

CHAPTER

10

Transformations

10.1 Translations

10.2 Reflections

10.3 Rotations

10.4 Lines of Symmetry

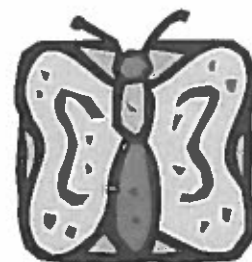
10.5 Planes of Symmetry

Review

Chapter Check

Problem Solving: Using the Strategies

Answers CHAPTER 10 Transformations



Skill Builder

1. Calculate.

a) $1 + 2 + 3 + 4 =$ _____

b) $0 + 5 + 6 + 7 =$ _____

c) $2 + 3 + 4 + 5 =$ _____

d) $3 + 4 + 5 + 6 =$ _____

e) $4 + 5 + 6 + 7 =$ _____

f) $0 + 3 + 4 + 5 =$ _____

2. a) Calculate.

A $10 + 2 - 7 =$ _____

Y $2 \times 8 - 6 =$ _____

R $36 \div 4 + 11 =$ _____

E $4 \times 6 \div 2 =$ _____

O $9 - 3 + 8 =$ _____

G $4 \times 7 + 5 =$ _____

U $28 \div 4 \times 5 =$ _____

D $3 \times 3 \div 3 =$ _____

b) To solve the riddle, write the letter that matches the answer on the blank below.

What goes up but never comes down?

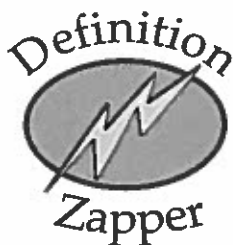
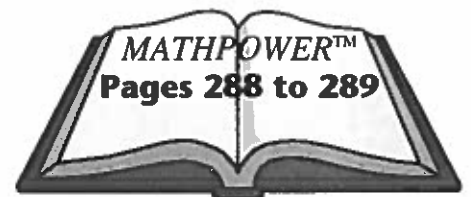
10 14 35 20

5 33 12

GETTING STARTED



Work together with your classmates, using your *MATHPOWER*[™] student text, pages 288 and 289.



Use your dictionary to find the definition of **transformation**.

5. Solve.

a) $n + 8 = 17$

b) $n - 3 = 6$

$$n + 8 + (-8) = 17 + (-8)$$

$$n = \underline{\hspace{2cm}}$$

c) $8n = 32$

d) $\frac{n}{6} = 2$

e) $n + 4 = 6.2$

f) $n + 3 = 4.5$

g) $2n = 0.4$

h) $\frac{n}{3} = 0.2$

Skill Builder

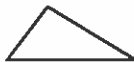
1. Match each shape with the correct name.

(i) _____



a) pentagon

(ii) _____



b) parallelogram

(iii) _____



c) equilateral triangle

(iv) _____



d) rhombus

(v) _____



e) scalene triangle

(vi) _____



f) hexagon

Continues on next page. →

10.1 Translations

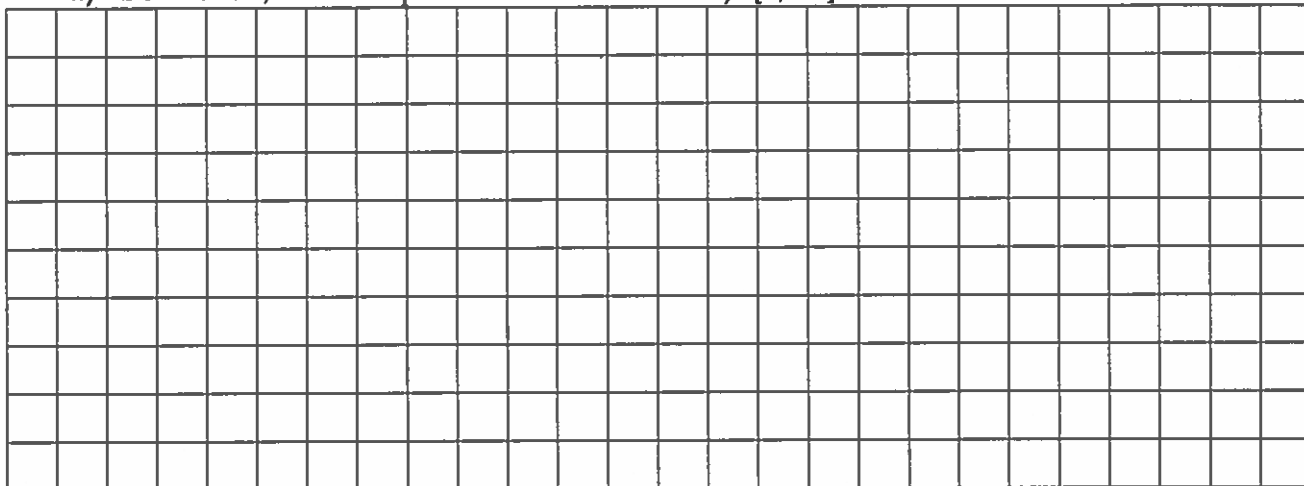


Practice

1. Draw an arrow on the grid to show each translation.

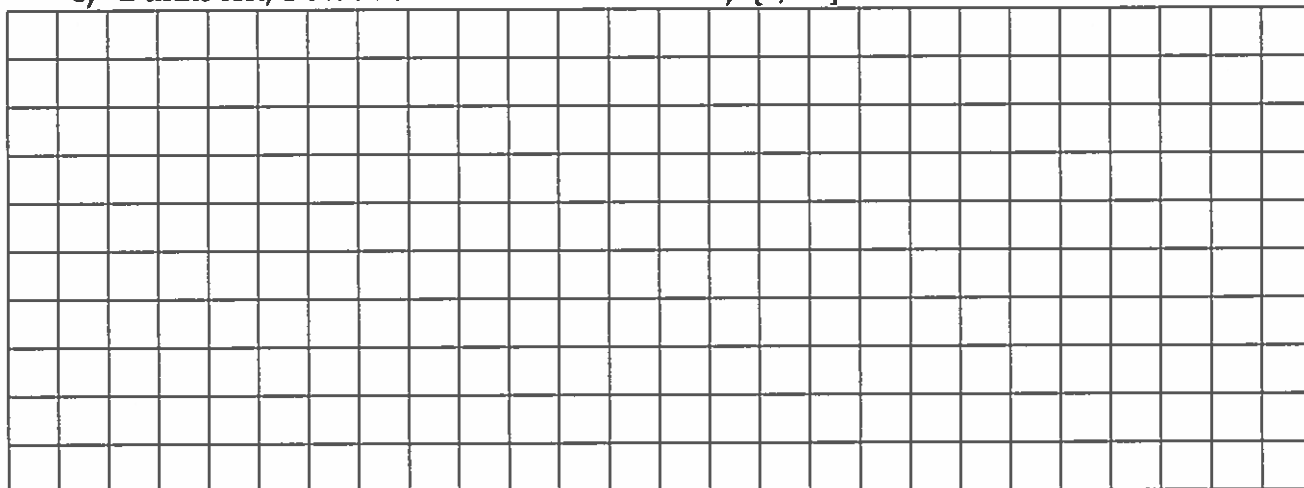
a) 4 units left, 3 units up

b) $[3, -3]$



c) 2 units left, 1 unit down

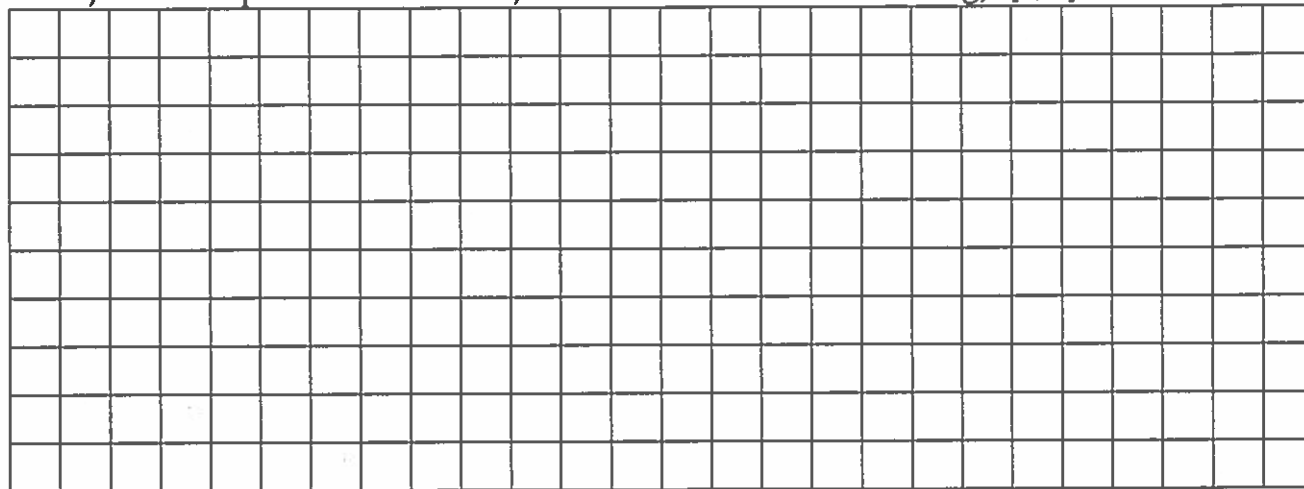
d) $[0, -6]$



e) 4 units up

f) 6 units left

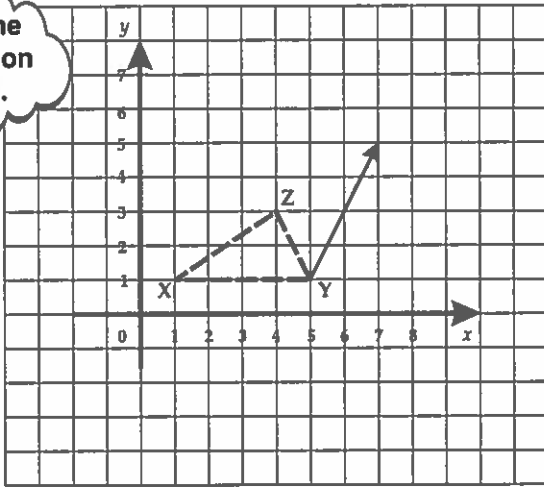
g) $[4, 0]$



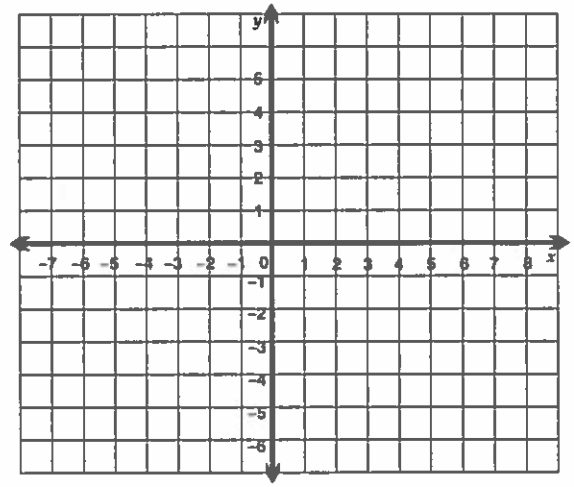
5. • First, draw each triangle on the grid.
 • Then, draw the translation image.

- a) (i) $X(1, 1), Y(5, 1), Z(4, 3)$
 (ii) translation $[2, 4]$

Draw the translation image.

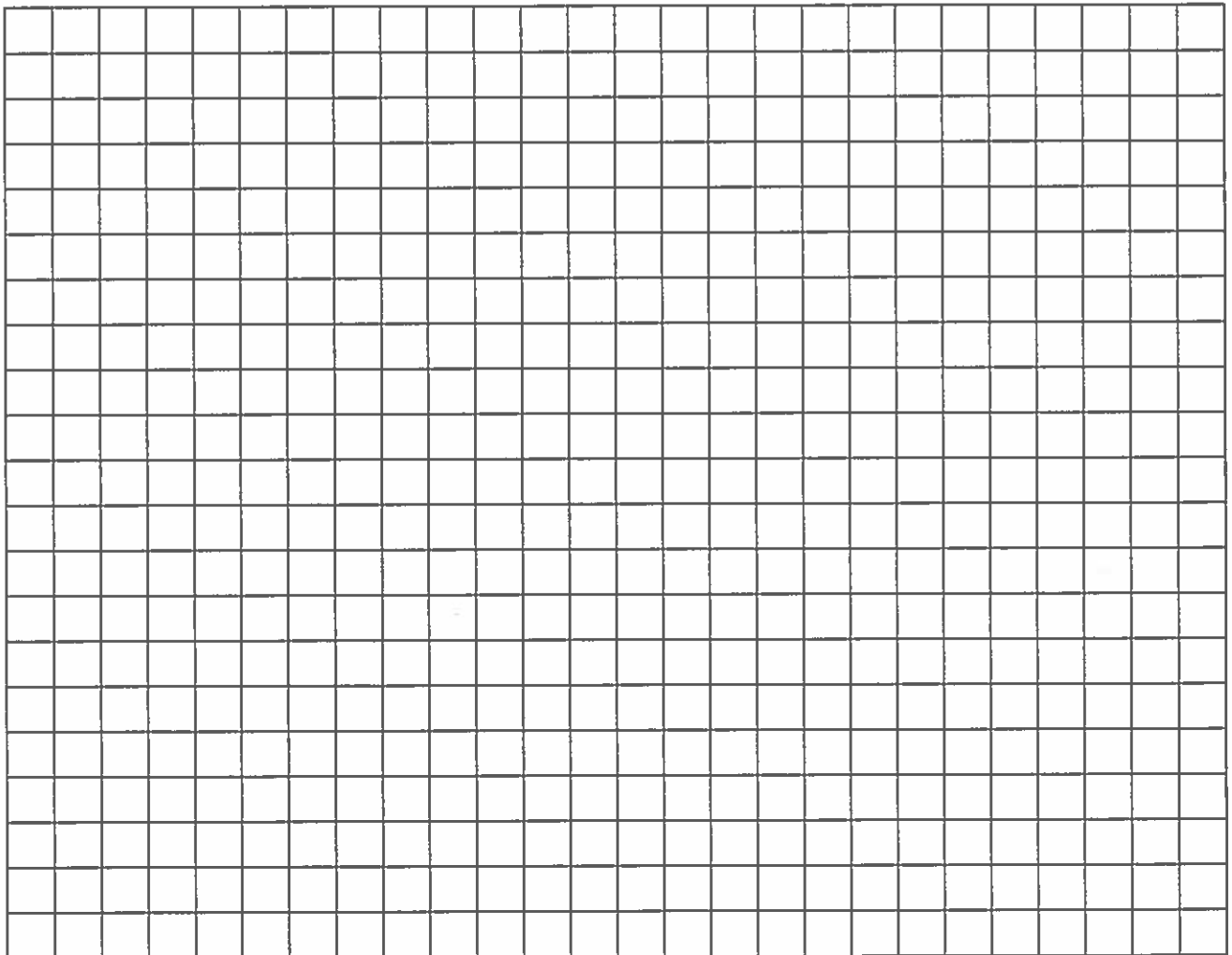


- b) (i) $C(-4, 2), A(-1, 1), T(0, 3)$
 (ii) translation $[5, -3]$



- c) (i) $A(-1, 4), B(-5, 2), C(-2, 2)$
 (ii) translation $[3, -4]$

- d) (i) $D(2, 2), A(4, 0), G(5, 2)$
 (ii) translation $[-2, -1]$



8. State whether each statement is true or false.

- a) _____ The size of a figure remains the same under a translation.
- b) _____ The angles of a translation image are larger than those of the original figure.
- c) _____ The translation image is always above the original figure.

Skill Builder

1. Name each of the following as a slide, flip, or turn.













2. Divide.

a) $(-28) \div (-7) =$ _____

b) $(-25) \div (+5) =$ _____

c) $(+54) \div (-9) =$ _____

d) $(-36) \div (-4) =$ _____

e) $(-56) \div (+8) =$ _____

f) $(+45) \div (-9) =$ _____

g) $(+32) \div (-4) =$ _____

h) $(-27) \div (+3) =$ _____

Remember:

$$+ \div + = +$$

$$- \div - = +$$

$$+ \div - = -$$

$$- \div + = -$$

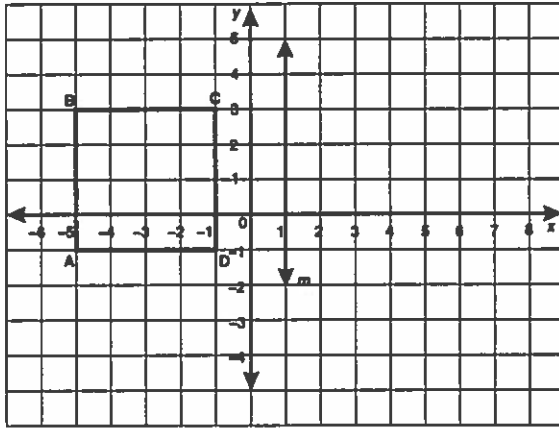
3. A drawer opening is an example of a slide. Name two other examples of a slide.

a) _____

b) _____



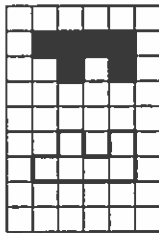
c)



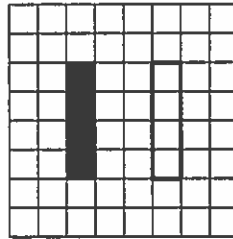
Write this reflection as a mapping.

4. Draw the reflection line for each pair.

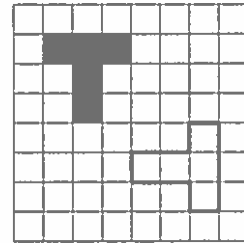
a)



b)

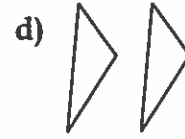
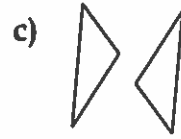
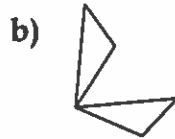
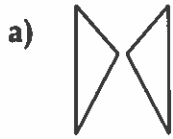


c)



Skill Builder

1. Name each of the following as a slide, flip, or turn.



2. Write in lowest terms.

a) $\frac{8}{18} = \frac{8 \div \text{cloud}}{18 \div \text{cloud}}$
 $= \square$

b) $\frac{70}{90}$

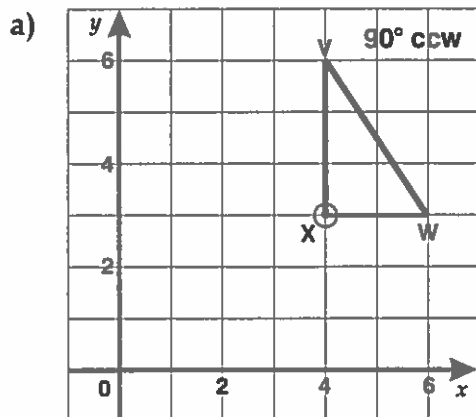
c) $\frac{6}{24}$

d) $\frac{18}{3}$

e) $\frac{12}{15}$

f) $\frac{6}{16}$

3. For each figure below, draw the rotation image.

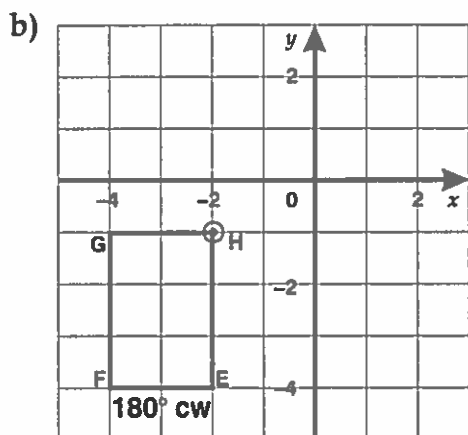


- (i) Label the image $V' W' X'$.
 (ii) This rotation can be written as a mapping.

$$V(4, 6) \rightarrow V'(\underline{\quad}, \underline{\quad})$$

$$W(6, 2) \rightarrow W'(\underline{\quad}, \underline{\quad})$$

$$X(4, 3) \rightarrow X'(\underline{\quad}, \underline{\quad})$$



- (i) Label the image.
 (ii) Write this rotation as a mapping.

$$E(-2, -4) \rightarrow E'(\underline{\quad}, \underline{\quad})$$

$$F(-4, -4) \rightarrow F'(\underline{\quad}, \underline{\quad})$$

4. Give an amount of the rotation and a direction of rotation equal to the following.

a) 180° counterclockwise = $^\circ$ cw

b) 90° clockwise = _____

c) 270° clockwise = _____

d) 90° counterclockwise = _____

CLUES

10.4 Lines of Symmetry



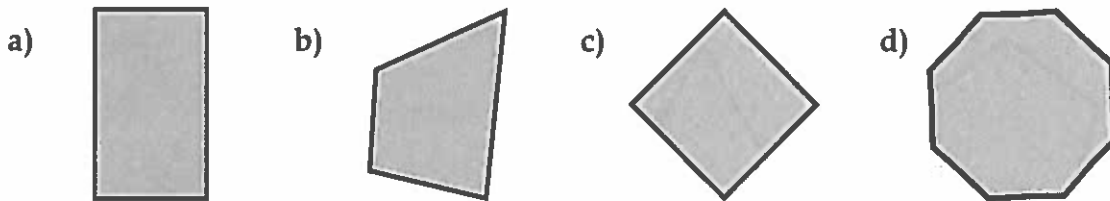
Practice

1. a) Print your name in block letters.

b) How many of the letters have one line of symmetry? _____

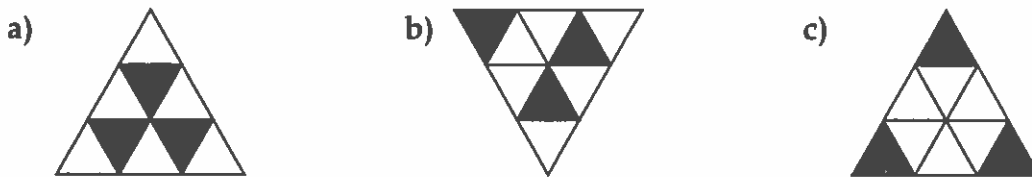
c) How many of the letters have two lines of symmetry? _____

2. Use a MIRA to draw all the lines of symmetry.

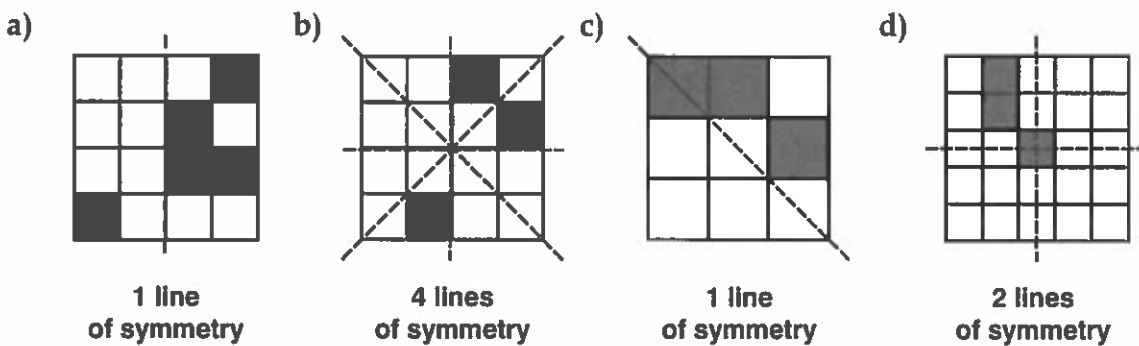


Problems and Applications

3. Draw all the lines of symmetry for each pattern.



4. Complete shading the parts so that the patterns have the given number of lines of symmetry.



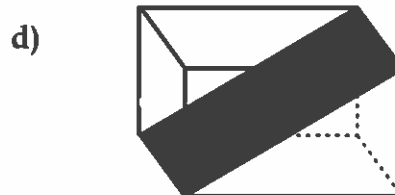
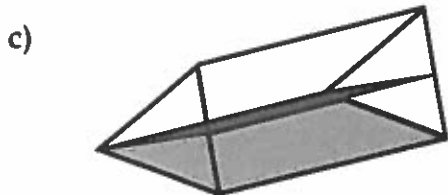
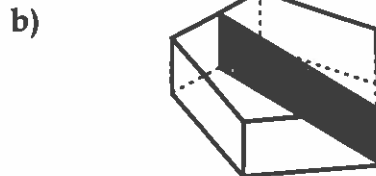
5. Draw the lines of symmetry for the flags below.



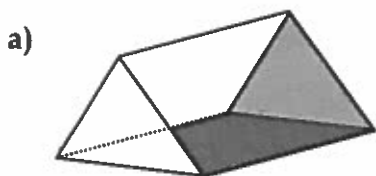
10.5 Planes of Symmetry

Practice

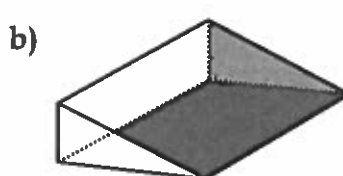
1. Is each plane a plane of symmetry?



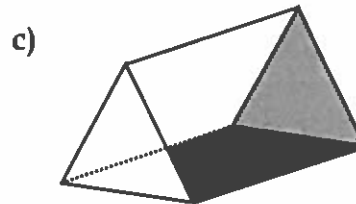
2. Write the number of planes of symmetry in each triangular prism.



isosceles
triangular prism



right scalene
triangular prism

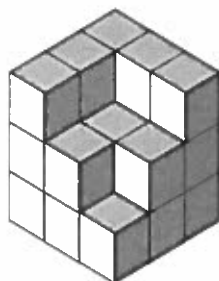


equilateral
triangular prism

3. List 3 objects in your classroom. Find the number of planes of symmetry for each object.



There are no cubes missing from the back of the stack.
How many cubes are in the stack?



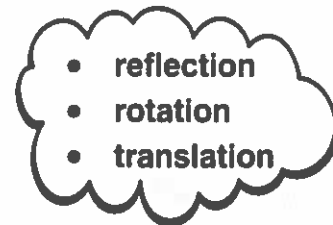
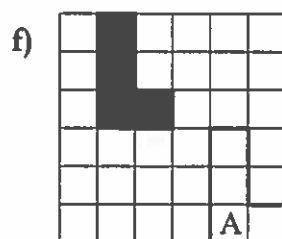
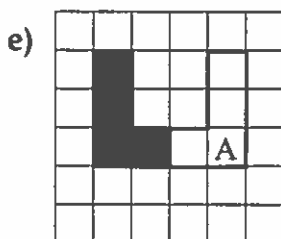
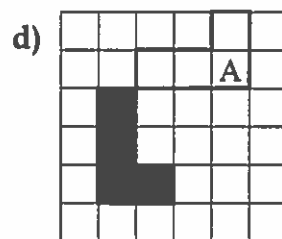
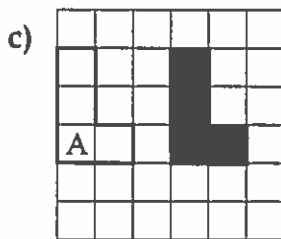
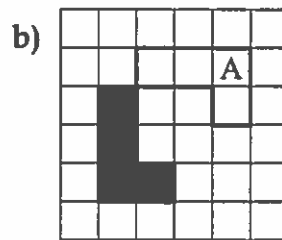
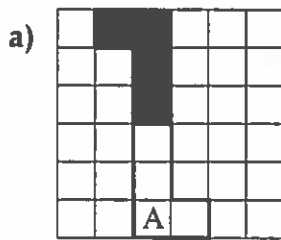
Review



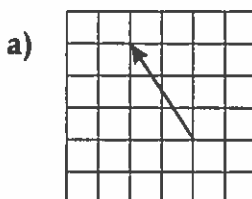
1. Match the transformation with the action.

- | | |
|-------------------|----------|
| (i) ___ translate | a) flip |
| (ii) ___ rotate | b) slide |
| (iii) ___ reflect | c) turn |

2. The shaded figure is an image of figure A in each of the following. Choose the transformation from the cloud to match the correct diagram.



3. Describe each translation in words.

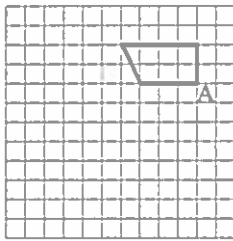


b) [5, 0]

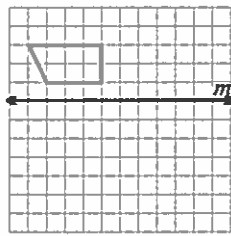
_____ units left, _____ units _____

8. Draw the figure as it would look after each step.

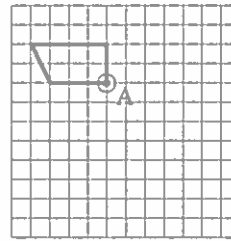
a) a translation
4 units down
and 3 units left



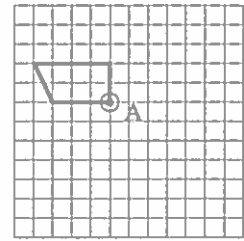
b) a reflection
in the line m



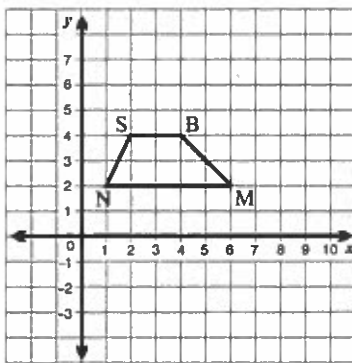
c) a rotation of
 90° clockwise
about A



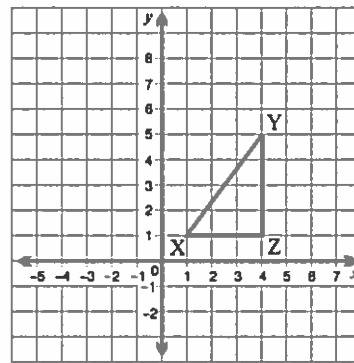
d) a rotation of
 180° counter-
clockwise
about A



9. a) Draw the image of SBMN translated
3 units right and 1 unit down.

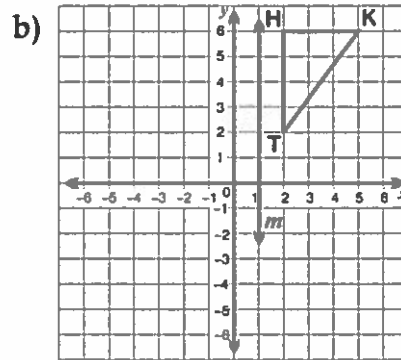
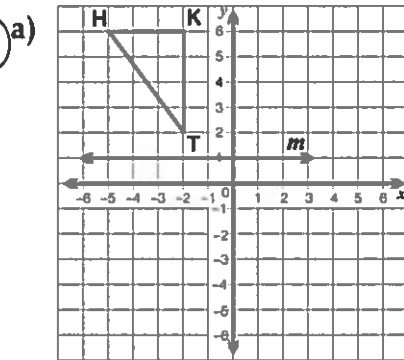


b) Draw the image of $\triangle XYZ$ translated
2 units left and 3 units up.



See
pages
493 to 496.

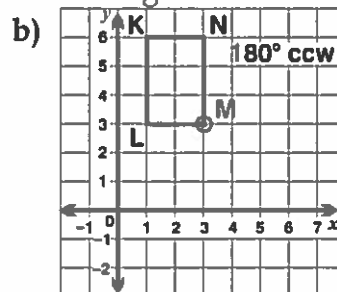
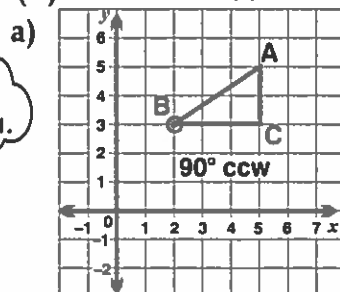
10. For $\triangle HKT$, draw a reflection in the line m .



See
page
498.

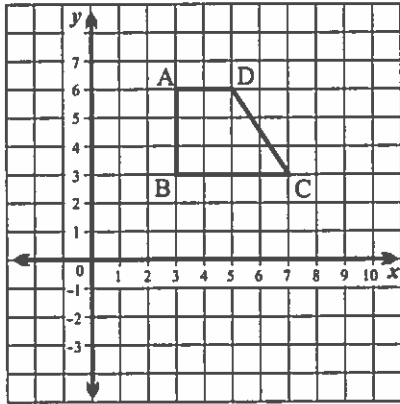
11. For each figure,

- draw the rotation image about the turn center, and
- name the coordinates of the vertices of the image.

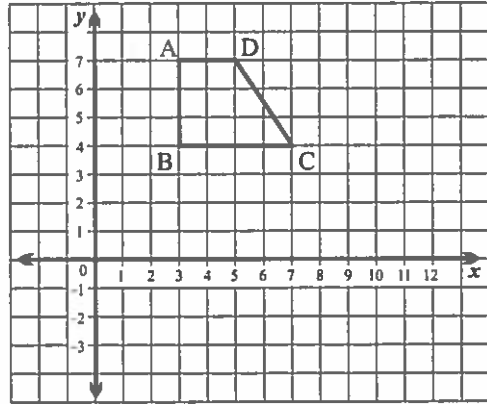


See
pages
500 and 501.

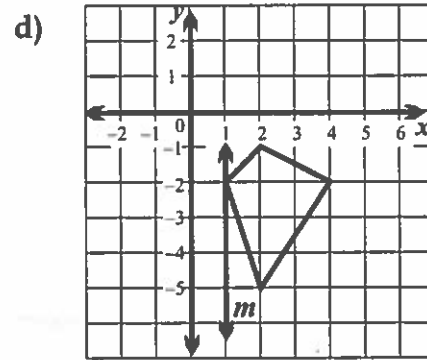
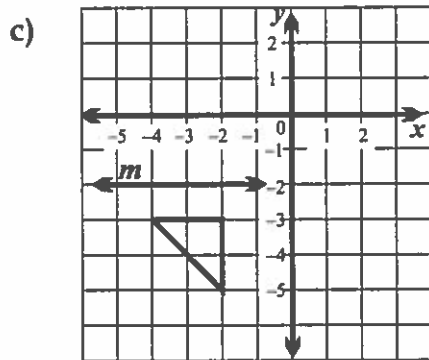
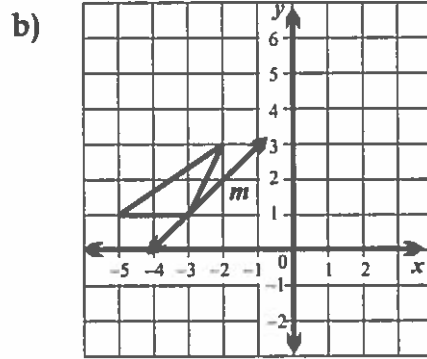
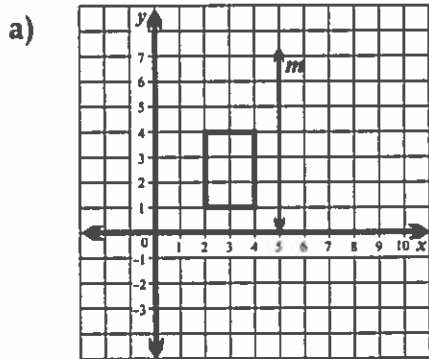
5. a) Draw the image of ABCD translated 2 units left and 4 units down.



- b) Draw the image of ABCD under the translation $[5, 1]$.



6. For each figure, draw the reflection image in line m .



7. Draw the rotation image of the figure.

