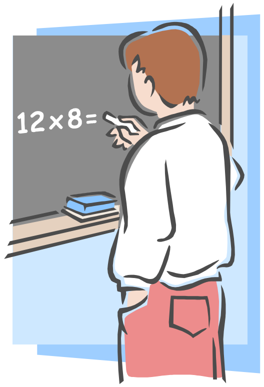
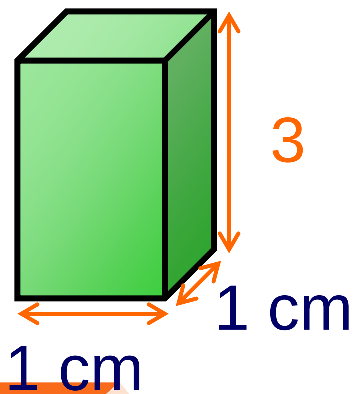
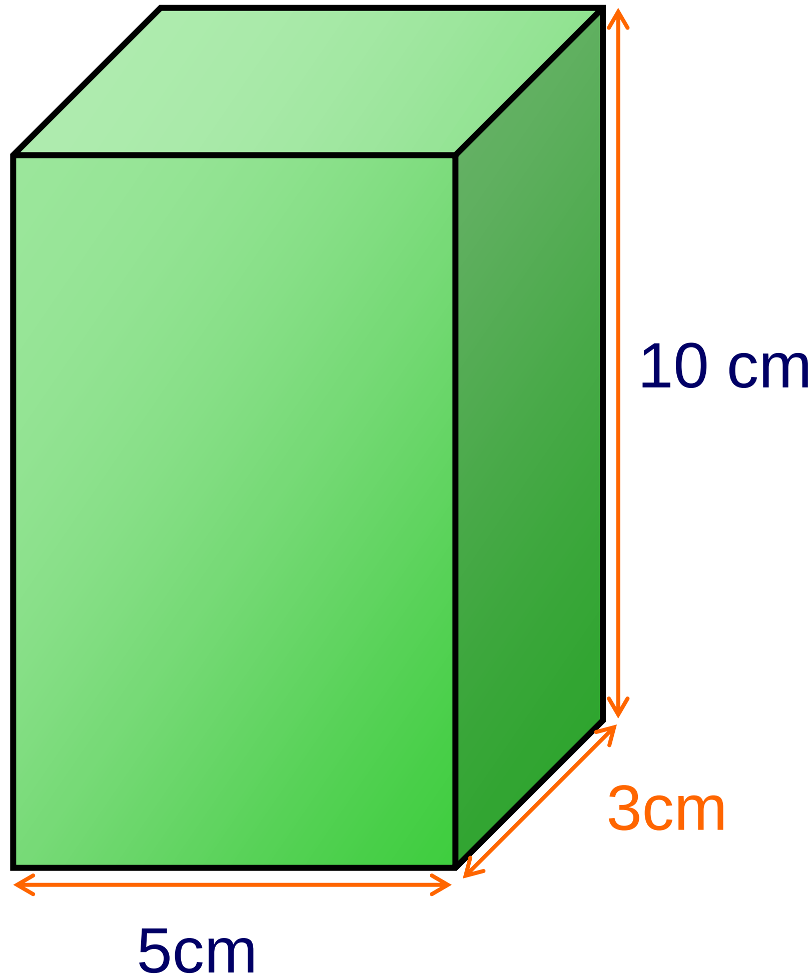


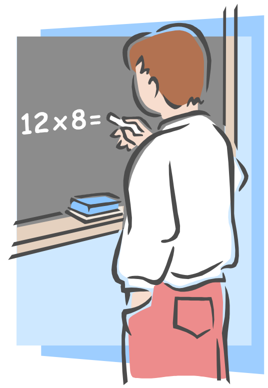
To find the surface area of a cuboid

Find the surface area of the cuboids





Learning Objective



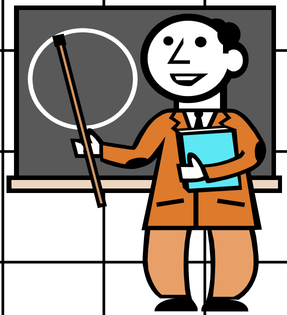
Draw the position of shapes on a coordinate grid after rotations and translations.

Translation

Translation: Translation means moving a shape to a new location. Watch these examples:

This shape has moved 4 places to the right, and 2 places up.

Congruent Shapes



CLICK!

When a shape is translated the image is **congruent** to the original.

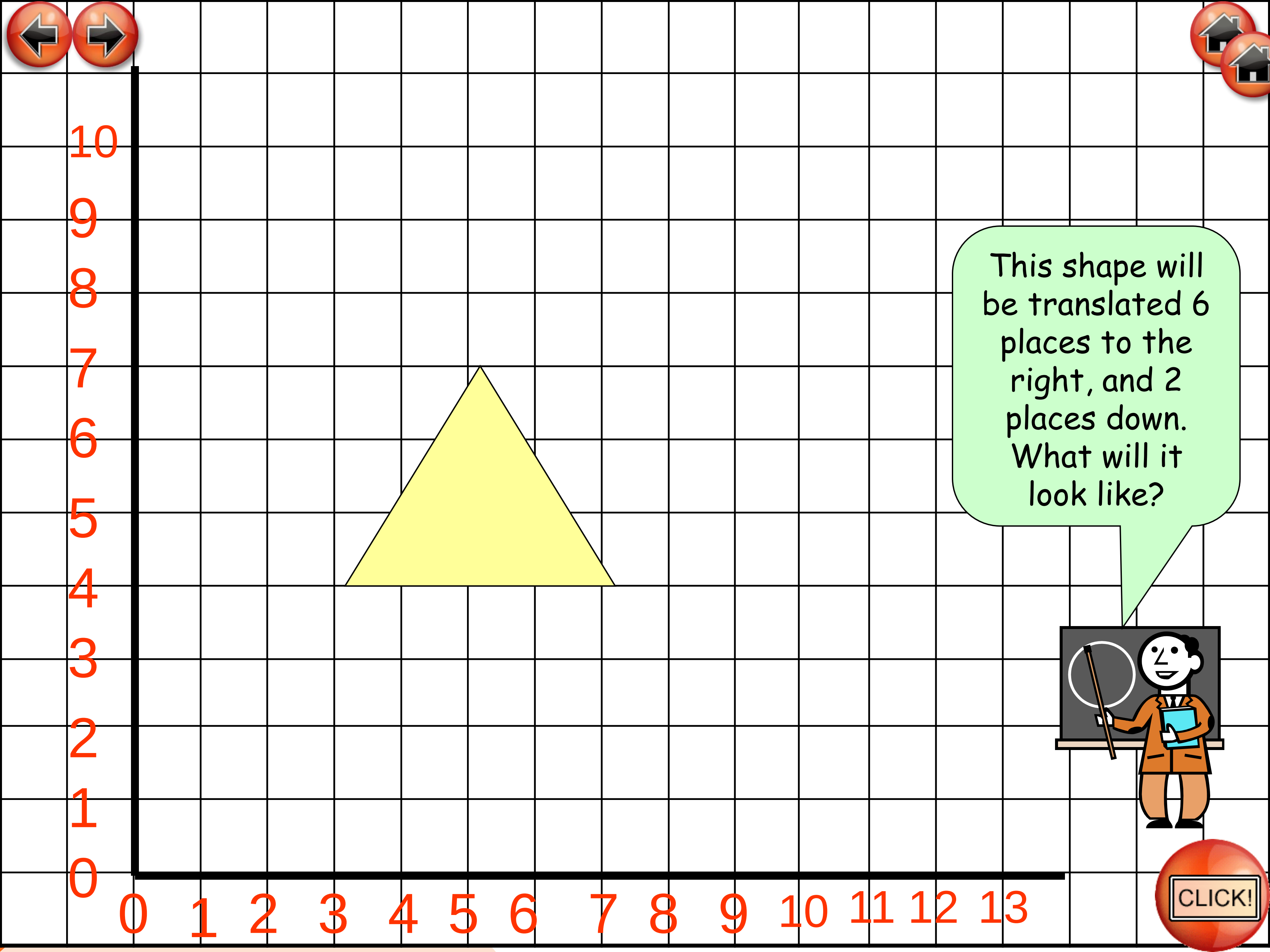
The orientations of the original shape and its image are the same.

An **inverse translation** maps the image that has been translated back onto the original object.

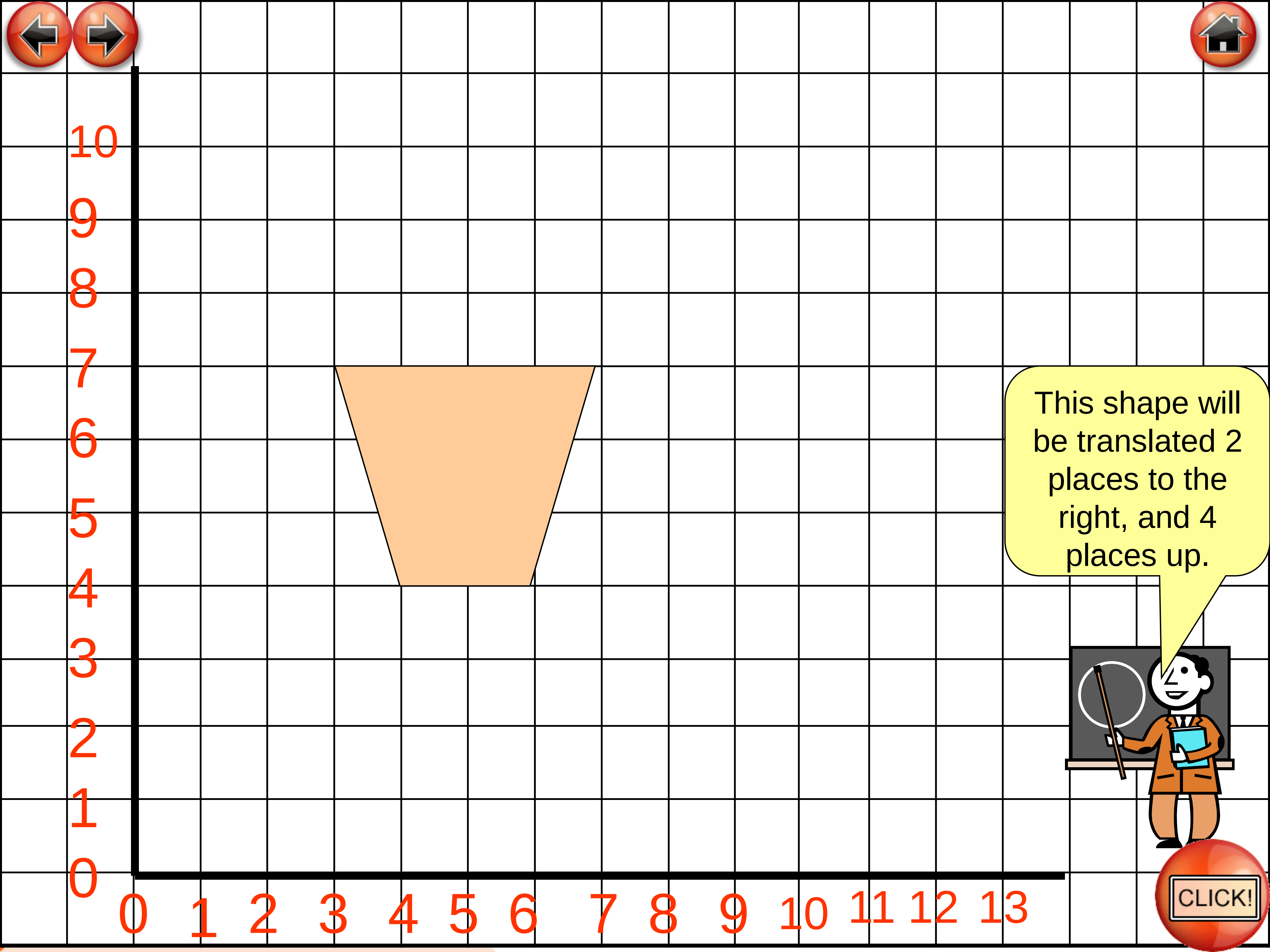
What is the inverse of a translation 7 units to the left and 3 units down?

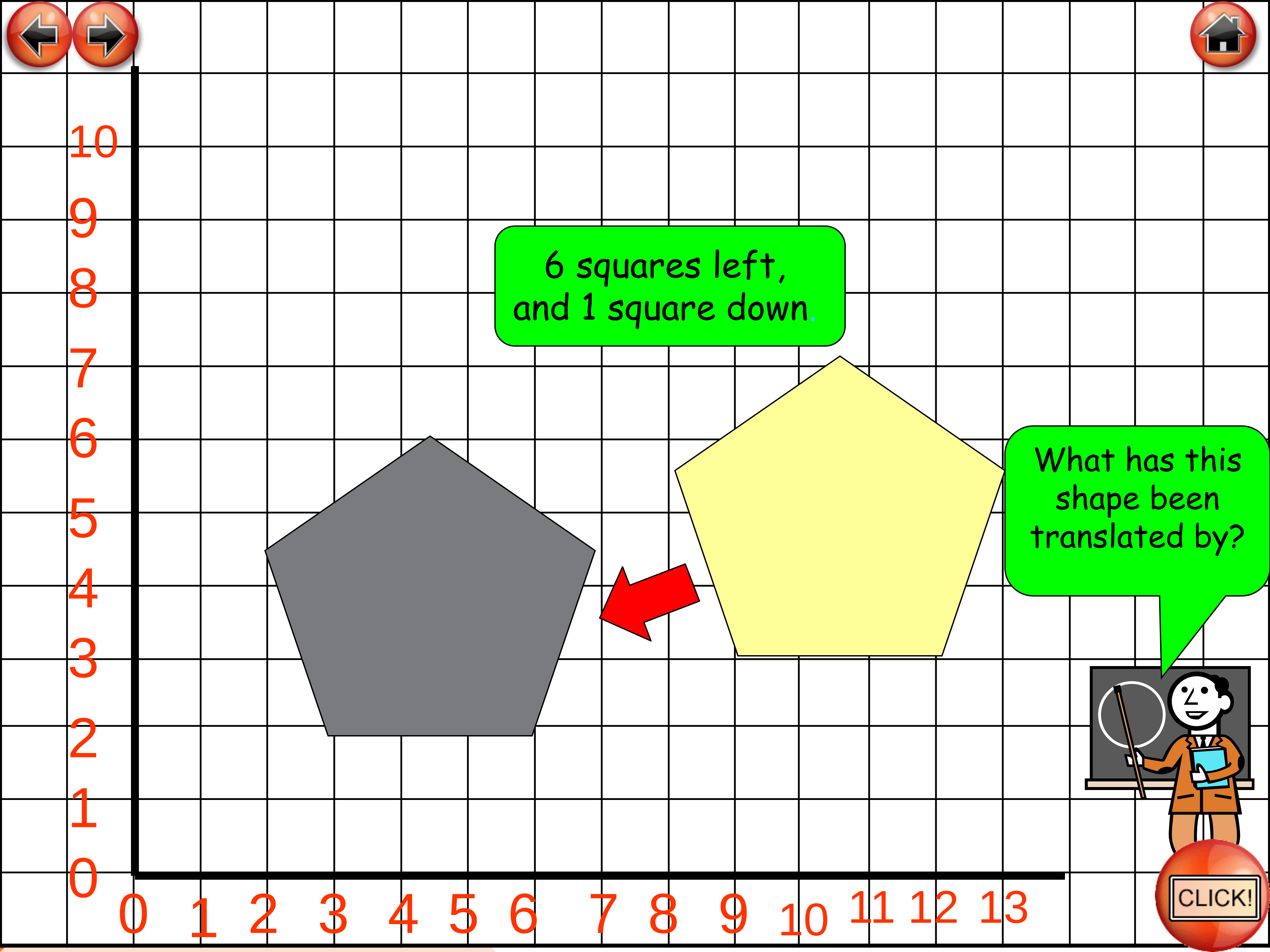
The inverse is an equal move in the opposite direction.

That is, 7 units right and 3 units up.



10
9
8
7
6
5
4
3
2
1
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
This shape will be translated 6 places to the right, and 2 places down. What will it look like?
CLICK!


This shape will be translated 2 places to the right, and 4 places up.
10 9 8 7 6 5 4 3 2 1 0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
CLICK!


6 squares left,
and 1 square down.
What has this shape been translated by?
10
9
8
7
6
5
4
3
2
1
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
CLICK!

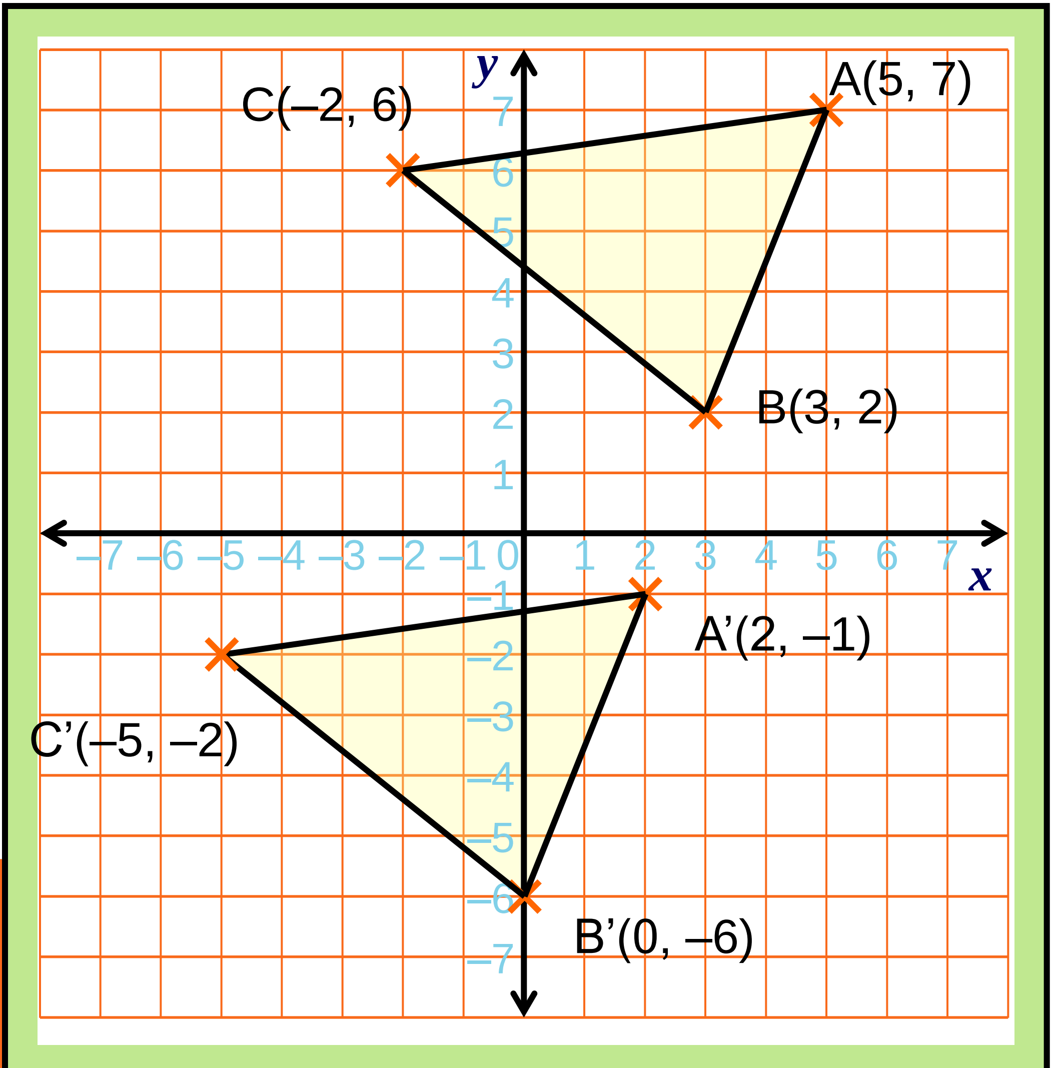
When we describe a translation we always give the movement left or right first followed by the movement up or down.

We can describe translations using **vectors**.

For example, the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$ describes a translation 3 right and 4 down.

As with coordinates, positive numbers indicate movements up or to the right and negative numbers are used for movements down or to the left.

A different way of describing a translation is to give the direction as an angle and the distance as a length.

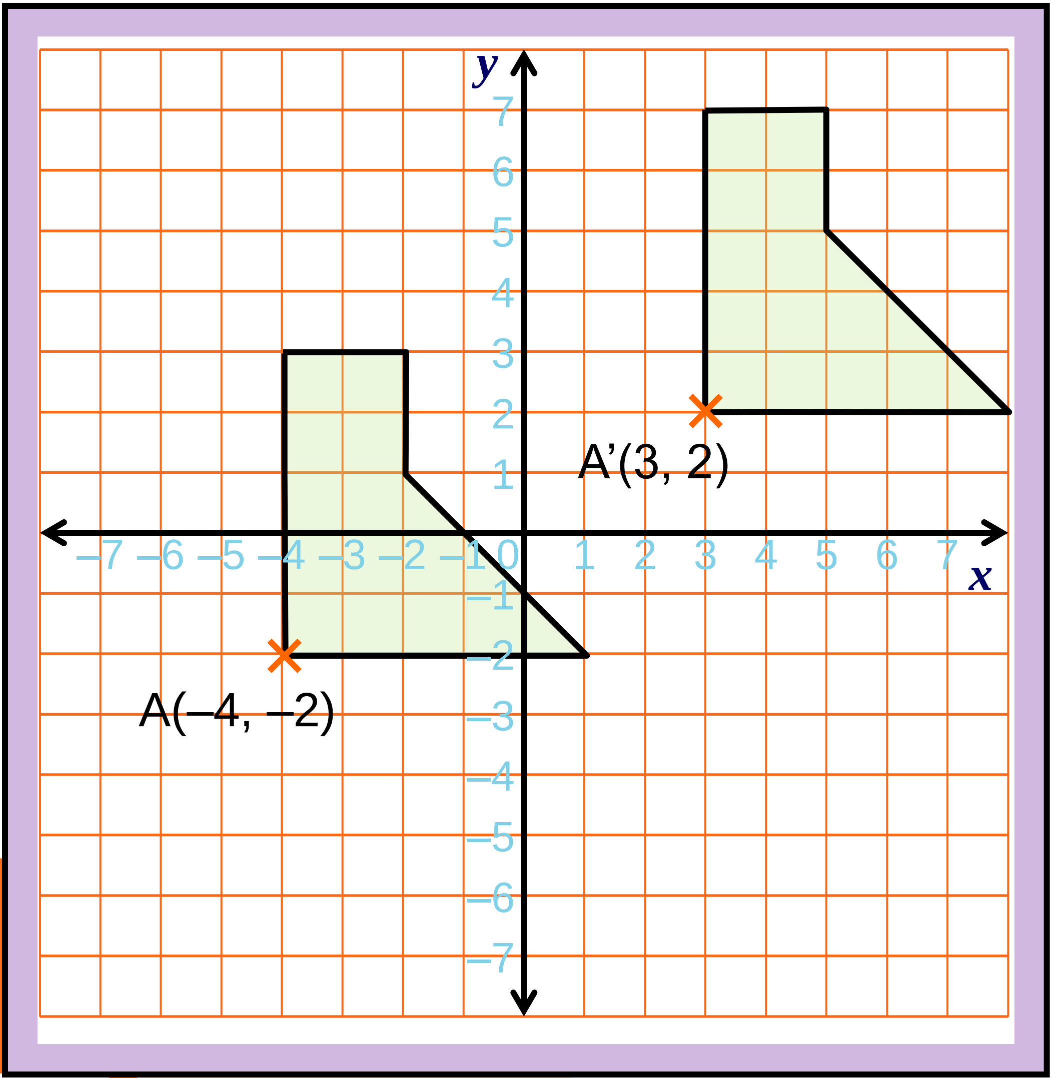


The vertices of a triangle lie on the points A(5, 7), B(3, 2) and C(–2, 6).

Translate the shape 3 squares left and 8 squares down. Label each point in the image.

What do you notice about each point and its image?

Translations on a coordinate grid

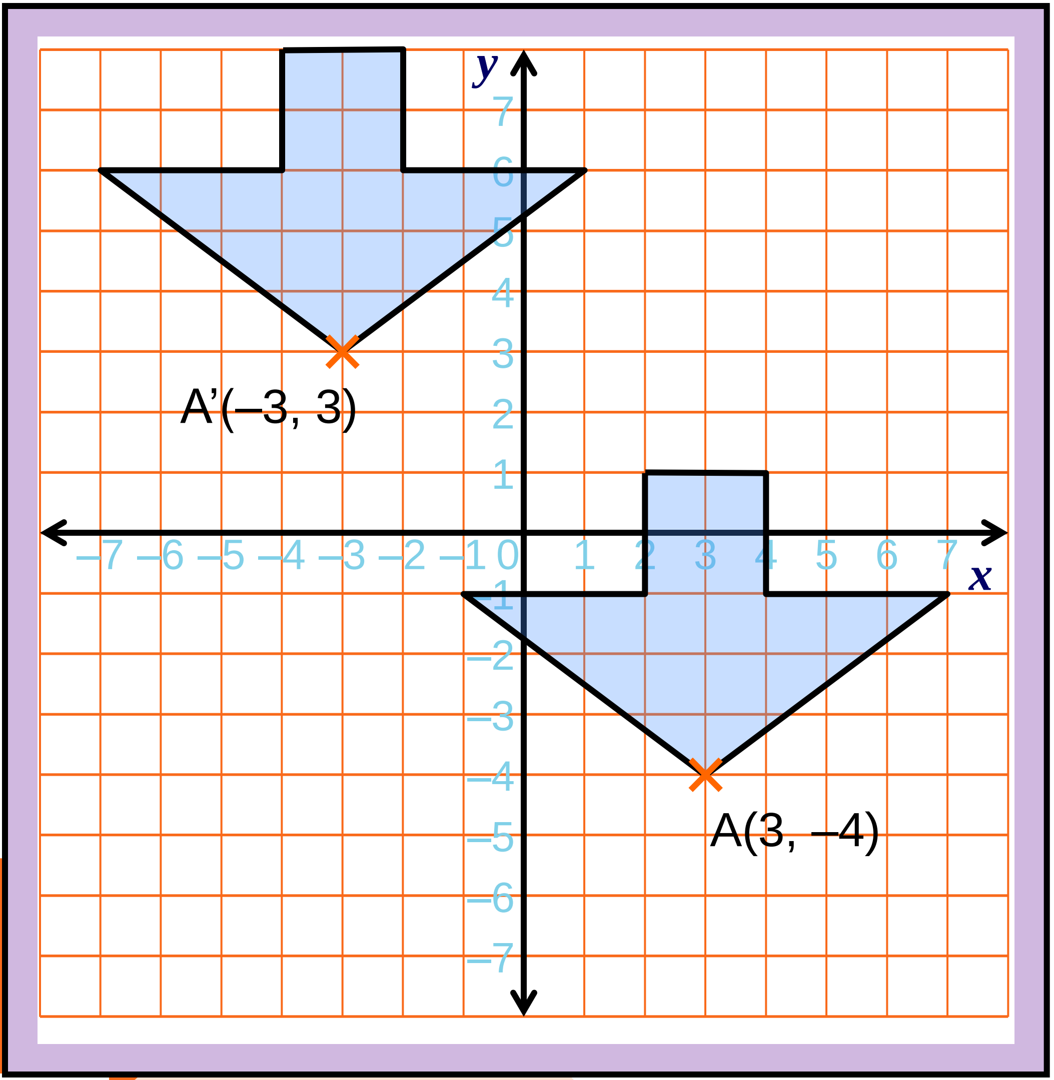


The coordinates of vertex A of this shape are (–4, –2).

When the shape is translated the coordinates of vertex A' are (3, 2).

What translation will map the shape onto its image?

7 right
4 up



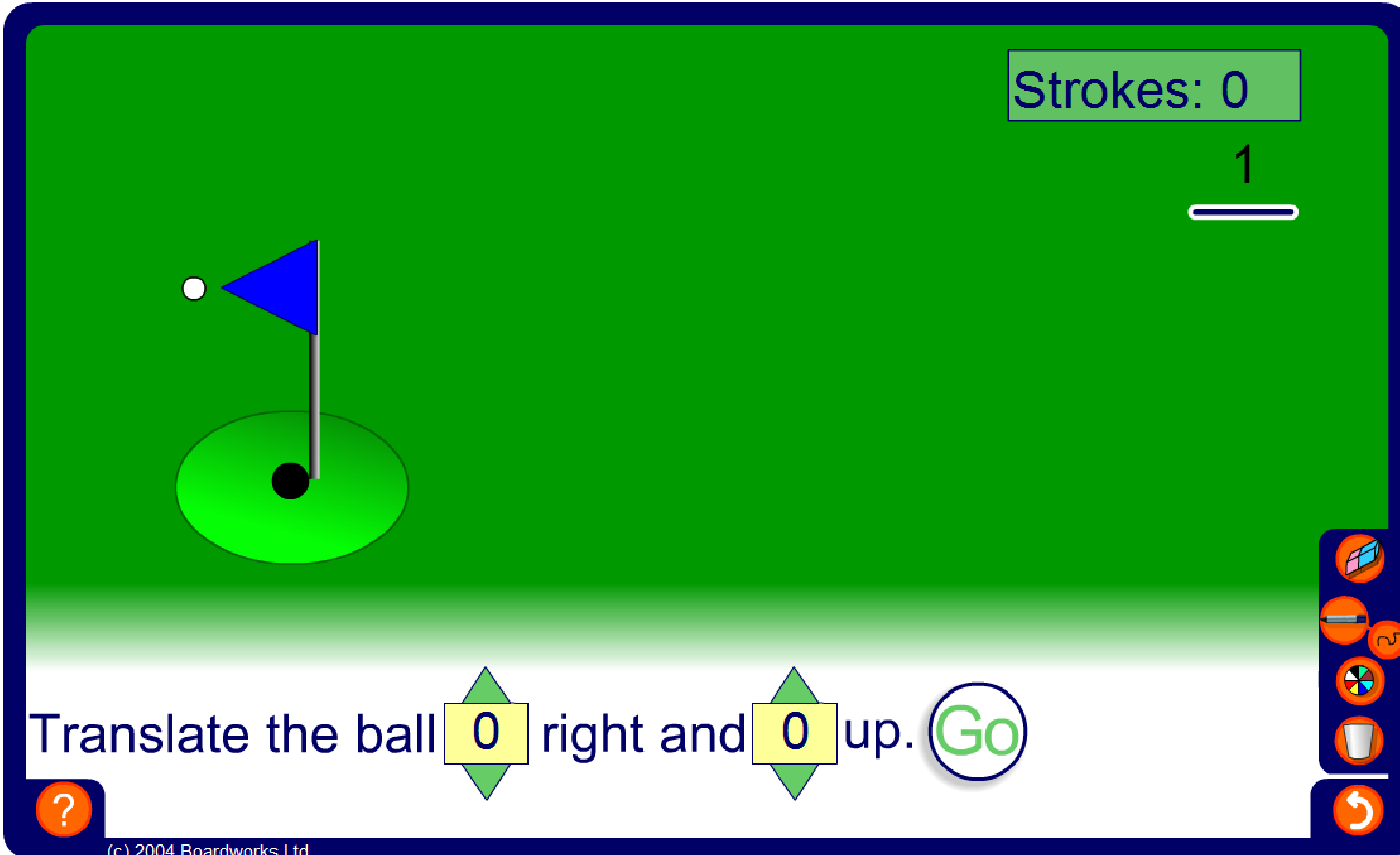
The coordinates of vertex A of this shape are (3, –4).

When the shape is translated the coordinates of vertex A' are(–3, 3).

What translation will map the shape onto its image?

6 left
7 up

Translation golf



$\frac{5}{9}$ $\frac{7}{12}$ $\frac{3}{6}$ $\frac{3}{4}$

Look at the DENOMINATORS.
What are the MULTIPLES?

9: 9, 18, 27, 36, 45, 54, …

12: 12, 24, 36, 48, 60, …

6: 6, 12, 18, 24, 30, 36, 48, …

4: 4, 8, 12, 16, 20, 24, 28, 32, 36,…

2/4

3/5

6/10

1/2

3/6

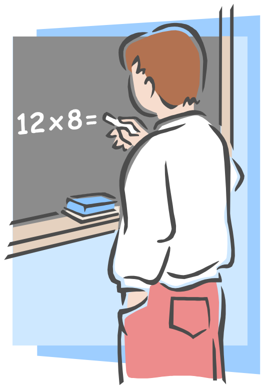
7/8

3/4

4/4

2/3

Learning Objective

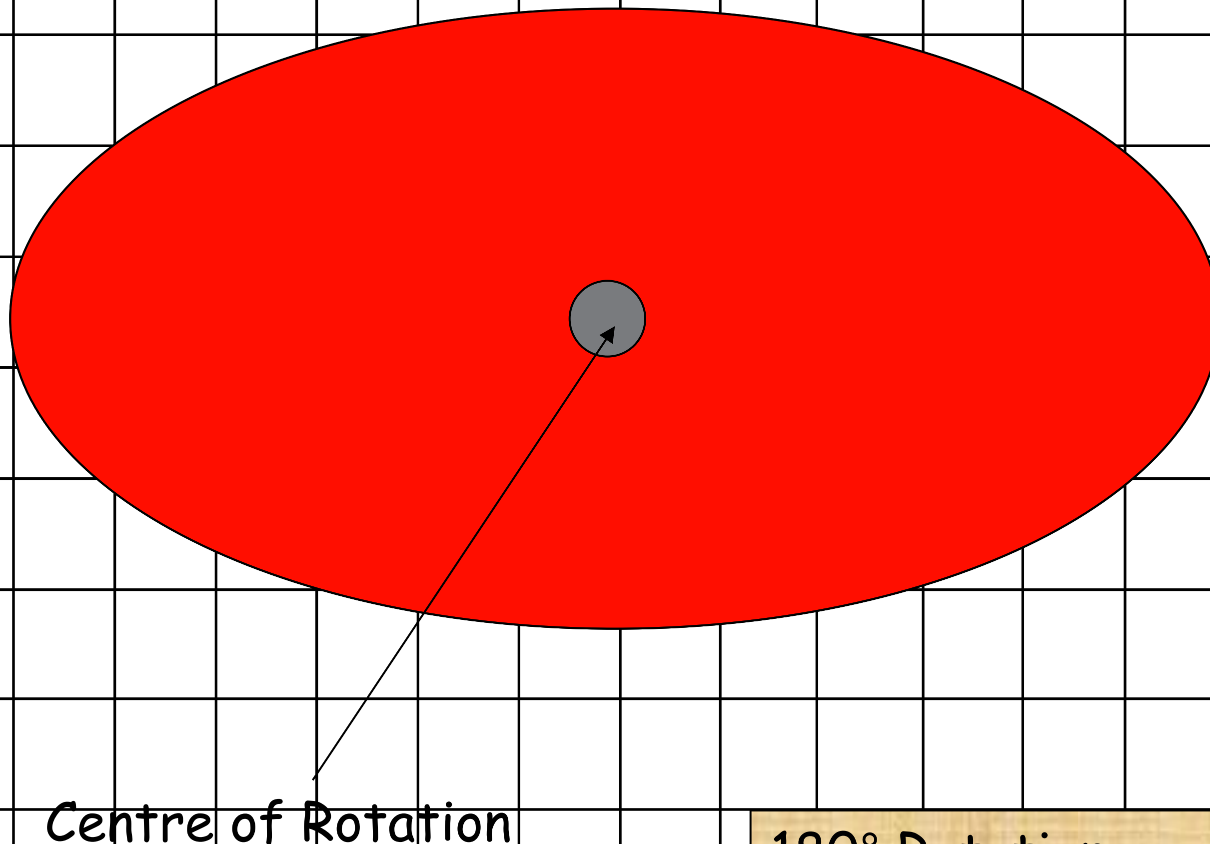


Draw the position of shapes on a coordinate grid after rotations and translations.

Rotational Symmetry

A complete turn (360°)

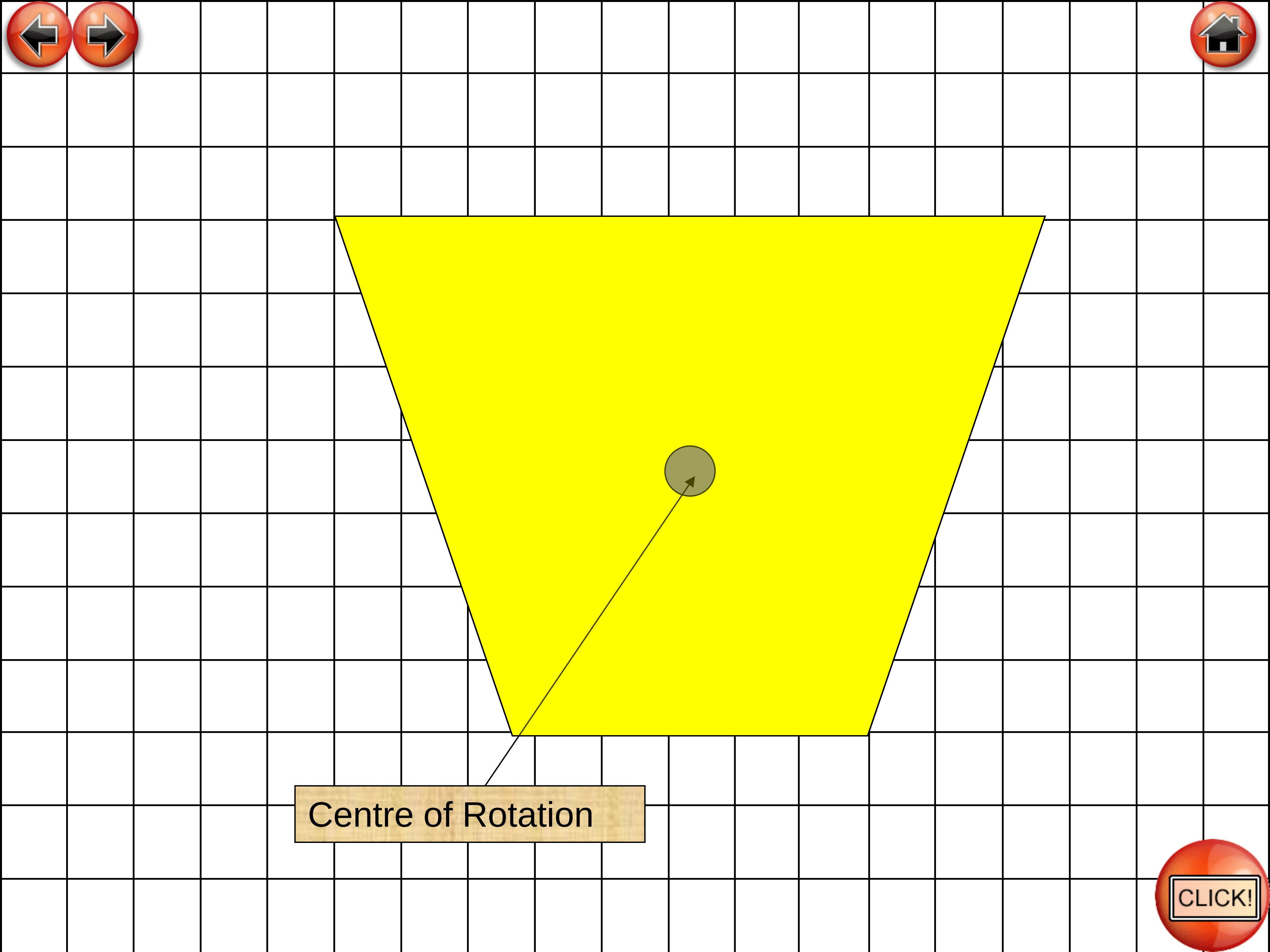
90° Rotation Clockwise

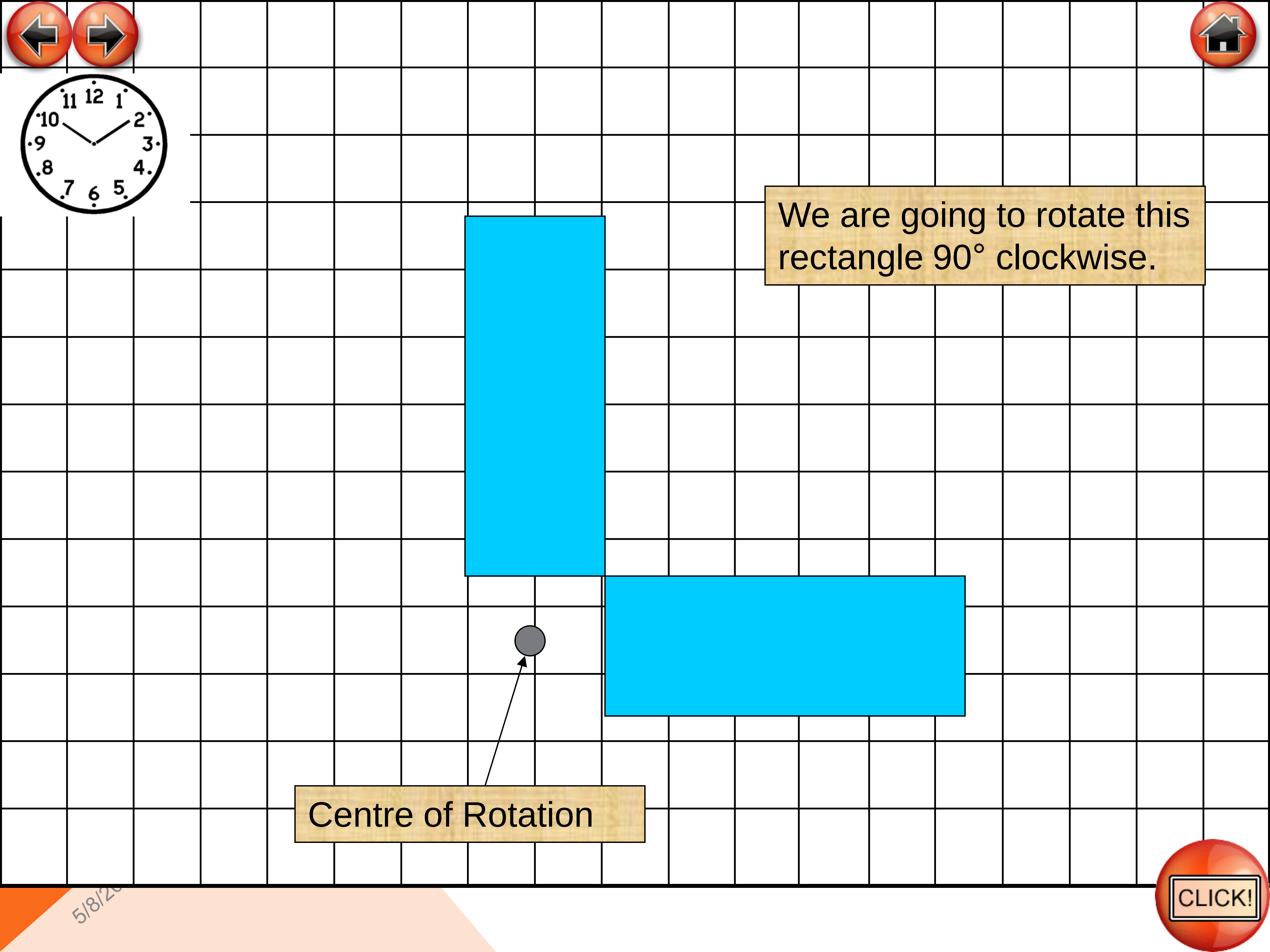


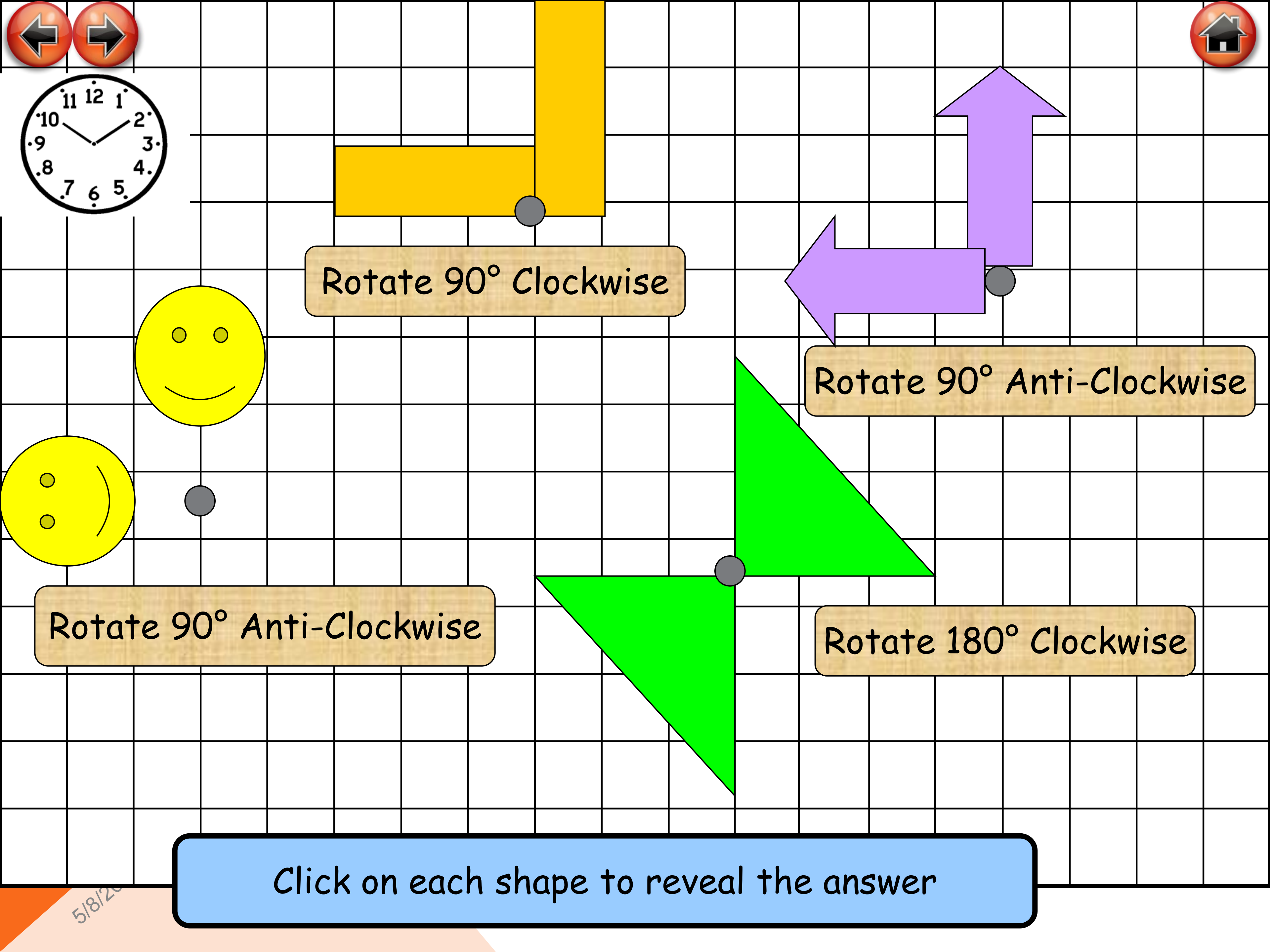
180° Rotation Clockwise

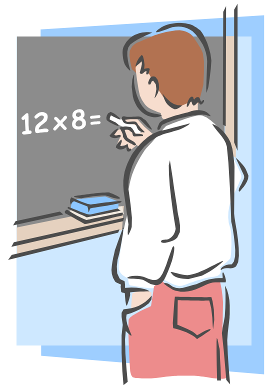
270° Rotation Clockwise

CLICK!


Centre of Rotation
CLICK!

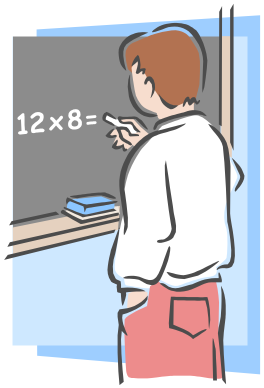

We are going to rotate this rectangle 90° clockwise.
Centre of Rotation
CLICK!


Rotate 90° Clockwise
Rotate 90° Anti-Clockwise
Rotate 90° Anti-Clockwise
Rotate 180° Clockwise
Click on each shape to reveal the answer



To work out the square and square root of numbers.

Learning Objective



To find the next number in a sequence, including decimal and Fraction sequences.

Look at these number sequences carefully can you guess the next 2 numbers?

What about guess the rule?

30	40	50	60	70	80	+10
17	20	23	26	29	32	+3
48	41	34	27	20	13	-7

Can you work out the missing numbers in each of these sequences?

50	75	100	125	150	175	+25
30	50	70	90	110	130	+20
196	191	186	181	176	171	-5
306	296	286	276	266	256	-10

Now try these sequences – think carefully and guess the last number!

1 2 4 7 11 16

+1, +2, +3 …

3 6 12 24 48 96

double

0.5 2 3.5 5 6.5 8

+ 1.5

7 4 1 -2 -5 -8

-3

Now try these sequences – think carefully and guess the last number!

2 1/3	2 2/3	3		3 2/3		+ 1/3
2	2 2/3	3 1/3	4	4 2/3		+ 2 2/3

This is a really famous number sequence which was discovered by an Italian mathematician a long time ago.

It is called the Fibonacci sequence and can be seen in many natural things like pine cones and sunflowers!!!

1 1 2 3 5 8 13 21 etc…

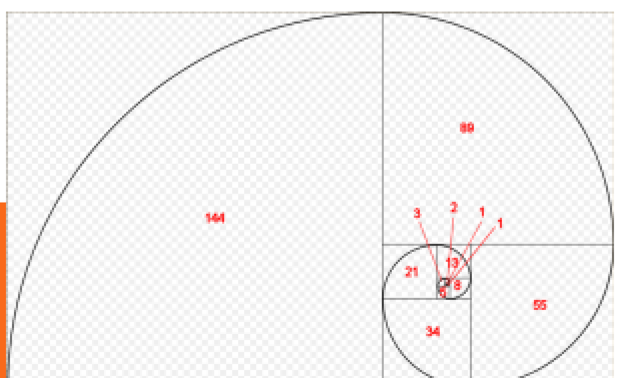
Can you see how it is made? What will the next number be?

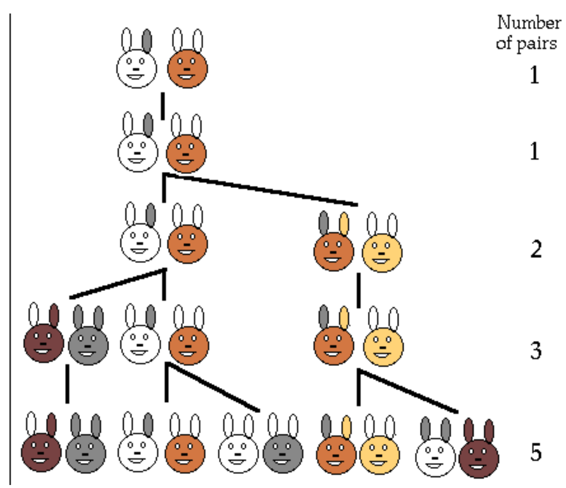
34!

See if you can find out something about Fibonacci!

Fibonacci's number pattern can also be seen elsewhere in nature:

- with the rabbit population
- with snail shells
- with the bones in your fingers
- with pine cones
- with the stars in the solar system





Guess my rule!

For these sequences I have done 2 maths functions!

3 7 15 31 63 127

x2 +1

x2 -1

2 3 5 9 17 33

24

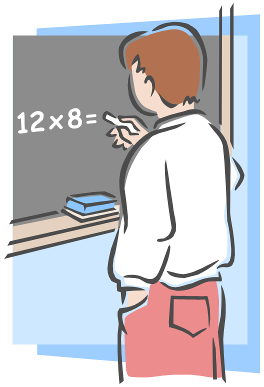
1	
2	
3	

42

1	

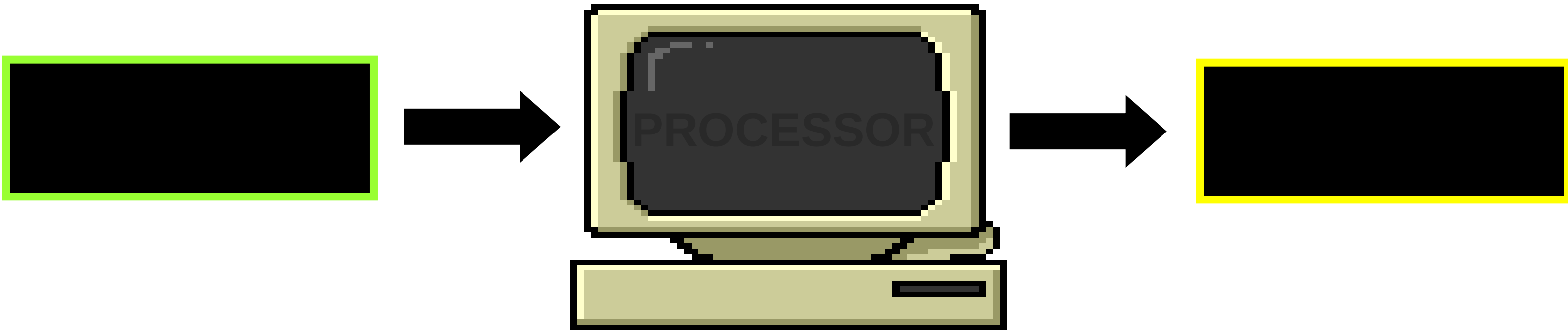
28

Learning Objective

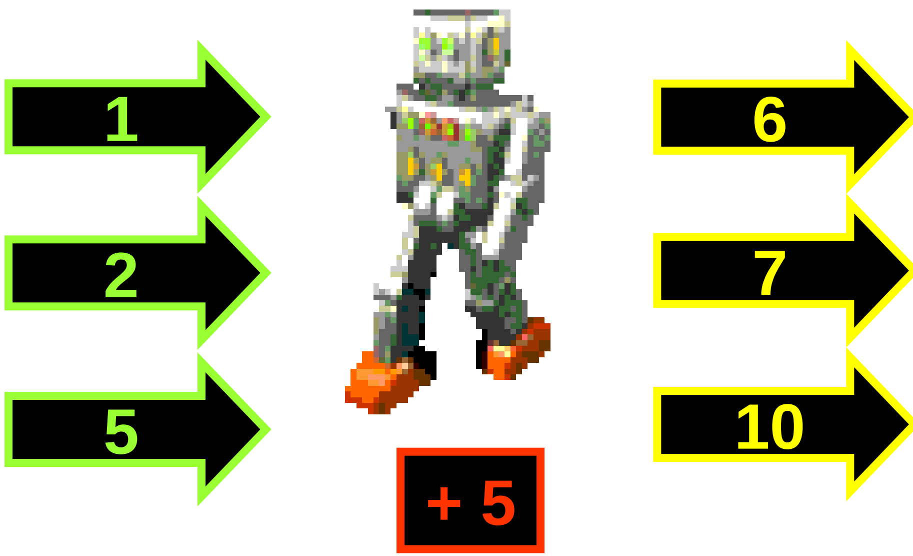


To use functions machines to recognise number sequences.

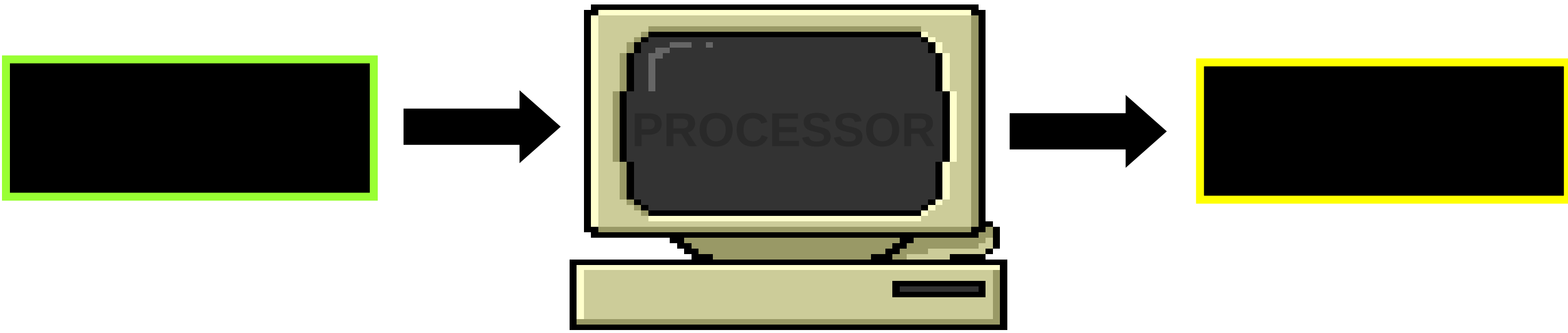
Single machines



- Imagine that we have a robot to help us make patterns.



Single machines



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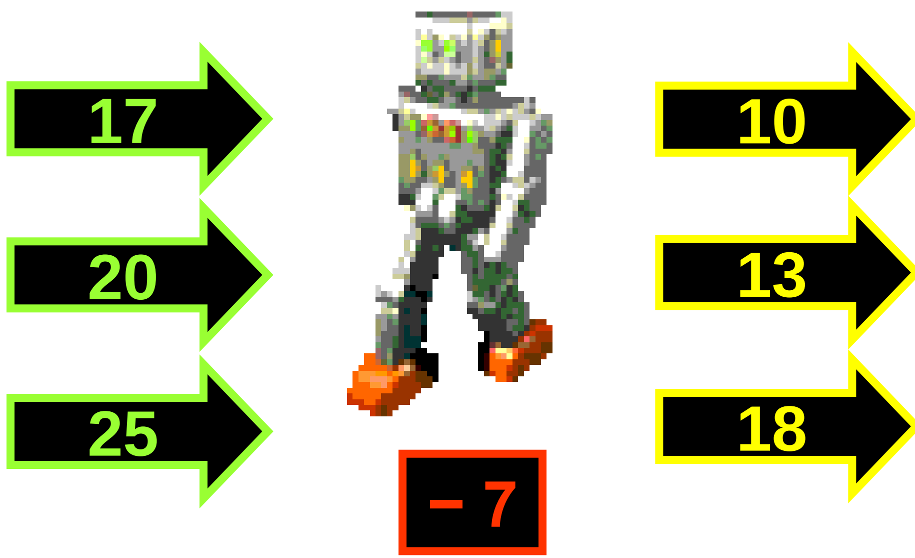
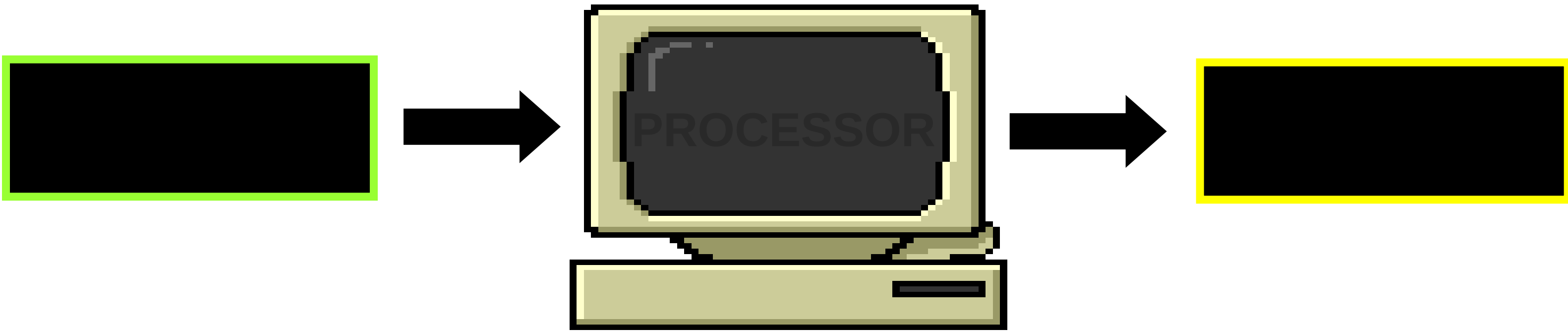


Single Machines



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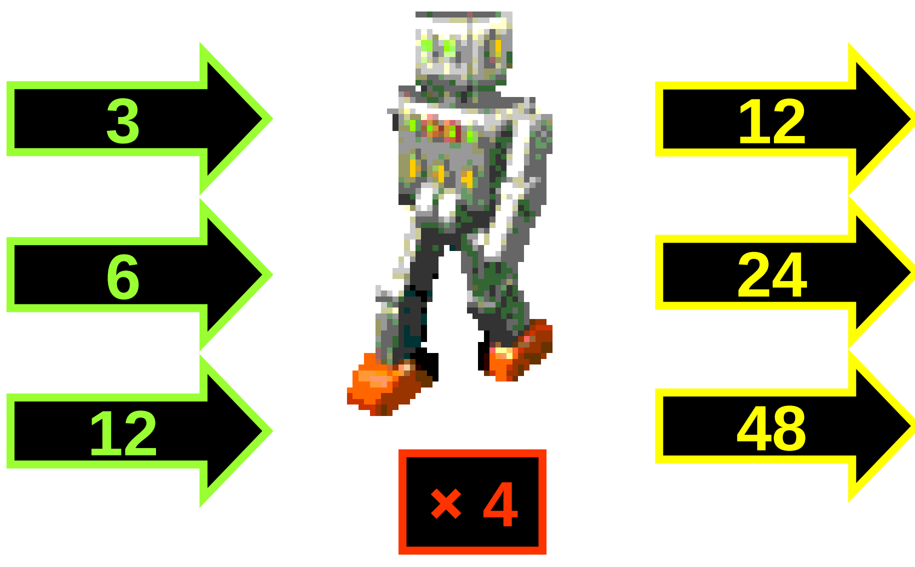
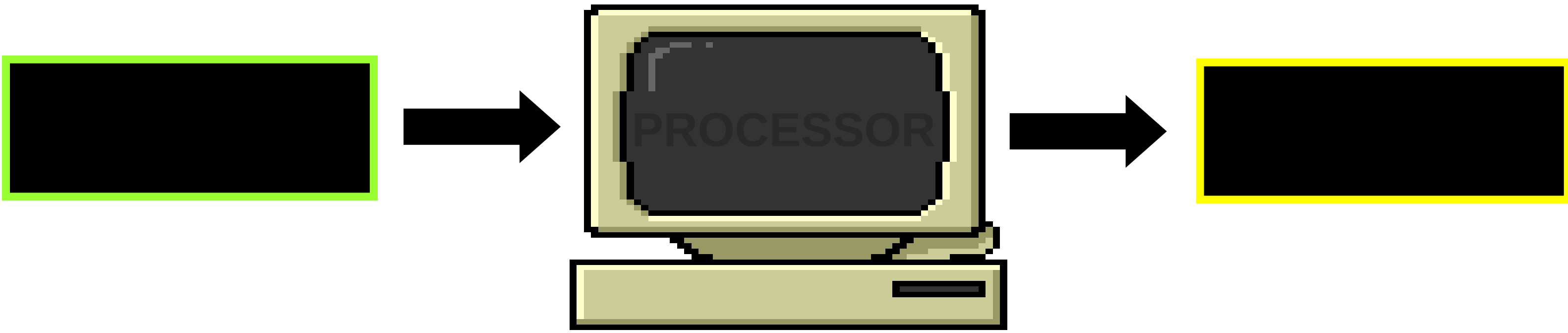


Single machines



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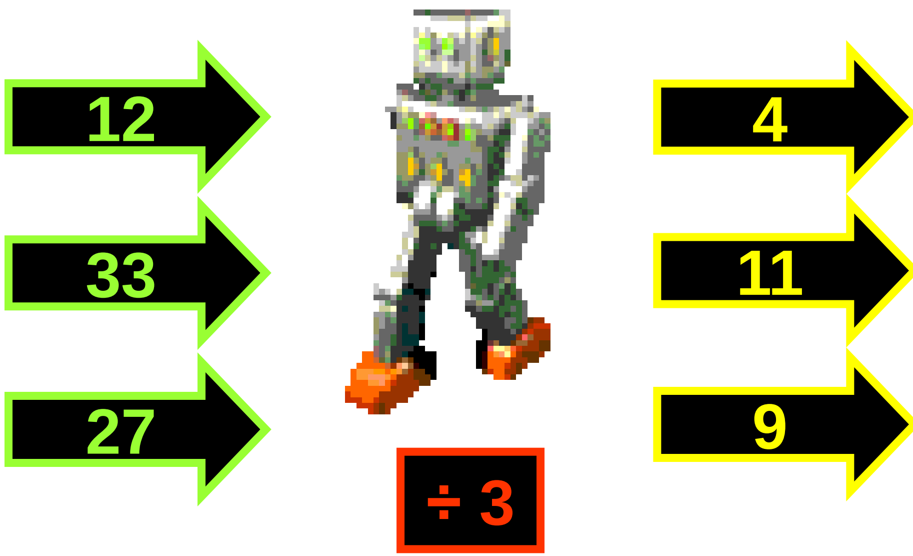


Exercises 1

- Here are single number machines
- What is the output since we know the input?

a

1 →	+ 2	→ 3
3 →	+ 2	→ 5
5 →	+ 2	→ 7

b

9 →	- 7	→ 2
13 →	- 7	→ 6
29 →	- 7	→ 22

c

3 →	× 4	→ 12
7 →	× 4	→ 28
9 →	× 4	→ 36

d

11 →	× 7	→ 77
9 →	× 7	→ 63
7 →	× 7	→ 49

e

12 →	÷ 6	→ 2
36 →	÷ 6	→ 6
66 →	÷ 6	→ 11

f

18 →	÷ 9	→ 2
54 →	÷ 9	→ 6
81 →	÷ 9	→ 9

Exercises 2

- Here are single number machines.
- What is the output since we know the input?

a

1 →	+ 9	→ 10
3 →		→ 12
5 →		→ 14

b

11 →	- 11	→ 0
24 →		→ 13
36 →		→ 25

c

4 →	× 8	→ 32
7 →		→ 56
9 →		→ 72

d

6 →	× 9	→ 54
4 →		→ 36
9 →		→ 81

e

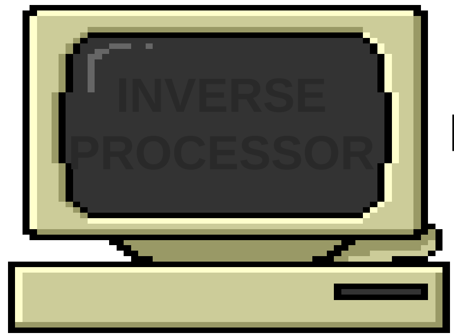
21 →	÷ 7	→ 3
49 →		→ 7
63 →		→ 9

f

11 →	÷ 11	→ 1
33 →		→ 3
66 →		→ 6

Inverse machines

- Can we calculate the input since we know the output?



6 → 12

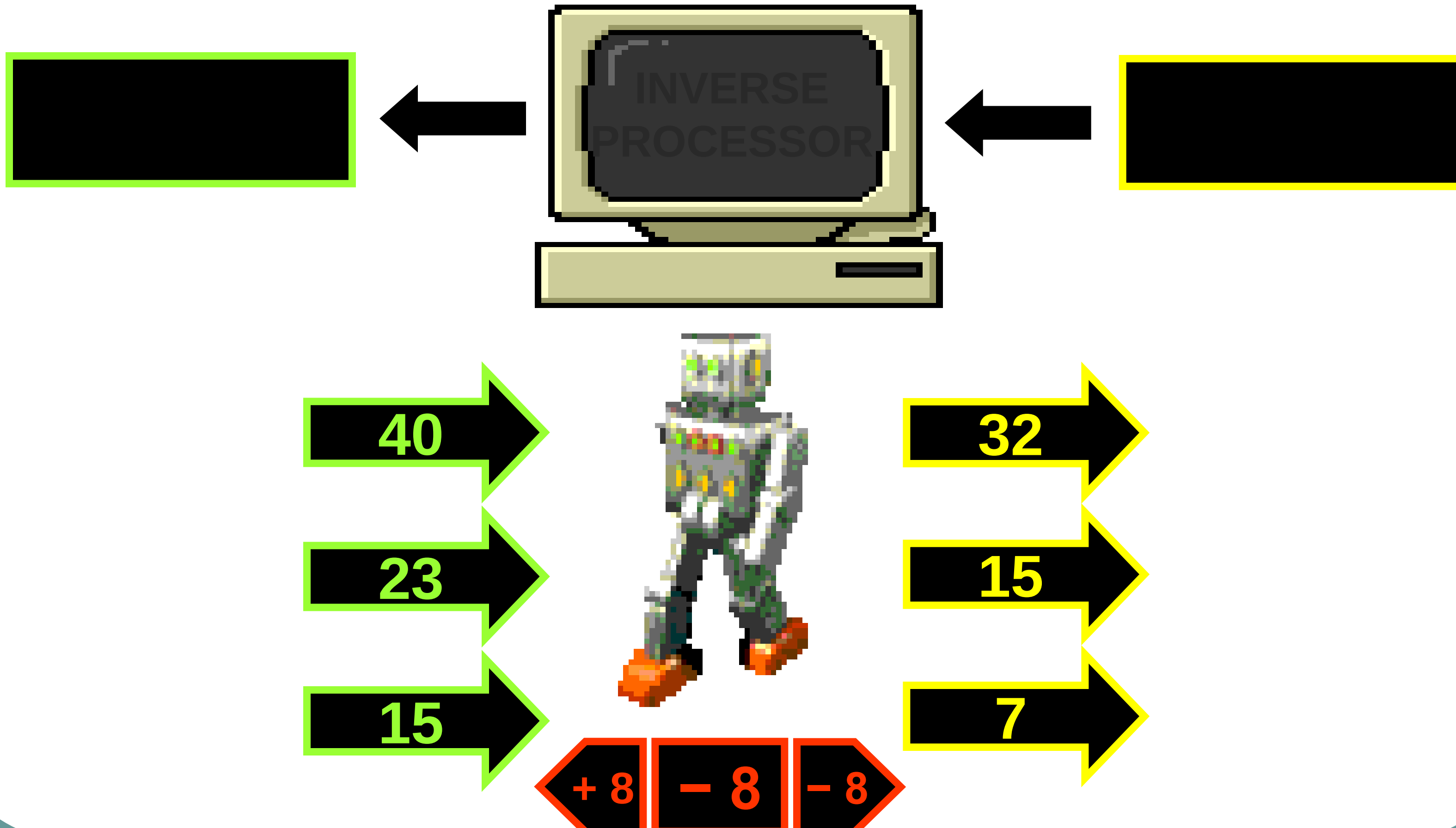
8 → 14

17 → 23

− 6 | + 6 | + 6

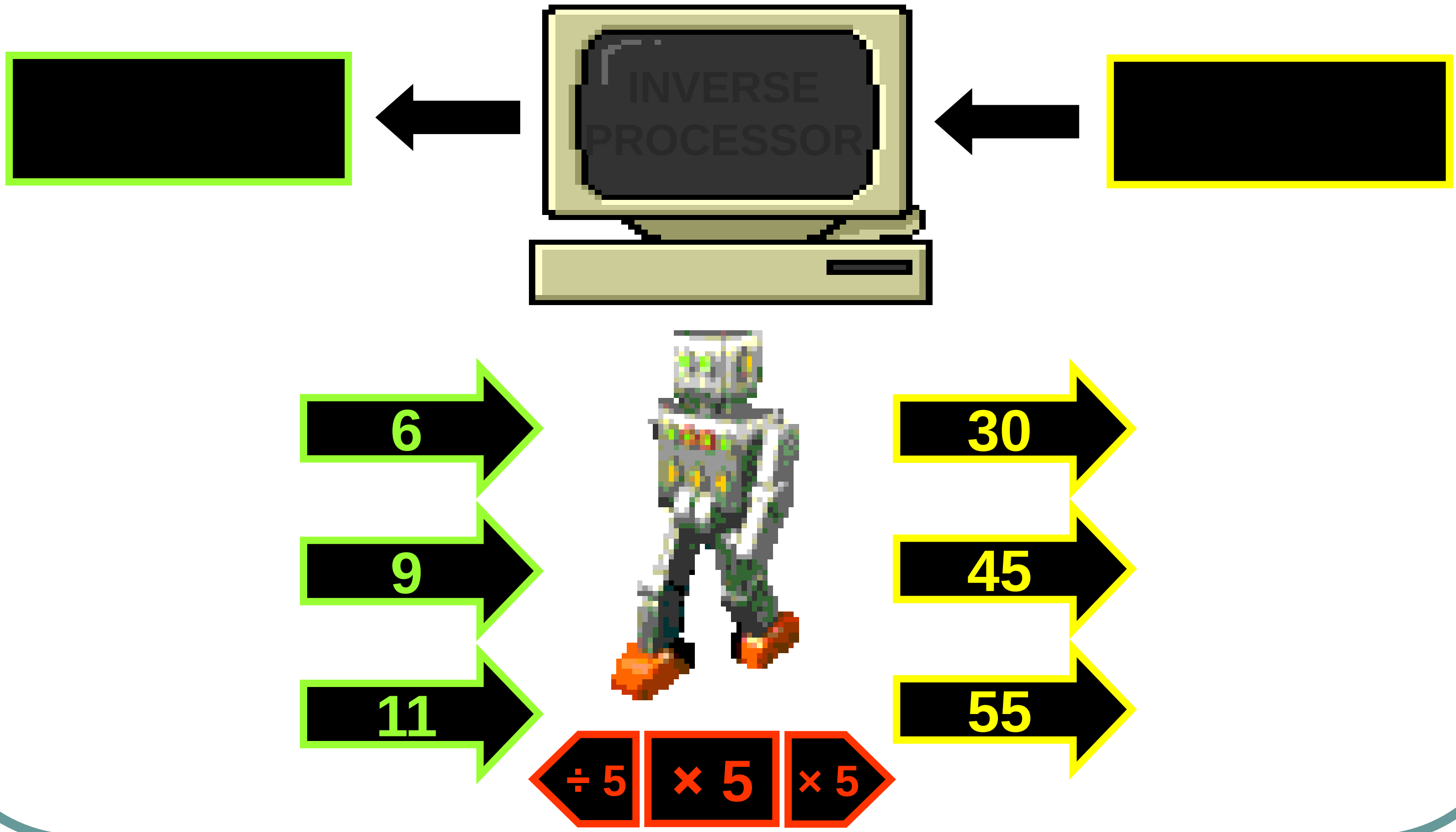
Inverse Machines

- Can we calculate the input since we know the output?



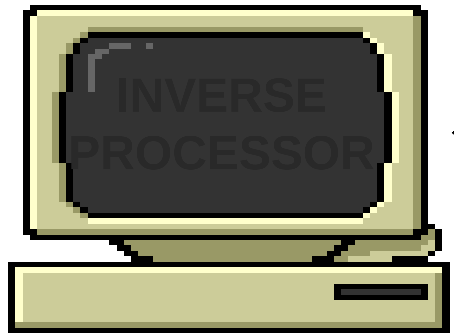
Inverse Machines

- Can we calculate the input since we know the output?



Inverse Machines

- Can we calculate the input since we know the output?



12 | 20 | 48

3 | 5 | 12

× 4 | ÷ 4 | ÷ 4

Exercises 3

- Here are single number machines
- What is the input since we know the output?

a

4 → 8 → 31 → **+ 3** → 7, 11, 34

b

12 → 14 → 18 → **- 6** → 6, 8, 12

c

7 → 11 → 12 → **× 6** → 42, 66, 72

d

5 → 2 → 6 → **× 12** → 60, 24, 72

e

39 → 65 → 91 → **÷ 13** → 3, 5, 7

f

30 → 75 → 105 → **÷ 15** → 2, 5, 7

Exercises 4

- Here are single number machines
- What is the input since we know the output?

a

6	→	+ 13	→	19
3	→		→	16
12	→		→	25

b

22	→	- 17	→	5
26	→		→	9
28	→		→	11

c

3	→	× 15	→	45
9	→		→	135
11	→		→	165

d

2	→	× 14	→	28
4	→		→	56
6	→		→	84

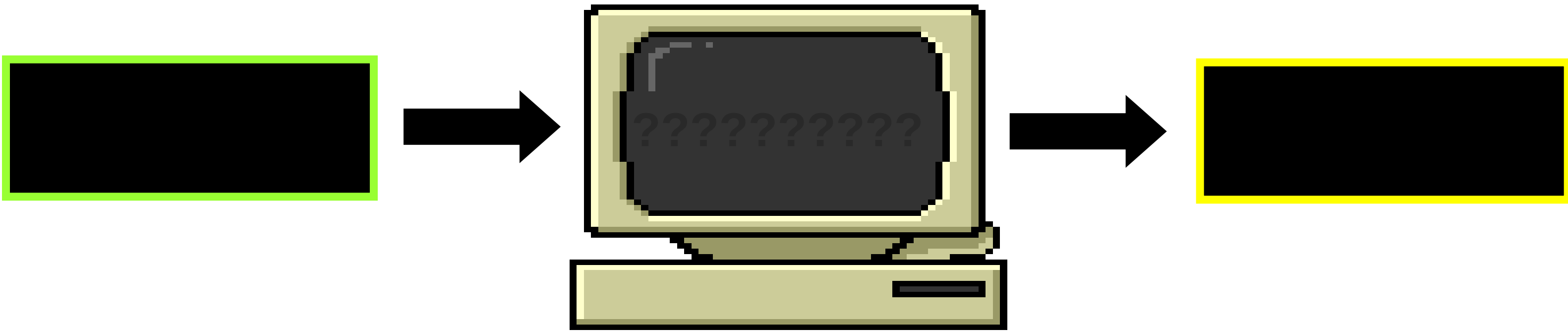
e

32	→	÷ 16	→	2
80	→		→	5
112	→		→	7

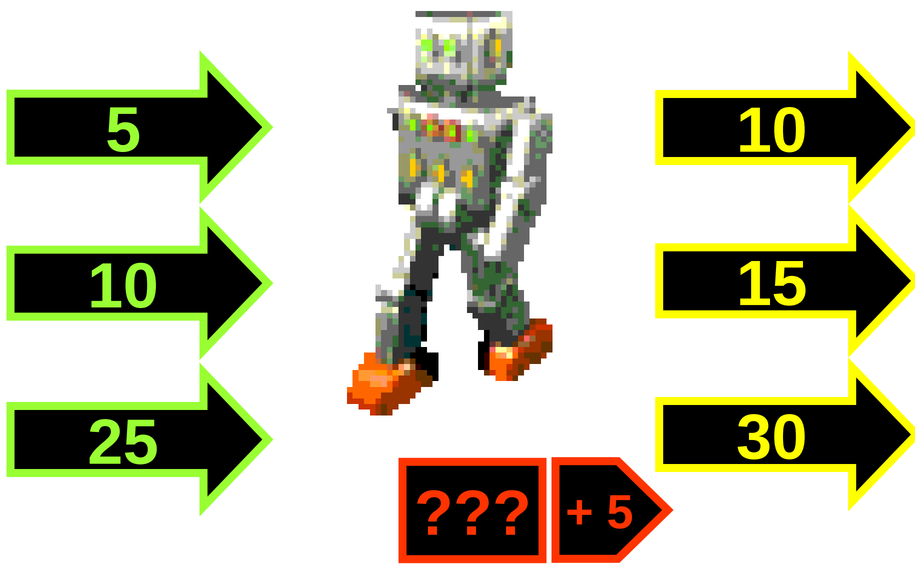
f

76	→	÷ 19	→	4
38	→		→	2
114	→		→	6

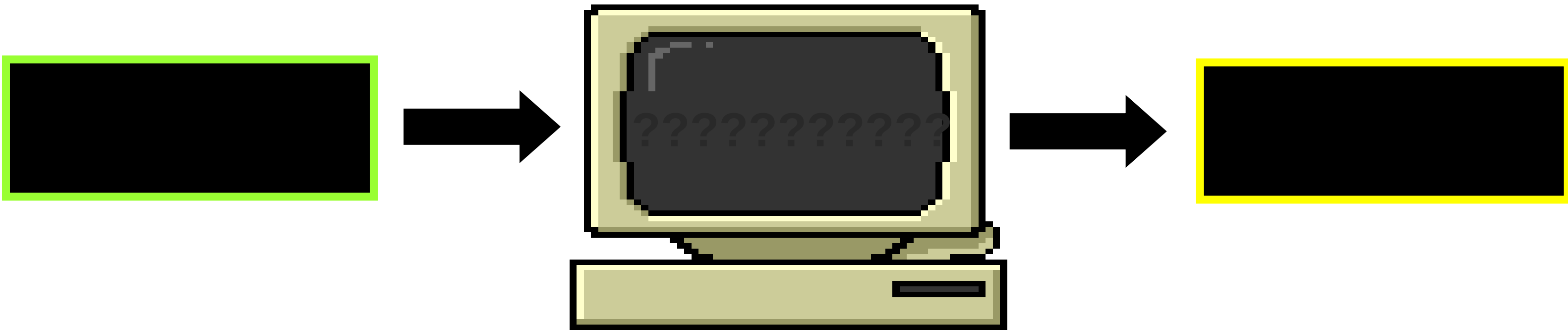
A Broken Processor



- Imagine that the processor has broken!!!!!



A Broken Processor



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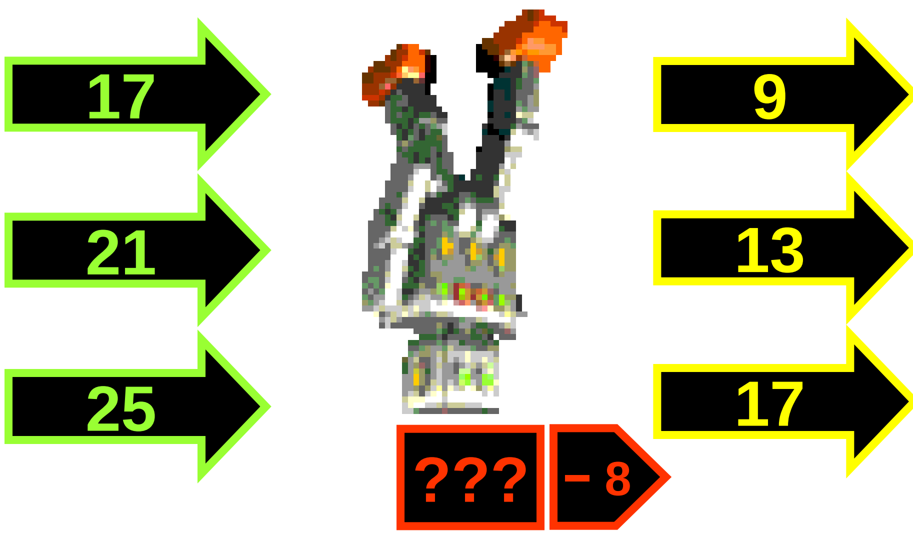
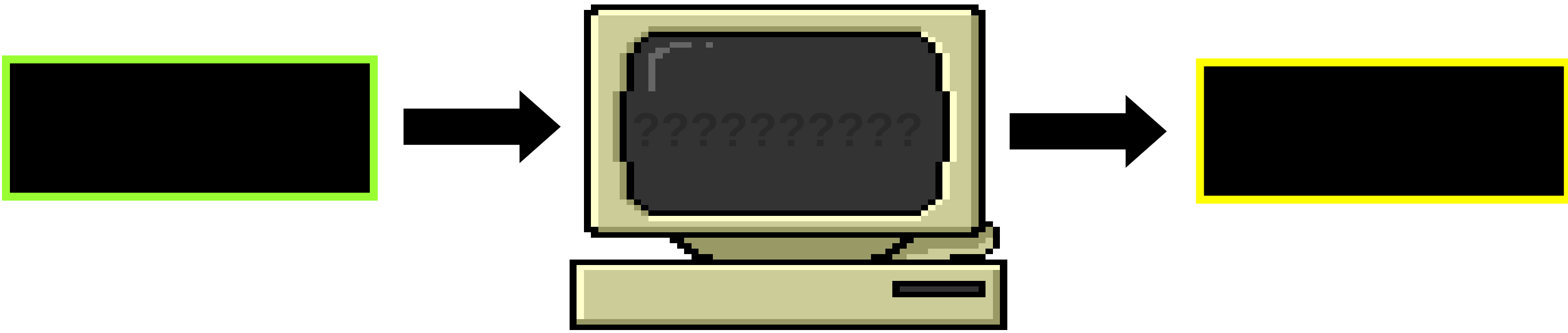


A Broken Processor



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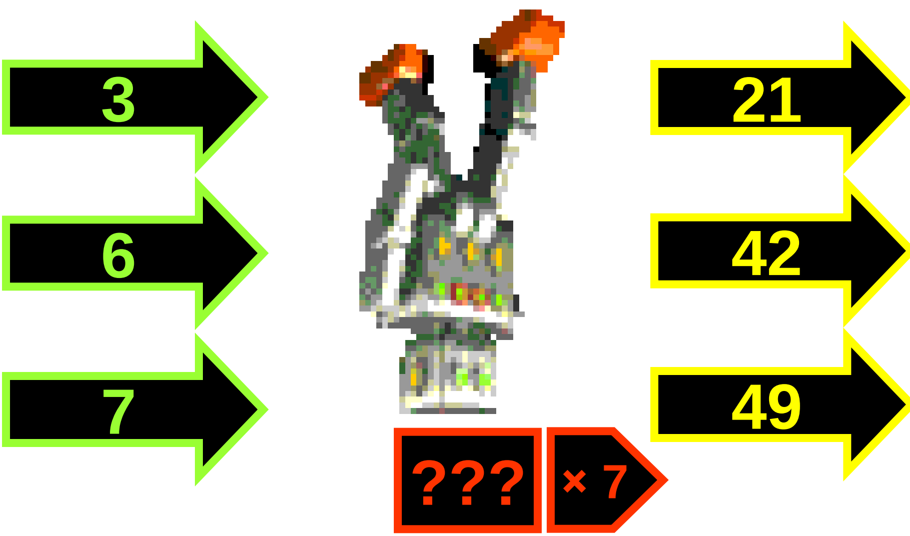
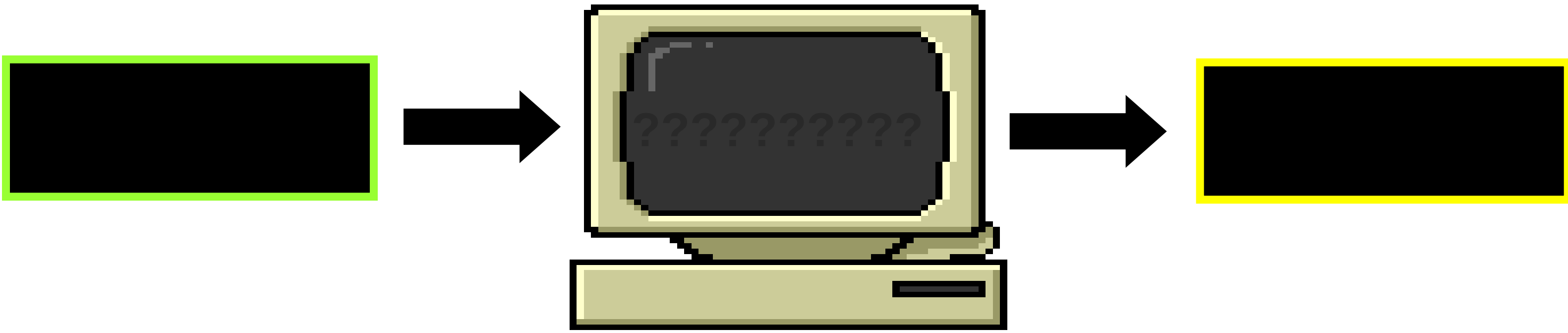
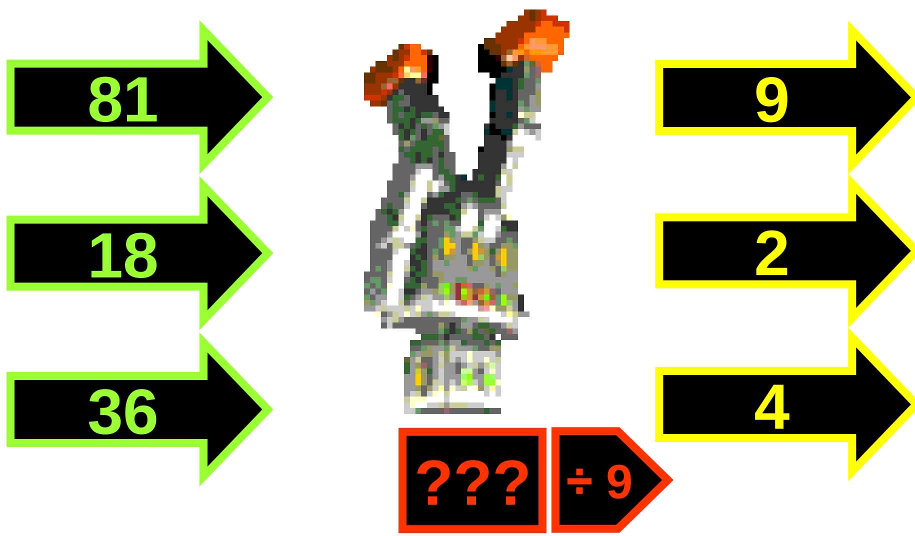


A Broken Processor



- Imagine that the processor has broken!!!!!



Exercises 5

- Here are single number machines
- What is the action since we know what the input and output are?

a

Input	Action	Output
1	+ 8	9
3		11
5		13

b

Input	Action	Output
10	- 5	5
41		36
88		83

c

Input	Action	Output
4	× 6	24
7		42
9		54

d

Input	Action	Output
3	× 11	33
7		77
10		110

e

Input	Action	Output
10	÷ 10	1
30		3
120		12

f

Input	Action	Output
34	÷ 17	2
102		6
51		3

Exercises 6

- Here are single number machines
- What is the action since we know what the input and output are?

a

Input	Action	Output
5 →	+ 4	→ 9
11 →		→ 15
23 →		→ 27

b

Input	Action	Output
15 →	- 7	→ 8
42 →		→ 35
88 →		→ 81

c

Input	Action	Output
4 →	× 5	→ 20
7 →		→ 35
9 →		→ 45

d

Input	Action	Output
3 →	× 8	→ 24
7 →		→ 56
10 →		→ 80

e

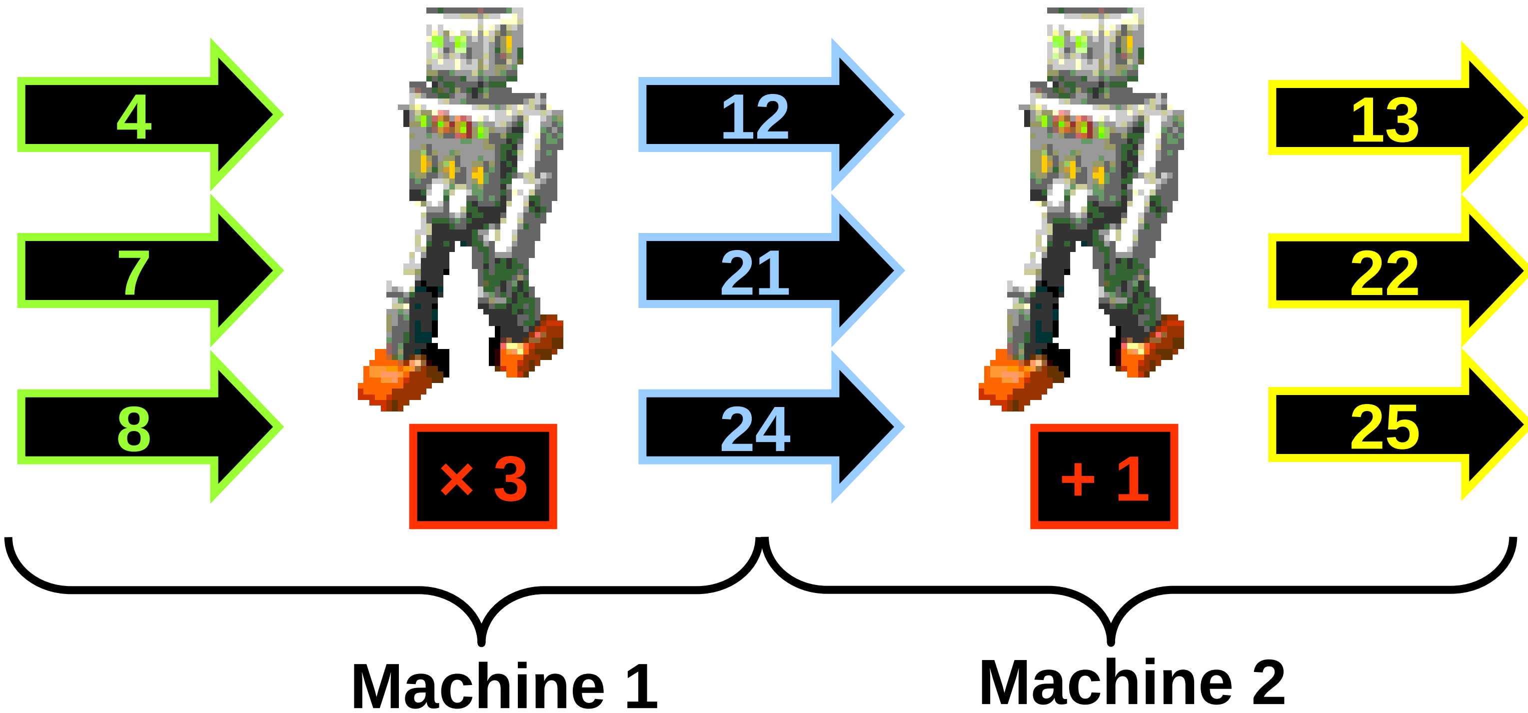
Input	Action	Output
39 →	÷ 3	→ 13
66 →		→ 22
120 →		→ 40

f

Input	Action	Output
42 →	÷ 7	→ 6
63 →		→ 9
77 →		→ 11

Double vision

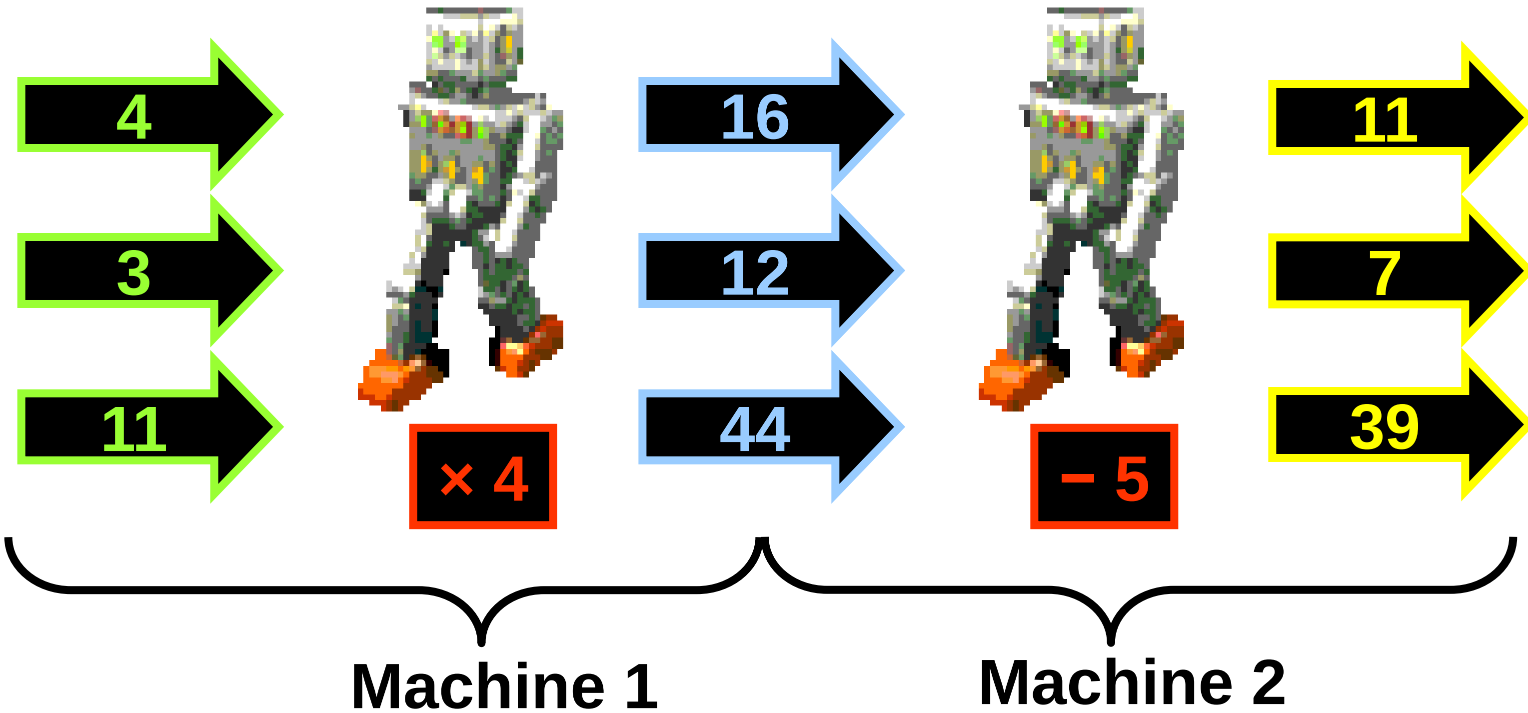
- Imagine that we have two robots to help us make patterns



- The output of machine 1 is input to machine 2

Double Vision

- Imagine that we have two robots to help us make patterns



- The output of machine 1 is input to machine 2

Exercises 7

- Here are two stage machines
- What is the output since we know the input?

a

2	→	× 5	→	+ 6	→	16
4	→		→		→	26
8	→		→		→	46

b

5	→	× 7	→	- 11	→	24
10	→		→		→	59
7	→		→		→	38

c

6	→	× 6	→	- 5	→	31
3	→		→		→	13
1	→		→		→	1

Exercises 8

- Here are two stage machines
- What is the output since we know the input?

a

Input	Stage 1	Stage 2	Output
6	÷ 2	+ 2	5
8			6
10			7

b

Input	Stage 1	Stage 2	Output
45	÷ 5	- 5	4
55			6
75			10

c

Input	Stage 1	Stage 2	Output
42	÷ 7	+ 6	12
21			9
35			11

30

1	
2	
3	

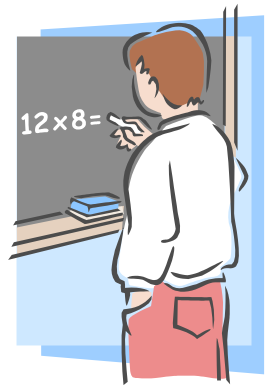
56

1	

52

1	

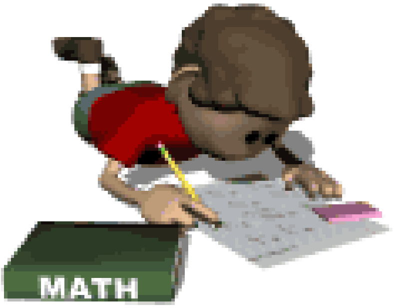
Learning Objective

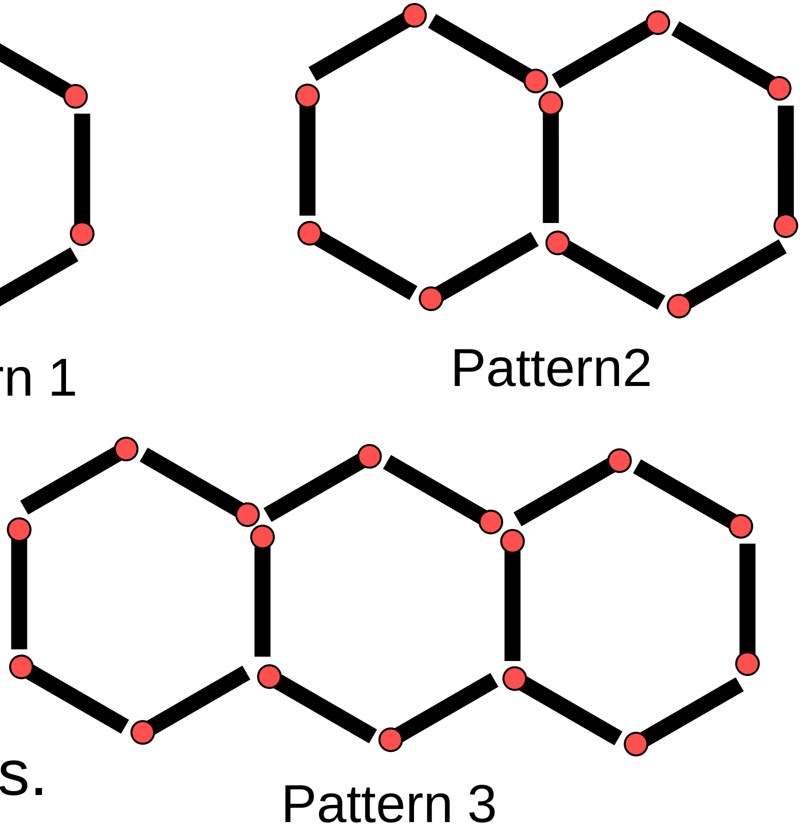


To know to find and extend number sequences and patterns

Number Patterns - Matches

- Gareth uses matches to produce hexagon patterns

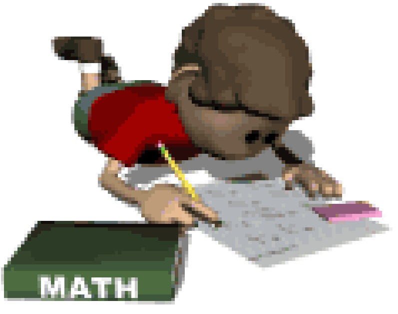


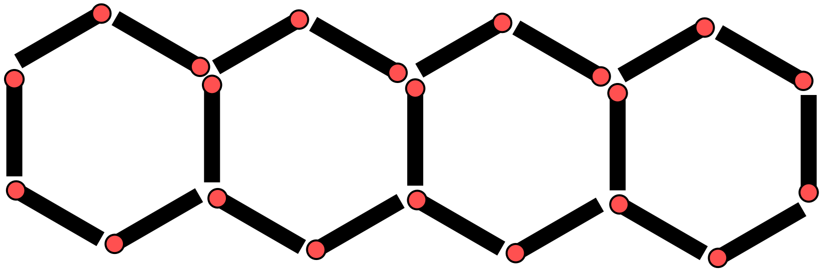


- Draw a rough draft
- of the next two patterns.

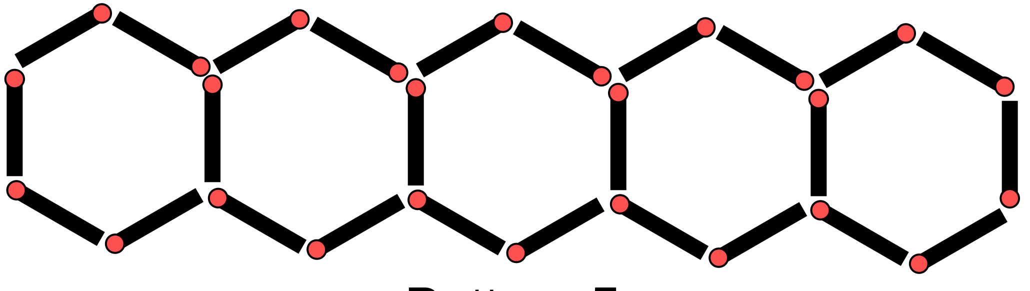
Number Patterns - Matches

- Gareth uses matches to produce hexagon patterns





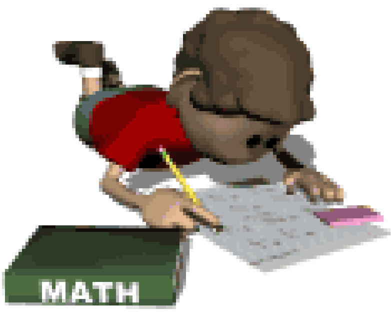
Pattern 4

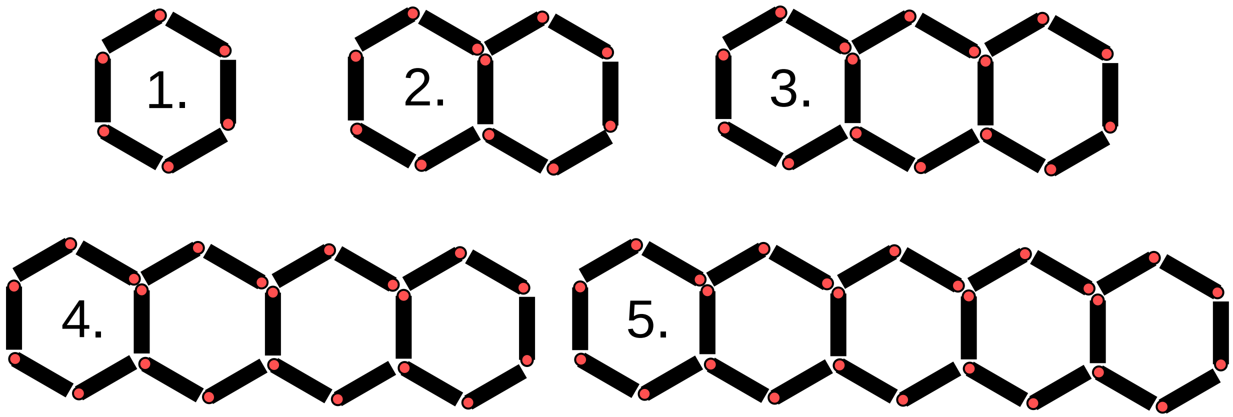


Pattern 5

Number Patterns - Matches

- Gareth uses matches to produce hexagon patterns



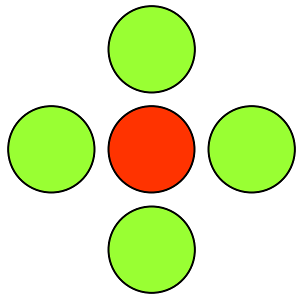


Pattern Number	1	2	3	4	5	6	7	8	9	10
Number of matches	6	11	16	21	26	31	36	41	46	51

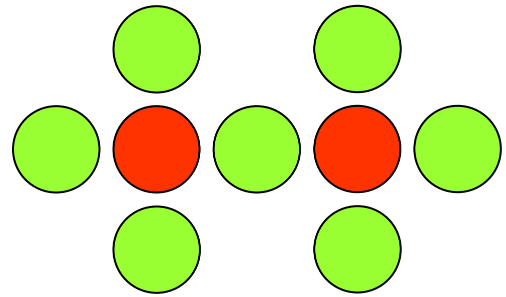
+5 +5 +5 +5 +5 +5 +5 +5 +5

Number Patterns – Counters

- Sion uses counters to produce coloured patterns

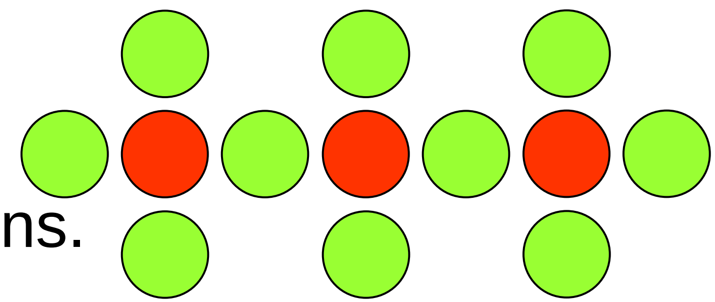


Pattern 1



Pattern 2

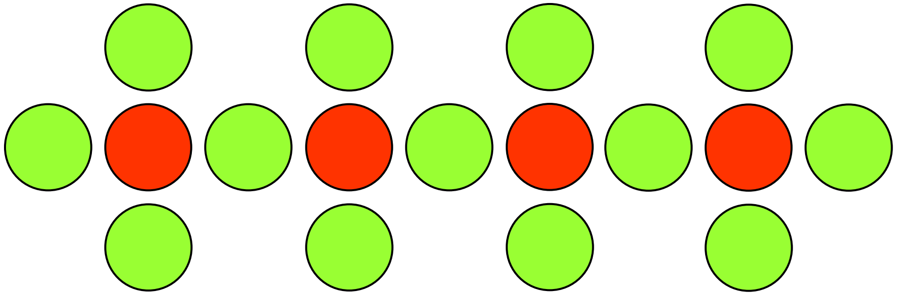
- Draw a rough draft of the next two patterns.



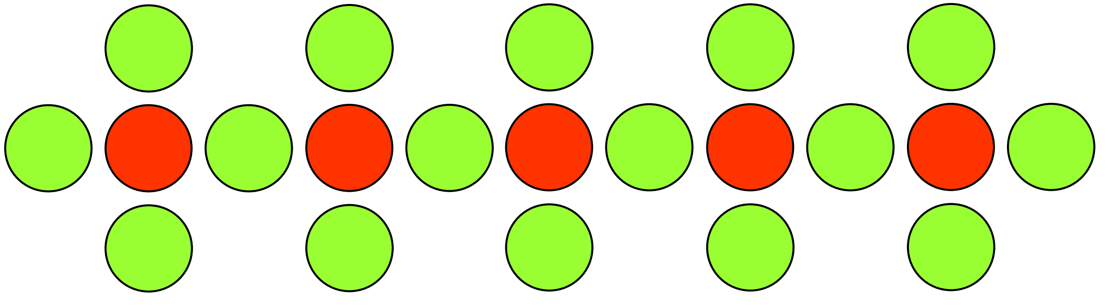
Pattern 3

Number Patterns – Counters

- Sion uses counters to produce coloured patterns.



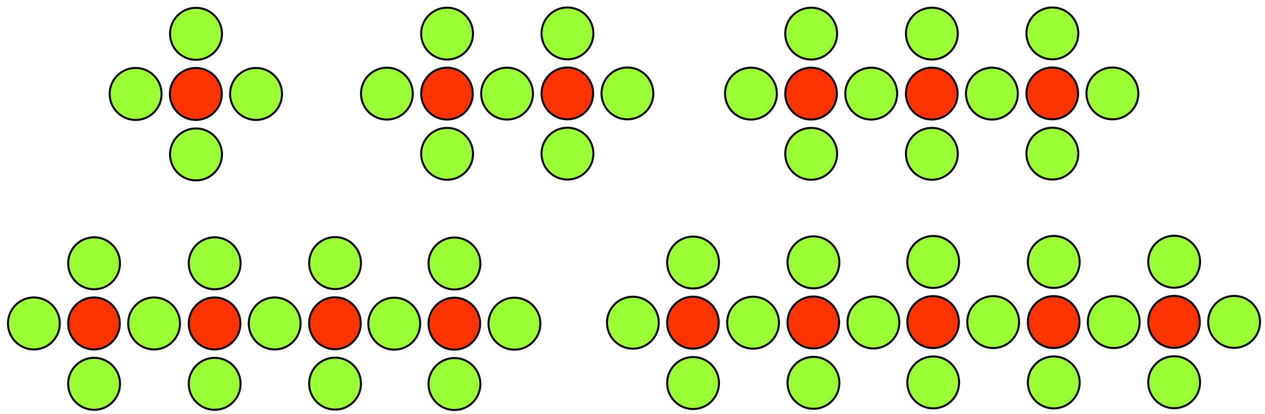
Pattern 4



Pattern 5

Number Patterns – Counters

- Sion uses counters to produce number patterns



- Complete the table below, what is the pattern?

Red	1	2	3	4	5	6	7	8	9	10
Green	4	7	10	13	16	19	22	25	28	31

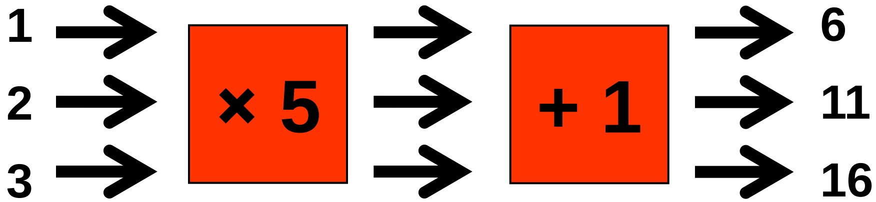
+3 +3 +3 +3 +3 +3 +3 +3 +3

Beginning to Use Algebra

- It is easy enough to discover how many need to be added every time. What about the following pattern?

Pattern Number	1	2	3	4	5	6	7	8	9	10
Number of matches	6	11	16	21	26	31	36	41	46	51

- What rules need to be used to calculate the number of matches since we know the pattern number?
- Think about the DOUBLE Robots!!

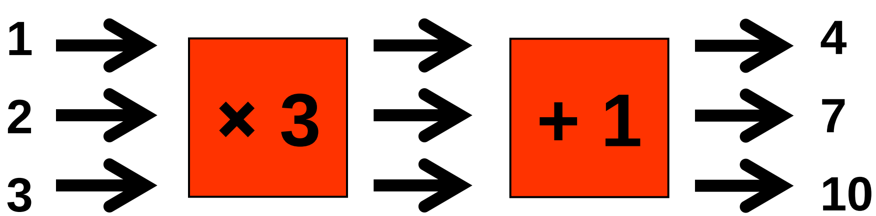


Beginning to Use Algebra

- It is easy enough to discover how many need to be added every time. What about the following pattern?

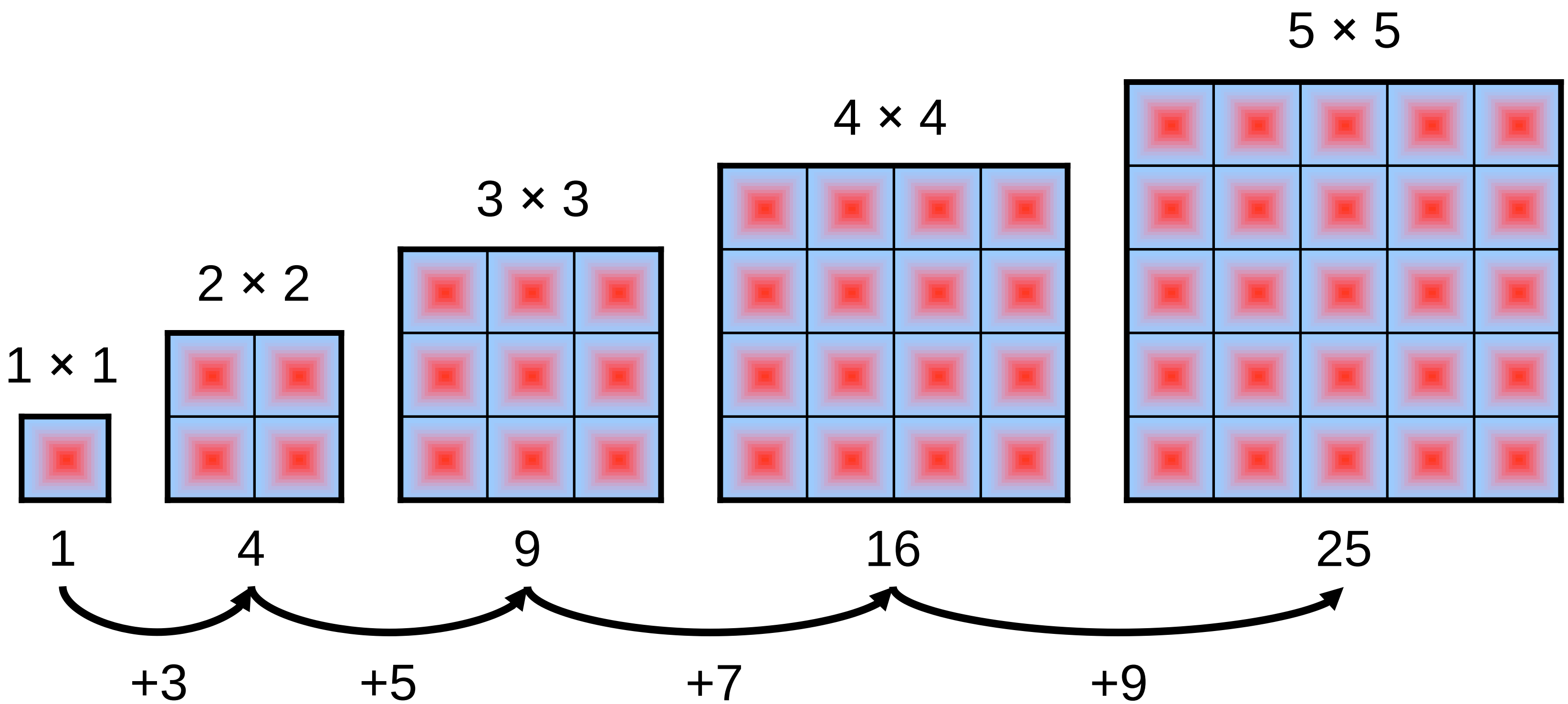
Red	1	2	3	4	5	6	7	8	9	10
Green	4	7	10	13	16	19	22	25	28	31

- What rules need to be used to calculate the number of green counters since we know the number of red counters?
- Think about the double Robots again.



Other Number Patterns

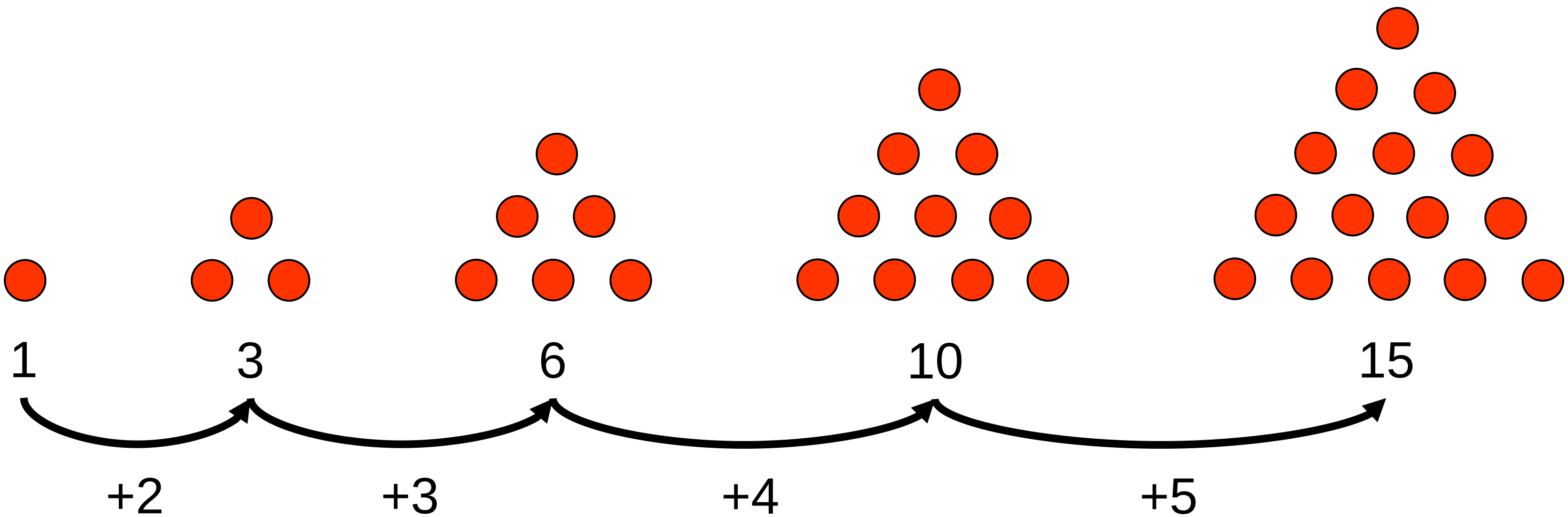
- Consider the following pattern using squares..



- The name of the above sequence is SQUARE NUMBERS

Other Number Patterns

- Consider the following pattern using dots.



- The name of the above sequence is TRIANGLE NUMBERS