

# SMILE WORKCARDS

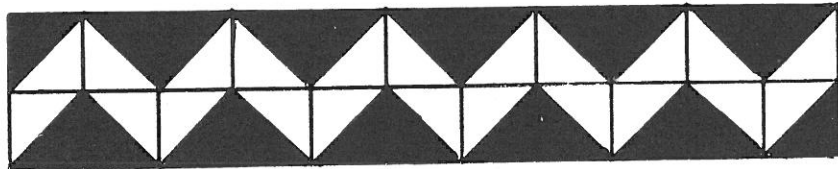
## Translations and Vectors Pack One

### Contents

	Title	Card Number
1	Border Patterns	471
2	Island Game	2279
3	Shape-Tiles w/s	2261
4	Vector Messages	339
5	Vector Sea	377
6	More Vector Messages w/s	1309
7	Translation	1123
8	Vector Match	2228
9	Race Track w/s	725
10	All out of Line	144
11	Trigg	1398
12	Queens	1714

You will need: cm. squared paper, colours

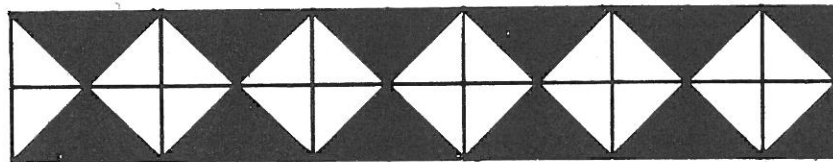
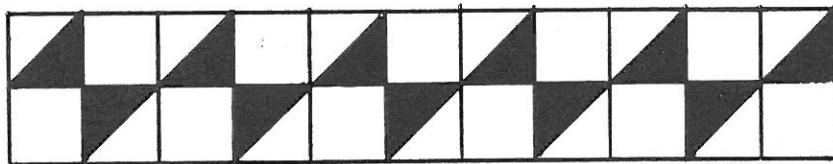
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## Border Patterns

These border patterns use squares  
and their diagonals.

Make up some of your own.



# Island Game

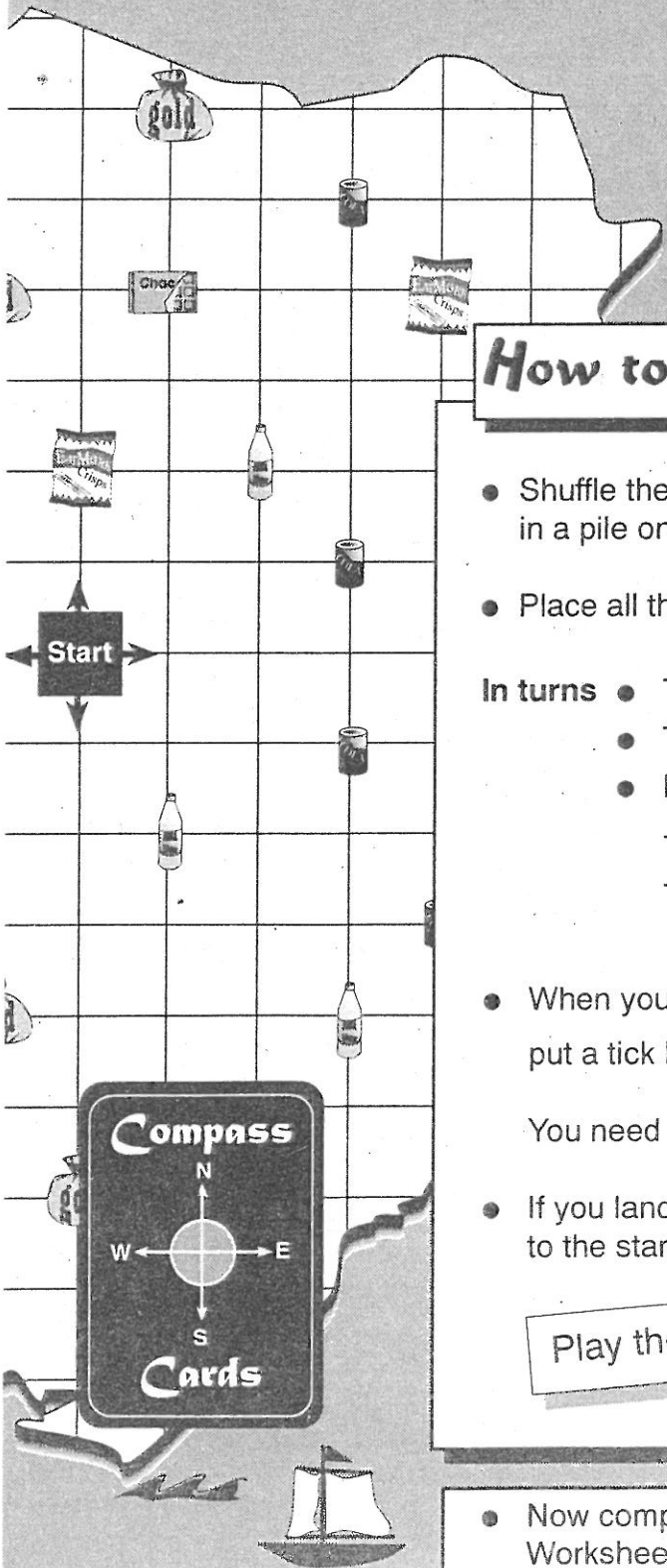
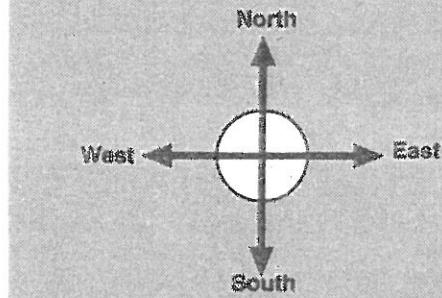
A game for 2 - 4 people.

This envelope contains

- *Island Game Board*, Smile 2279a
- 16 *Compass Cards*, Smile 2279b


You will also need

- a dice
- a different coloured counter for each player.
- a copy of *Worksheet 2279c*.



## How to Play

- Shuffle the **Compass Cards** and place them face down in a pile on the **Island Game Board**.

- Place all the counters on 

- In turns**
- Take a **Compass Card**.
  - Throw the dice.
  - Move your counter
    - in the **direction** shown on the **Compass Card**.
    - the **number** of jumps shown on the dice.

- When you land on     or  put a tick by it on the worksheet.

You need **one of each item** to win.

- If you land in the sea you must go back to the start.


Play the game at least 3 times.

Smile

### Island Game Recording Sheet

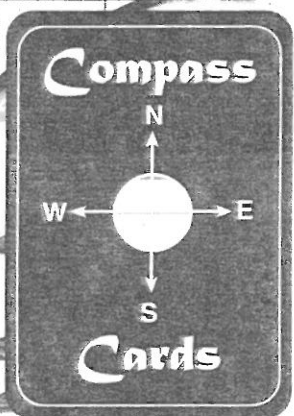
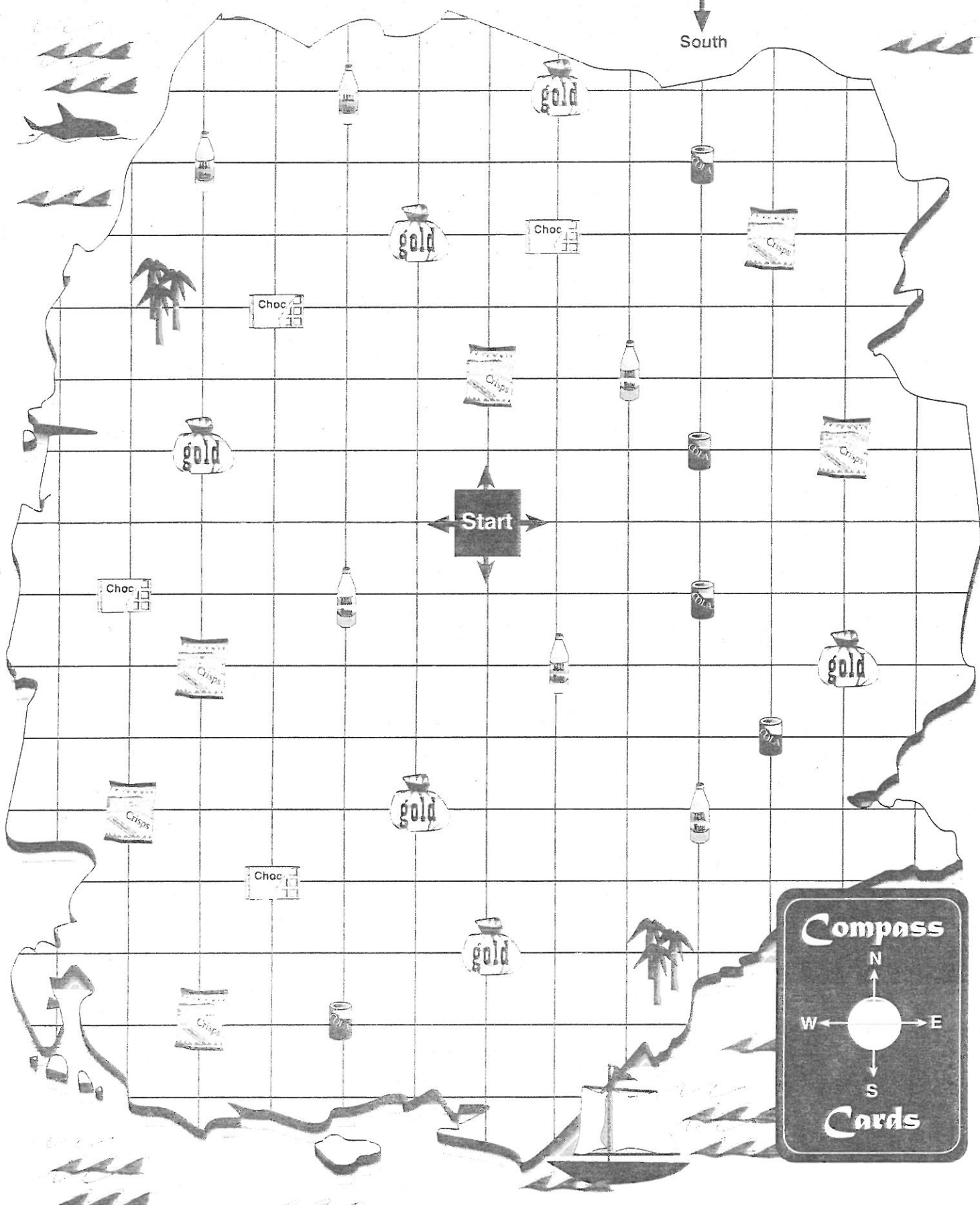
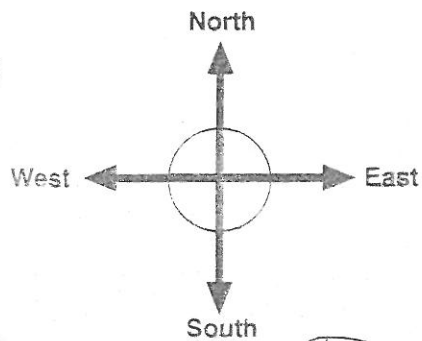
Game 1				
Player 1		✓	✓	
Player 2	✓		✓	
Player 3		✓		
Player 4	✓	✓	✓	

Game 2				
Player 1				

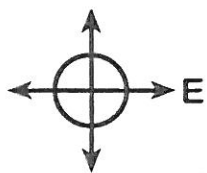
- Now complete a copy of *Smile Worksheet 2279d*.

# Island Game



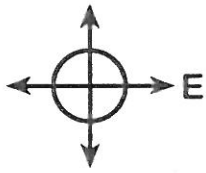
● Cut out these 16 cards and keep them in the envelope Smile 2279 *Island Game*.

Smile 2279b



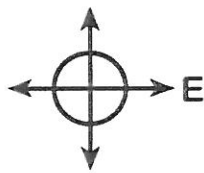
**East**

Smile 2279b



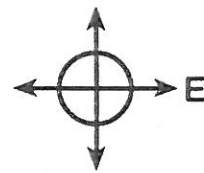
**East**

Smile 2279b



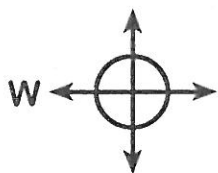
**East**

Smile 2279b



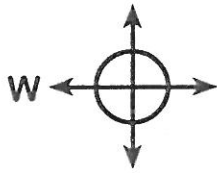
**East**

Smile 2279b



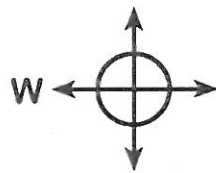
**West**

Smile 2279b



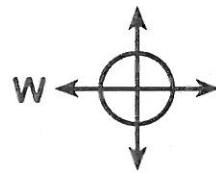
**West**

Smile 2279b



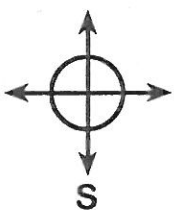
**West**

Smile 2279b



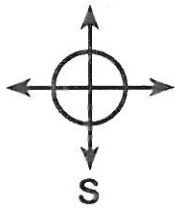
**West**

Smile 2279b



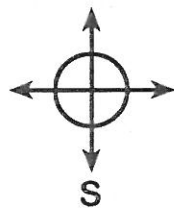
**South**

Smile 2279b



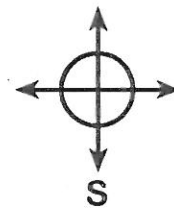
**South**

Smile 2279b



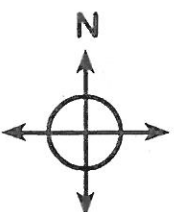
**South**

Smile 2279b



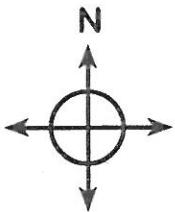
**South**

Smile 2279b



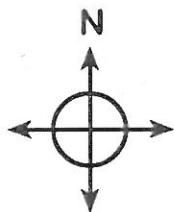
**North**

Smile 2279b



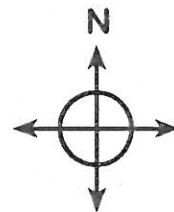
**North**

Smile 2279b







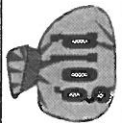
**North**






Smile 2279b





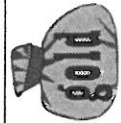


**North**

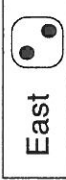
# Island Game Recording Sheet

Game 1					
Player 1					
Player 2					
Player 3					
Player 4					

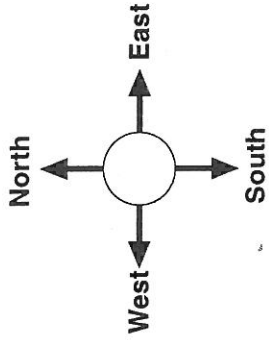
Game 2					
Player 1					
Player 2					
Player 3					
Player 4					

Game 3					
Player 1					
Player 2					
Player 3					
Player 4					

# Island Game Worksheet



means move 2 jumps in the direction East.



1. Follow these moves.  
Tick the objects you collect.

- a) East
- b) North
- c) North
- d) West
- e) South
- f) South
- g) East
- h) South
- i) West
- j) East
- k) South
- l) West

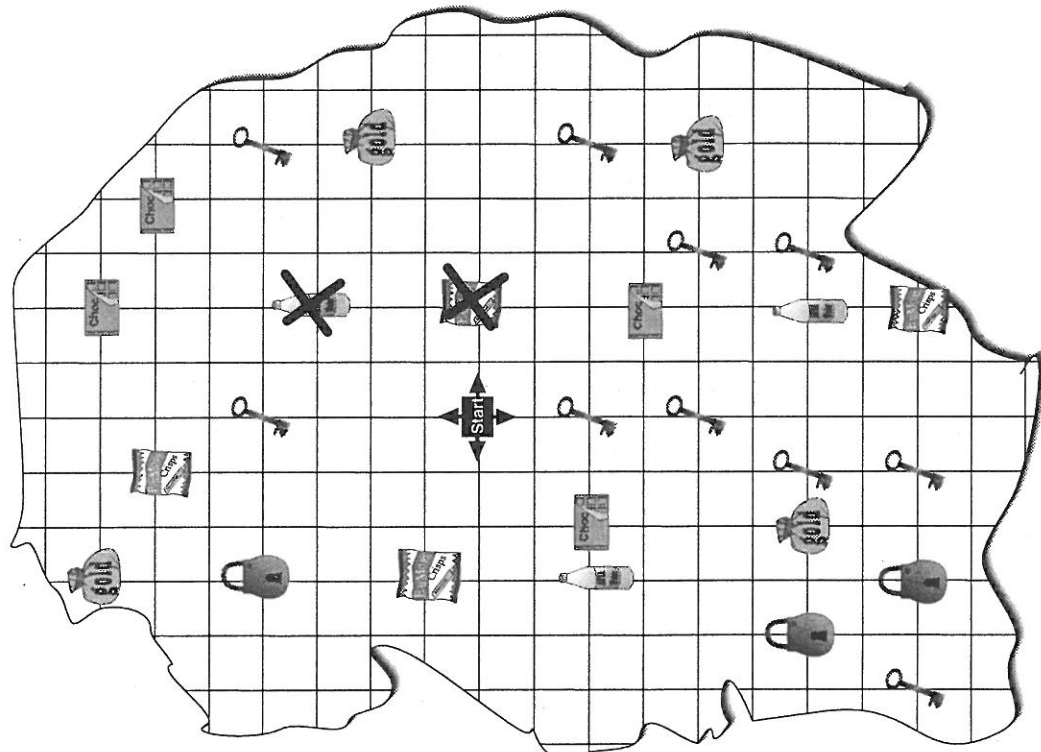
					<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Total number of  
each object  
collected.

2. Find a route to collect **all** the keys.

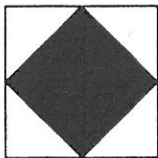
Fill in the direction and the number of jumps.

North	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

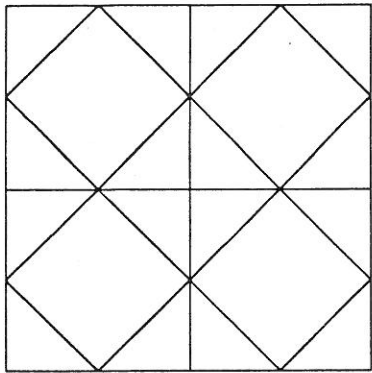
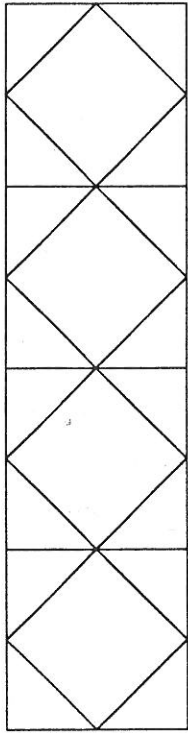


# Shape-tiles

- 1) This tile has a **square** shaded.



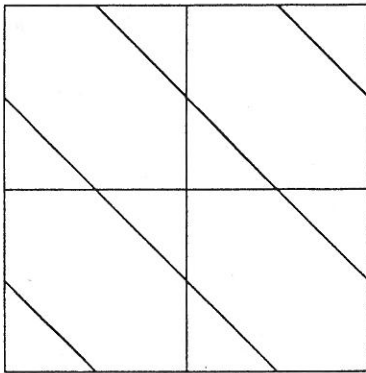
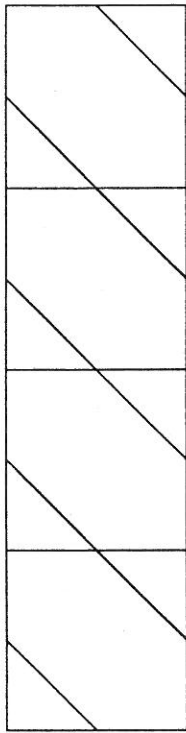
Copy the tile to make a repeating pattern.



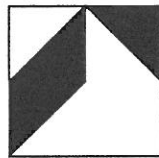
- 2) This tile has two **triangles** shaded.



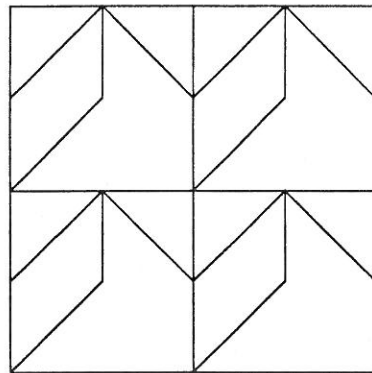
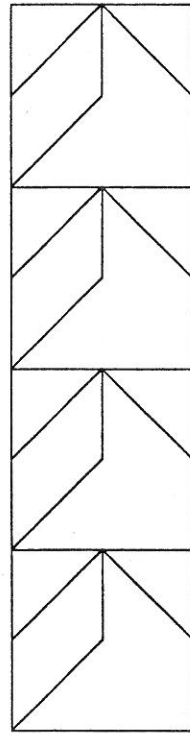
Copy the tile to make a repeating pattern.



- 3) This tile has a **triangle** and a **parallelogram** shaded.

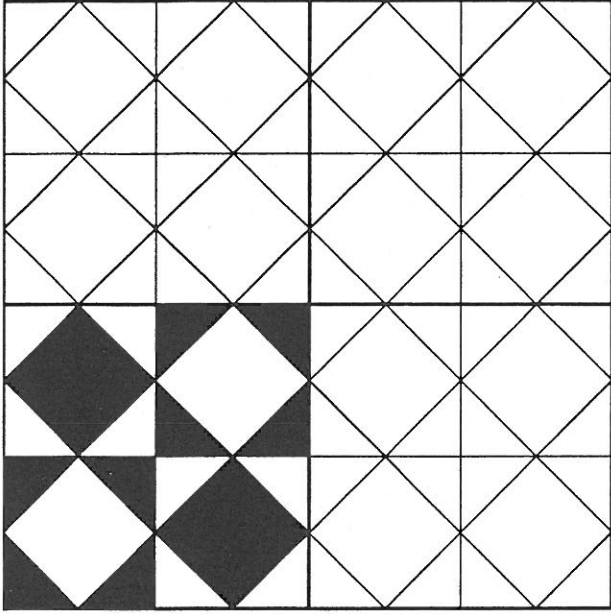
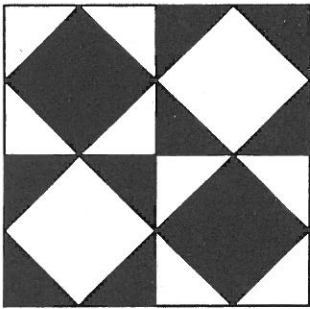


Copy the tile to make a repeating pattern.

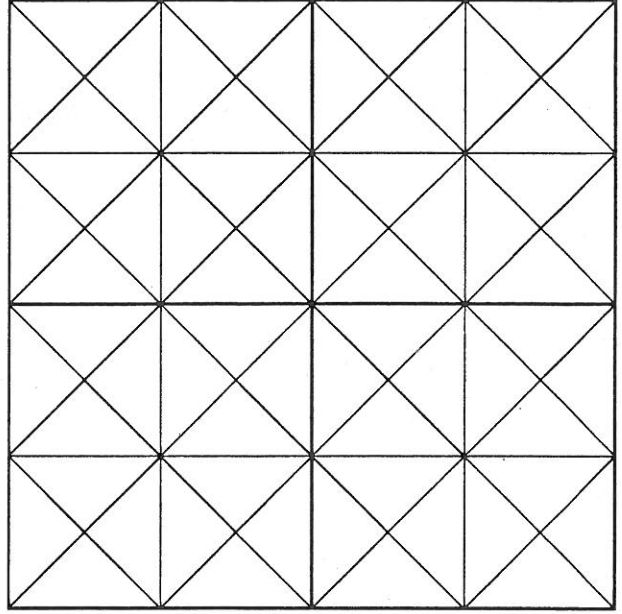
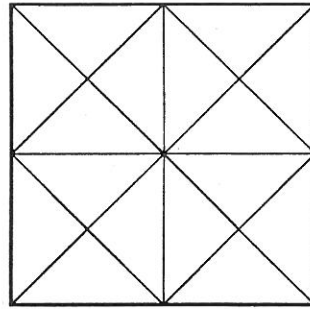




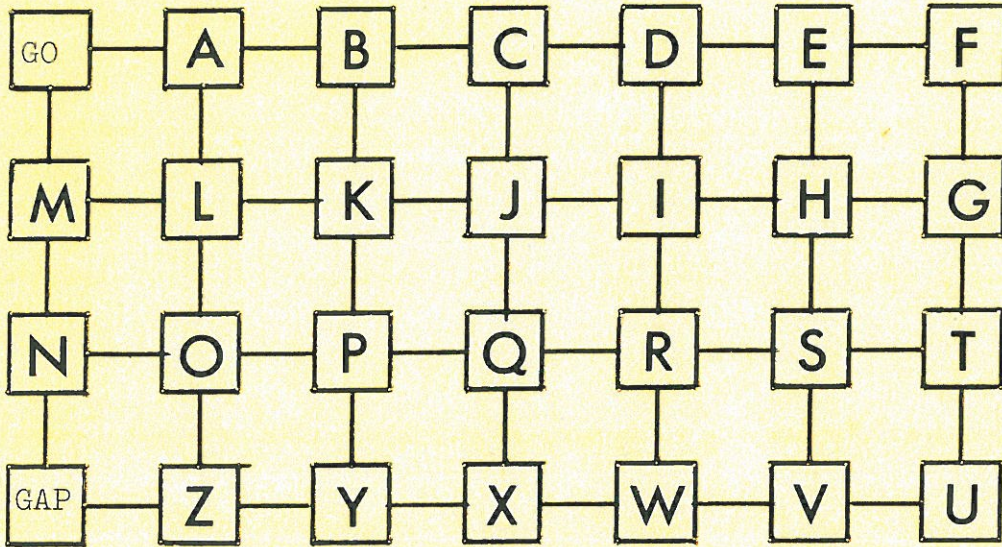
4) Continue this tiling pattern.



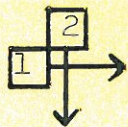
5) Design your own tile and make a repeating tile pattern.



Vector Messages

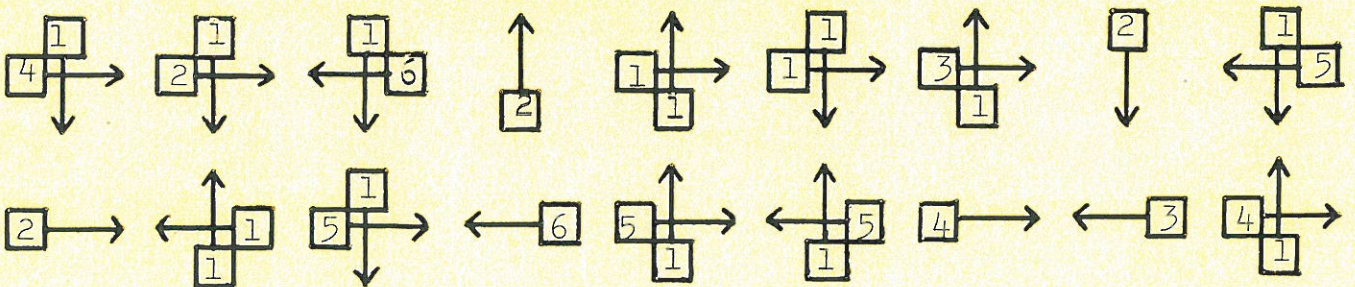


This is a vector. It tells you which way to move and how far to go. This one tells you to move 3 steps to the right.



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

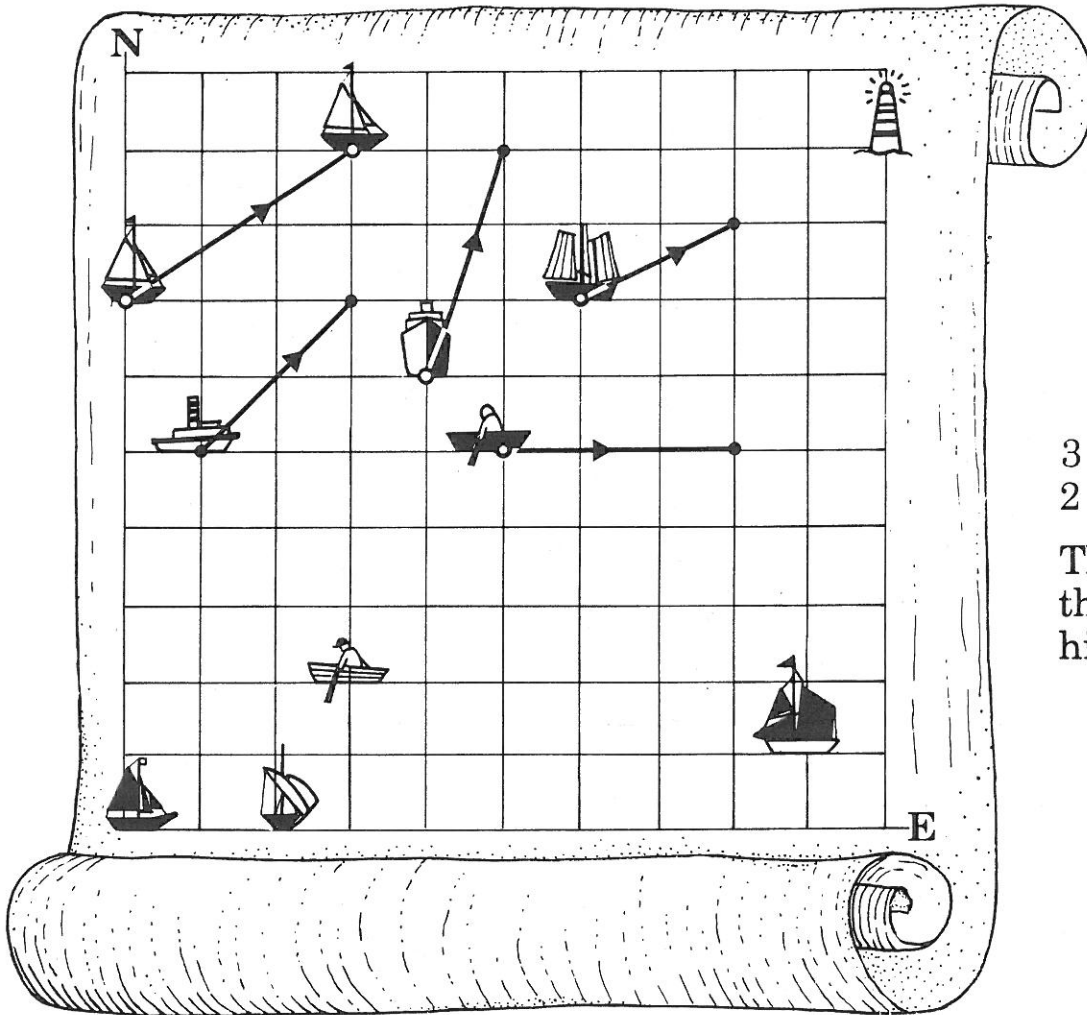
(1) Start at GO, see what the first vector takes you to and carry on from there.




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


(3) Make a vector message for your friend.

# 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.

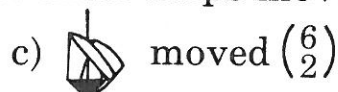
1)  has moved 1 square East and 3 North.


What vector did the captain write?

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



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



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  $\left\{ \begin{array}{l} 2 \text{ squares left} \\ 1 \text{ square up} \end{array} \right\}$  from start to **S**  
 $\begin{pmatrix} +3 \\ -3 \end{pmatrix}$  means move  $\left\{ \begin{array}{l} 3 \text{ squares right} \\ 3 \text{ squares down} \end{array} \right\}$  from **S** to **M**

1) What do the other three vectors mean?

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

2) Decode this message:

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

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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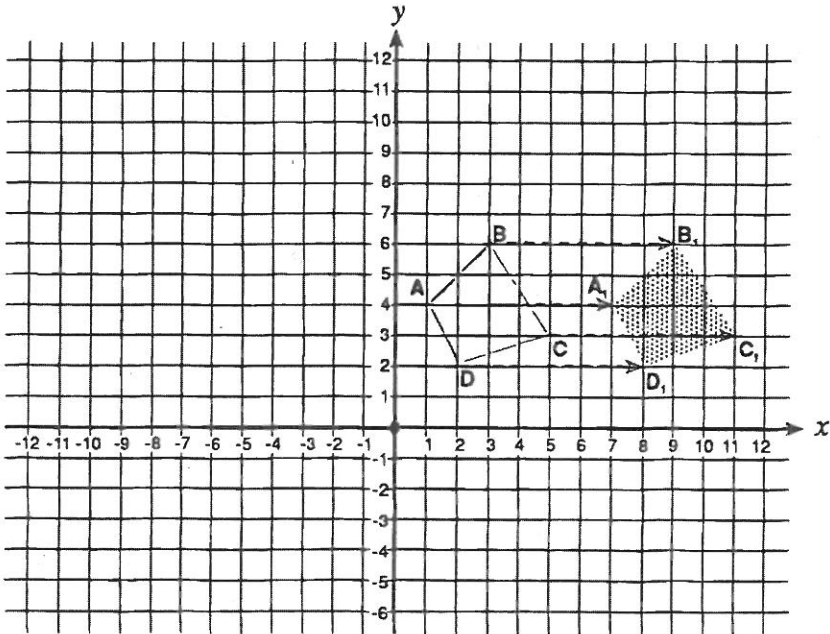


# Translation

**ABCD** is a quadrilateral.

**A** (1, 4), **B** (3, 6), **C** (5, 3) and **D** (2, 2) are the vertices of quadrilateral **ABCD**.

**A<sub>1</sub>B<sub>1</sub>C<sub>1</sub>D<sub>1</sub>** is the image of the quadrilateral **ABCD** after a translation +6 parallel to the *x*-axis



This mapping shows how each point is mapped to its corresponding point of the image.

A (1, 4)	→ +6 parallel to the <i>x</i> -axis →	A <sub>1</sub> (7, 4)
B (3, 6)	→	B <sub>1</sub> (9, 6)
C (5, 3)	→	C <sub>1</sub> (11, 3)
D (2, 2)	→	D <sub>1</sub> (8, 2)

Draw and scale axes as above. Plot points **A**, **B**, **C** and **D**. Draw the quadrilateral **ABCD**.

Draw **A<sub>2</sub>B<sub>2</sub>C<sub>2</sub>D<sub>2</sub>**, the image of **ABCD** after a translation -5 parallel to the *x*-axis

Copy and complete this mapping for this translation.

A (1, 4)	→ -5 parallel to the <i>x</i> -axis →	A <sub>2</sub> (-4, 4)
B (3, 6)	→	B <sub>2</sub> ( , )
C (5, 3)	→	C <sub>2</sub> ( , )
D (2, 2)	→	D <sub>2</sub> ( , )

Draw **A<sub>3</sub>B<sub>3</sub>C<sub>3</sub>D<sub>3</sub>**, the image of the quadrilateral **ABCD** after a translation -6 parallel to the *y*-axis

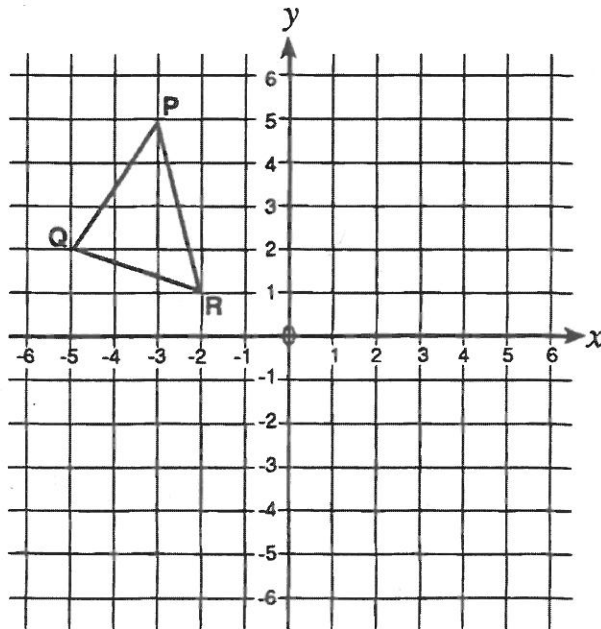
Copy and complete the mapping for this translation.

A (1, 4)	→ -6 parallel to the <i>y</i> -axis →	A <sub>3</sub> ( , )
----------	---------------------------------------	----------------------

Draw **A<sub>4</sub>B<sub>4</sub>C<sub>4</sub>D<sub>4</sub>**, the image of the quadrilateral **ABCD** after a translation +5 parallel to the *y*-axis

Copy and complete the mapping for this translation.

A (1, 4)	→ +5 parallel to the <i>y</i> -axis →	A <sub>4</sub> ( , )
----------	---------------------------------------	----------------------



of triangle **PQR** after a translation +7 parallel to the  $x$ -axis

this translation.

$$P(-3, 5) \xrightarrow{+7 \text{ parallel to the } x\text{-axis}} P_1( \quad , \quad )$$

of triangle **P<sub>1</sub>Q<sub>1</sub>R<sub>1</sub>** after a translation -6 parallel to the  $y$ -axis

this translation.

$$P_1( \quad , \quad ) \xrightarrow{-6 \text{ parallel to the } y\text{-axis}} P_2( \quad , \quad )$$

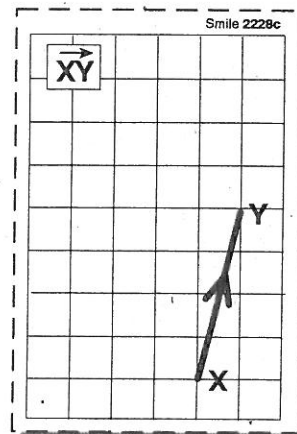
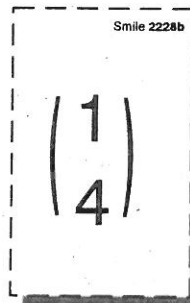
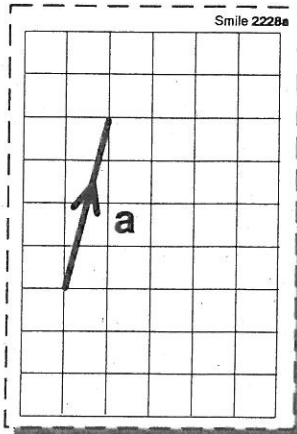
show the combined translation +7 parallel to  $x$ -axis followed by -6 parallel to  $y$ -axis

$$P(-3, 5) \xrightarrow{\begin{array}{l} +7 \text{ parallel to the } x\text{-axis} \\ \text{followed by} \\ -6 \text{ parallel to the } y\text{-axis} \end{array}} P_2( \quad , \quad )$$

# VECTOR MATCH

This envelope contains 24 vector cards.

**Vectors** can be expressed in three ways.



$$\mathbf{a} = \begin{pmatrix} 1 \\ 4 \end{pmatrix} = \overrightarrow{XY}$$

These vectors are equivalent.

- Match the cards into 7 sets of 3 equivalent vectors.  
*You will find three of the cards cannot be matched.*
- Copy the three remaining cards and draw/write equivalent vectors to match them.

Note

In print, letter vectors appear in bold type

**a**

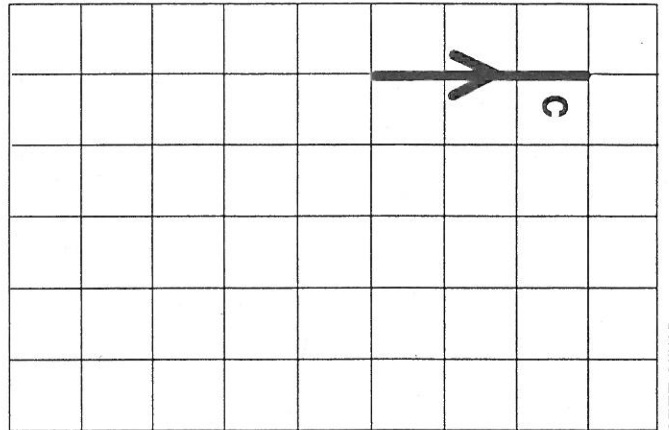
When handwritten letter vectors are underlined

a

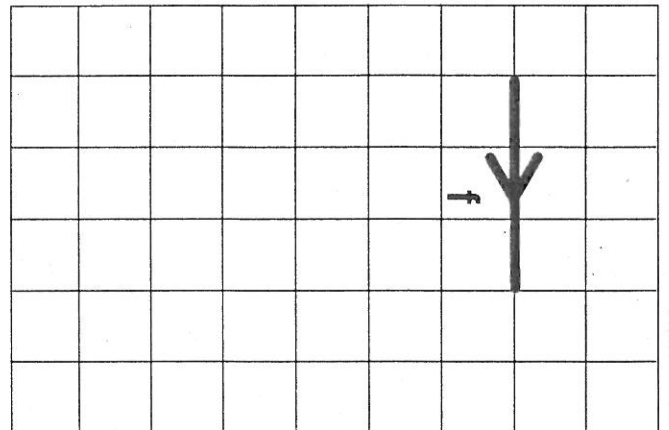




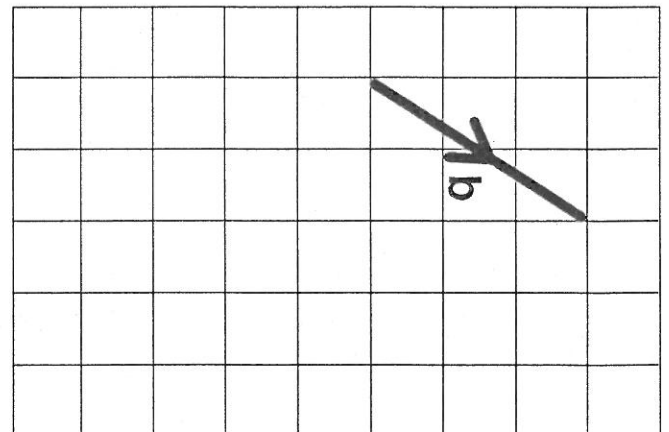
Cut out these cards and put them together with the cards from 2228b and 2228c into envelope 2228.



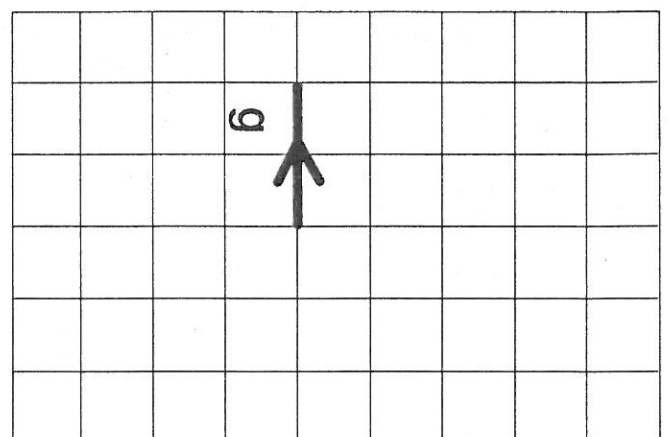
Smile 2228a



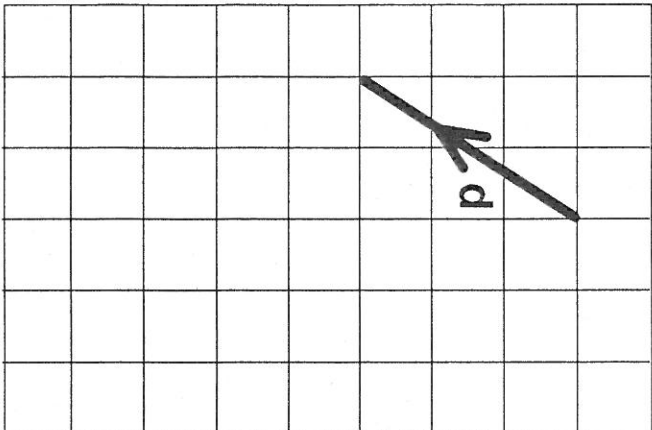
Smile 2228a



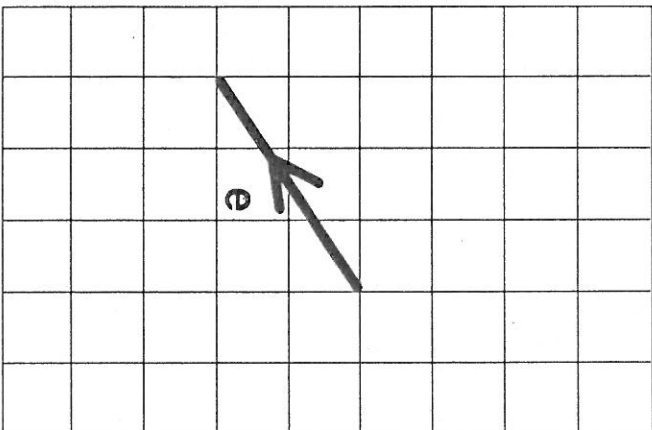
Smile 2228a



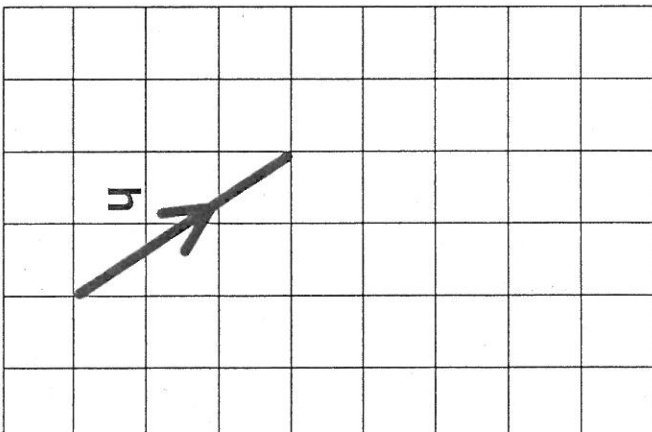
Smile 2228a



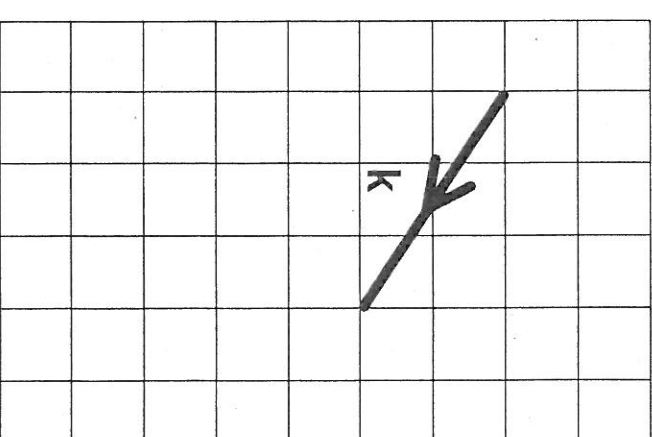
Smile 2228a



Smile 2228a



Smile 2228a



Smile 2228a

Cut out these cards and put them together with the cards from 2228a and 2228c into envelope 2228.



Smile 2228b

$$\begin{pmatrix} 2 \\ -3 \end{pmatrix}$$

Smile 2228b

$$\begin{pmatrix} 3 \\ 0 \end{pmatrix}$$

Smile 2228a

$$\begin{pmatrix} 3 \\ -2 \end{pmatrix}$$

Smile 2228b

$$\begin{pmatrix} 2 \\ 3 \end{pmatrix}$$

Smile 2228b

$$\begin{pmatrix} -2 \\ -3 \end{pmatrix}$$

Smile 2228b

$$\begin{pmatrix} 0 \\ 3 \end{pmatrix}$$

Smile 2228b

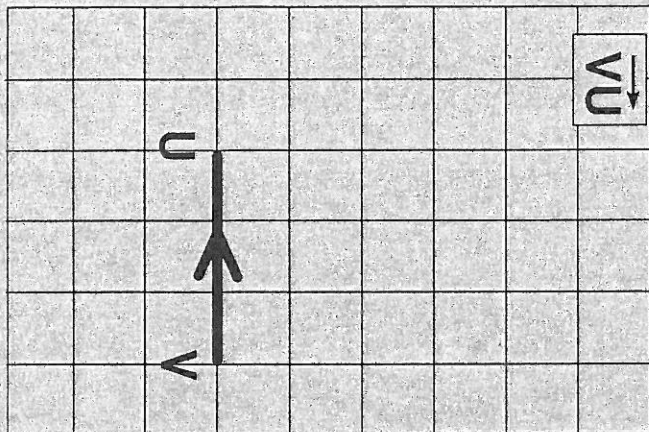
$$\begin{pmatrix} -3 \\ -2 \end{pmatrix}$$

Smile 2228b

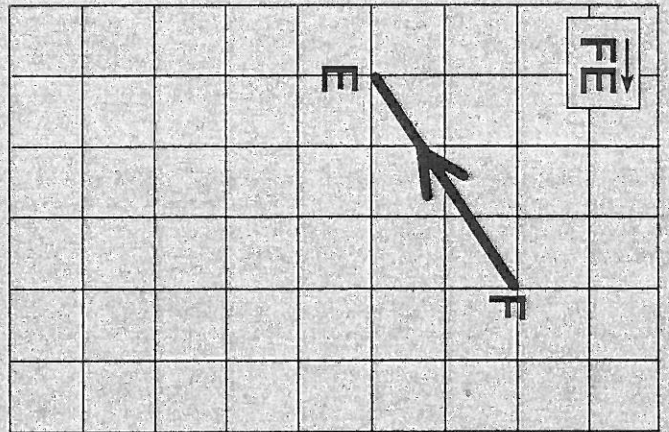
$$\begin{pmatrix} -2 \\ 0 \end{pmatrix}$$



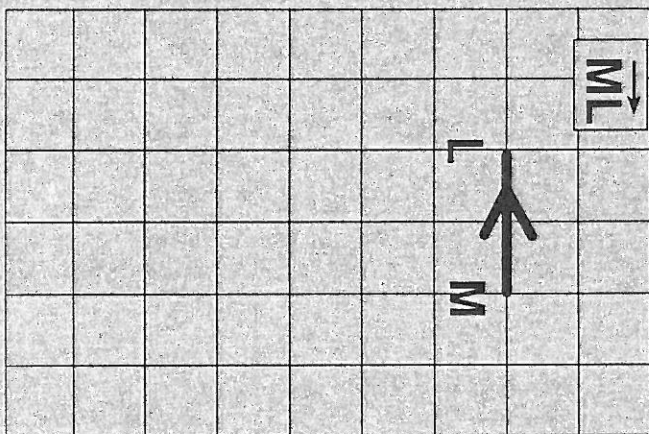
Cut out these cards and put them together with the cards from 2228a and 2228b into envelope 2228.



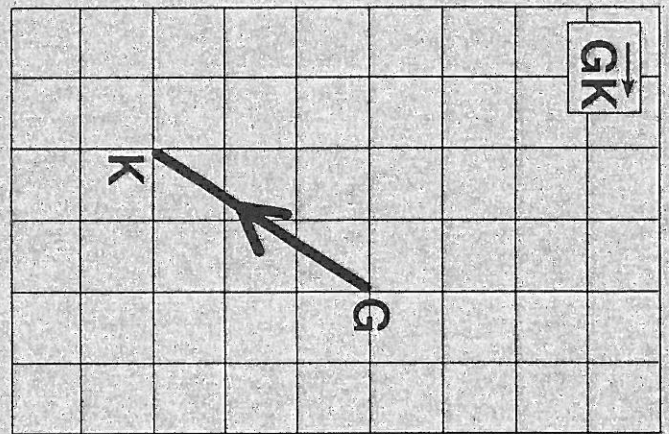
Smile 2228c



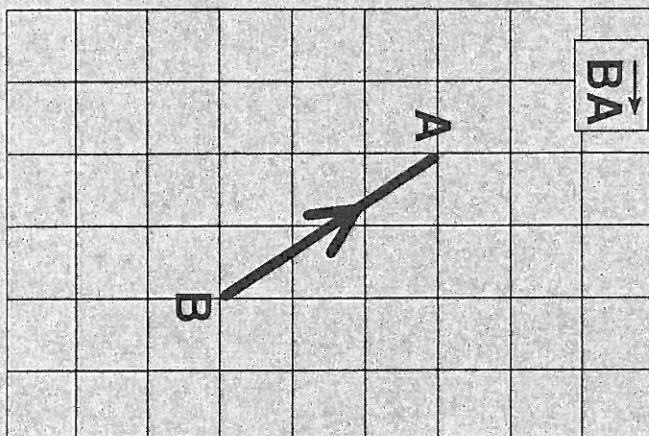
Smile 2228c



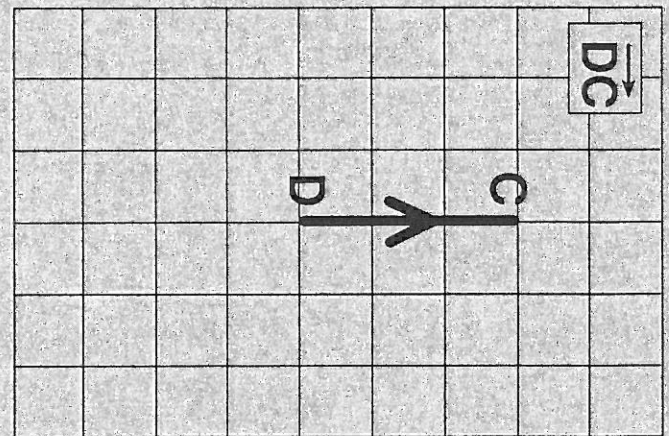
Smile 2228c



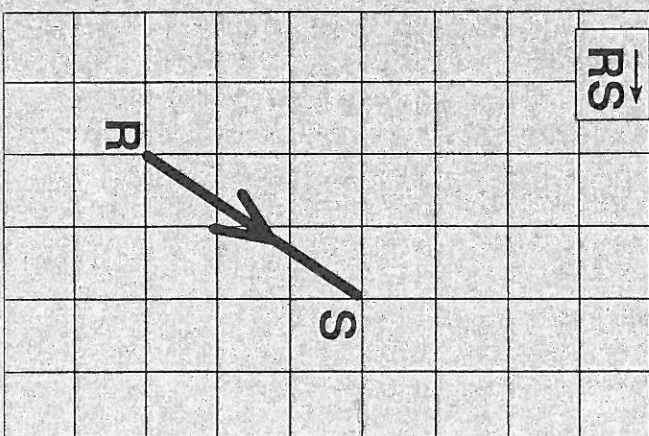
Smile 2228c



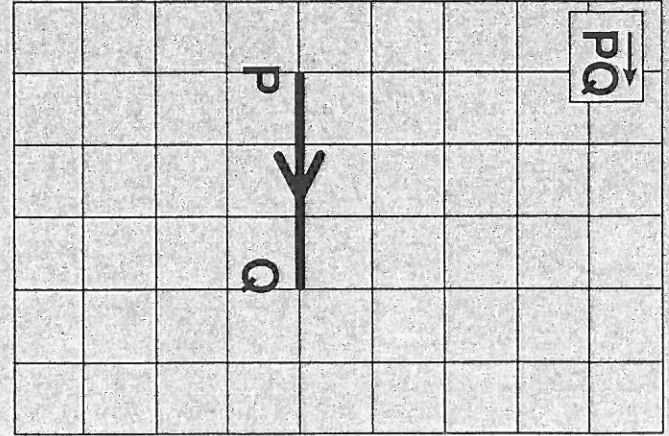
Smile 2228c



Smile 2228c

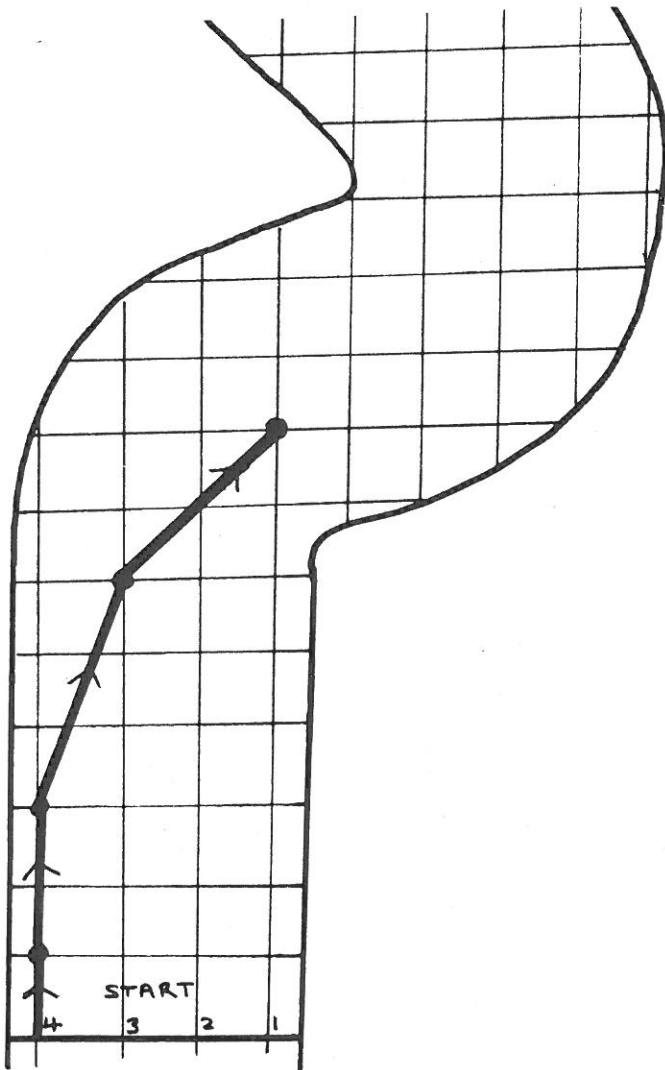


Smile 2228c



Smile 2228c

# RACE TRACK



This is a game for 2 - 4 players.

Each player moves in turn and the moves must be written as vectors.

John's first 4 moves are:

$$\begin{pmatrix} 0 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ 2 \end{pmatrix}, \begin{pmatrix} 1 \\ 3 \end{pmatrix}, \begin{pmatrix} 2 \\ 2 \end{pmatrix}, \dots$$

## RULES

(1) Each player starts off from rest, i.e. with the vector  $\begin{pmatrix} 0 \\ 0 \end{pmatrix}$

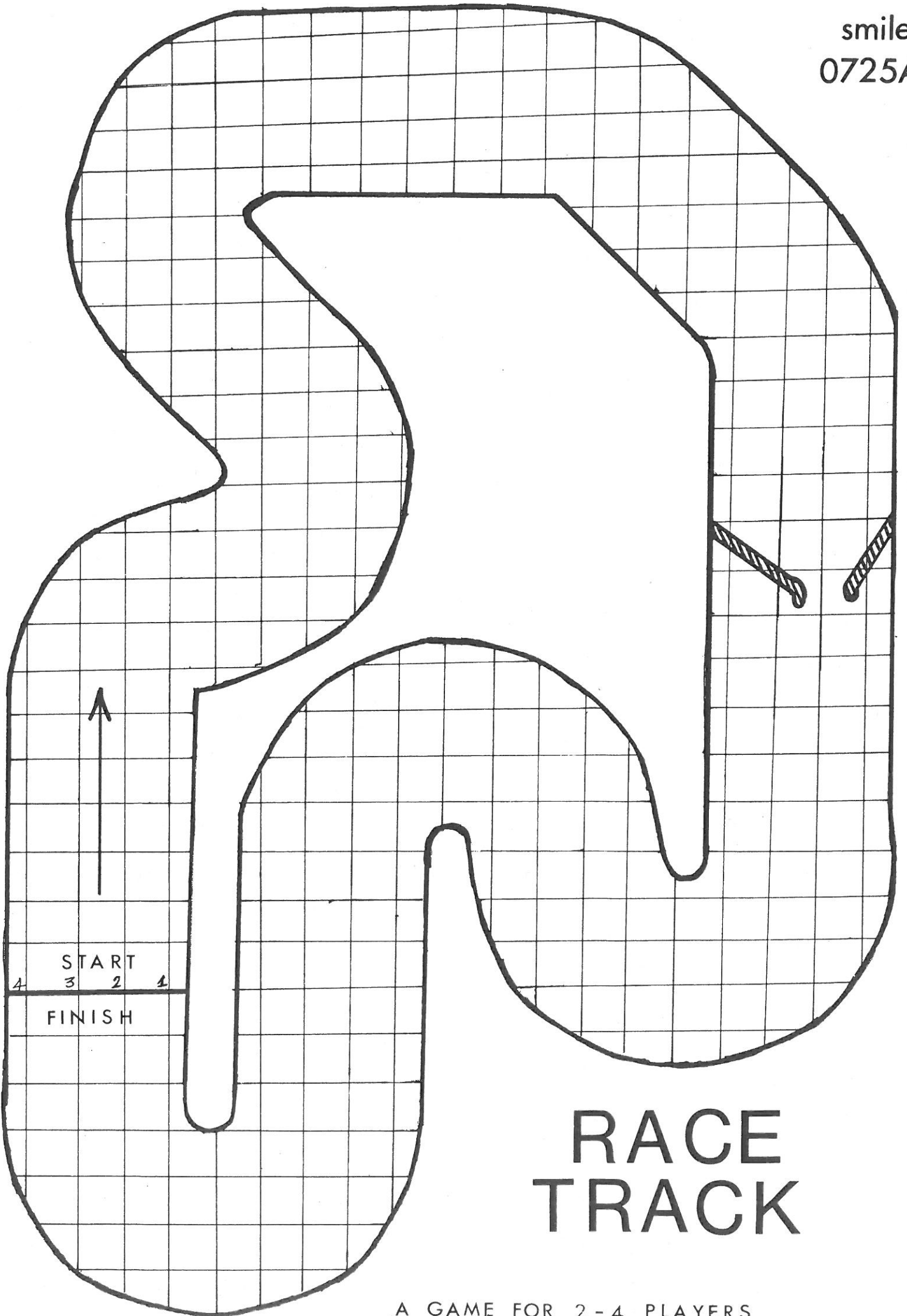
(2) To move, each component of your previous move may be changed by 1 or left alone.

After a move of  $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$  any of the following moves are possible:

$$\begin{pmatrix} 0 \\ 3 \end{pmatrix} \quad \begin{pmatrix} -1 \\ 3 \end{pmatrix} \quad \begin{pmatrix} 1 \\ 3 \end{pmatrix} \quad \begin{pmatrix} 0 \\ 2 \end{pmatrix} \quad \begin{pmatrix} -1 \\ 2 \end{pmatrix} \quad \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad \begin{pmatrix} 0 \\ 4 \end{pmatrix} \quad \begin{pmatrix} -1 \\ 4 \end{pmatrix} \quad \begin{pmatrix} 1 \\ 4 \end{pmatrix}$$

This game is now available as a micro-program RACEGAME (SMILE 1654). There are 3 different tracks in this program.

smile  
0725A

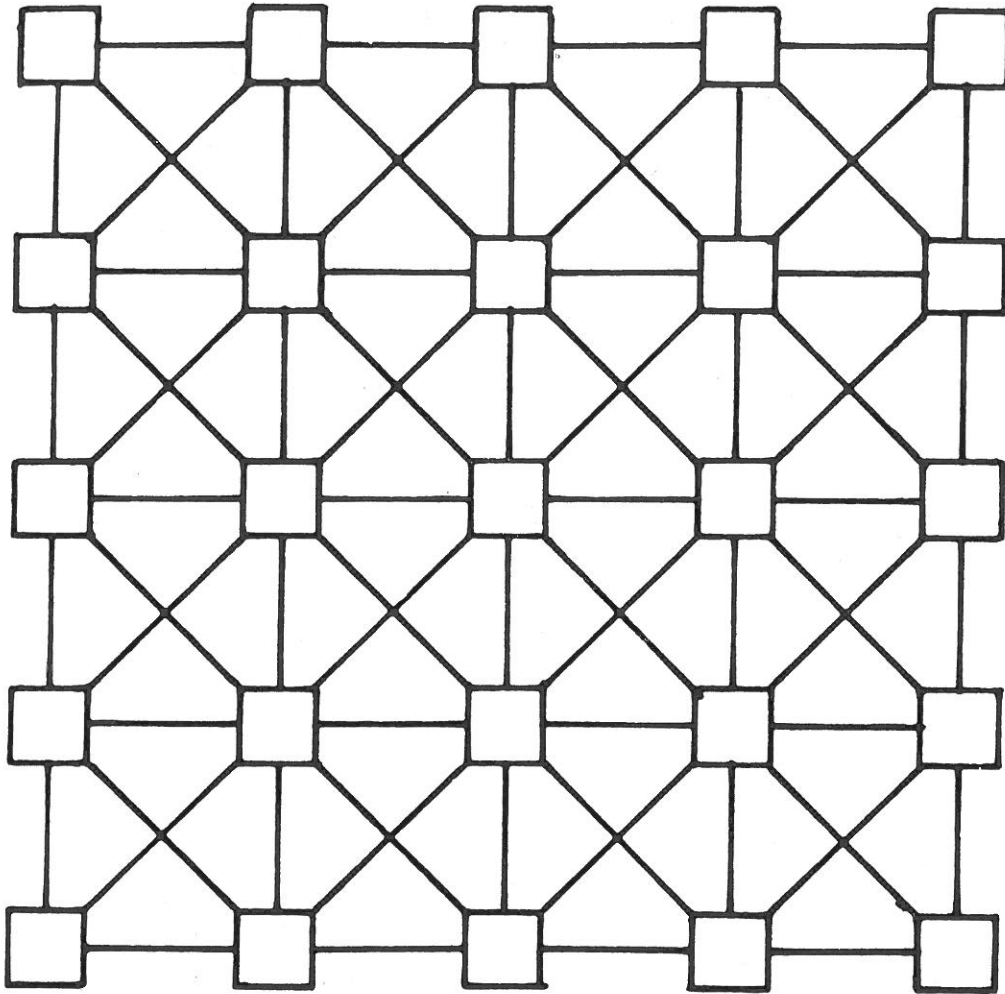


# RACE TRACK

A GAME FOR 2-4 PLAYERS

You will need: Materials: 25 counters  
(5 red, 5 blue, 5 green, 5 white, 5 yellow)

All out of line



Puzzle 1

You must put 5 red counters on the squares so that no 2 counters are on a straight line.

Puzzle 2

Add 5 blue counters so that no 2 blue counters are on a straight line either.

Puzzle 3

Fill the board using 25 counters (5 colours) so that no 2 counters OF THE SAME COLOUR are in a straight line.

Draw your answers.

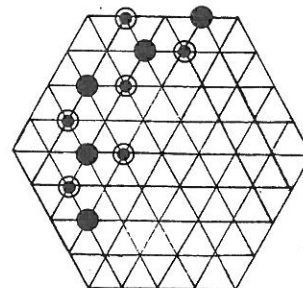
You will need red and blue counters.

Smile 1398

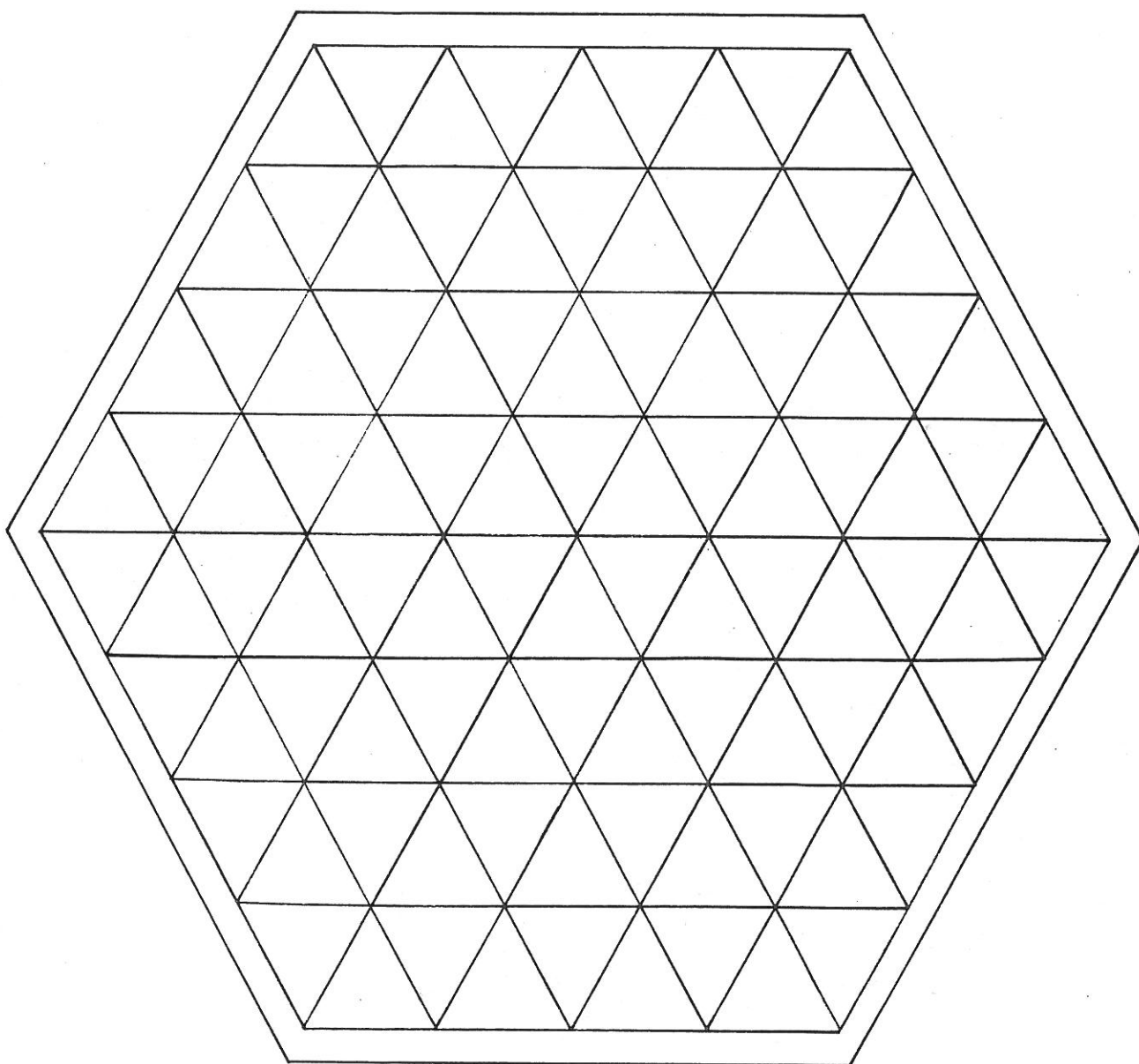
# Trigg

- a game for 2 players

Red ● puts her counter on one vertex of the grid.  
Blue ● puts her counter on any vertex next to any  
of her opponent's . . . . . *but not next to her own.*

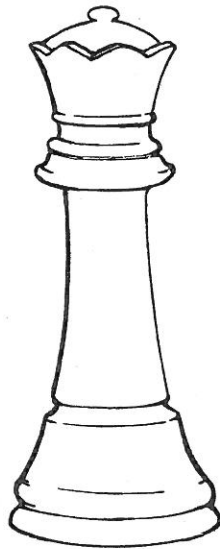


Win by preventing your opponent from moving.



## Large board Trigg

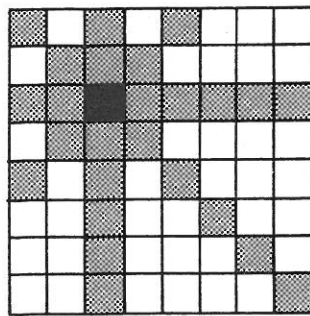
If you have enjoyed playing Trigg, you might like to make it more difficult by using a larger hexagon on which to play.



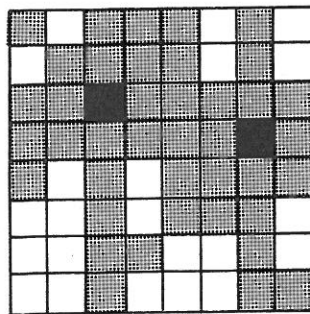
# Queens

In chess a queen can move any distance in a straight line; along rows, along columns, or along diagonals.

Normally each player only has one queen...



... but if you could have more than one queen, you could protect many more squares.



*Problem: Can you arrange 5 queens on a chess-board (8 x 8) so that the queens are protecting every square?*

This problem is quite hard. It will be helpful to use the micro program called QUEENS. This program enables you to draw several patterns very quickly. You can also rub out queens you don't want, and so it is easier to explore different arrangements.

With the micro program you can work with boards of different sizes, so there are many more problems you can try...