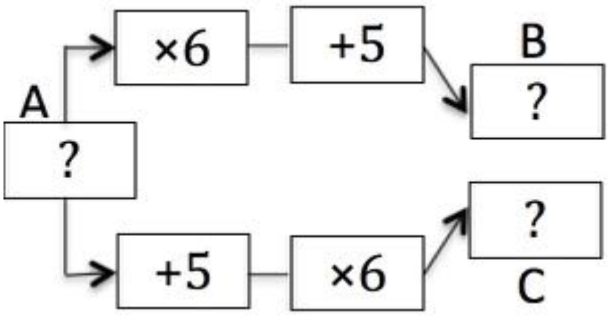
AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES
SCHOOLS ENRICHMENT CENTRE
TEACHER NETWORK

SWOP



(1) You are blindfolded. The audience tells you the number in Box B and you can immediately say the numbers in box C and box A.

How is this trick done?

Can you make the trick more impressive?

You can change the x 6 and + 5 to other operations and numbers if you like and you can combine 3 operations.

Make up some similar tricks and test them out with a partner.

(2) What functions are shown in this mapping diagram and what do their graphs look like? What transformation maps the graph of one function to the graph of the other?

SOLUTION

(1) If the input is n then box B will contain $6n + 5$ and box C will contain $6n + 30$ and that will always be 25 more than box B.

To get the input number work out the inverse. From the number in box B subtract 5 and divide by 6.

(2) The two functions are $f(x) = 6x + 5$ and $g(x) = 6(x + 5) = 6x + 30$. These are linear functions.

The graphs are straight lines with gradient 6 cutting the y-axis at (0 , 5) and (0 , 30).

The graph of f is mapped to the graph of g by a translation of 25 units parallel to the y-axis.

NOTES FOR TEACHERS

Diagnostic Assessment
This should take about 5–10 minutes.

1. Write the question on the board, say to the class:
   "Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 fingers for D".
2. Notice how the learners responded. Ask a learner who gave answer A to explain why he or she gave that answer and DO NOT say whether it is right or wrong but simply thank the learner for giving the answer.
3. Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.
4. Ask the class **again** to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers. It is important for learners to explain the reason for their answer otherwise many learners will just make a guess.
5. If the concept is needed for the lesson to follow, explain the right answer or give a remedial task.

Which of the following points belongs to the linear function $y = \frac{3}{8}x + 7$?

A. (1, 3) B. (3, 2) C. (8, 10) D. (10, 12)

C is the correct answer.

Common Misconceptions

A. $(1 + 7) \times \frac{3}{8}$ instead of $(\frac{3}{8} \times 1) + 7$

B. $(3 \times 3 + 7) \div 8$ instead of $(3 \times 3) \div 8 + 7$

D. Calculating error, perhaps did $30/8 + 7 = 96/8 = 12$

https://diagnosticquestions.com

Why do this activity?
This activity provides an entertaining way to review what learners know about linear functions. It gives learners the opportunity to be creative, possibly by introducing quadratic as well as linear functions, and in this way enables the teacher to cater for learners of all abilities.

Intended learning outcomes
To review multiple representations of linear functions.

Suggestions for teaching
This activity can be used as a 15 minute lesson starter.

Draw the mapping diagram on the board and stand with your back to the board. Invite learners to write an input in Box A and the outputs in Boxes B and C and to tell you what is in Box B . Without looking at the board you should be able to tell the learners immediately what is in Boxes A and C. Repeat this.

Ask the class if anyone can explain the trick? If anyone claims to know how it works then invite that learner to take your place and be the person who stands with his back to the board. If this learner gets it right, repeat this until several learners have worked it out. Then ask these learners to explain the trick to the rest of the class.

The invention of different mappings and part (2) of this activity can be given as a homework task.

Key questions
Can you give an expression for the output in Box B if the input is n?
Can you give an expression for the output in Box C if the input is n?
If you know the output how do you find the input?
Why are the two mappings shown in the diagram NOT inverses of each other?

Possible extension
Answer the same question when the mapping from A to B is square -> +3
and from A to C is +3 -> square

Possible support
Ask the learner to try different inputs and each time to write down the outputs for each of the boxes B and C. What do they notice?

Note: The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA and to Years 4 to 12 in the UK.

	Lower Primary or Foundation Phase	Upper Primary	Lower Secondary	Upper Secondary
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
USA	Kindergarten and G1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
UK	Reception and Years 1 to 3	Years 4 to 6	Years 7 to 9	Years 10 to 13
East Africa	Nursery and Primary 1 to 3	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6