

Translation and Vectors part 1

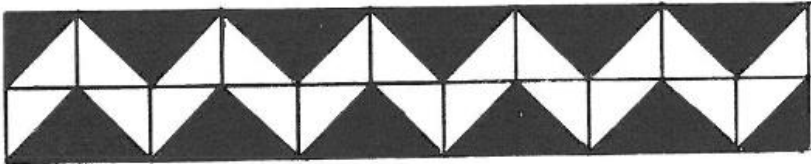
Whether you are a parent, teacher or home school educator, we've compiled examples of activities, games and puzzles which can be used to support the learning of shape and space.

These examples are taken from the 'Translation and Vectors' packs found in our SMILE resource collection. The mathematical demand increases as you work through the packs. There are lots more ideas in the complete packs, which can be downloaded at <https://www.stem.org.uk/rxzfo>

Answers to cards can be found at <https://www.stem.org.uk/rxxo5>

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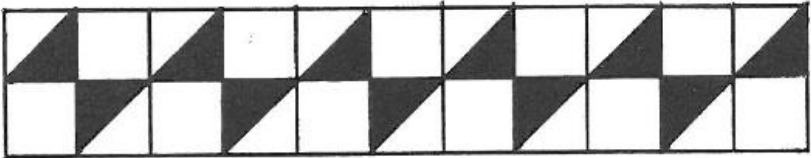
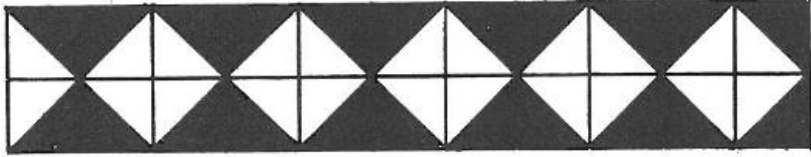
You will need: cm. squared paper, colours



Border Patterns

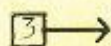
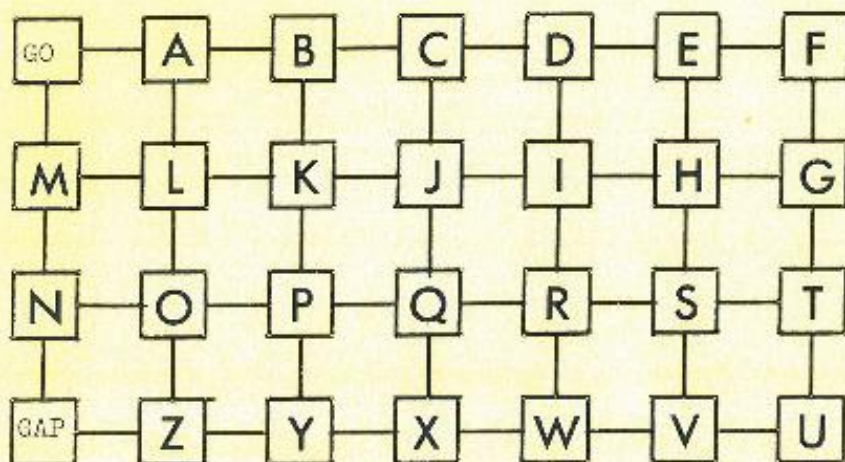
These border patterns use squares
and their diagonals.

Make up some of your own.

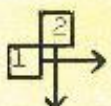



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Vector Messages

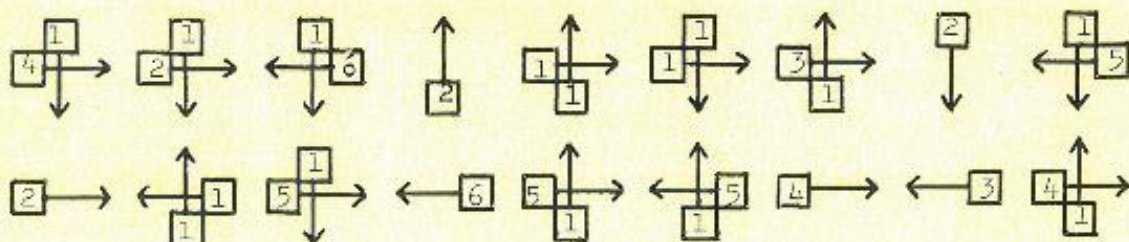


This is a vector. It tells you which way to move and how far to go. This one tells you to move 3 steps to the right.



This one tells you to move one to the right and two downwards.

- (1) Start at GO, see what the first vector takes you to and carry on from there.



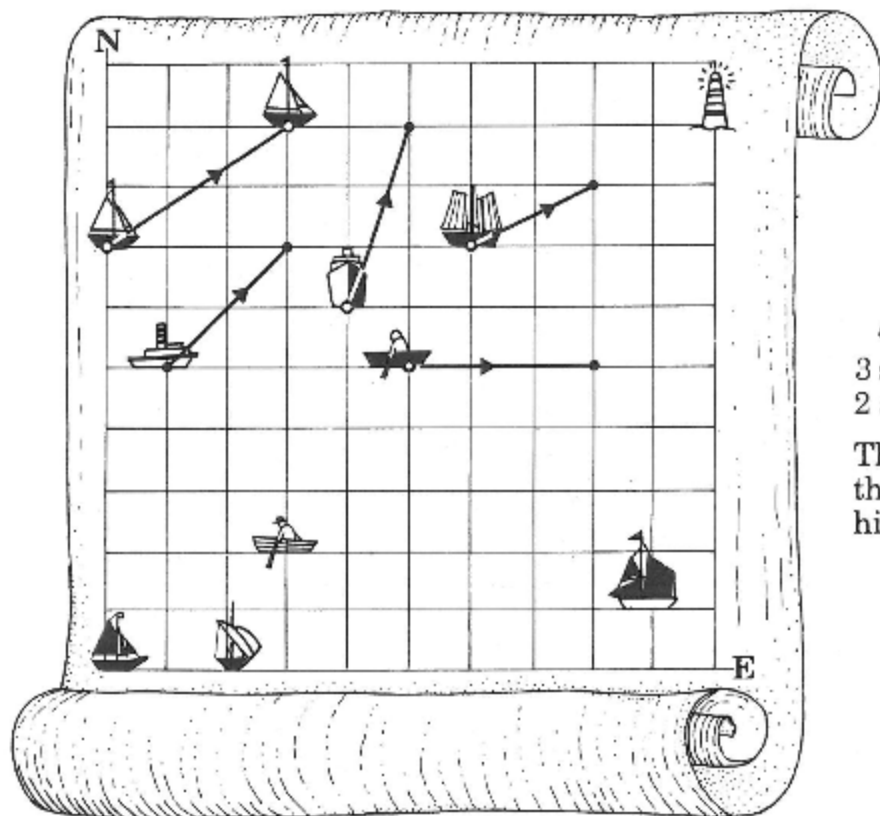
- (2) If you start at GO, show how you would spell out the word VECTORS.


- (3) Make a vector message for your friend.

You will need: cm squared paper


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Vector Sea



 has moved
3 squares East and
2 squares North.

The captain wrote
the vector $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$ in
his log.

- 1)  has moved 1 square East and 3 North.

What vector did the captain write?


- 2) What vectors did the captains of these ships write:


a) 


b) 


c) 

- 3) Draw a map of Vector Sea and show how these ships moved:

a)  moved $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

b)  moved $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$

c)  moved $\begin{pmatrix} 6 \\ 2 \end{pmatrix}$

- 4)  moved $\begin{pmatrix} 5 \\ 1 \end{pmatrix}$, then $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$

Draw the ship's path so far.

The ship then sailed straight to the light-house.
What vector did the captain write?

MORE VECTOR MESSAGES

+	-	x	÷	/	:	space
)	T	U	V	W	X	Y
(	S	F	G	H	I	Z
?	R	E	start	A	J	1
.	Q	D	C	B	K	2
,	P	O	N	M	L	3
0	9	8	7	6	5	4

Can you see why $\begin{pmatrix} -2 \\ +1 \end{pmatrix} \begin{pmatrix} +3 \\ -3 \end{pmatrix} \begin{pmatrix} +1 \\ +3 \end{pmatrix} \begin{pmatrix} 0 \\ -3 \end{pmatrix} \begin{pmatrix} -3 \\ +2 \end{pmatrix}$ means SMILE?

The top number in a vector says how far to move to the right (+) or left (-).
The bottom number says how far up (+) or down (-).

So $\begin{pmatrix} -2 \\ +1 \end{pmatrix}$ means move 2 squares left, 1 square up from start to S

$\begin{pmatrix} +3 \\ -3 \end{pmatrix}$ means move 3 squares right, 3 squares down from S to M

1) What do the other three vectors mean?

$\begin{pmatrix} +1 \\ +3 \end{pmatrix}$ means move	}	from	to
$\begin{pmatrix} 0 \\ -3 \end{pmatrix}$ means move		from	to
$\begin{pmatrix} -3 \\ +2 \end{pmatrix}$ means move		from	to

2) Decode this message:

$$\begin{pmatrix} 0 \\ +2 \end{pmatrix} \begin{pmatrix} -1 \\ -2 \end{pmatrix} \begin{pmatrix} +1 \\ +3 \end{pmatrix} \begin{pmatrix} -2 \\ +4 \end{pmatrix} \begin{pmatrix} +1 \\ +2 \end{pmatrix} \begin{pmatrix} -1 \\ +3 \end{pmatrix} \begin{pmatrix} +5 \\ -4 \end{pmatrix} \begin{pmatrix} -3 \\ -1 \end{pmatrix} \begin{pmatrix} 0 \\ +1 \end{pmatrix} \begin{pmatrix} 0 \\ +1 \end{pmatrix} \begin{pmatrix} -1 \\ +1 \end{pmatrix} \begin{pmatrix} +5 \\ +2 \end{pmatrix} \begin{pmatrix} -2 \\ -3 \end{pmatrix} \begin{pmatrix} -3 \\ 0 \end{pmatrix} \begin{pmatrix} +1 \\ 0 \end{pmatrix} \begin{pmatrix} +4 \\ +3 \end{pmatrix} \begin{pmatrix} -4 \\ -3 \end{pmatrix} \begin{pmatrix} +2 \\ 0 \end{pmatrix} \begin{pmatrix} -3 \\ +1 \end{pmatrix} \begin{pmatrix} +5 \\ +1 \end{pmatrix} \begin{pmatrix} -6 \\ -3 \end{pmatrix}$$

+	-	x	÷	/	:	space
)	T	U	V	W	X	Y
(	S	F	G	H	I	Z
?	R	E	start	A	J	1
.	Q	D	C	B	K	2
,	P	O	N	M	L	3
0	9	8	7	6	5	4

3) Decode this message:

$$\begin{pmatrix} +2 \\ +1 \end{pmatrix} \begin{pmatrix} -2 \\ -3 \end{pmatrix} \begin{pmatrix} +3 \\ +5 \end{pmatrix} \begin{pmatrix} -3 \\ -1 \end{pmatrix} \begin{pmatrix} -1 \\ -2 \end{pmatrix} \begin{pmatrix} +1 \\ +3 \end{pmatrix} \begin{pmatrix} -2 \\ +4 \end{pmatrix} \begin{pmatrix} +1 \\ +2 \end{pmatrix} \begin{pmatrix} -1 \\ +1 \end{pmatrix} \begin{pmatrix} 0 \\ +2 \end{pmatrix} \begin{pmatrix} +5 \\ -1 \end{pmatrix} \begin{pmatrix} -5 \\ -1 \end{pmatrix} \begin{pmatrix} +3 \\ -1 \end{pmatrix} \begin{pmatrix} -2 \\ -1 \end{pmatrix} \begin{pmatrix} +4 \\ +3 \end{pmatrix} \begin{pmatrix} -5 \\ -1 \end{pmatrix} \begin{pmatrix} +1 \\ -4 \end{pmatrix} \begin{pmatrix} -1 \\ 0 \end{pmatrix} \begin{pmatrix} +5 \\ +5 \end{pmatrix}$$
$$\begin{pmatrix} -4 \\ -2 \end{pmatrix} \begin{pmatrix} +3 \\ 0 \end{pmatrix} \begin{pmatrix} -2 \\ 0 \end{pmatrix} \begin{pmatrix} -1 \\ +1 \end{pmatrix} \begin{pmatrix} -1 \\ -2 \end{pmatrix} \begin{pmatrix} +1 \\ 0 \end{pmatrix} \begin{pmatrix} +4 \\ +3 \end{pmatrix} \begin{pmatrix} -1 \\ -2 \end{pmatrix} \begin{pmatrix} -4 \\ 0 \end{pmatrix} \begin{pmatrix} +5 \\ +2 \end{pmatrix} \begin{pmatrix} -4 \\ -2 \end{pmatrix} \begin{pmatrix} 0 \\ -3 \end{pmatrix} \begin{pmatrix} -1 \\ +2 \end{pmatrix} \begin{pmatrix} +5 \\ +3 \end{pmatrix} \begin{pmatrix} -5 \\ -3 \end{pmatrix} \begin{pmatrix} +4 \\ +1 \end{pmatrix} \begin{pmatrix} -2 \\ 0 \end{pmatrix} \begin{pmatrix} +1 \\ 0 \end{pmatrix} \begin{pmatrix} -3 \\ +1 \end{pmatrix} \begin{pmatrix} +5 \\ +1 \end{pmatrix}$$
$$\begin{pmatrix} -6 \\ -2 \end{pmatrix} \begin{pmatrix} 0 \\ +2 \end{pmatrix} \begin{pmatrix} 0 \\ -1 \end{pmatrix} \begin{pmatrix} +6 \\ +1 \end{pmatrix} \begin{pmatrix} -4 \\ -5 \end{pmatrix} \begin{pmatrix} -1 \\ +2 \end{pmatrix} \begin{pmatrix} +5 \\ +3 \end{pmatrix} \begin{pmatrix} -1 \\ -5 \end{pmatrix} \begin{pmatrix} -3 \\ +2 \end{pmatrix} \begin{pmatrix} 0 \\ +1 \end{pmatrix} \begin{pmatrix} -1 \\ +1 \end{pmatrix} \begin{pmatrix} +5 \\ +1 \end{pmatrix} \begin{pmatrix} -6 \\ -2 \end{pmatrix} \begin{pmatrix} +1 \\ +2 \end{pmatrix} \begin{pmatrix} -1 \\ -1 \end{pmatrix} \begin{pmatrix} 0 \\ -3 \end{pmatrix}$$

4) Encode this message: THE BOTTOM FIGURE MEANS UP OR DOWN.

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