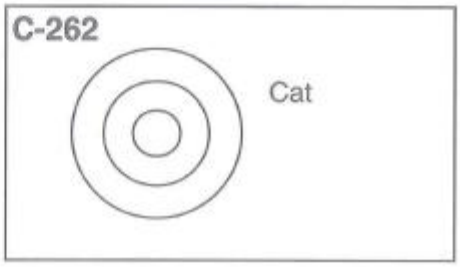




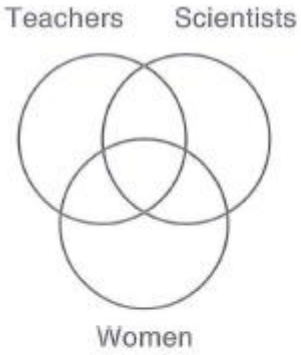






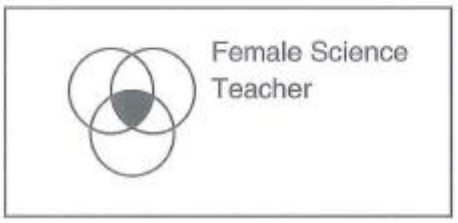


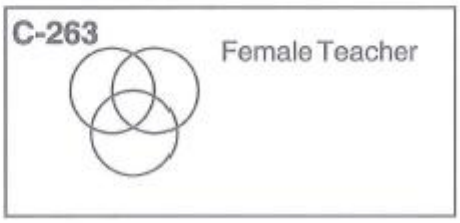
Question 9:

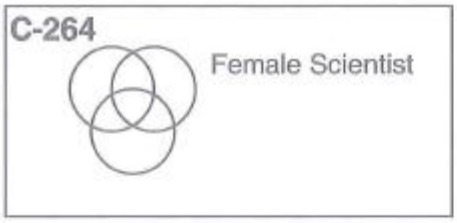


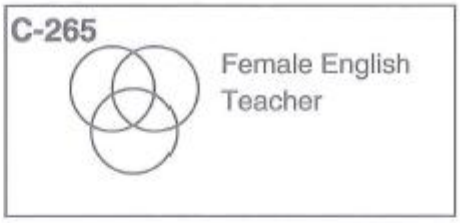
These overlapping diagrams illustrate the relationship between the classes of "Teachers," "Scientists," and "Women." Decide where each class below would reside in the Venn diagram and then shade the appropriate area. If the class would not be found in the Venn diagram, then label the class "O" for "Outside."

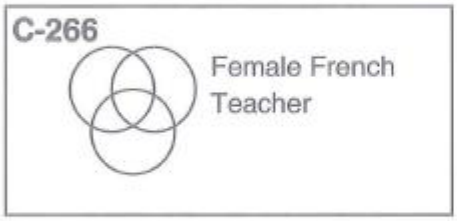
EXAMPLE:

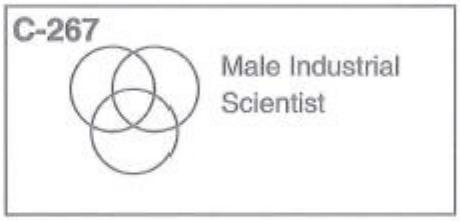


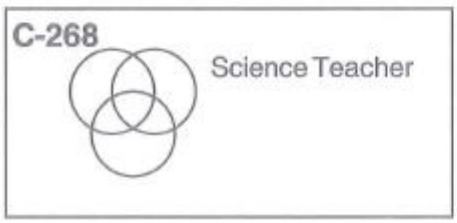


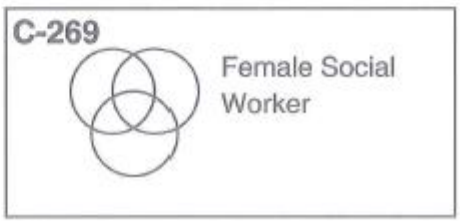






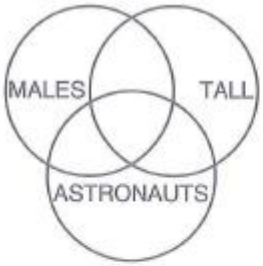






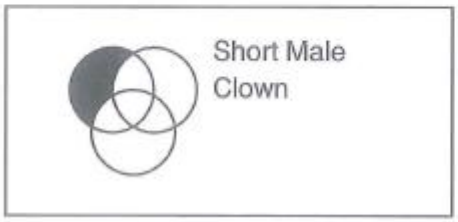
Hint: "Residing" doesn't necessarily mean occupying the whole area. It means "belonging to" the area. (Same to Questions 10 and 11 below.)

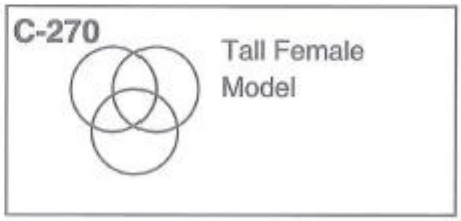
Question 10:

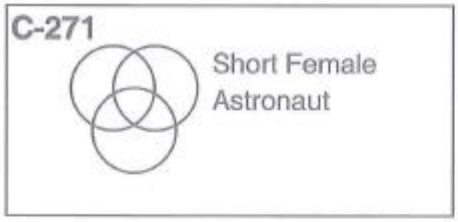


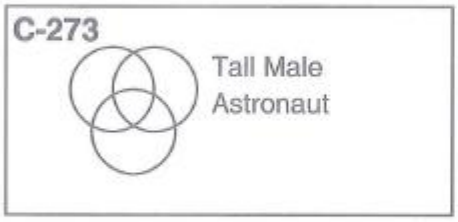
These overlapping diagrams illustrate the relationship between the classes of "Males," "Tall," and "Astronauts." Decide where each class below would reside in the Venn diagram and then shade the appropriate area. If the class would not be found in the Venn diagram, then label the class "O" for "Outside."

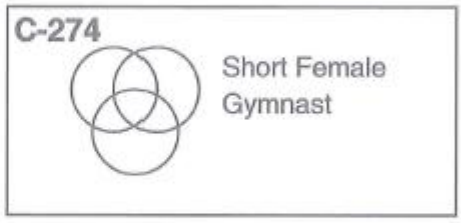
EXAMPLE:

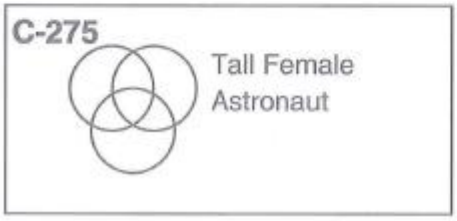




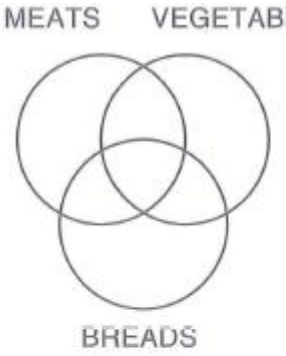






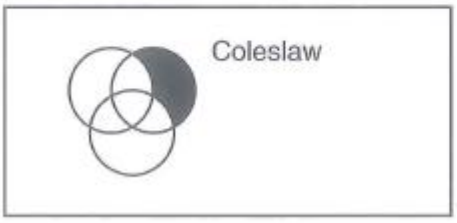


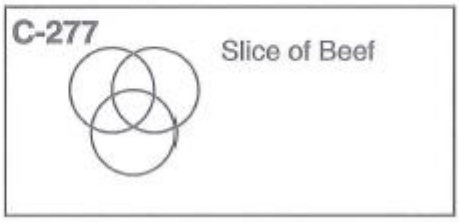
Question 11:

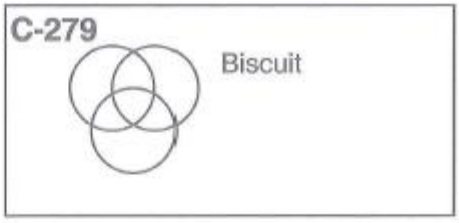


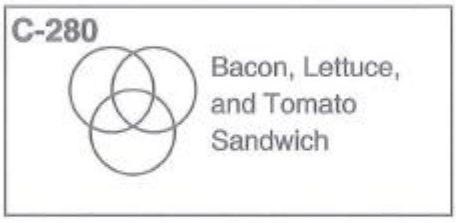
These overlapping diagrams illustrate the relationship between the classes of "Meats," "Vegetables," and "Breads." Decide where each class below would reside in the Venn diagram and then shade the appropriate area. If the class would not be found in the Venn diagram, then label the class "O" for "Outside."

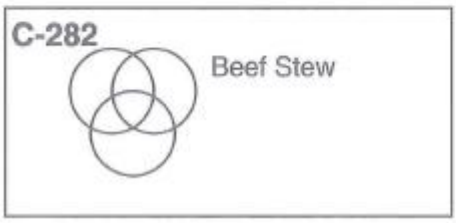
EXAMPLE:

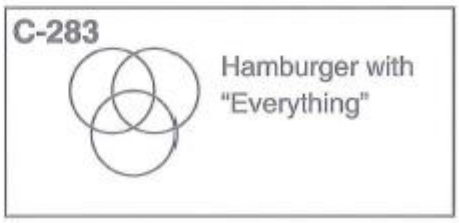




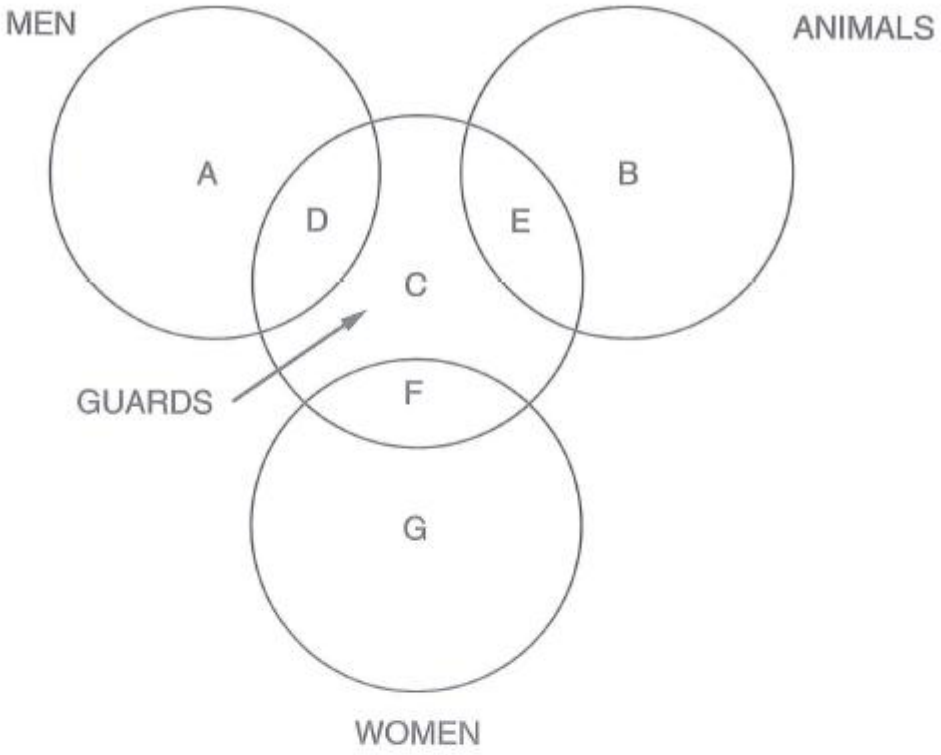








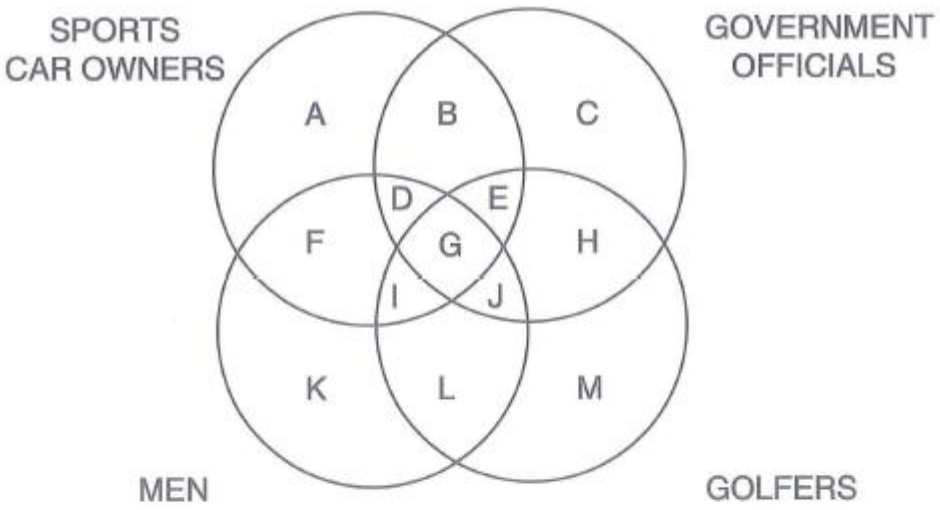
Question 12:



Study this diagram and decide in which region each of the descriptions below would fit. Write the letter representing the correct region on the line provided.

	DESCRIPTION	REGION
EXAMPLE:	male security officer	D
C-296	female police officer	_____
C-297	watchdog	_____
C-298	poodle	_____
C-299	burglar alarm	_____
C-300	lioness with cubs	_____

Question 13:



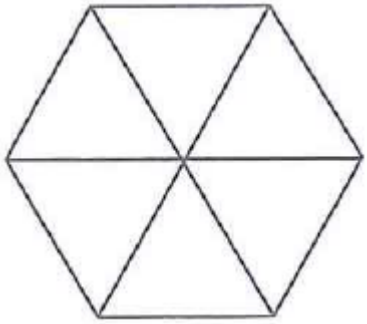
Study this diagram and decide in which region each of the descriptions below would fit. Write the letter representing the correct region on the line provided.

	PERSON	REGION
EXAMPLE:	a woman judge who golfs and drives a station wagon	H
C-301	a congresswoman who plays only tennis and drives a Porsche	_____
C-302	a congressman who swims, jogs, and drives an Alfa Romeo	_____
C-303	a restaurant hostess who golfs and drives a compact car	_____
C-304	a male factory worker who golfs and owns a sports car	_____
C-305	President Eisenhower, who golfed but did not own a sports car	_____

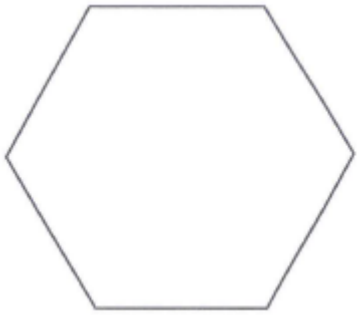
(end of Question 13)

DRAWING TESSELLATING PATTERNS (QUESTIONS 14-17)

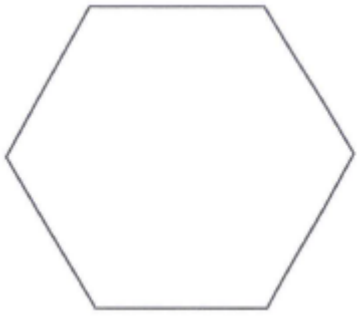
Some figures can be filled by tessellating (repeating) shapes. For example, it is possible to fill a hexagon with 6 equilateral triangles, figure below.



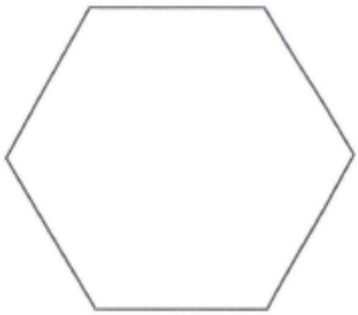
Question 14:
Is it possible to fill a hexagon with right triangles? If so, how many right triangles are needed to fill it?



Question 15:
Is it possible to fill a hexagon with diamond shaped figures? If so, how many diamond shapes are needed to fill it?

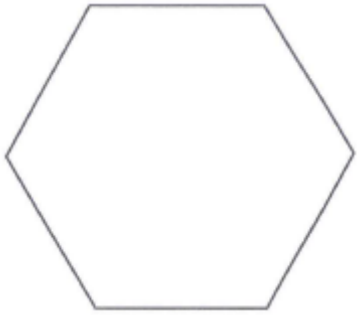


Question 16:
Is it possible to fill a hexagon with squares? If so, how many squares are needed to fill it?



Question 17:

Is it possible to fill a hexagon with hexagons? If so, how many hexagons are needed to fill it?



(end of Question 17)

COMPLETING TRUE-FALSE TABLES (QUESTIONS 18-22)

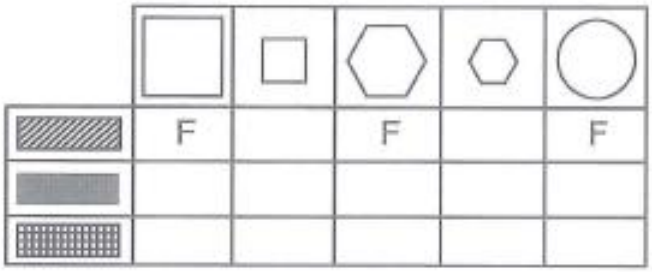
EXAMPLE: Shade the figures below so that they meet the following conditions.

1. Large figures are not striped.
2. Hexagons are not checked.
3. There is only one gray figure.
4. No small figure is checked.

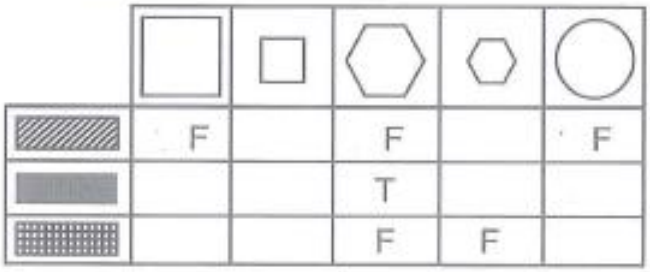
In each space on the grid, write **True** or **False**, depending on whether the figure can be shaded to fit the conditions given.

Use these shades only ↓					
					
					
					

Clue 1 - "Large figures are not striped." Write **F** (for false) in the "striped" row under the large figures.

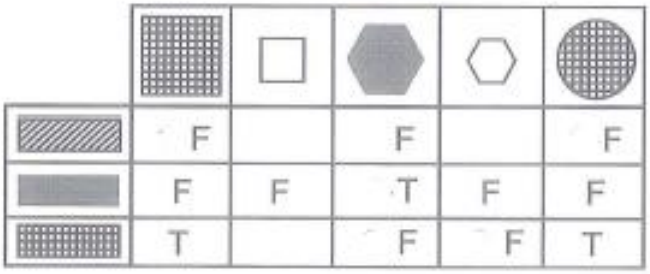


Clue 2 - "Hexagons are not checked." Write **F**s in the "checked " row and the "hexagon" columns.



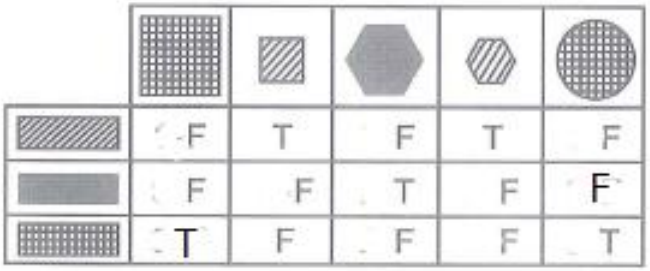
If the large hexagon is neither striped nor checked, then it must be gray.

Clue 3 - "There is only one gray figure." Since we have deduced from clues 1 & 2 that the hexagon is gray, no other figure can be gray. In the "gray" row mark all the other figures **F**.



If the large square and circle are neither striped nor gray, then they must be checked.

Clue 4 - "No small figure is checked." Write an **F** in the "checked" row and remaining "small" column.



If the small square and small hexagon are neither gray nor checked, then they are striped.

Hint:
Each figure has one of the three shades: striped, gray, or checked.

Striped: 

Gray: 

Checked (= Checkered): 

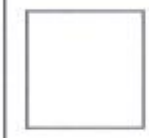
(end of Example)

Question 18:

Shade the figures below so that they meet the following conditions.

1. Squares are not striped.
2. The circle is not checked.
3. No large figure is gray.
4. No small figure is checked.
5. No hexagon is striped.

In each space on the grid, write **True** or **False**, depending on whether the figure can be shaded to fit the conditions given.

Use these shades only ↓					
					
					
					

Hint:

Each figure has one of the three shades: striped, gray, or checked.

Striped: 

Gray: 

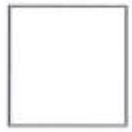
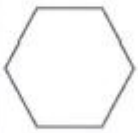
Checked (= Checkered): 

Question 19:

Shade the figures below so that they meet the following conditions.

1. Polygons are not gray.
2. Small figures are not striped.
3. There is one gray figure.
4. Large polygons* are not striped.

In each space on the grid, write **True** or **False**, depending on whether the figure can be shaded to fit the conditions given.

Use these shades only ↓					
					
					
					

*A polygon is a closed figure having sides that are all line segments.

Hint:

Each figure has one of the three shades: striped, gray, or checked.

Striped: 

Gray: 

Checked (= Checkered): 

Question 20:

Shade the figures below so that they meet the following conditions.

1. It is not true that the circle is gray.
2. Large figures are not checked.
3. Squares are not striped.
4. Small figures are not gray.
5. Hexagons are not striped.

In each space on the grid, write **True** or **False**, depending on whether the figure can be shaded to fit the conditions given.

Use these shades only ↓					
					
					
					

Hint:
Each figure has one of the three shades: striped, gray, or checked.

Striped: 

Gray: 

Checked (= Checkered): 

Question 21:

Shade the figures below so that they meet the following conditions.

1. Small figures are not striped.
2. No figure is gray.
3. Non-polygons are striped.
4. The squares are not shaded alike.
5. The non-square polygons are shaded alike.

In each space on the grid, write **True** or **False**, depending on whether the figure can be shaded to fit the conditions given.

Use these shades only ↓					
					
					
					

Hint:

Each figure has one of the three shades: striped, gray, or checked.

Striped: 

Gray: 

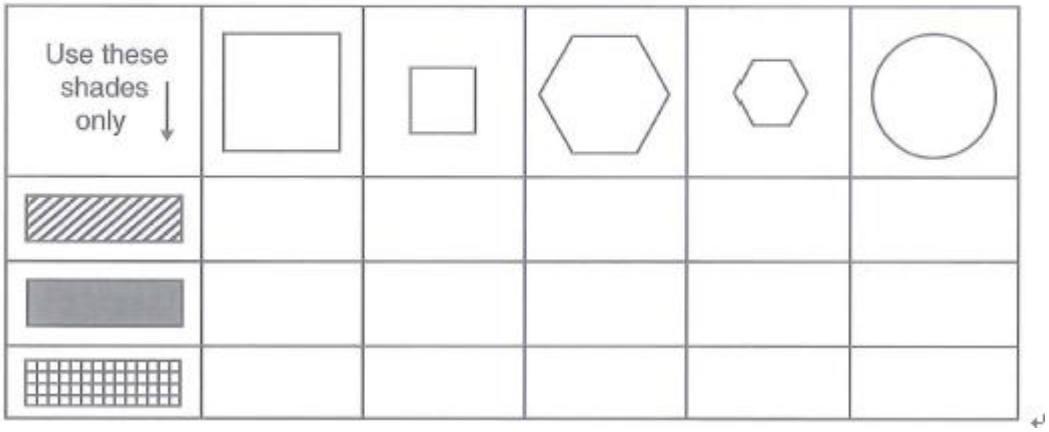
Checked (= Checkered): 

Question 22:

Shade the figures below so that they meet the following conditions.

1. No large polygon is striped.
2. Small figures are not shaded the same.
3. Large figures are not shaded the same.
4. No square is checked.
5. No hexagon is gray.
6. No small figure is striped.

In each space on the grid, write **True** or **False**, depending on whether the figure can be shaded to fit the conditions given.



Hint:

Each figure has one of the three shades: striped, gray, or checked.

Striped: 

Gray: 

Checked (= Checkered): 

(end of Question 22)

RECOGNIZING CONGRUENT PARTS (QUESTION 23)

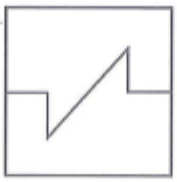
The following figure has been divided into congruent parts. The parts might not face the same direction.

EXAMPLE:

Question 23:

Evaluate if each figure below has been divided into congruent parts. The parts might not face the same direction.

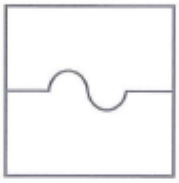
a.



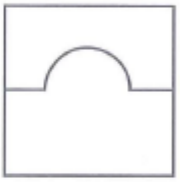
b.

c.

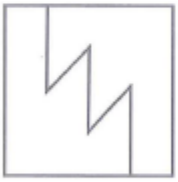
d.



e.



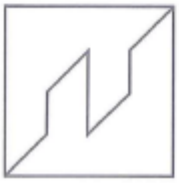
f.



g.

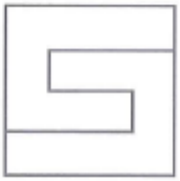
h.

i.



j.

k.



(end of Question 23)

CONGRUENCE AND SIMILARITY (QUESTIONS 24-34)

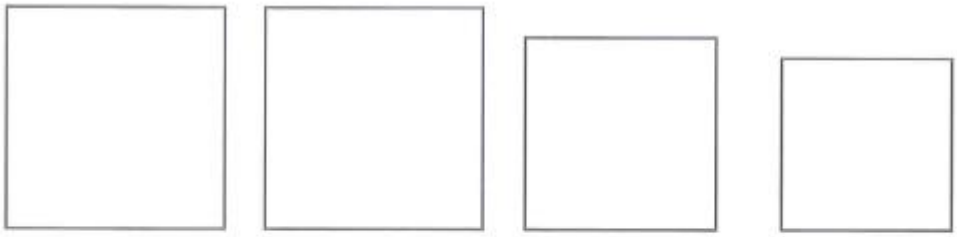
CONGRUENCE AND SIMILARITY

Two shapes are **congruent** if they have the same shape and the same size.

These two shapes are congruent.

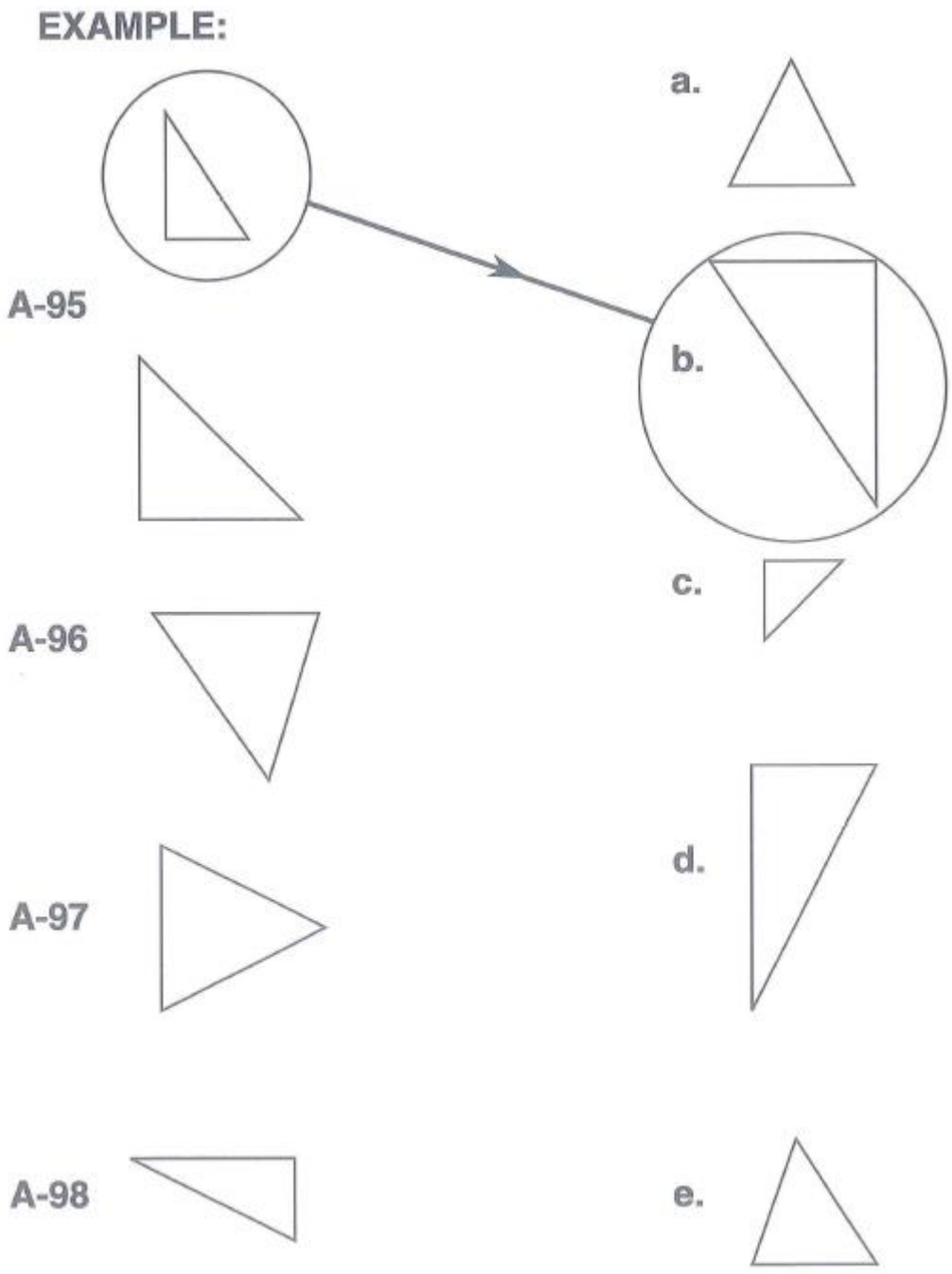
These two shapes are **not** congruent.

The shapes above are **similar** because, although they have different sizes, they have exactly the same shape.

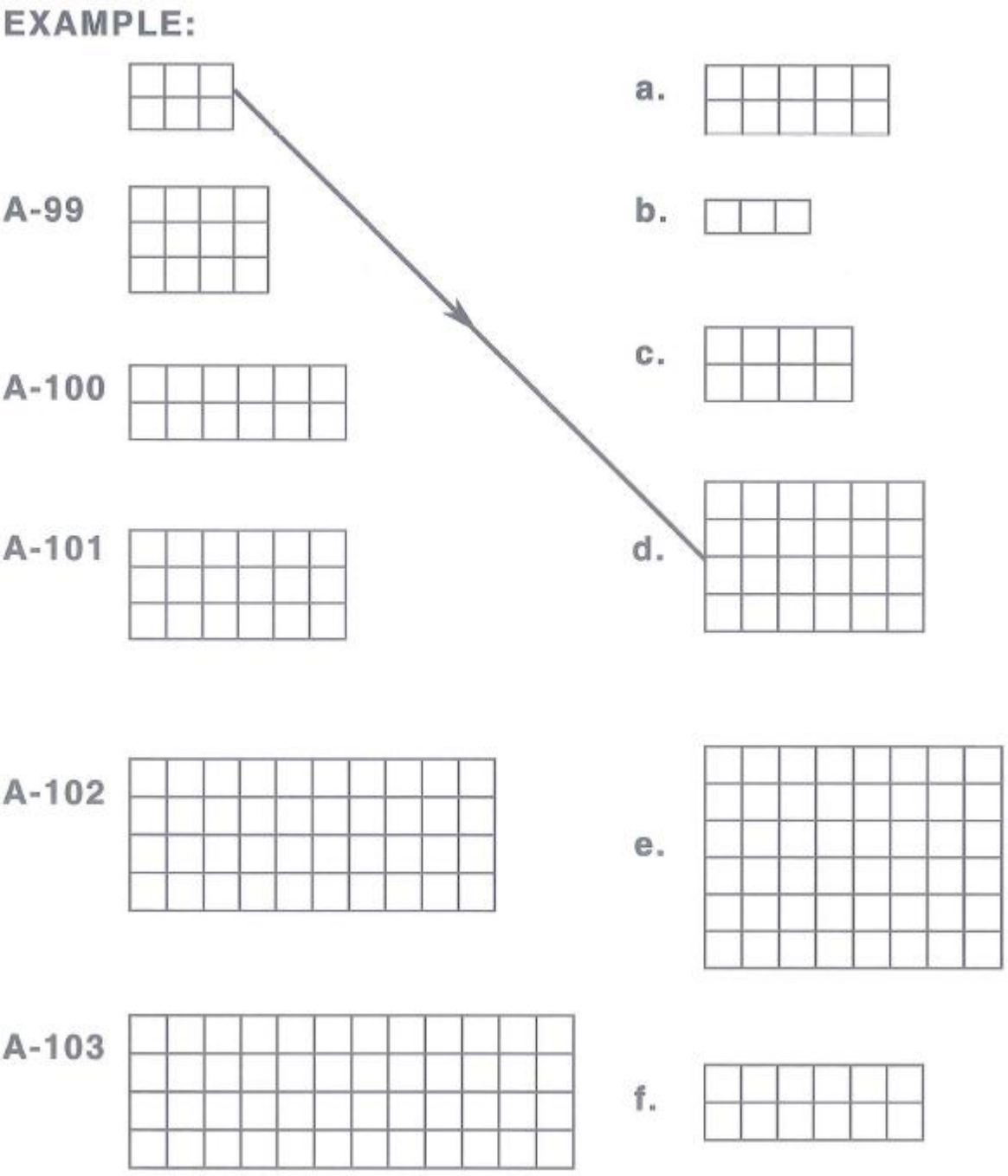


All the squares above are **similar** (because they have the same shape), but only the first two squares are **congruent** (because they have the same shape **and** the same size).

Question 24 (Matching Similar Figures):
Similar figures have the same shape but different sizes. Identify for each figure on the left its similar figure on the right. For example, the figure on top left is similar to “b” on the right.

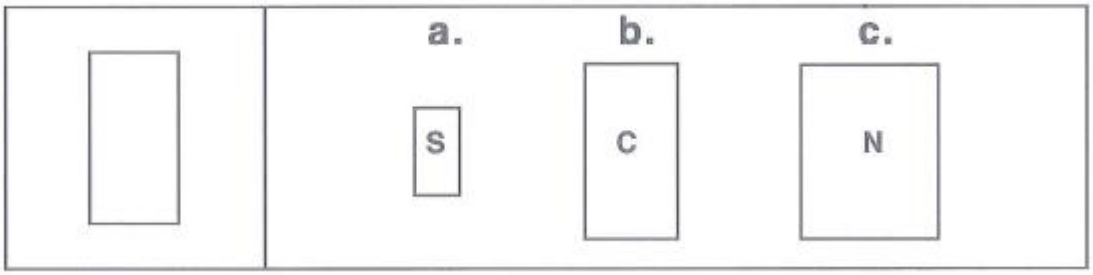


Question 25 (Matching Similar Figures):
Similar figures have the same shape but different sizes. Identify for each figure on the left its similar figure on the right. Use the square grid to check proportions. For example, the figure on top left is similar to “d” on the right.

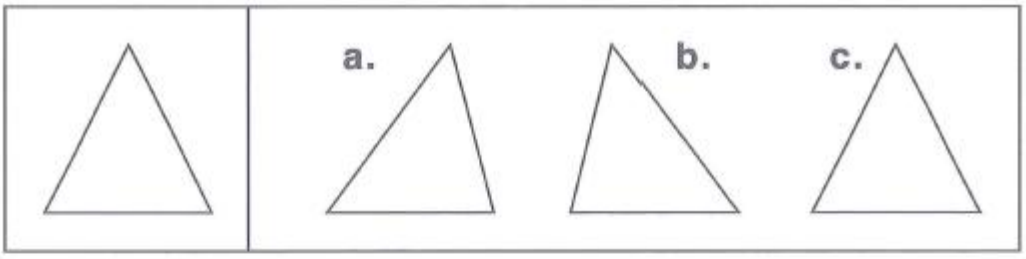


Question 26 (Identifying Similarity and Congruence):
Mark each figure ("a", "b", and "c") **S** if it is a similar to the first one. Mark it **C** if it is congruent to the first one. Mark it **N** if it is neither. For example, in the first row, figure "a" is marked **S**. Figure "b" is marked **C**. And figure "c" is marked **N**.

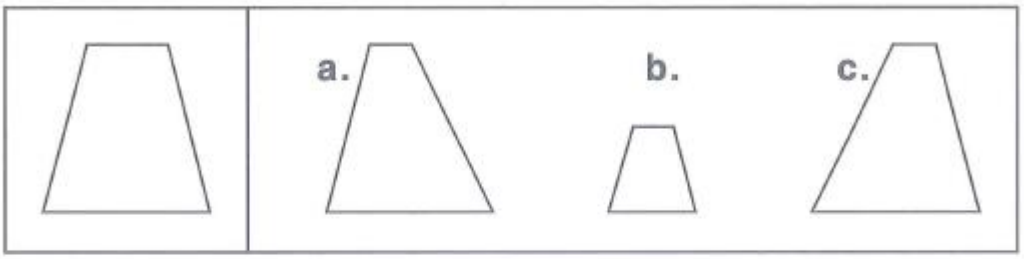
EXAMPLE:



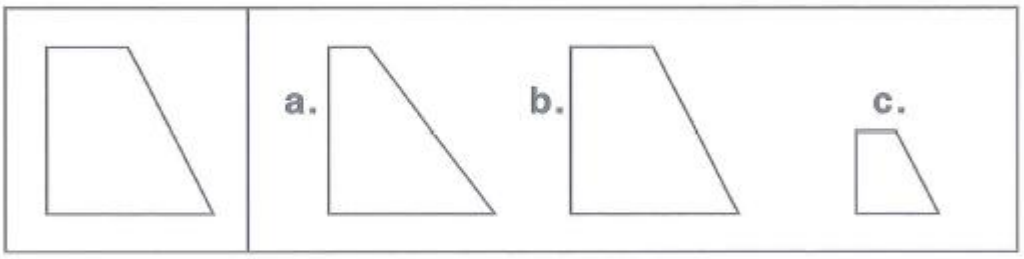
A-107



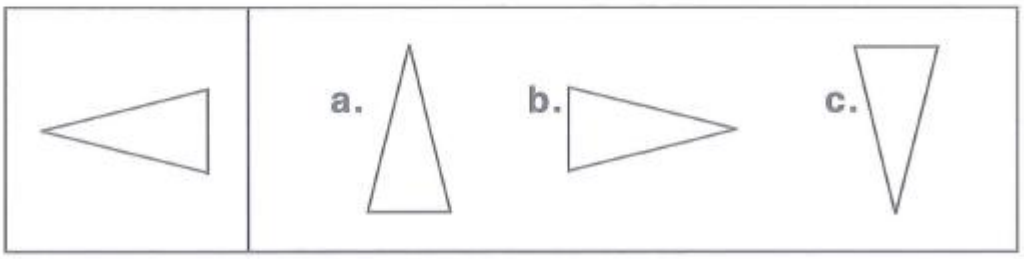
A-108



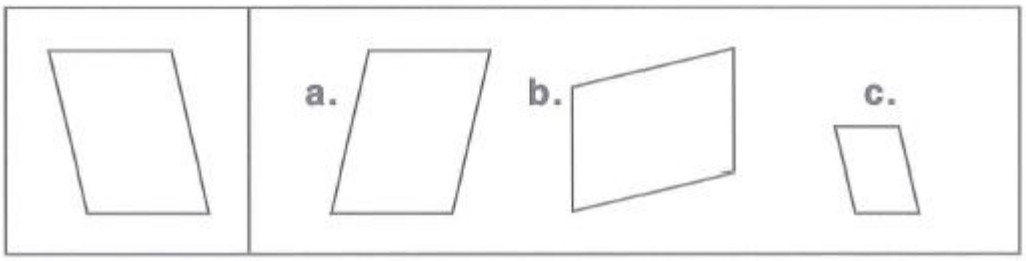
A-109



A-110



A-111

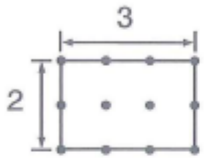


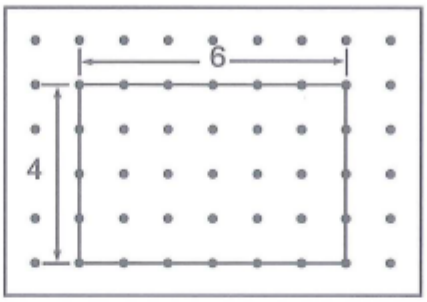
(end of Question 26)

PRODUCING SIMILAR FIGURES – ENLARGING

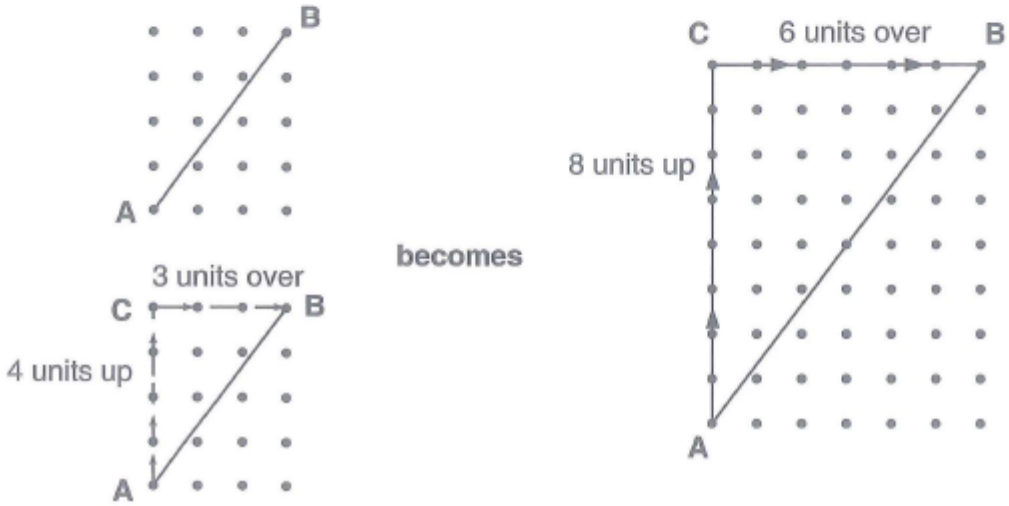
To produce a figure that is similar to another, the length of each side must be multiplied by the same factor.

To enlarge a figure or pattern so that each side is twice as long, use the dots to help count the number of units on each side of the figure and multiply by two. Use the dot grid to mark off the length of each side of the enlarged figure.





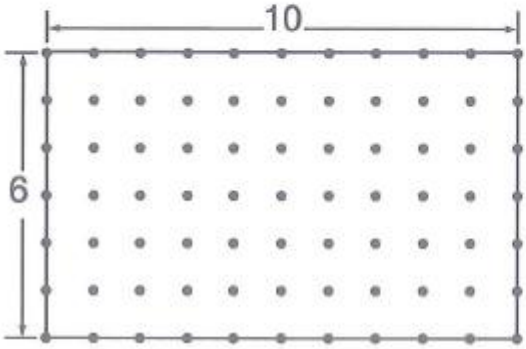
If the pattern is not a rectangle, then it is difficult to count units (dots) directly. For example, the line from point A to point B below does not pass through the dots directly. Lines AC and BC do go through the dots exactly; therefore, the dots can be used as a guide for measuring lengths AC and BC. If lines AC and BC are doubled, then the line AB will also be doubled. This "triangle rule" will help you enlarge more complicated patterns.

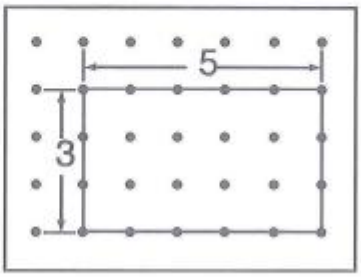


PRODUCING SIMILAR FIGURES – REDUCING

To reduce a figure or pattern so that each side is half as long, count the number of units on each side of the figure and divide by two. Use the dot grid to mark off the length of each side of the reduced figure.

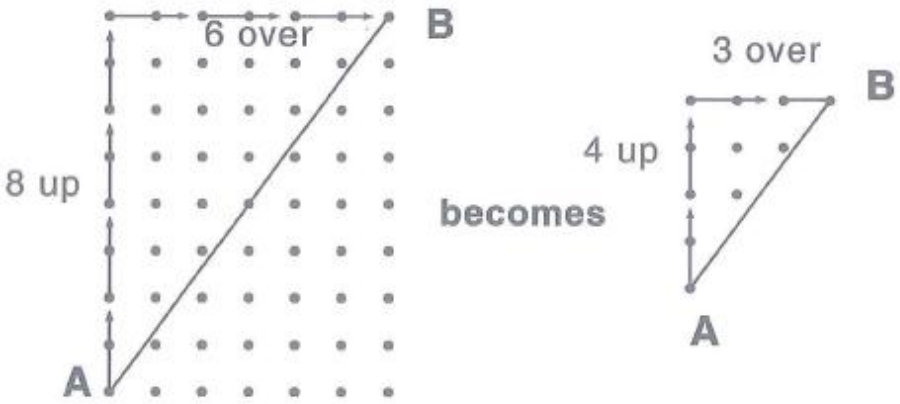
Reducing a rectangle:





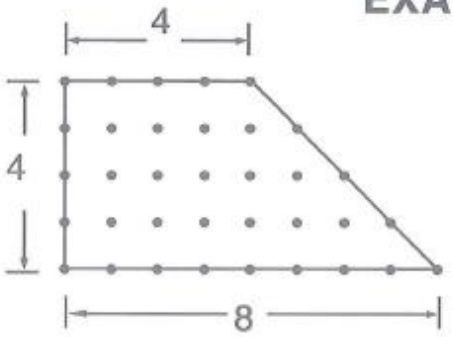
If the pattern is not a rectangle, then the "triangle rule" may be used to reduce the size of a line drawn at an angle.

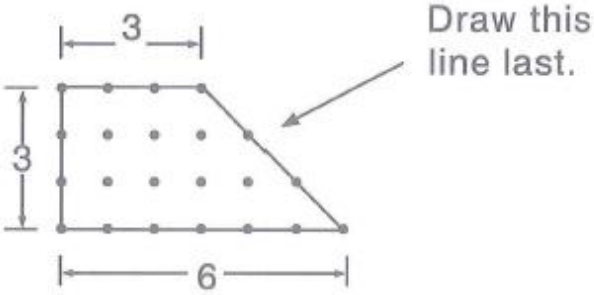
Here is an example of the "triangle rule." Start at point A and go upward until your pencil is in line with point B. Then go over until your pencil is on point B. Next count the units and divide by two. Finally, draw the reduced figure as shown below.



To reduce a figure so that each side is three-fourths (¾) as long, count the number of units on each side of the figure and multiply by ¾.

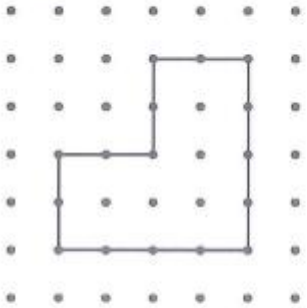
EXAMPLE: 4 x ¾ = 3 ; 8 x ¾ = 6

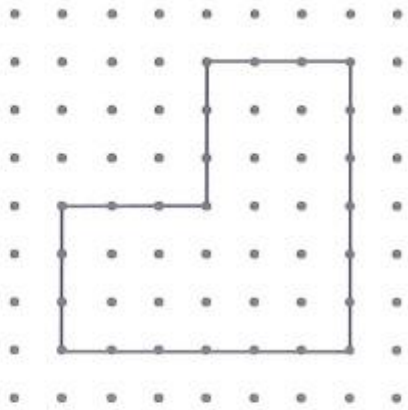




Identifying Enlargement and Reduction (Questions 27-34):
Compare figure B to figure A, below. Decide whether figure B has been enlarged or reduced and by what factor.

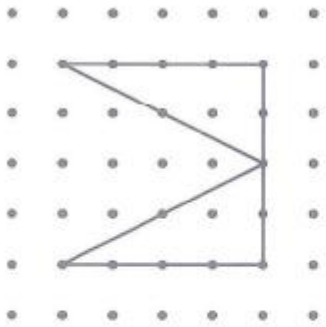
EXAMPLE:

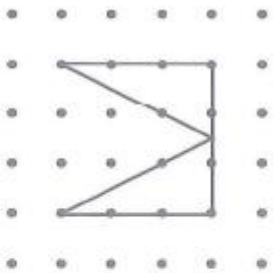
A. 

B. 

Each side of figure B has been enlarged to 1½ times as long.

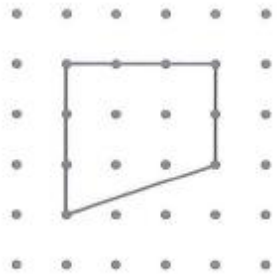
Question 27 (Identifying Enlargement and Reduction):
Compare figure B to figure A, below. Decide whether figure B has been enlarged or reduced and by what factor.

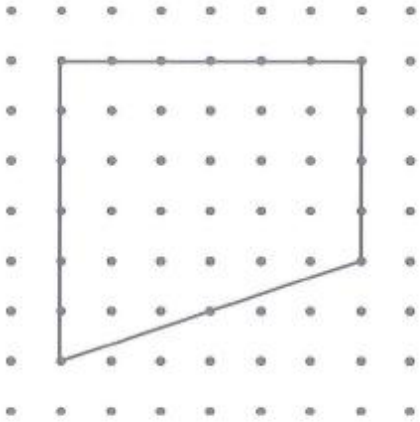
A. 

B. 

Each side of figure B has been _____ to _____ times as long.

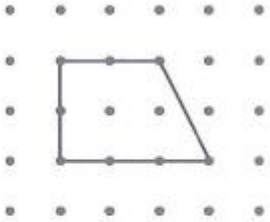
Question 28 (Identifying Enlargement and Reduction):
Compare figure B to figure A, below. Decide whether figure B has been enlarged or reduced and by what factor.

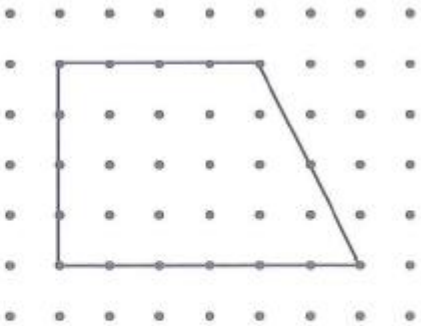
A. 

B. 

Each side of figure B has been _____ to _____ times as long.

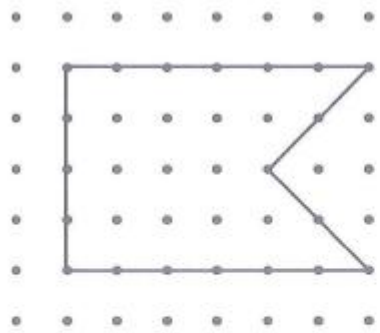
Question 29 (Identifying Enlargement and Reduction):
Compare figure B to figure A, below. Decide whether figure B has been enlarged or reduced and by what factor.

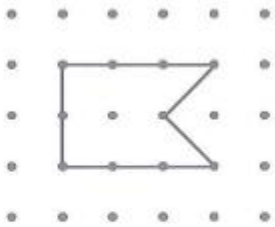
A. 

B. 

Each side of figure B has been _____ to _____ times as long.

Question 30 (Identifying Enlargement and Reduction):
Compare figure B to figure A, below. Decide whether figure B has been enlarged or reduced and by what factor.

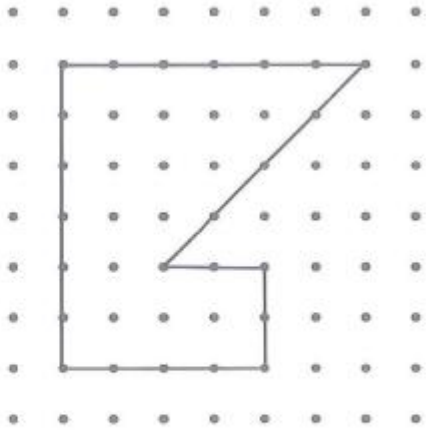
A. 

B. 

Each side of figure B has been _____ to _____ times as long.

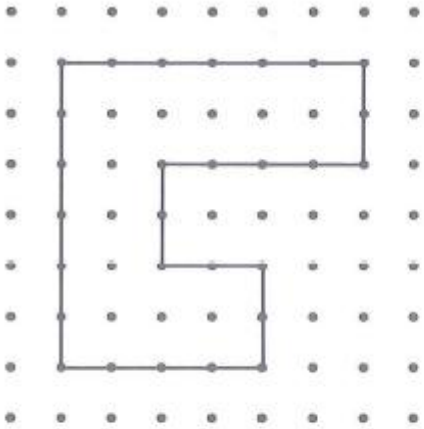
Question 31 (Identifying Enlargement and Reduction):
Compare figure B to figure A, below. Decide whether figure B has been enlarged or reduced and by what factor.

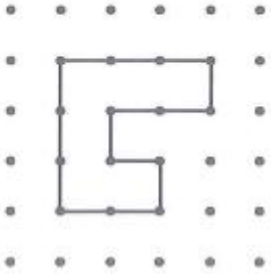
A. 

B. 

Each side of figure B has been _____ to _____ times as long.

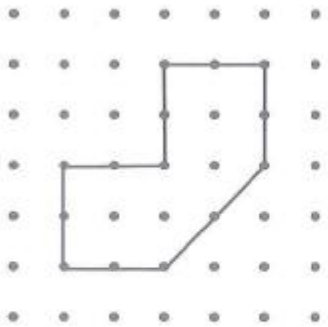
Question 32 (Identifying Enlargement and Reduction):
Compare figure B to figure A, below. Decide whether figure B has been enlarged or reduced and by what factor.

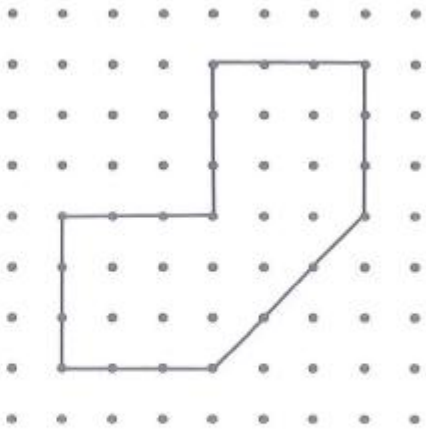
A. 

B. 

Each side of figure B has been _____ to _____ times as long.

Question 33 (Identifying Enlargement and Reduction):
Compare figure B to figure A, below. Decide whether figure B has been enlarged or reduced and by what factor.

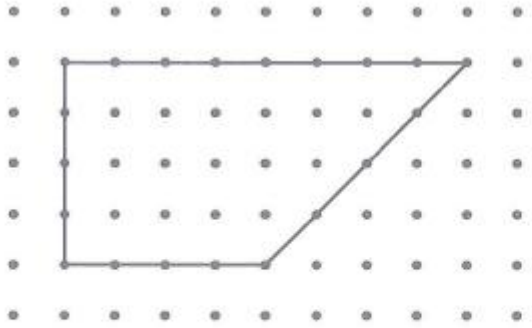
A. 

B. 

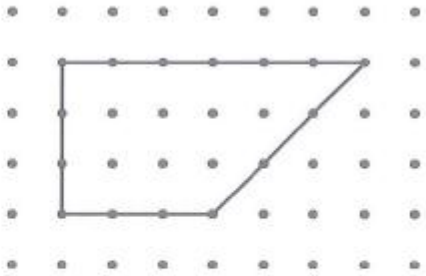
Each side of figure B has been _____ to _____ times as long.

Question 34 (Identifying Enlargement and Reduction):
Compare figure B to figure A, below. Decide whether figure B has been enlarged or reduced and by what factor.

A.



B.



Each side of figure B has been _____ to _____ times as long.

FOLLOWING DIRECTIONS (QUESTIONS 35 - 42)

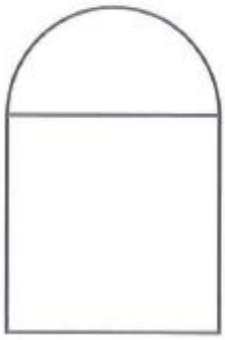
Question 35：

Read the directions below, then identify the figure that correctly represents the directions.

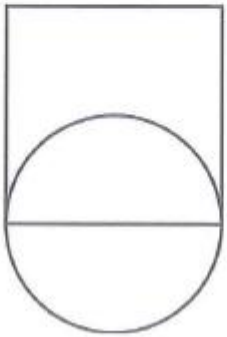
DIRECTIONS: Draw a square. Use the top side of the square as the base of a half circle.

FIGURES:

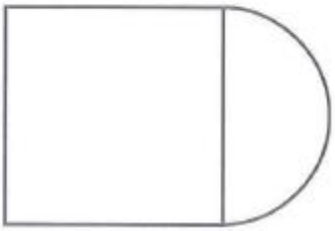
a.



b.



c.



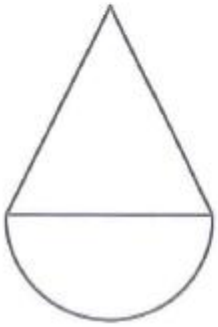
Question 36：

Read the directions below, then identify the figure that correctly represents the directions.

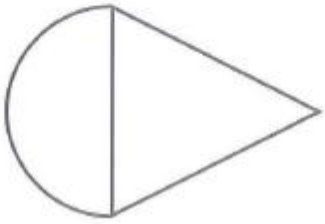
DIRECTIONS: Draw a vertical line. Use the lines as part of a half circle and part of a triangle. The triangle should be to the left of the half circle.

FIGURES:

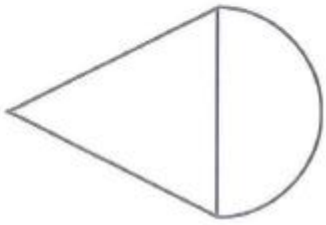
a.



b.



c.



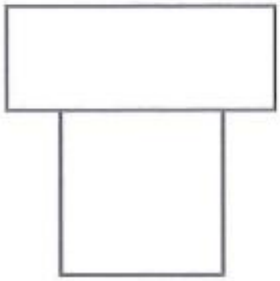
Question 37：

Read the directions below, then identify the figure that correctly represents the directions.

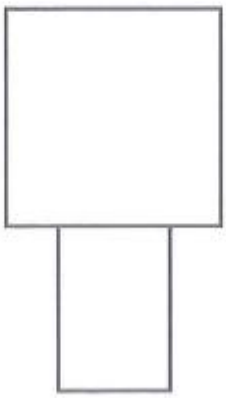
DIRECTIONS: Draw a small square above and touching a larger rectangle.

FIGURES:

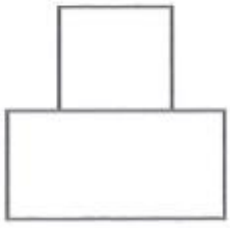
a.



b.



c.



Question 38：

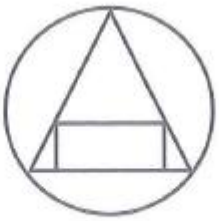
Read the directions below, then identify the figure that correctly represents the directions.

DIRECTIONS: Draw a large circle. Inside the circle draw a triangle. Inside the triangle draw a rectangle.

FIGURES:

a.

b.



c.

Question 39：

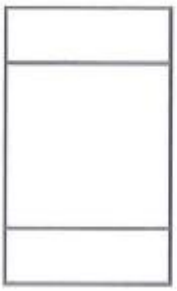
Read the directions below, then identify the figure that correctly represents the directions.

DIRECTIONS: Draw a square and two rectangles. The long side of the rectangles should be the same length as a side of the square. The rectangles should touch opposite sides of the square to form a tall rectangle.

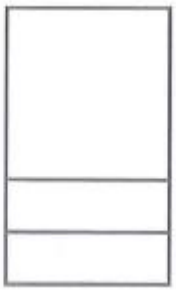
FIGURES:

a.

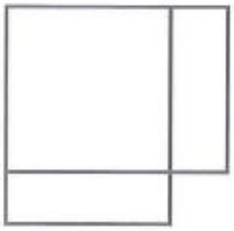
b.



c.



d.



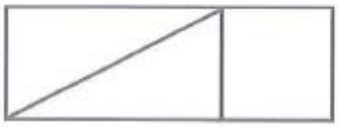
Question 40：

Read the directions below, then identify the figure that correctly represents the directions.

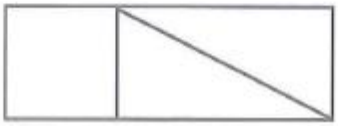
DIRECTIONS: Draw a rectangle. Divide the rectangle into two equal triangles by drawing a line from the upper right corner to the lower left corner. Draw a square using the left side of the rectangle as the right side of the square.

FIGURES:

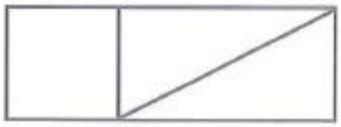
a.



b.



c.

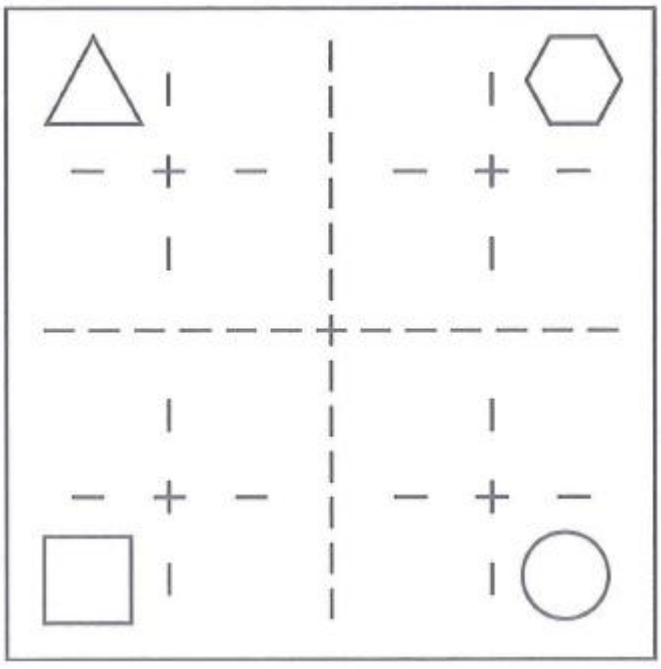


Question 41:

Complete the sentence below with the correct words from the choice box.

CHOICE BOX

center, left, lower, right, upper



Example:

The hexagon is near the <u>upper</u> <u>right</u> corner.

(1) The circle is near the _____ _____ corner.

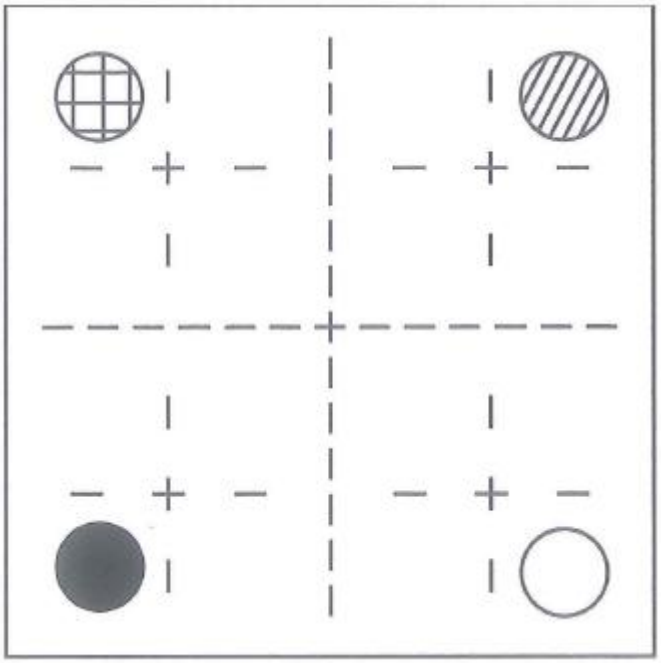
(2) The square is near the _____ _____ corner.

(3) The triangle is near the _____ _____ corner.

Question 42：

Complete the sentence below with the correct words from the choice box.

CHOICE BOX
center, left, lower, right, upper



(1) The white circle is near the _____ _____ corner.
(2) The striped circle is near the _____ _____ corner.
(3) The black circle is near the _____ _____ corner.
(4) The checkered circle is near the _____ _____ corner.

STACKING SHAPES (QUESTIONS 43-48)

Question 43：

Here are four shapes. Listed below are eight different combinations of shapes by placing one shape on another. Select the stack that fits each description.

EXAMPLE:

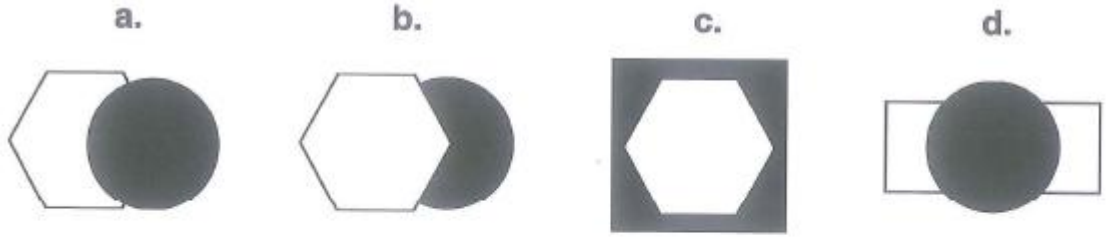
The circle is on the rectangle. Answer: d

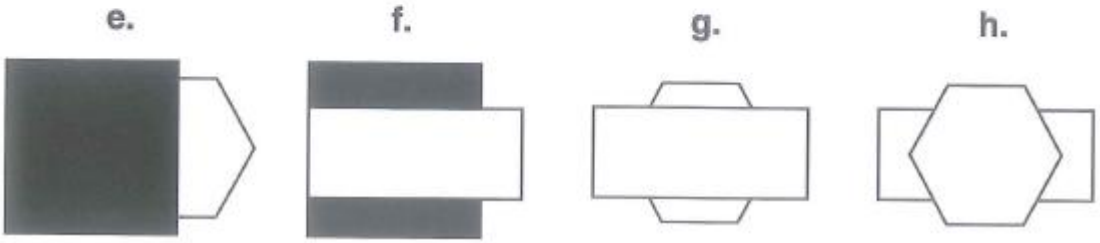
B-39 The rectangle is on the square. Answer: _____

B-40 The square is under the hexagon. Answer: _____

B-41 The circle is on the hexagon. Answer: _____

B-42 The hexagon is under the rectangle. Answer: _____





Question 44：

Here are four shapes. Listed below are eight different combinations of shapes by placing one shape on another. Select the stack that fits each description.

B-43 The triangle is on the square. Answer: _____

B-44 The circle is on the triangle. Answer: _____

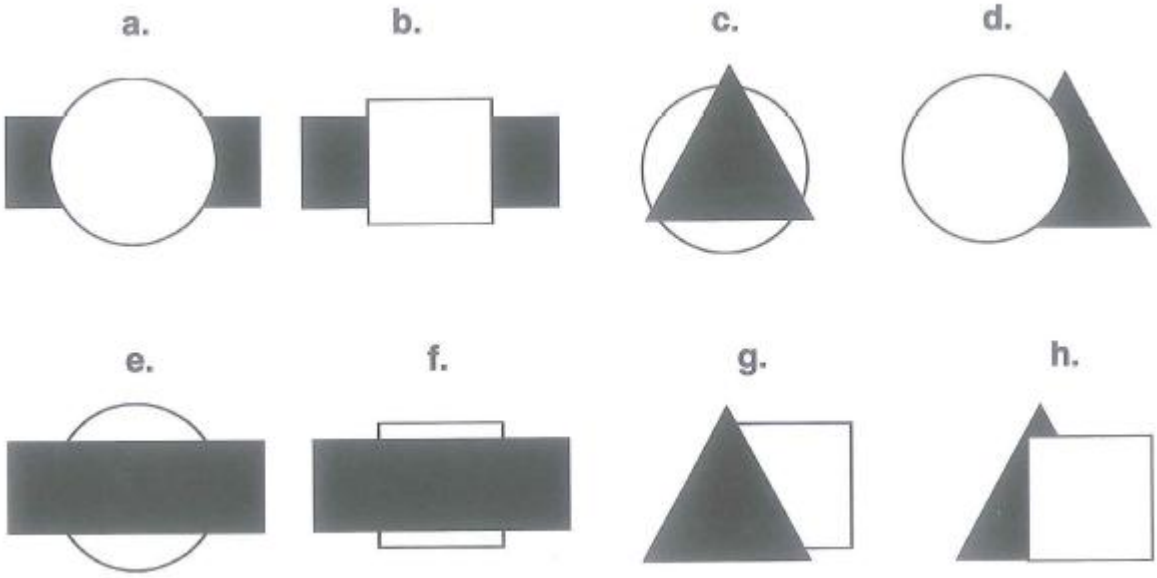
B-45 The square is on the rectangle. Answer: _____

B-46 The rectangle is under the circle. Answer: _____

B-47 The triangle is under the square. Answer: _____

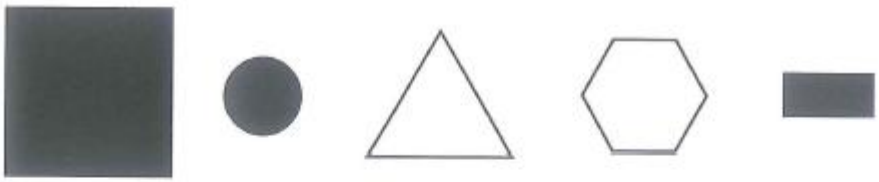
B-48 The circle is under the rectangle. Answer: _____

B-49 The triangle is on the circle. Answer: _____



Question 45：

Here are four shapes. Listed below are eight different combinations of shapes by placing one shape on another. Select the stack that fits each description.

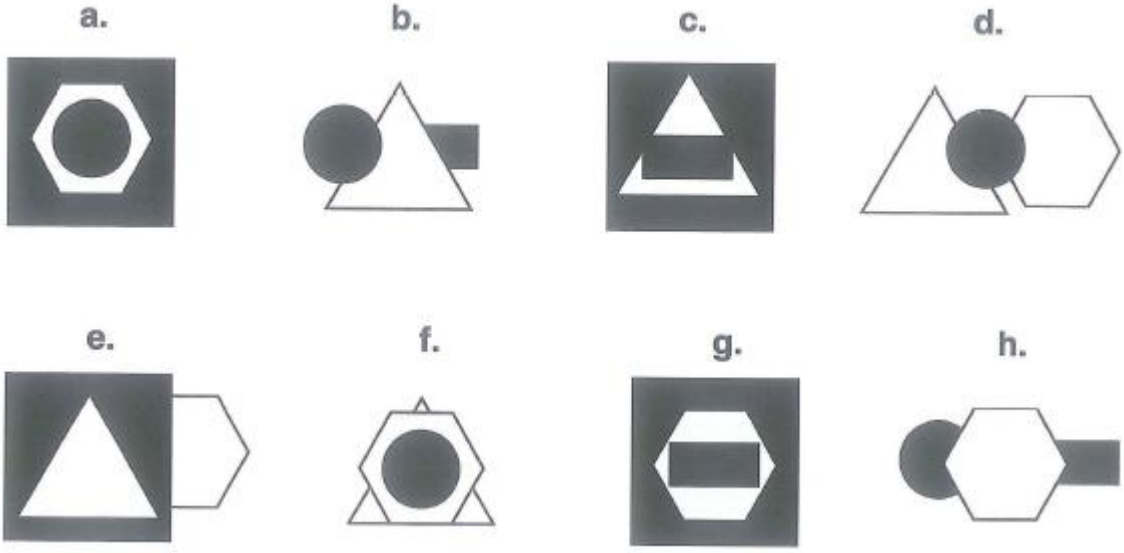


B-50 The hexagon is on the triangle and under the circle. Answer: _____

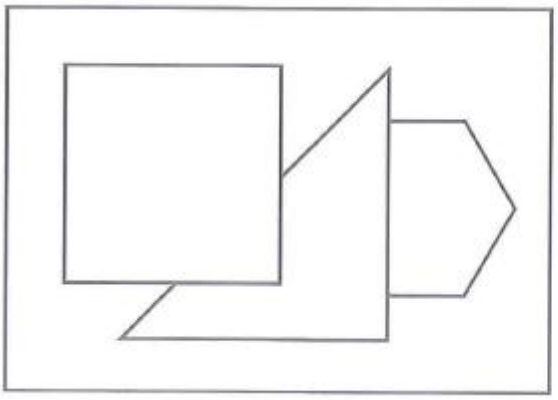
B-51 The triangle is under the rectangle and on the square. Answer: _____

B-52 The circle is on the triangle, and the triangle is on the rectangle. Answer: _____

B-53 The circle is on both the triangle and hexagon. Answer: _____



Question 46：

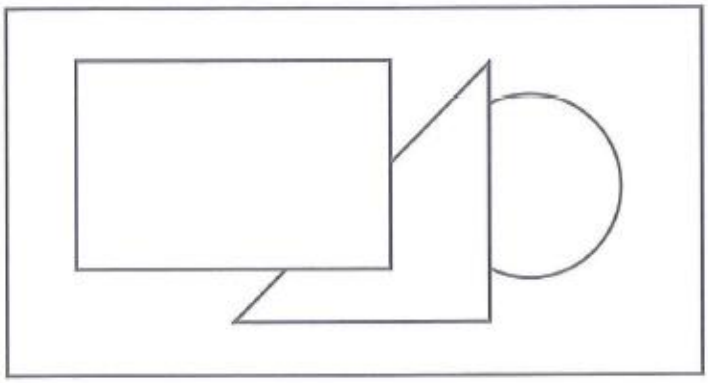


Here are a square, a triangle, and a hexagon.

The hexagon is under the (**a.**) _____.

The square is on top of the (**b.**) _____.

Question 47：



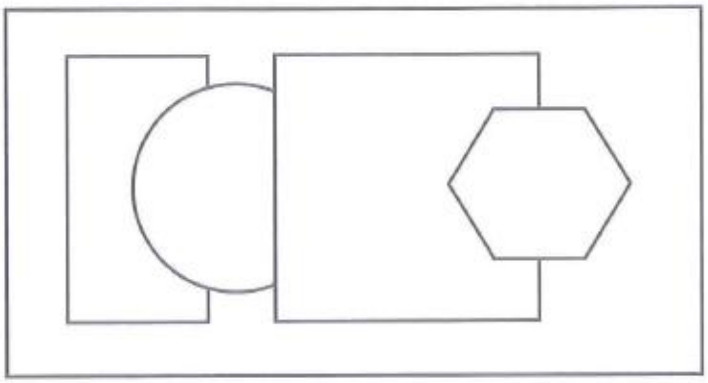
Here are a rectangle, a triangle, and a circle.

The (**a.**) _____ is on top.

The (**b.**) _____ is on the bottom.

The (**c.**) _____ is in between.

Question 48：



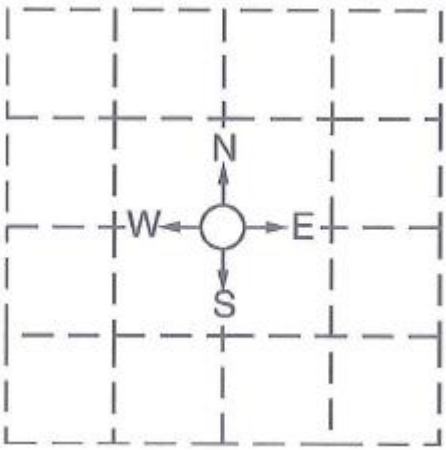
Here are a rectangle, a circle, a square, and a hexagon.

The circle is on top of the (**a.**) _____.
The circle is underneath the (**b.**) _____.

The (**c.**) _____ is the uppermost shape.

DESCRIBING LOCATIONS ON A GRID (QUESTIONS 49-52)

Question 49：



For the following exercises, take paths along the dashed lines and make as few turns as needed.

A unit is the length of the side of one of the small squares of the grid.

B-106 How far is it from the northeast corner to the northwest corner? Answer:_____ units

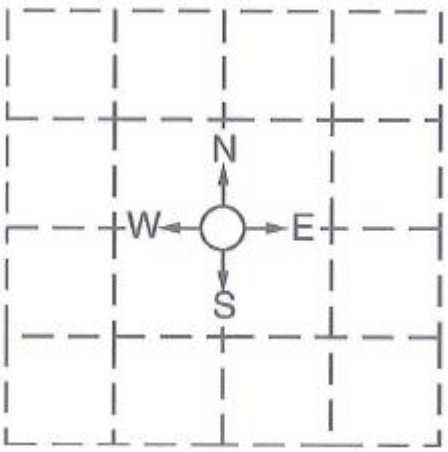
B-107 How far is it from the northwest corner to the southwest corner? Answer:_____ units

B-108 How far is it from the southwest corner to the northeast corner? Answer:_____ units

B-109 How far is it from the center of the grid to the northeast corner? Answer:_____ units

B-110 How far is it from the center of the grid to any corner? Answer:_____ units

Question 50：



You are standing at the center of the grid facing the northeast corner. You lift your right arm and it points southeast.

B-111 You lift your left arm and it points in which direction? Answer: _____

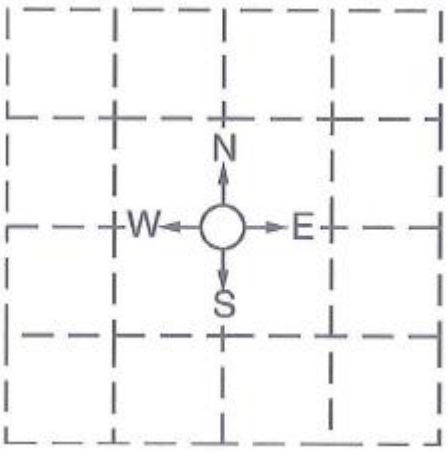
B-112 What direction is directly behind you? Answer: _____

Staying at the center, you now turn so that you are facing southwest.

B-113 What direction is to your left? Answer: _____

B-114 What direction is behind you? Answer: _____

Question 51：



You are standing at the center of the grid facing north. The direction to the left and north is northwest.

B-117 What direction is to the left and south?
Answer: _____

B-118 What direction is to the right and south?
Answer: _____

B-119 What direction is to the right and north?
Answer: _____

Staying at the center, you now turn and face west.

B-120 What direction is it to your right and behind you? Answer: _____

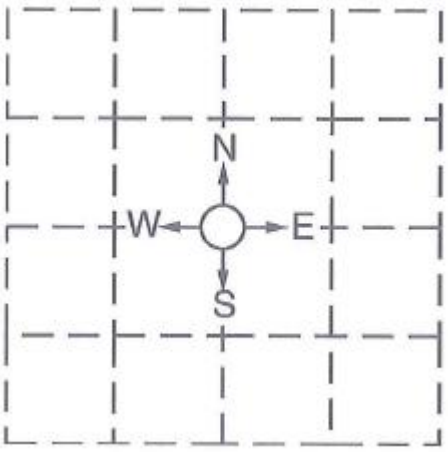
B-121 What direction is to your left and in front of you? Answer: _____

Staying at the center, you turn so that northeast is behind you.

B-122 What direction is to your right? Answer: _____

B-123 What direction is in front of you and to your left? Answer: _____

Question 52:



You are standing at the center of the grid.

B-124 Which way are you facing if northwest is behind you? Answer: _____

You turn so that northwest is on your right.

B-125 Which way are you facing? Answer: _____

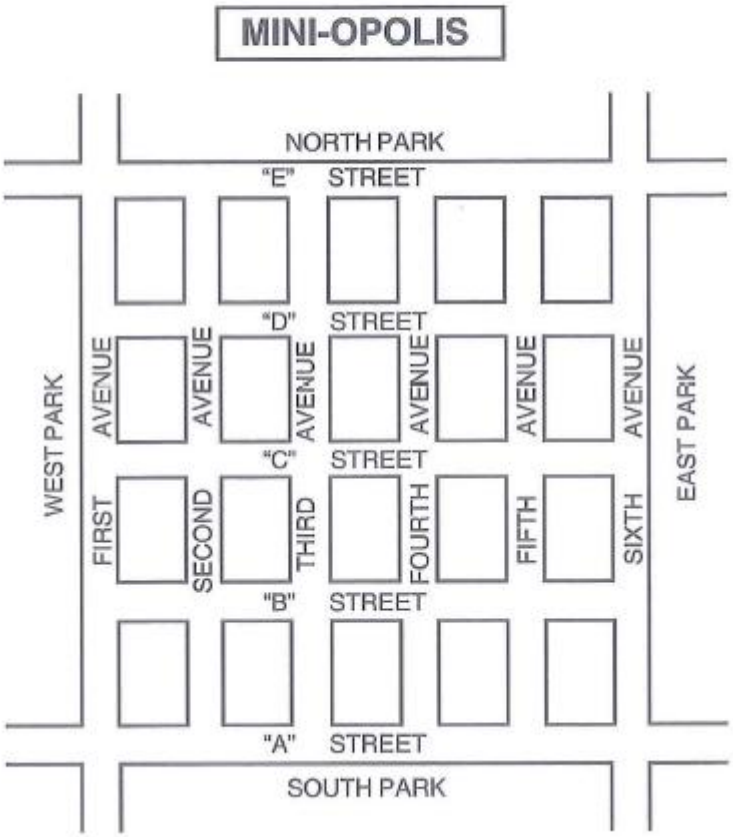
You turn so that east is in front of you and to your right.

B-126 Which way are you facing? Answer: _____

DESCRIBING LOCATIONS AND DIRECTIONS WITH MAPS (QUESTIONS 53-58)

Question 53：

DESCRIBING LOCATIONS USING MAPS



Print a **P** where Third Avenue and "B" Street cross.

Print a **Q** where Fifth Avenue and "C" Street cross.

Print an **R** at the intersection* of First Avenue and "E" Street.

a. Which letter (P, Q, or R) is closest to East Park?

Answer: _____

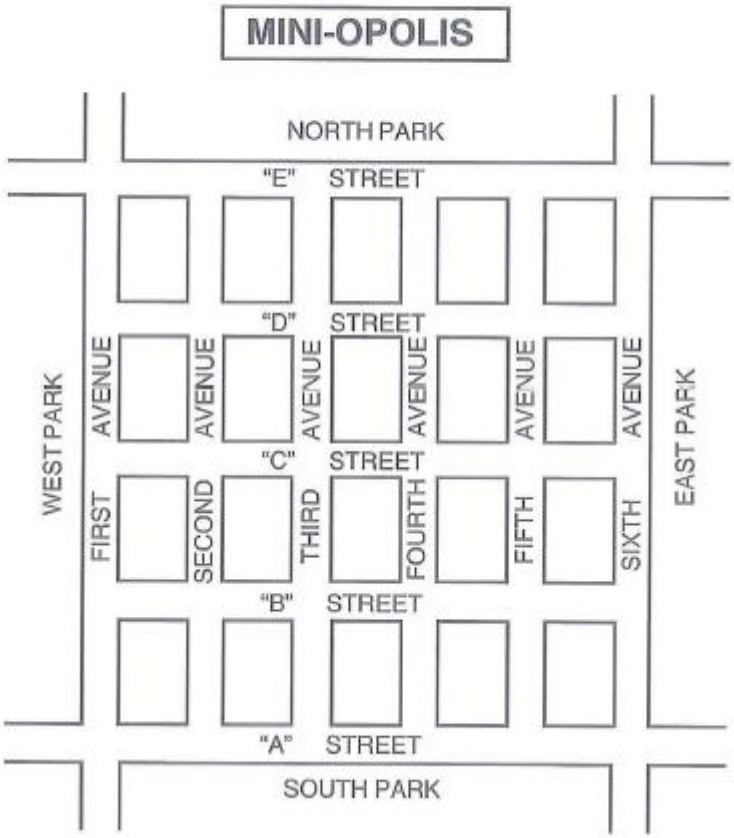
b. Which letter is in the northwest corner of the map?

Answer: _____

*intersection: the place where two or more streets (or lines) cross or meet.

Question 54:

DESCRIBING LOCATIONS USING MAPS



B-128 If you start at First Avenue and "B" Street and travel two blocks north and then three blocks east, where will you be?

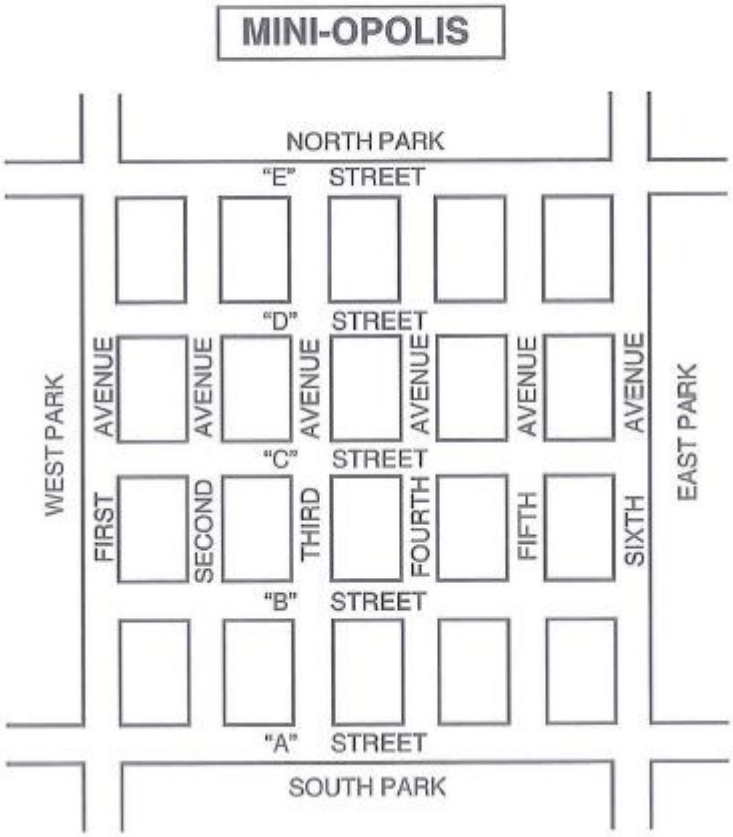
Answer: At the intersection of _____Street and _____ Avenue

B-129 If you start at Fifth Avenue and "D" Street and travel three blocks west and two blocks south, where will you be?

Answer: At the intersection of _____Street and _____ Avenue

Question 55：

DESCRIBING LOCATIONS USING MAPS



B-130 You are facing North Park. "C" Street is one block behind you; Fifth Avenue is two blocks to your right. What is your location?

Answer: At the intersection of_____Street and

_____ Avenue

B-131 How far are you from East Park?

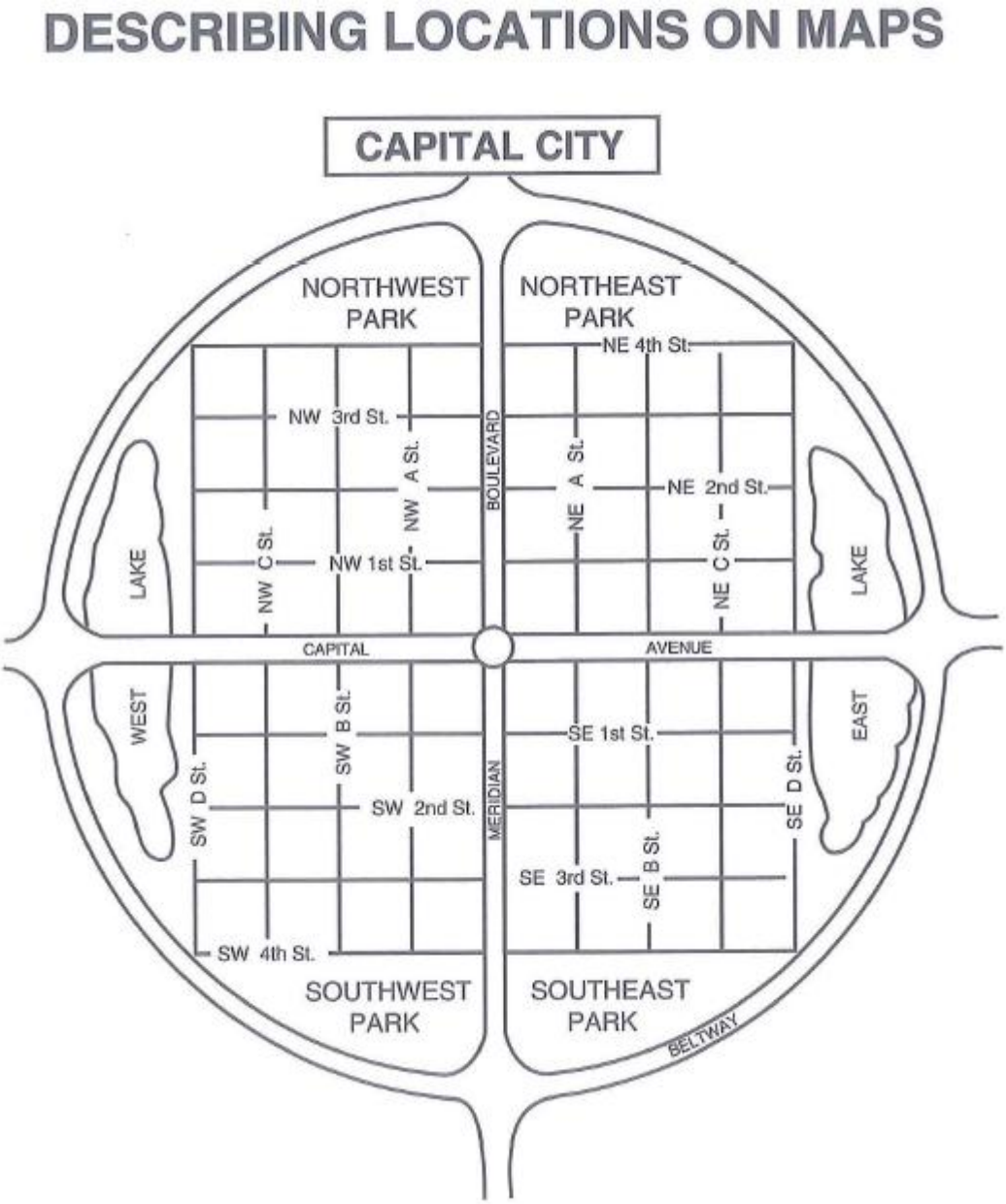
Answer:_____blocks

B-132 You have moved and are now facing East Park. Sixth Avenue is two blocks ahead of you; "D" Street is two blocks to your left. What is your location?

Answer: At the intersection of_____Street and

_____Avenue

Question 56：



Put a **P** at the intersection of NE 2nd Street and NE "A" Street.

Put a **Q** at the intersection of NW 3rd Street and NW "B" Street.

Put an **R** at the intersection of SE 1st Street and SE "C" Street.

Put an **S** at the intersection of SW 4th Street and SW "C" Street.

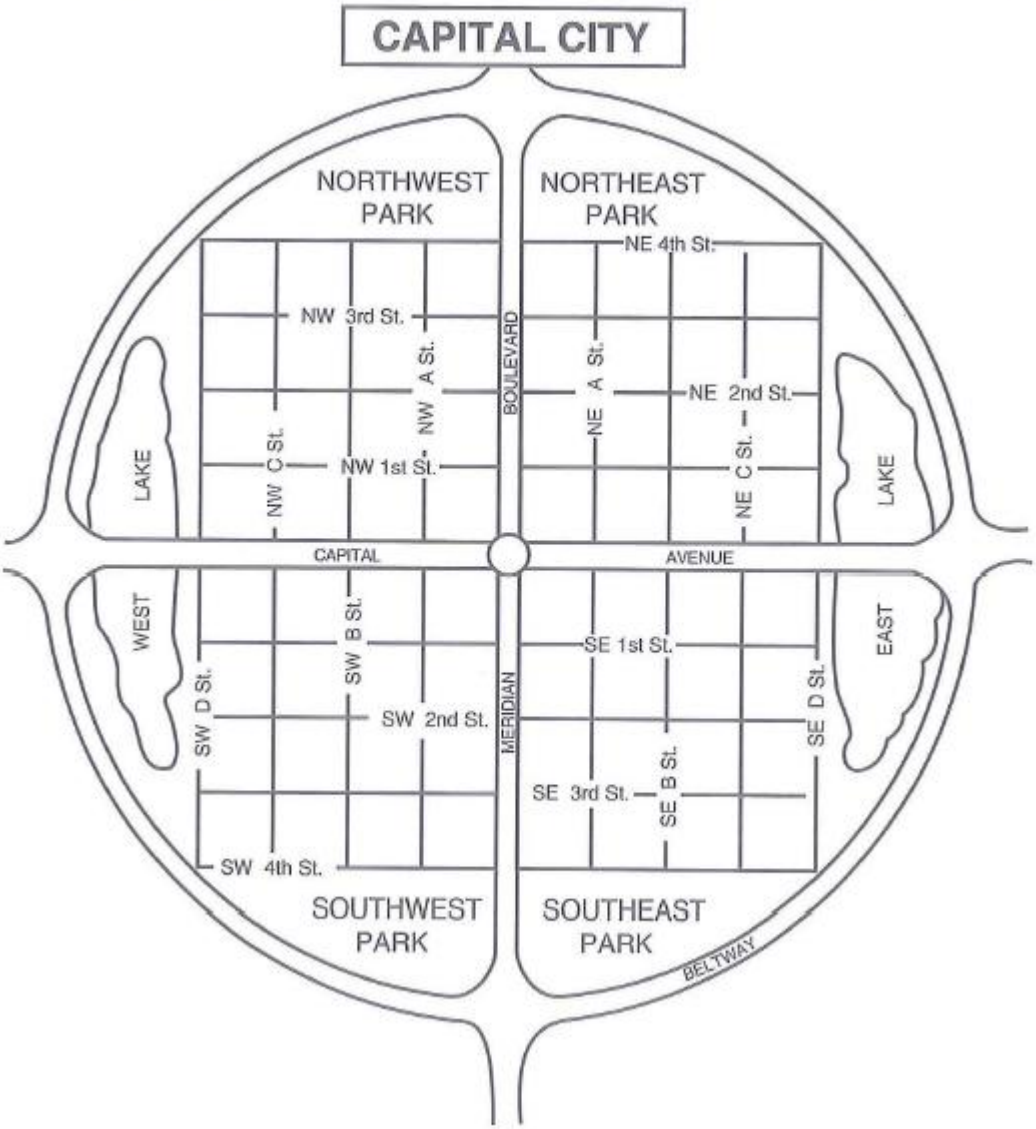
If the four parts of Capital City are northeast, northwest, southwest, and southeast quarters (quadrants), in what part of Capital City are each of the following located?

Point P? _____ Point Q? _____

Point R? _____ Point S? _____

Question 57：

DESCRIBING DIRECTIONS USING MAPS



B-137 If you walk along Capital Avenue from West "B" Street to East "A" Street, how far do you walk?

Answer: _____ blocks to the _____
(number) (direction)

B-138 If you walk along Meridian Boulevard from South 3rd Street to North 2nd Street, how far do you walk?

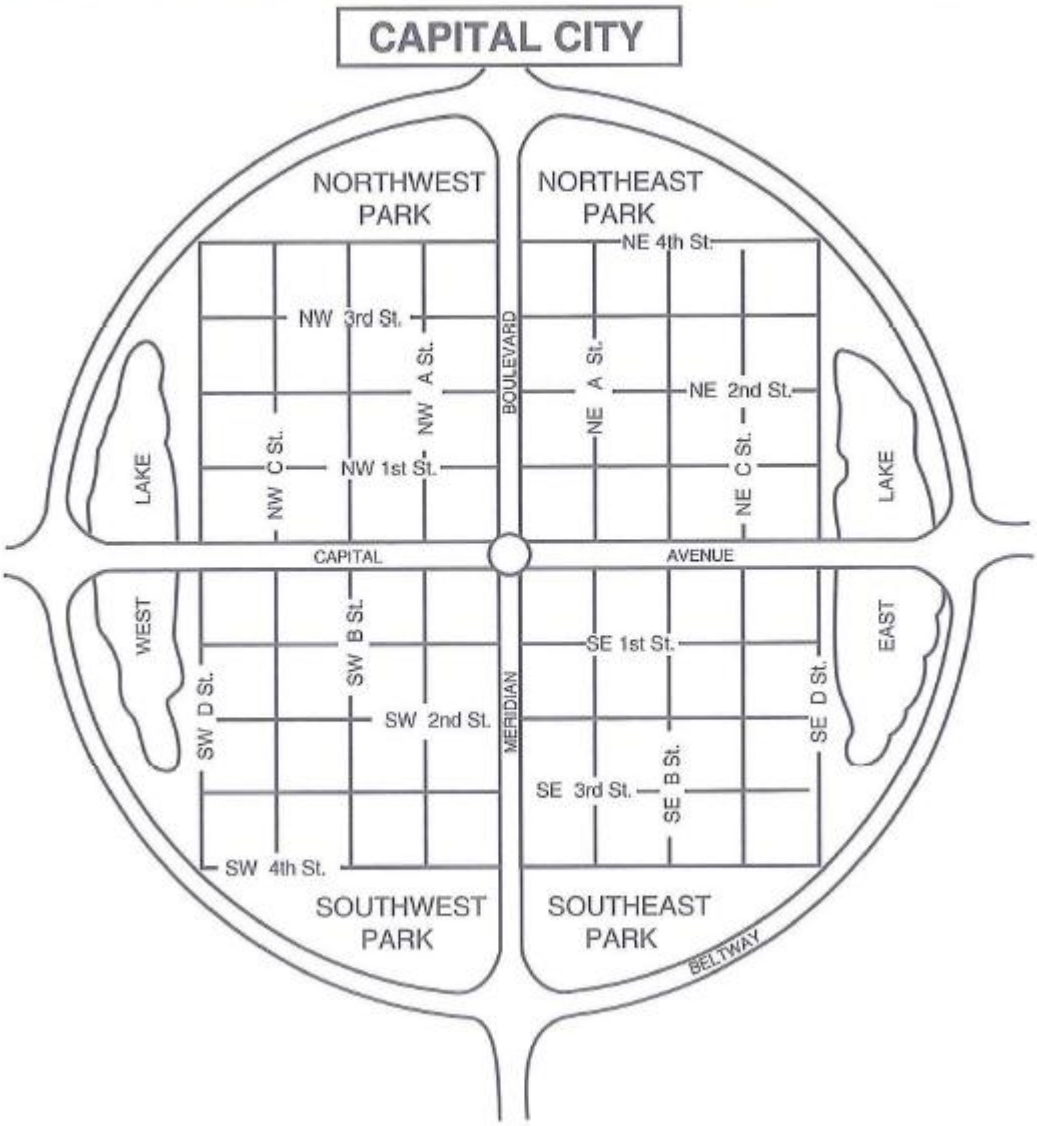
Answer: _____ blocks to the _____
(number) (direction)

B-139 How far is it from the corner of East "C" Street and Capital to the corner of South 3rd Street and Meridian? (Take a path with only one turn.)

Answer: _____ blocks
(number)

Question 58：

DESCRIBING DIRECTIONS USING MAPS



B-141 The center of the northeast section of Capital City is the intersection of NE 2nd Street and NE "B" Street. Place an **X** at that point. Place a **Y** at the center of the southeast section of Capital City.

How far is it from X to Y?

Answer: _____ blocks to the _____
(number) (direction)

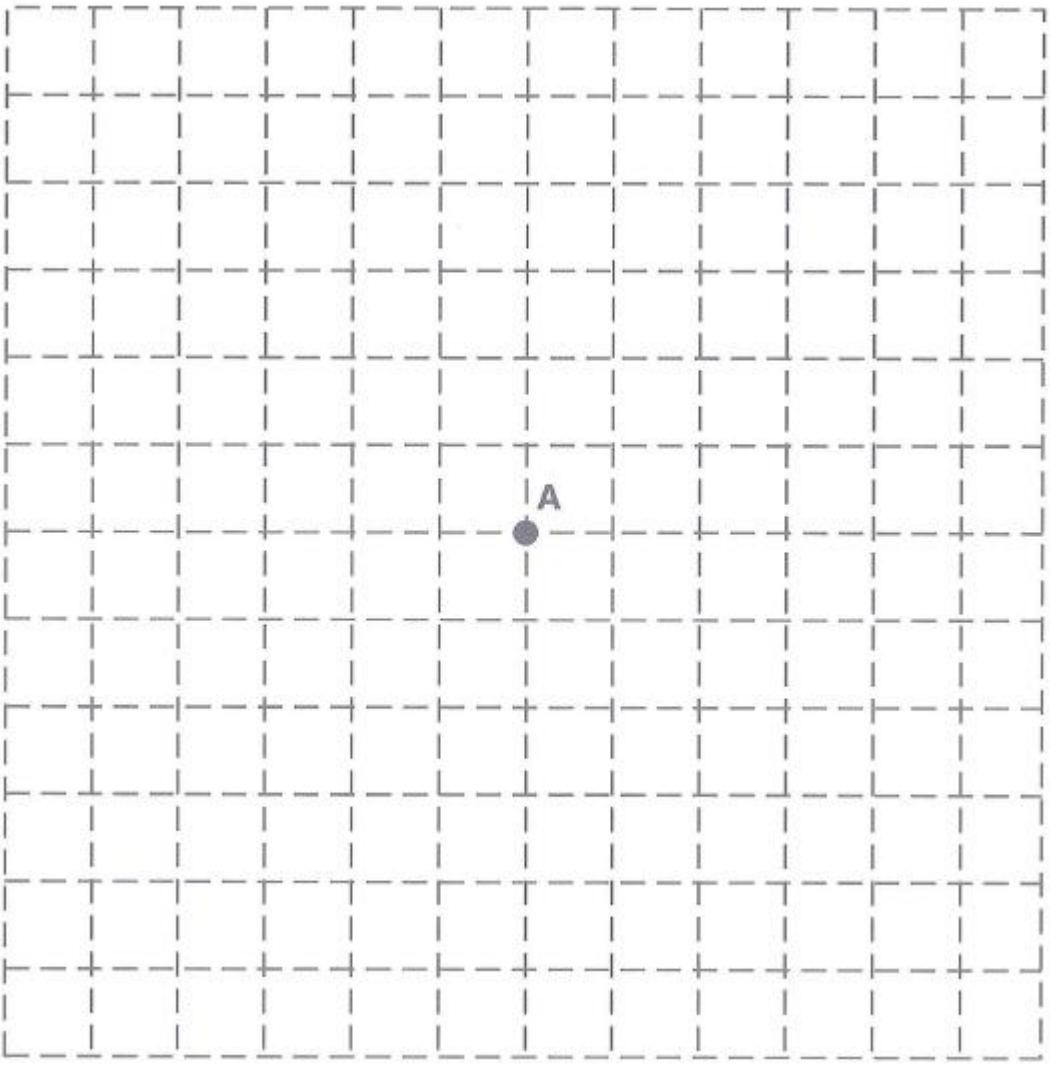
B-142 If you make only one turn in a walk from the center of the northwest quarter to the center of the southeast quarter, how far do you walk?

Answer: _____ blocks
(number)

DEPICTING DIRECTIONS (QUESTIONS 59 – 61)

Question 59：

Ms. Rodriguez owns a rectangular piece of land. The northwest corner is shown below as point A. The land extends three miles to the south of point A and five miles to the east of point A.
Draw a sketch of Ms. Rodriguez's land on your own scratch paper. Each unit on the grid represents one mile.



Mr. Shultz owns some land next to Ms. Rodriguez's land. Mr. Shultz's land is a square – four miles on each side. Point A is the northeast corner of Mr. Shultz's land. Sketch Mr. Shultz's land on your own scratch paper.

B-162 How much of Mr. Shultz's fence is shared by the two neighbors? Answer: _____(miles)

B-163 How much fence is required to enclose Ms. Rodriguez's land? Answer: _____

B-164 How much fence is required to enclose Mr. Shultz's land? Answer: _____

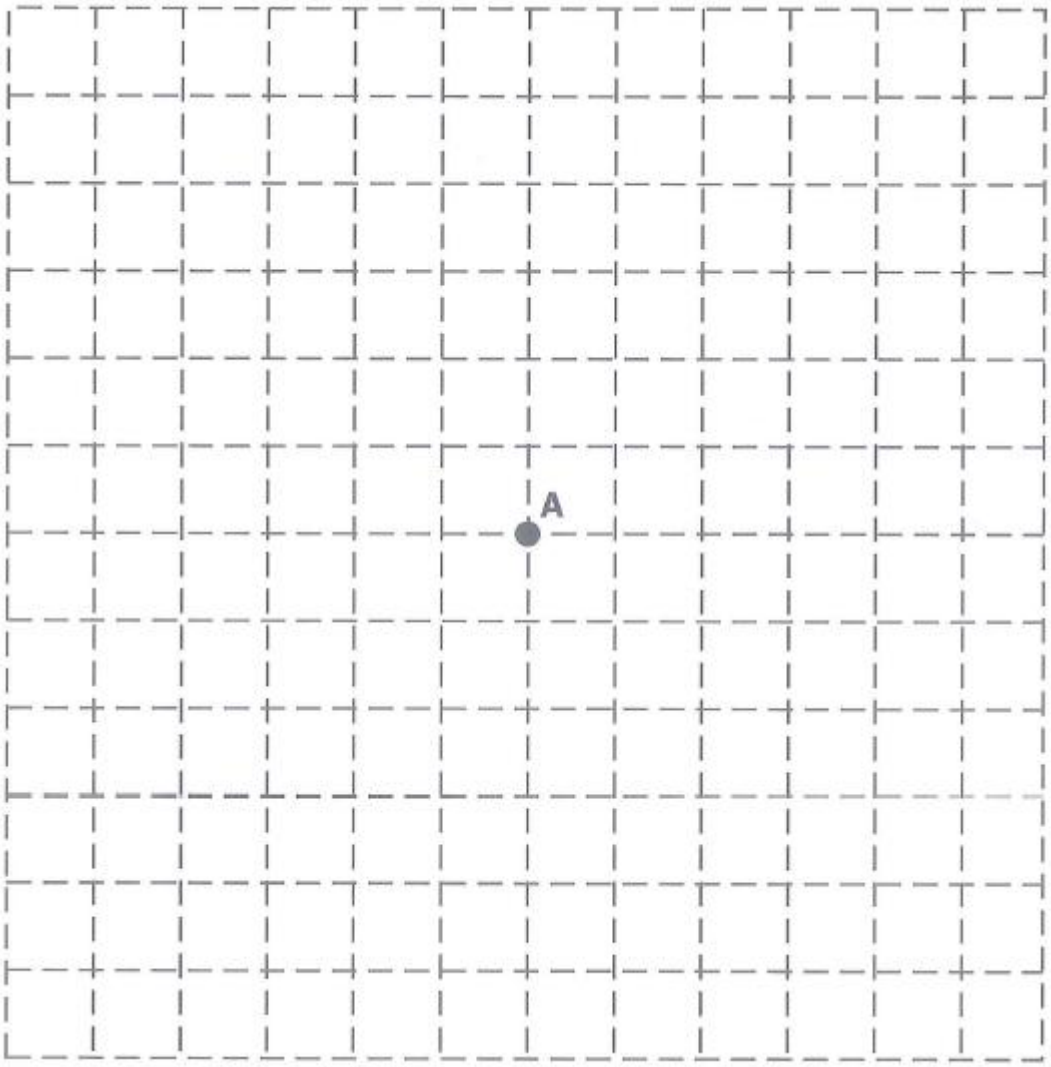
B-165 Each small square on the grid represents a square mile. How many square miles does Ms. Rodriguez own? Answer: _____

B-166 How many square miles does Mr. Shultz own? Answer: _____

Question 60：

While on vacation, the Itamura family had to detour. They had to go south two miles, east three miles, south one mile, east two miles, and north three miles.

Starting at point A, draw the route of their detour on your own scratch paper. Mark the end of the detour as point B.



B-168 How long is the detour? Answer: _____miles

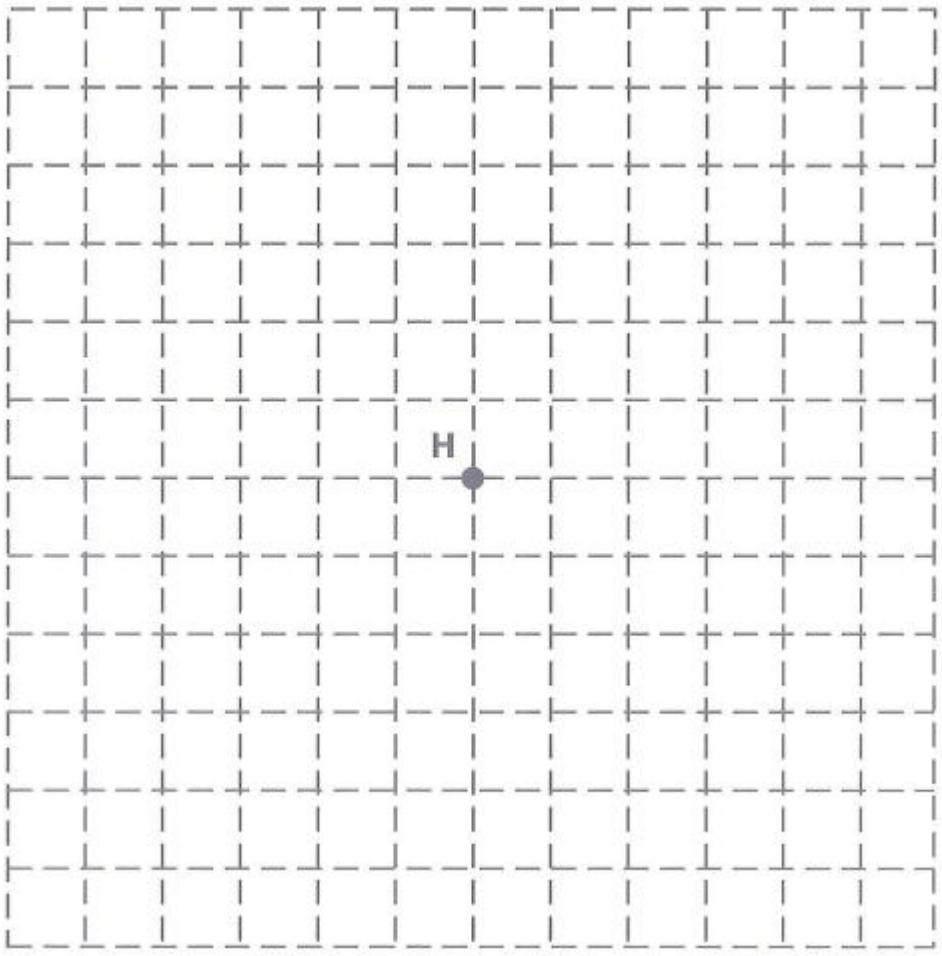
B-169 How far is it (in a straight line) from point A to point B? Answer: _____

B-170 How much longer than the planned route is the detour? Answer: _____

Question 61：

Mrs. Perez takes the following route on her errand day. Starting from **H** (home), she travels four miles south to the hairdresser, then five miles east to the lumber yard, two miles north to the post office, three miles west to the supermarket, and two miles north to pick up her children at school. From school she goes directly home.

Sketch Mrs. Perez's route on your own scratch paper.



B-172 How far do the Perezes live from the school?
Answer: _____

B-173 In what direction did Mrs. Perez travel to go directly home from school? Answer: _____

B-174 How long is the total route? Answer: _____

TIME SEQUENCE (QUESTIONS 62 – 65)

Question 62:

The first two words in each group suggest an order of occurrence. In the blank, you should write the word from the choice column that will continue the time sequence.

		Choice Column
B-175	invasion, combat, _____	attack battle truce
B-176	enroll, attend, _____	graduate register select
B-177	till, plant, _____	harvest plow sow
B-178	larva, pupa, _____	adult cocoon egg
B-179	initial, intermediate, _____	original previous terminal
B-180	sprout, bloom, _____	blossom bud wilt
B-181	design, construct, _____	build conceive occupy

Question 63:

The first two words in each group suggest an order of occurrence. In the blank, you should write the word from the choice column that will continue the time sequence.

		Choice Column
B-182	attempt, pursue, _____	conduct succeed undertake
B-183	doubt, inquire, _____	determine investigate question
B-184	prior, existing, _____	following preceding previous
B-185	commence, continue, _____	begin conclude proceed
B-186	income, savings, _____	earnings expenditures wages
B-187	motive, deed, _____	cause consequence reason
B-188	conceive, develop, _____	conclude introduce originate

Question 64：

Rewrite each group of words in order of occurrence from earliest to latest.

B-189 memorize, read, recite

_____

B-190 design, distribute, manufacture

_____

B-191 afterward, beforehand, presently

_____

B-192 believe, deliberate, read

_____

B-193 choose, examine, purchase

_____

B-194 action, consequence, plan

_____

B-195 current, obsolete, recent

_____

Question 65：

Rewrite each group of words in order of occurrence from earliest to latest.

B-196 cut, mark, measure

_____

B-197 intermediate, primary, secondary

_____

B-198 outline, research, write

_____

B-199 colonization, discovery, exploration

_____

B-200 contracting, designing, engineering

_____

B-201 crack, crumble, stress

_____

B-202 cook, defrost, serve

_____

DEGREE OF MEANING (QUESTIONS 66 – 69)

Question 66:

The first two words in each group suggest a sequence of rank, degree, size, or order. In the blank you should write the word from the choice column that will continue the sequence.

		Choice Column
B-221	insufficient, adequate, _____	abundant enough scarce
B-222	admit, ignore, _____	acknowledge confirm deny
B-223	absurd, possible, _____	actual conceivable ridiculous
B-224	approval, admiration, _____	agreement credit devotion
B-225	question, disagree, _____	argue challenge consider
B-226	urge, push, _____	compel hustle suggest

Question 67：

The first two words in each group suggest a sequence of rank, degree, size, or order. In the blank you should write the word from the choice column that will continue the sequence.

		Choice Column
B-227	advance, maintain, _____	attack charge retreat
B-228	fretting, worried, _____	anxious concerned frantic
B-229	ordinary, rare, _____	common unique unusual
B-230	irrelevant, useful, _____	essential trivial useless
B-231	fastened, loosened, _____	bound joined untied
B-232	suggest, request, _____	invite order prompt

Question 68：

Rewrite each group of words in order from lowest or smallest to highest or largest in degree, rank, size, or order.

EXAMPLE: bellow, cry, whimper

whimper, cry, bellow

(arranged by degree of "loudness" from less loud to more loud)

B-233 limit, prohibit, regulate

B-234 dislike, reject, shun

B-235 excited, savage, violent

B-236 acceptance, contempt, criticism

B-237 dull, lustrous, vivid

B-238 vital, significant, urgent

Question 69：

Rewrite each group of words in order from lowest or smallest to highest or largest in degree, rank, size, or order.

B-239 baboon, chimpanzee, gorilla

_____

B-240 beacon, bulb, candle

_____

B-241 citizen, patriot, traitor

_____

B-242 admirable, ideal, typical

_____

B-243 dissatisfied, grouchy, hostile

_____

B-244 risk, peril, security

_____

B-245 confirm, deny, suggest

_____

B-246 extinct, common, rare

_____

DEDUCTIVE REASONING (QUESTIONS 70 – 78)

Instructions:

A *Mind Bender®* is a problem in matching lists. Making a chart helps you work the problem. Here is a *Mind Bender®* involving three people and their pets.

EXAMPLE:

Michael, Sarah, and Tina own a cat, a goldfish, or a parakeet.

From the clues below, match each pet with the proper owner.

a. Tina is allergic to animal fur.
b. Michael's pet does not use kitty litter or live in a cage.

Step 1: From the clue "Tina is allergic to animal fur," you can figure out that Tina does not own the cat. Find the row marked "T" for Tina and write NO in the column marked "C" for cat.

	C	G	P
M			
S			
T	NO		

Step 2: The second clue, "Michael's pet does not use kitty litter or live in a cage," tells you that Michael does not own a cat or bird. Find the row marked "M" for Michael and write NO in both the "C" (for cat) column and the "P" (for parakeet) column.

	C	G	P
M	NO		NO
S			
T	NO		

Step 3: You know that each person owns a pet. Since neither Michael nor Tina owns the cat, Sarah must be the cat owner. Write a YES in the "S" row and the"C"column.

	C	G	P
M	NO		
S	YES		
T	NO		

Step 4: Since Sarah owns the cat, Sarah does not own the goldfish or the parakeet. Write NO in the "S" row in both the "G" column and the "P" column.

	C	G	P
M	NO		NO
S	YES	NO	NO
T	NO		

Step 5: By the same kind of reasoning, you see that the only vacancy in the "M" row is in the "G" column. From this, you figure out (**deduce**) that Michael is the goldfish owner. Write a YES in this position.

	C	G	P
M	NO	YES	NO
S	YES	NO	NO
T	NO		

Step 6: Since Michael owns the goldfish, then neither Sarah nor Tina owns the goldfish. You have already figured out (deduced) that Sarah doesn't own the goldfish. Now you know that Tina doesn't either. Mark NO in the "T" row and the "G" column.

	C	G	P
M	NO	YES	NO
S	YES	NO	NO
T	NO	NO	

Step 7: The only vacancy on the chart is in the "T" row and the "P" column. You now know that Tina is the parakeet owner.

Question 70：

Bob, Joe, Freddy, and Christy are all in grade school (1st, 2nd, 4th, and 6th grades). From the clues below, match each child with his or her grade.

a. No student has been held back or skipped a grade.
b. Joe is about three years younger than Bob.
c. Christy is about four years older than Freddy.

	B	C	F	J
1				
2				
4				
6				

Hint:
B: Bob
C: Christy
F: Freddy
J: Joe

Question 71：

Four World War II tanks have the following gun sizes: 49mm, 75mm, 88mm, and 100mm. The larger the gun, the more powerful it is. From the clues below, match each tank with its gun.

a. The Tiger tank has a larger gun than either the American or British tank.
b. The Sherman tank is American.
c. The SU-100 has the most powerful gun.
d. The Crusader, a British tank, has the least powerful gun.

	C	Sh	SU	T
49				
75				
88				
100				

Hint:
C: Crusader
Sh: Sherman Tank
SU: SU-100
T: Tiger Tank

Question 72：

Use the following clues to determine the running speeds of a cheetah, deer, elephant, and fox.

a. The largest animal is the slowest.
b. The fastest weighs less than half as much as a deer.
c. A fox can't catch a deer or a cheetah.

	Running Speed km/hr			
	38	64	79	112
Cheetah				
Deer				
Elephant				
Fox				

Question 73：

Use the following clues to compare the orbit times of Jupiter, Mercury, Pluto, and Venus.

a. Jupiter has the shortest rotation time but has neither the longest nor the shortest orbit time.
b. Pluto has an orbit time about 22.5 times that of Jupiter.
c. Mercury has a shorter rotation time and a shorter orbit time than Venus.

	Orbit Time in yrs.			
	1/4	2/3	11	248
Jupiter				
Mercury				
Pluto				
Venus				

Question 74：

Totino, Warpenburg, Schleinstein, and Kavana live in Russia, the Czech Republic, Chile, and Zambia. From the clues below, match the residents with their countries.

a. Kavana's country has no sea coast and is in the Southern Hemisphere.
b. Schleinstein's and Totino's countries are not in South America.
c. Totino lives north of Schleinstein.

	K	S	T	W
Chile				
Czech Republic				
Russia				
Zambia				

Hint:
K: Kavana
S: Schleinstein
T: Totino
W: Warpenburg

Question 75：

Mr. Jaworski, Miss Roberts, Mrs. Bradley, and Mr. Forsythe are all dog owners. From the clues below, match the dogs (Collie, German Shepherd, Great Dane, and Dachshund) with their owners.

a. Miss Roberts does not own a dog that has fleas.
b. Neither Mr. Jaworski nor Mrs. Bradley owns the Great Dane.
c. Mr. Forsythe knows the German Shepherd and Dachshund owners.
d. Mr. Jaworski and Mr. Forsythe don't know each other.
e. German Shepherds and Great Danes have fleas.

	B	F	J	R
Collie				
Great Dane				
German Shepherd				
Dachshund				

Hint:
B: Mrs. Bradley
F: Mr. Forsythe
J: Mr. Jaworski
R: Miss Roberts

Question 76：

Fred, Ken, Ross, and Tim are married. Their wives' names are Betty, Lora, Mary, and Pam. From the clues below, match the men with their wives.

a. Pam and Mary are sisters.

b. Ross' s best friend is Fred.

c. Ross is an only child.

d. Pam's sister married Tim' s brother.

e. Betty and Ross's best friend are married.

f. Lora is married to Ken' s brother.

	F	K	R	T
B				
L				
M				
P				

Hint:
B: Betty
L: Lora
M: Mary
P: Pam

F: Fred
K: Ken
R: Ross
T: Tim

Question 77：

Phillippe, Letitia, Cicero, and Beaumont are from Greece, Spain, France, and England; they were born in 1942, 1931, 1946, and 1935. They each visited their home country recently.

Use the following clues to figure out where and when each of them was born.

a. Phillipe is older than Letitia but younger than Cicero.
b. Beaumont is older than Cicero.
c. The oldest is not from Greece or Spain.
d. The youngest is not from England or France.
e. The second oldest visited Athens.
f. The next to youngest is not from England.

OLDEST 1931 _____

1935 _____

1942 _____

YOUNGEST 1946 _____

	E	F	G	S
B				
C				
L				
P				

Hint:
B: Beaumont
C: Cicero
L: Letitia
P: Phillippe

E: England
F: France
G: Greece

S: Spain

Question 78:

George, Jim, and Sam left class for basketball, football, and swimming practice. The guidance office looked for the last names Carey, Roberts, and Wolfe.

Use the following clues to match first and last names. In each clue, the two names do not belong to the same person.

a. George and Carey do not go to basketball practice.

b. Sam and Wolfe do not go to football practice.

c. Jim and Roberts do not go to swimming practice.

d. Jim and Carey do not go to football practice.

FIRST NAMES			SPORT	LAST NAMES		
G	J	S		C	R	W
			Basketball			
			Football			
			Swimming			

SPORT	FIRST NAME	LAST NAME
Basketball	_____	_____
Football	_____	_____
Swimming	_____	_____

Hint:
G: George
J: Jim
S: Sam

C: Carey

R: Roberts
W: Wolfe

END OF CONTEST