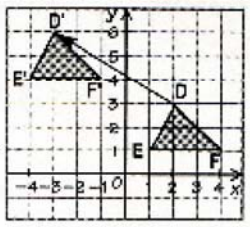
8.1 Translations

Translation

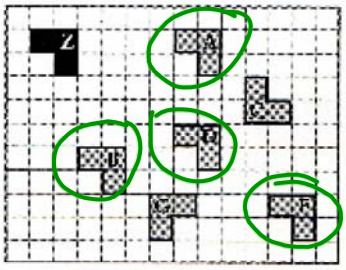


- A figure slides the same distance and direction to a new position.

↓ 3
R ⇒ 5

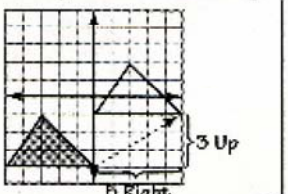
Practice

1. Which of the lettered figures are translation images of figure Z?



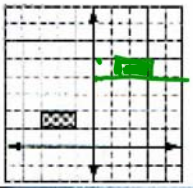
2. *Graph the image of each figure under the given translation.*

Example:
5 units right and 3 units up.

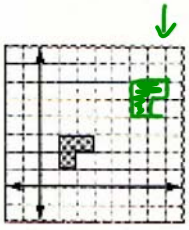


4 units right and 3 units up

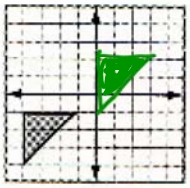
a)



b)

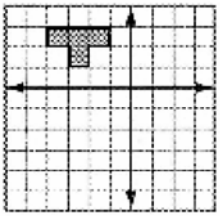


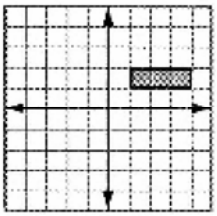
c)

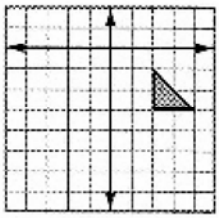


3. *Graph the image of each figure under the given translation.*

2 units left and 5 units down

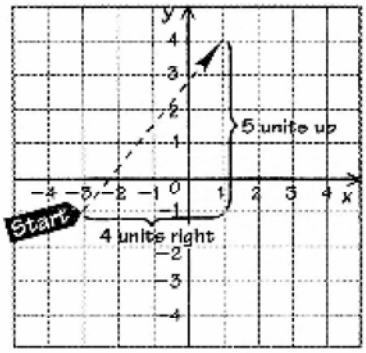
a) 

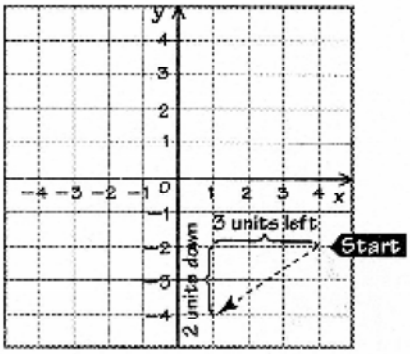
b) 

c) 

4. *State the translation described by each arrow. Write your translation in the form [x, y] and in words.*

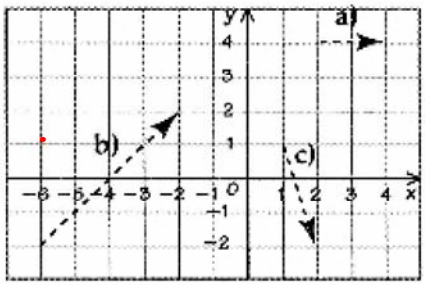
Example:





a) 4 units right and 5 units up [4, 5]

b) 3 units left and 2 units down [–3, –2]



	Words	[x, y]
a)	2 units right, 0 units up	[2, 0]
b)		
c)		

5. *Describe each translation in **words**.*

Example:
$(x, y) \rightarrow (x - 4, y + 3)$
means
4 units left and 3 units up.

a) $(x, y) \rightarrow (x + 3, y + 2)$

b) $(x, y) \rightarrow (x - 1, y + 4)$

c) $(x, y) \rightarrow (x - 2, y - 3)$

d) $(x, y) \rightarrow (x + 5, y - 1)$

e) $(x, y) \rightarrow (x, y + 6)$

f) $(x, y) \rightarrow (x - 3, y)$

g) $[2, -3]$

☐ units right, ☐ units down

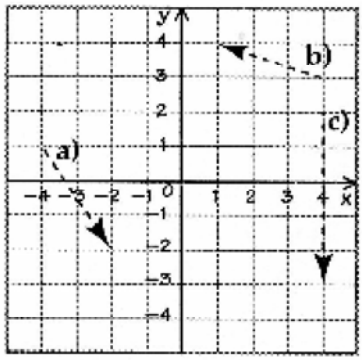
h) $[-3, 5]$

i) $[-4, 2]$

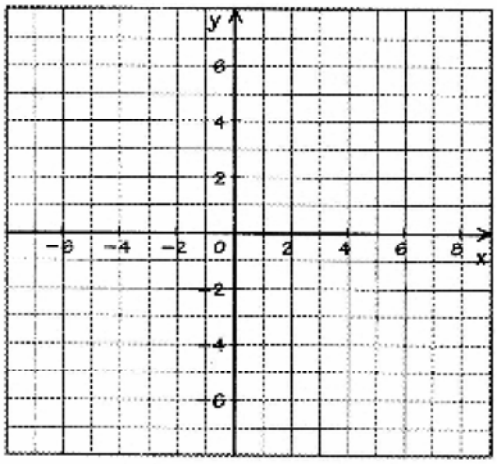
j) $[1, -6]$

6. *Draw an arrow on the grid below to show each translation.*

Examples:
a) $[2, -3]$
b) $[-3, 1]$
c) $[0, -5]$

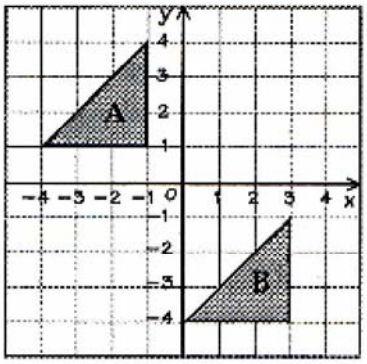


a) $[2, -3]$
b) $[-1, -5]$
c) $[1, -5]$
d) $[5, 0]$
e) $[3, -2]$
f) $[-2, 3]$
g) $[0, -5]$
h) $[5, -4]$



7. *Name the translation that maps Figure A onto Figure B.*

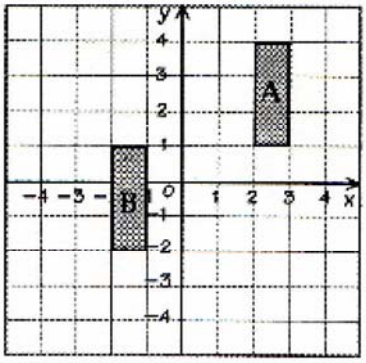
a)



☐ units right, ☐ units down

or [☐, ☐]

b)



8. *Find the coordinates of each point after the translation.*

Point	Translation	Translation Point
a) A(2, 3)	[3, 4]	A'(___, ___)
b) B(−3, −1)	[2, −2]	B'(___, ___)
c) C(5, −2)	[−1, 5]	
d) D(−5, 7)	[−2, −6]	

a) For A(2, 3),

→ (2 + 3, 3 + 4) ← Translation → [3, 4]

So A' (___, ___)

b) For B(−3, −1),

→ (−3 + ___, −1 + (=___))

So B' (___, ___)

c)

d)

9. *Express each translation as an ordered pair.*

a) A(3, 5) to A'(7, 9) [4, ___]

[7 − 3, 9 − 5] = [4, ___]

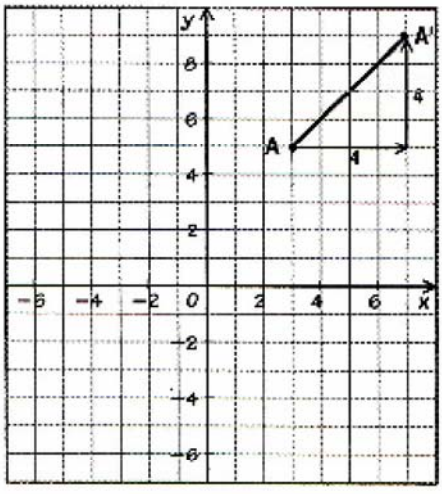
b) C(2, 1) to C'(3, 0) [___, ___]

c) X(−2, −4) to X'(−3, −5) [___, ___]

d) M(0, −1) to M'(4, −6) [___, ___]

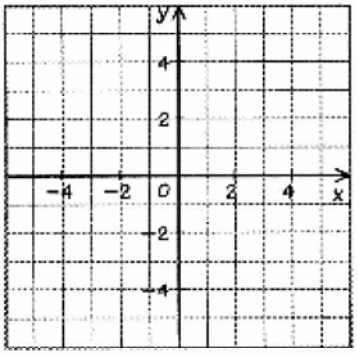
e) T(−1, −3) to T'(−6, 5) [___, ___]

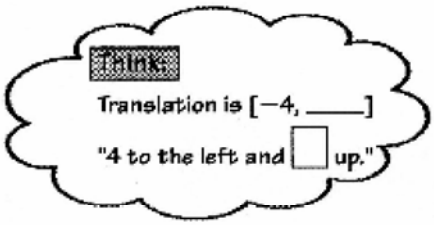
f) P(0, 4) to P'(−1, −2) [___, ___]



10. *Draw each triangle on the grid. Then, draw the translation image.*

a) A(3, 2), B(1, 4), C(1, 2)
$(x, y) \rightarrow (x - 4, y + 2)$





First: *Plot points* **A**, **B** *and* **C**.

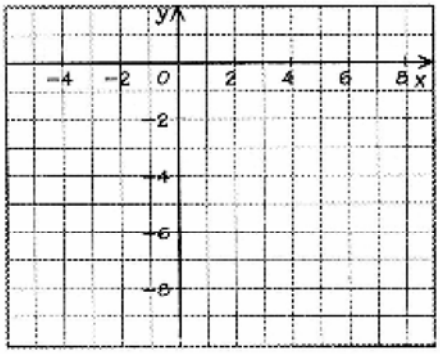
Second: *Join the points to form a triangle.*

Third: *Plot translation image* (A'B'C') → *4 units to the left and 2 units up.*

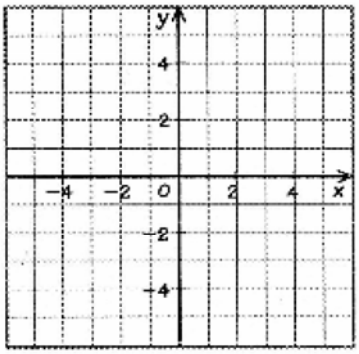
b) D(−2, 0), E(4, −1), F(2, −5)
$(x, y) \rightarrow (x + 3, y - 3)$

Translation is

"☐ units right and ☐ units down."

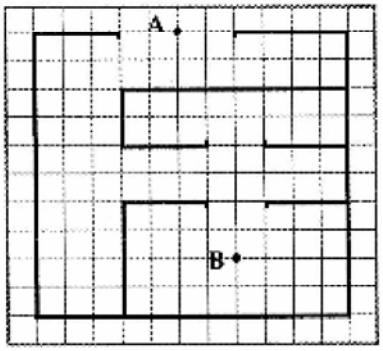


c) R(0, 0), S(−4, 0), T(−3, −5)
$(x, y) \rightarrow (x + 2, y + 3)$



Problems and Applications

11. What translations are needed to get a robot from Point A to point B? *(The robot cannot cross the lines.)*



First: *Point* **A** *moves* ***down 1****, so translation is* [0, −1].

Second: *Point* **A** *moves* ***left 3****, so translation is* [____, ____].

Third: _____

_____

Fourth: _____

_____

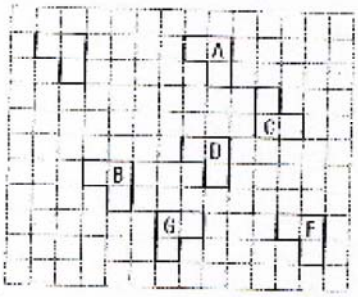
Fifth: _____

_____

Do WS Translations - all

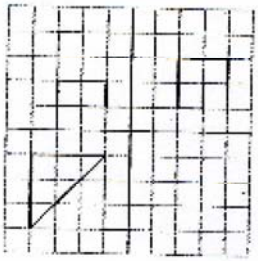
Translations

1. Which of the lettered figures are translation images of the green figure? Give reasons for your answers.

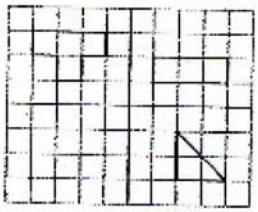


2. Plot each set of figures on a grid. Graph the image of each figure under the given translation.

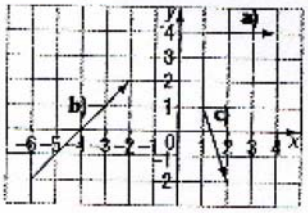
a) 4 units right and 3 units up



b) 2 units left and 5 units down



3. State the translation described by each arrow. Write your answers in the form $[x, y]$.



Describe each translation in words.

4. $(x,y) \rightarrow (x+3, y+2)$
5. $(x,y) \rightarrow (x-1, y+4)$
6. $(x,y) \rightarrow (x-2, y-3)$
7. $(x,y) \rightarrow (x+5, y-1)$
8. $(x,y) \rightarrow (x, y+6)$
9. $(x,y) \rightarrow (x-3, y)$
10. $[2, -3]$
11. $[-3, 5]$
12. $[-4, 2]$
13. $[1, -6]$

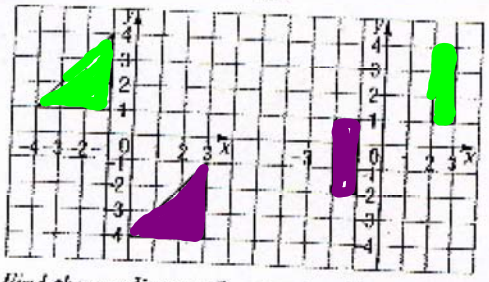
Draw an arrow on grid paper to show each translation.

14. $[2, -3]$
15. $[-1, 5]$
16. $[1, -5]$
17. $[5, 0]$
18. $[3, -2]$
19. $[-2, 3]$
20. $[0, 5]$
21. $[5, 4]$

Name the translation that maps each green figure onto its purple image.

22.

23.



Find the coordinates of each point after the translation.

24. $(2, 3)$ $[3, 4]$
25.
26. $(5, -2)$ $[-1, 5]$
27.

Express each translation as an ordered pair.

28. A(3, 5) to A′(7, 9)
29. C(2, 1) to C′(3, 0)
30. X(−2, −4) to X′(−3, −5)
31. M(0, −1) to M′(4, −6)
32. T(−1, −3) to T′(−6, 5)
33. P(0, 4) to P′(−1, −2)

Draw each triangle on grid paper. Then, draw the translation image.

34. A(3, 2), B(−1, 4), C(−3, −5)
$(x,y) \rightarrow (x-4, y+2)$
35. D(−2, 0), E(4, −1), F(2, −5)
$(x,y) \rightarrow (x+3, y-3)$
36. R(0, 0), S(−4, 0), T(−3, −5)
$(x,y) \rightarrow (x+2, y+3)$

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