

Big Question: What is Arithmetic Shift

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Learning Intention

To develop knowledge

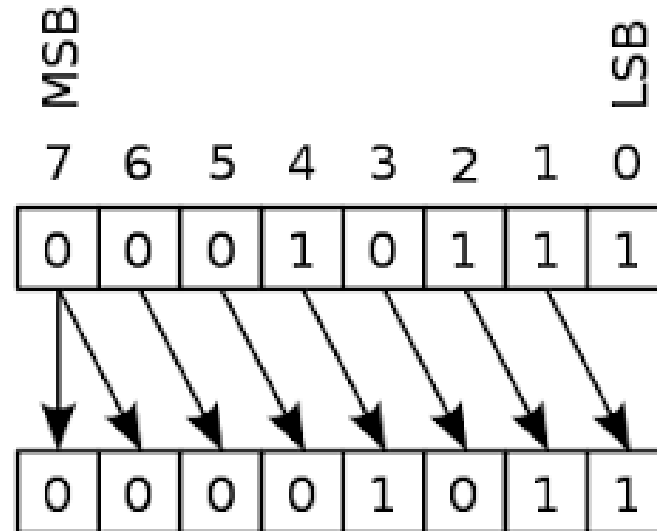
Understand how
Arithmetic shift effects
binary numbers

To secure understanding by

Perform binary shift
calculations using left and
right shift

To achieve excellence by

Explain using own
examples how we can
manipulate binary numbers



Keywords

Arithmetic shift

shifting binary numbers
either right or left.

Arithmetic shifts can help
perform multiplication or
division on binary numbers.

LEFT SHIFT

SHIFTS Each number left a certain amount of spaces

	128	64	32	16	8	4	2	1	
Original number = 1					0	0	0	1	
L shift 1 place = 2				0	0	0	1	0	x 2
L shift 2 place = 4			0	0	0	1	0	0	x 4
L shift 3 place = 8		0	0	0	1	0	0	0	x 8
L shift 4 place = 16	0	0	0	1	0	0	0		x 16

LEFT SHIFT 1 place

SHIFTS Each number 1 place to the left

	128	64	32	16	8	4	2	1	
	0	0	0	0	1	0	1	1	
	0	0	0	0	1	0	1	0	

Original number = 11

New number after Left shift = 22

Left shift 1 place is the same as
multiplying by **2**

LEFT SHIFT 2 places

SHIFTS Each number 2 places to the left

	128	64	32	16	8	4	2	1
	0	0	0	0	1	0	1	1
	0	0	0	0	1	0	0	0

Original number = 11

New number after Left shift = 44

Left shift 2 places is the same as
multiplying by 4

RIGHT SHIFT

SHIFTS Each number RIGHT a certain amount of spaces

	128	64	32	16	8	4	2	1	
Original number = 16				1	0	0	0	1	
R shift 1 place = 8				0	1	0	0	0	/ 2
R shift 2 place = 4				0	0	1	0	0	/ 4
R shift 3 place = 2				0	0	0	1	0	/ 8
R shift 4 place = 1				0	0	0	0	1	/ 16

RIGHT SHIFT 1 place

SHIFTS Each number 1 place to the Right

	128	64	32	16	8	4	2	1
	0	0	0	0	1	1	0	0
	0	0	0	0	1	1	0	0

Original number = 12

New number after right shift = 6

Right shift 1 place is the same as
dividing by **2**

RIGHT SHIFT 2 places

SHIFTS Each number 2 place to the Right

128	64	32	16	8	4	2	1
0	0	0	0	1	1	0	0
0	0	0	0	1	1	0	0

Original number = 12

New number after Right shift = 3

Right shift 2 places is the same as
dividing by 4

Binary Shift Task Sheet

1. What effect do the following shifts have on a binary value?

- a) One place right: Dividing by 2
- b) Two places right: _____
- c) Three places right: _____
- d) Four places right: _____
- e) One place left: _____
- f) Two places left: _____
- g) Three places left: _____
- h) Four places left: _____

2. Perform arithmetic shifts on the numbers below: