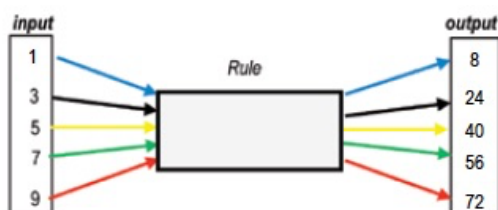


FUNCTION GAME – GUESS MY RULE



What is the rule (or function) that gives the outputs corresponding to the inputs shown in the diagram mapping 1 to 8 and 3 to 24 etc?

This is like translating from one language to another – input English and out comes isiXhosa!



ACTIVITY FOR ALL AGES

The Function Game is played in silence. Players have to guess the rule in the other teacher's mind.

The teacher tells them that she wants them **to tell her** what she is doing.

She asks the learners to give her numbers and writes them in a column of inputs. For each input she writes an output for the rule she is thinking of alongside. She asks "What am I doing?" and says "the outputs give clues for finding my rule".

She makes the rule simple for young players and more complicated for older players. Other players can take the teacher's role.

A player who thinks he or she has guessed what the teacher is doing puts up a hand and the teacher suggests a number and asks the learner to do the same with it and give the answer. If the learner gets the right output the teacher congratulates him or her and writes it on the list.

In class, the game continues until about half of the learners have guessed the rule. Then learners who have guessed it explain what the teacher was doing for the benefit of those who did not guess it and the game is repeated with another rule.

For example the rule might be "multiply the number by 3 then add 5".

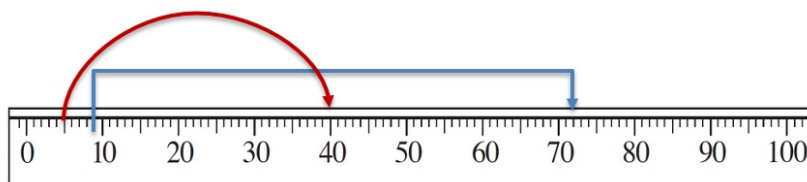
That gives $2 \rightarrow 11$, $3 \rightarrow 14$, $10 \rightarrow 35$ etc.

Algebraically the rule is called a **function** and written as $x \rightarrow 3x + 5$

FUNCTION GAME FOR 2 PLAYERS

The 2 players, take it in turns to think of the rule and the other player tries to guess the rule with the fewest clues. Have 5 turns each, the player who has made fewest guesses in all wins, and the player who needed more guesses is the loser.

You can show what happens on a number line. What rule does this show?



HELP

If $1 \rightarrow 2$ and $2 \rightarrow 4$, and $3 \rightarrow 6$ and $4 \rightarrow 8$ can you guess the rule?

What about $1 \rightarrow 3$ and $2 \rightarrow 5$, and $3 \rightarrow 7$ and $4 \rightarrow 9$ can you guess this rule?

Try again to find the rule for the picture in the top box.

NEXT

VARIATION TO INVERSE FUNCTIONS

When we think '+7 days and -7 days' for this time next week or this time last week and '+12 months and -12 months' for forwards and backwards in years and '+24 hours and -24 hours' for tomorrow and yesterday – forward and back 24 hours on the clock, we are thinking of functions and their inverses without knowing exactly what the process is called.

COMBINATIONS OF FUNCTIONS

Think about this example: for the function 'multiply by 3 then add 5' (written $x \rightarrow 3x+5$), if the output is 41 how do you find the input?

You first undo the 'add 5' by subtracting 5, then undo the 'multiply the number by 3' by dividing by 3 which gives the input 12.

The inverse function is $x \rightarrow (x - 5)/3$.

Investigate what happens when other functions are combined with their inverses and answer the question:

What happens when you combine a function with its inverse function?

THE INVERSE FUNCTIONS GAME FOR 2 PLAYERS.

Player 1 gives the outputs.

Player 2 (thinking of both a function and its inverse function) writes Player 1's number in the **output** column and the corresponding number in the **input** column.

This continues until Player 1 guesses the rule (also called a function) and also the inverse function and gets his total number of guesses as his score.

Then the two players exchange roles.

The players have 5 turns each, the player who has made fewest guesses in all wins.

The player who needed more guesses is the loser.

1

2

3

4

5

6

7

8

9

0

