

Function Machines

State the *outputs* for the given inputs.

1 in $\rightarrow$ $\boxed{\times 2} \rightarrow \boxed{+ 1} \rightarrow$ out

- (a) 1 (b) 3 (c) 5 (d) 7

2 in $\rightarrow$ $\boxed{\times 3} \rightarrow \boxed{- 5} \rightarrow$ out

- (a) 10 (b) 8 (c) 6 (d) 4

3 in $\rightarrow$ $\boxed{\times 2} \rightarrow \boxed{+ 2} \rightarrow$ out

- (a) 1 (b) 3 (c) 5 (d) 7

4 in $\rightarrow$ $\boxed{\div 2} \rightarrow \boxed{+ 1} \rightarrow$ out

- (a) 10 (b) 12 (c) 14 (d) 16

5 in $\rightarrow$ $\boxed{\times 7} \rightarrow \boxed{+ 1} \rightarrow$ out

- (a) 1 (b) 2 (c) 3 (d) 4

6 in $\rightarrow$ $\boxed{\times 3} \rightarrow \boxed{- 1} \rightarrow$ out

- (a) 10 (b) 11 (c) 12 (d) 13

7 in $\rightarrow$ $\boxed{\times 8} \rightarrow \boxed{+ 2} \rightarrow$ out

- (a) 2 (b) 4 (c) 6 (d) 8

8 in $\rightarrow$ $\boxed{\times 6} \rightarrow \boxed{- 5} \rightarrow$ out

- (a) 8 (b) 6 (c) 4 (d) 2

9 in $\rightarrow$ $\boxed{\div 3} \rightarrow \boxed{+ 4} \rightarrow$ out

- (a) 3 (b) 6 (c) 9 (d) 18

10 in $\rightarrow$ $\boxed{\times \frac{1}{4}} \rightarrow \boxed{+ 5} \rightarrow$ out

- (a) 24 (b) 20 (c) 16 (d) 12

Function Machines Backwards

State the *inputs* for the given outputs.

1 in $\rightarrow \boxed{\times 3} \rightarrow \boxed{- 2} \rightarrow$ out

- (a) 7 (b) 10 (c) 13 (d) 16

2 in $\rightarrow \boxed{\div 2} \rightarrow \boxed{+ 1} \rightarrow$ out

- (a) 7 (b) 6 (c) 5 (d) 4

3 in $\rightarrow \boxed{\times 2} \rightarrow \boxed{- 4} \rightarrow$ out

- (a) 8 (b) 6 (c) 4 (d) 2

4 in $\rightarrow \boxed{\div 3} \rightarrow \boxed{+ 1} \rightarrow$ out

- (a) 1 (b) 2 (c) 3 (d) 4

5 in $\rightarrow \boxed{\times 5} \rightarrow \boxed{+ 2} \rightarrow$ out

- (a) 17 (b) 22 (c) 27 (d) 32

6 in $\rightarrow \boxed{\div 3} \rightarrow \boxed{- 4} \rightarrow$ out

- (a) 3 (b) 4 (c) 5 (d) 20

7 in $\rightarrow \boxed{\times 2} \rightarrow \boxed{+ 1} \rightarrow$ out

- (a) 9 (b) 11 (c) 13 (d) 51

8 in $\rightarrow \boxed{\div 4} \rightarrow \boxed{+ 3} \rightarrow$ out

- (a) 3 (b) 4 (c) 5 (d) 6

9 in $\rightarrow \boxed{\times 5} \rightarrow \boxed{- 3} \rightarrow$ out

- (a) 22 (b) 27 (c) 32 (d) 52

10 in $\rightarrow \boxed{\times \frac{1}{2}} \rightarrow \boxed{- 1} \rightarrow$ out

- (a) 0 (b) 1 (c) 2 (d) 15

Function Machines Forwards & Backwards

State the missing inputs or outputs:

1 2, 3, 4, 5 $\boxed{\times 2} \rightarrow \boxed{-1} \rightarrow ?$

2 1, 2, 3, 4 $\rightarrow \boxed{\times 3} \rightarrow \boxed{-2} \rightarrow ?$

3 ? $\rightarrow \boxed{\times 2} \rightarrow \boxed{+1} \rightarrow 11, 13, 15, 17$

4 ? $\rightarrow \boxed{\div 2} \rightarrow \boxed{-1} \rightarrow 5, 6, 7, 8$

5 0, 1, 2, 3 $\rightarrow \boxed{\times 2} \rightarrow \boxed{+2} \rightarrow ?$

6 0, 2, 4, 6 $\rightarrow \boxed{\div 2} \rightarrow \boxed{+1} \rightarrow ?$

7 ? $\rightarrow \boxed{\times 2} \rightarrow \boxed{-3} \rightarrow 1, 3, 5, 7$

8 ? $\rightarrow \boxed{\div 3} \rightarrow \boxed{-3} \rightarrow 2, 3, 4, 5$

9 5, 6, 7, 8 $\rightarrow \boxed{\times 2} \rightarrow \boxed{+3} \rightarrow ?$

10 2, 4, 6, 8 $\rightarrow \boxed{\div 2} \rightarrow \boxed{-1} \rightarrow ?$

11 ? $\rightarrow \boxed{\times 3} \rightarrow \boxed{+3} \rightarrow 12, 15, 18, 21$

12 ? $\rightarrow \boxed{\div 2} \rightarrow \boxed{-2} \rightarrow 2, 4, 6, 8$

13 1, 2, 3, 4 $\rightarrow \boxed{\times 6} \rightarrow \boxed{-1} \rightarrow ?$

14 9, 15, 21, 27 $\rightarrow \boxed{\div 3} \rightarrow \boxed{+2} \rightarrow ?$

15 $? \rightarrow \boxed{\div 2} \rightarrow \boxed{-1} \rightarrow 1, 3, 5, 7$

16 $? \rightarrow \boxed{\times 2} \rightarrow \boxed{+5} \rightarrow 17, 19, 21, 23$

17 $2, 3, 4, 5 \rightarrow \boxed{\times 5} \rightarrow \boxed{-1} \rightarrow ?$

18 $? \rightarrow \boxed{\times 3} \rightarrow \boxed{+2} \rightarrow 8, 11, 14, 17$

19 $2, 3, 4, 5 \rightarrow \boxed{\times 7} \rightarrow \boxed{+2} \rightarrow ?$

20 $? \rightarrow \boxed{\div 5} \rightarrow \boxed{-4} \rightarrow 1, 2, 3, 4$