

Reasoning and Problem Solving

Step 3: Forming Expressions

National Curriculum Objectives:

Mathematics Year 6: (6A1) [Express missing number problems algebraically](#)

Differentiation:

Questions 1, 4 and 7 (Problem Solving)

Developing Find the expression in a sequence which uses addition and multiplication.

Expected Find the expression in a multi-step sequence which uses all four operations.

Greater Depth Find the expression in a multi-step sequence which uses all four operations. Includes decimals numbers.

Questions 2, 5 and 8 (Reasoning)

Developing Explain the mistake when forming an expression from a one-step function machine, using addition or multiplication.

Expected Explain the mistake when forming an expression from a two-step function machine, using all four operations.

Greater Depth Explain the mistake when forming an expression from a two-step function machine, using all four operations. Includes decimals numbers.

Questions 3, 6 and 9 (Problem Solving)

Developing Work out the output from a given input where the one-step function must be calculated first. Function machine uses addition or multiplication.

Expected Work out the output from a given input where the one-step function must be calculated first. Function machine can use all four operations.

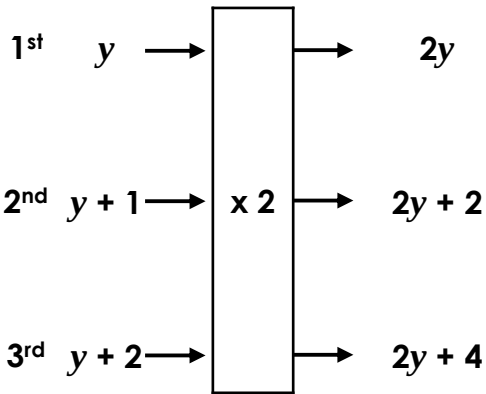
Greater Depth Work out the output from a given input where the two-step functions must be calculated first. Function machine can use all four operations and decimal numbers.

More [Year 6 Algebra](#) resources.

Did you like this resource? Don't forget to [review](#) it on our website.

Forming Expressions

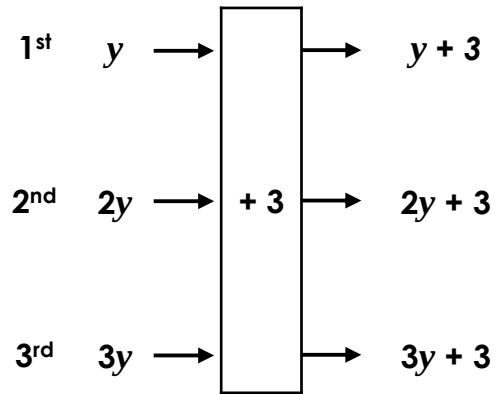
1a. What is the 5th expression in the sequence?



PS

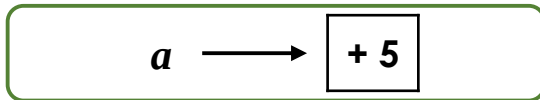
Forming Expressions

1b. What is the 7th expression in the sequence?



PS

2a. Raza has created a function machine.



She says,



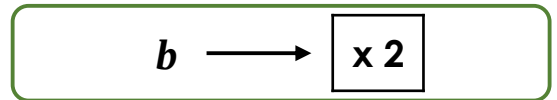
The expression formed from this function machine is $5a$.

Explain Raza's mistake.



R

2b. Leon has created a function machine.



He says,



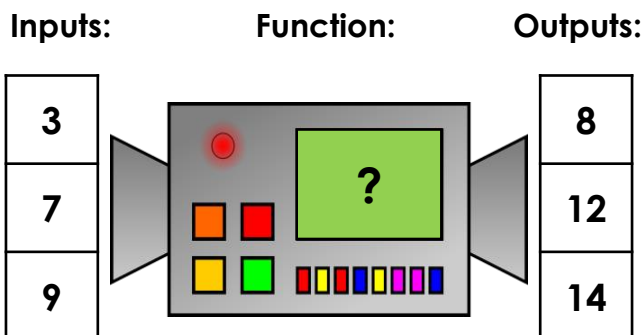
The expression formed from this function machine is $b \times 2$.

Explain Leon's mistake.



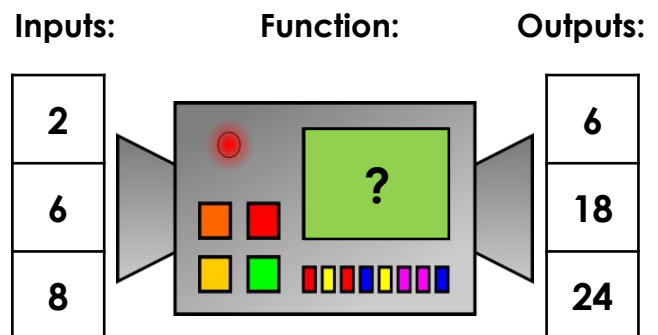
R

3a. Jim has put some terms into a function machine. What is the output if the input is 12?



PS

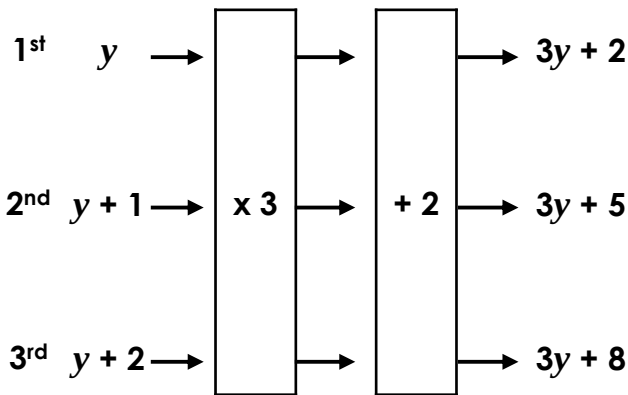
3b. Caz has put some terms into a function machine. What is the output if the input is 9?



PS

Forming Expressions

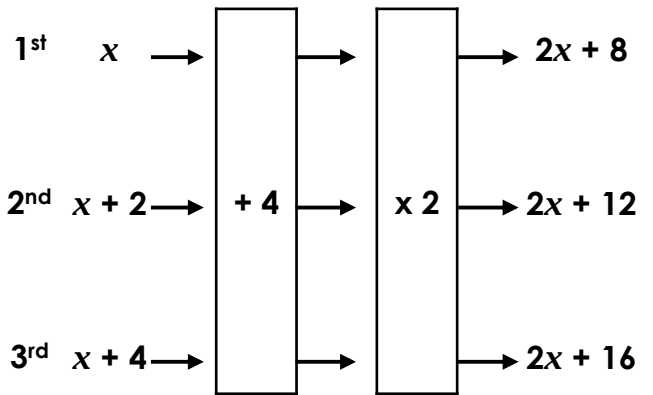
4a. What is the 9th expression in the sequence?



PS

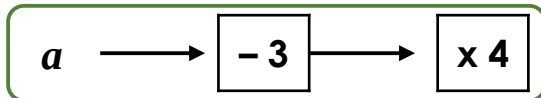
Forming Expressions

4b. What is the 10th expression in the sequence?



PS

5a. Jane has created a function machine.



She says,



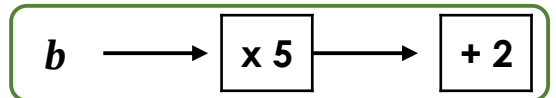
The expression formed from this function machine is $4a - 3$.

Explain Jane's mistake.



R

5b. Peri has created a function machine.



He says,



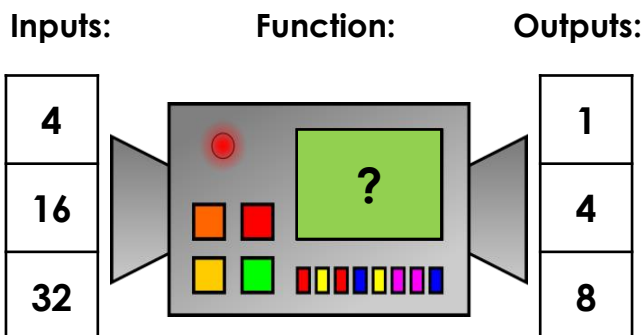
The expression formed from this function machine is $b \times 5 + 2$.

Explain Peri's mistake.



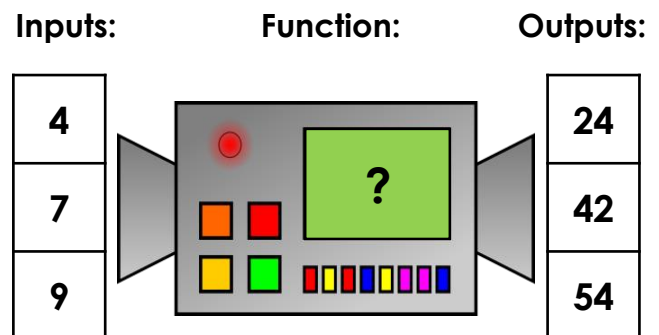
R

6a. Tom has put some terms into a function machine. What is the output if the input is 48?



PS

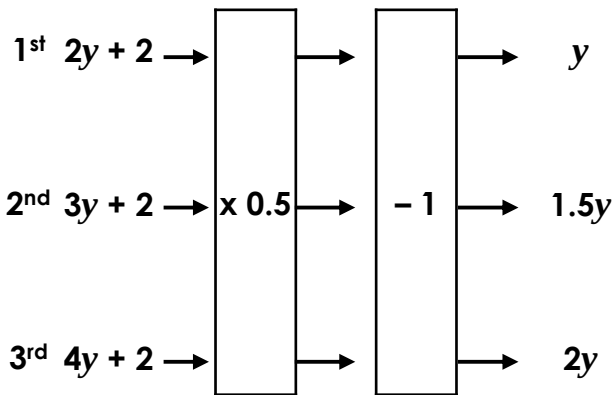
6b. Leia has put some terms into a function machine. What is the output if the input is 12?



PS

Forming Expressions

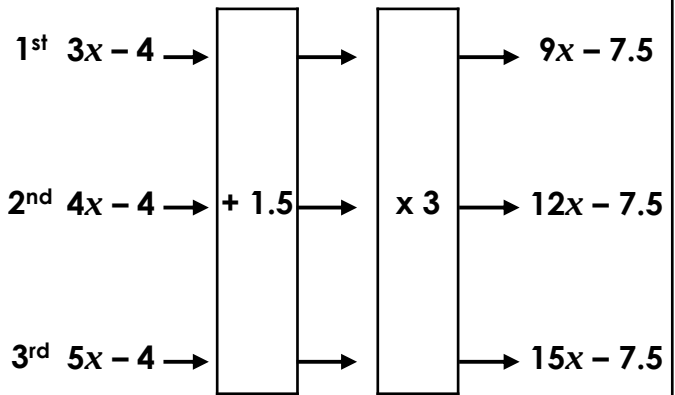
7a. What is the 16th expression in the sequence?



PS

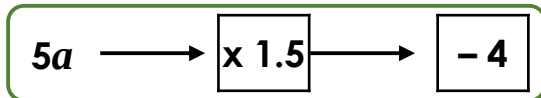
Forming Expressions

7b. What is the 21st expression in the sequence?



PS

8a. Nya has created a function machine.



She says,



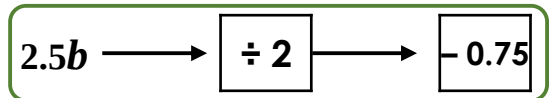
The expression formed from this function machine is $6.5a - 4$.

Explain Nya's mistake.



R

8b. Kia has created a function machine.



He says,



The expression formed from this function machine is $1.5b - 0.75$.

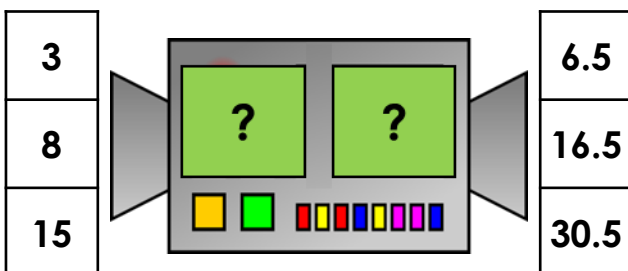
Explain Kia's mistake.



R

9a. Bill has put some terms into a function machine. What is the output if the input is 22?

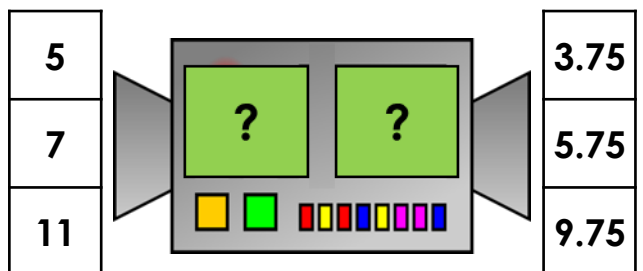
Inputs: Functions: Outputs:



PS

9b. Saul has put some terms into a function machine. What is the output if the input is 16?

Inputs: Functions: Outputs:



PS

Reasoning and Problem Solving Forming Expressions

Developing

1a. $2y + 8$

2a. Raza has multiplied instead of adding. Her expression should be $a + 5$.

3a. The function is $+ 5$ so the output will be 17.

Expected

4a. $3y + 26$

5a. Jane has swapped the functions around but this changes the expression. Her expression should be $a - 3 \times 4$.

6a. The function is $\div 4$ so the output will be 12.

Greater Depth

7a. $8.5y$

8a. Nya has added the 5 and 1.5 together to make 6.5. She should have multiplied them together. Her expression should be $7.5a - 4$.

9a. The function is $\times 2 + 0.5$ so the output will be 44.5.

Reasoning and Problem Solving Forming Expressions

Developing

1b. $7y + 3$

2b. Leon has forgotten that when multiplying in algebra we write the expression $2b$.

3b. The function is $\times 3$ so the output will be 27.

Expected

4b. $2x + 44$

5b. Peri has forgotten that when multiplying in algebra we write the expression $5b$. His expression should be $5b + 2$.

6b. The function is $\times 6$ so the output will be 72.

Greater Depth

7b. $69x - 7.5$

8b. Kia has tried to divide 2.5 by 2 to combine the steps but his dividing is inaccurate. His expression should be $1.25b - 0.75$.

9b. The function is $- 2 + 0.75$ so the output will be 14.75.