UNIT- 1
NUMBER SYSTEMS & CODES

TOPIC 1.1
NUMBER SYSTEM & CONVERSION

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Introduction

Signals-

Types of signals

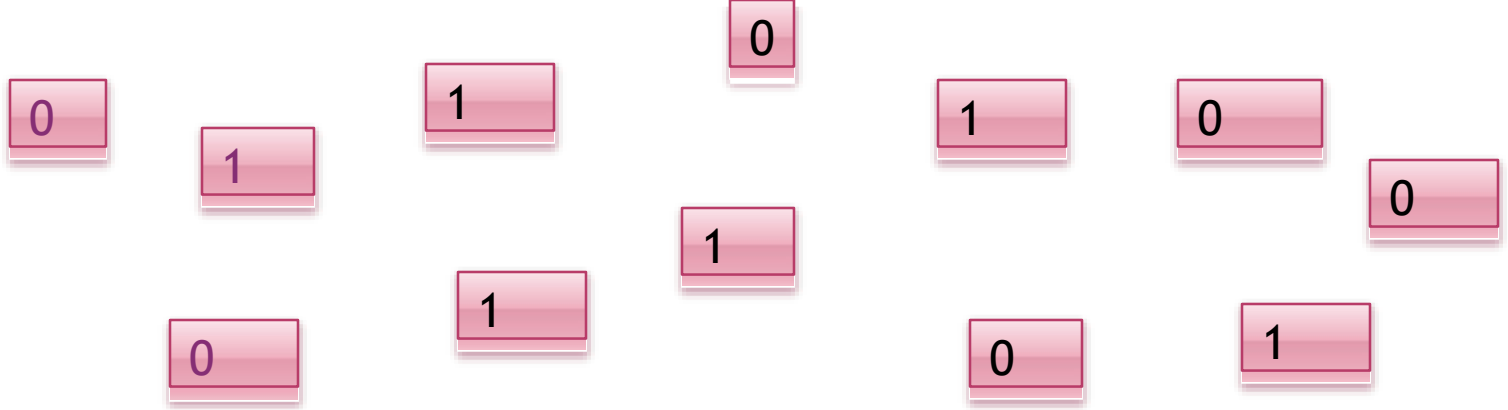
1. Analog Signals
2. Digital Signals

Input binary sequence

Digital Systems

2
+1
=3

HOW THE COMPUTER GETS THE ANSWER

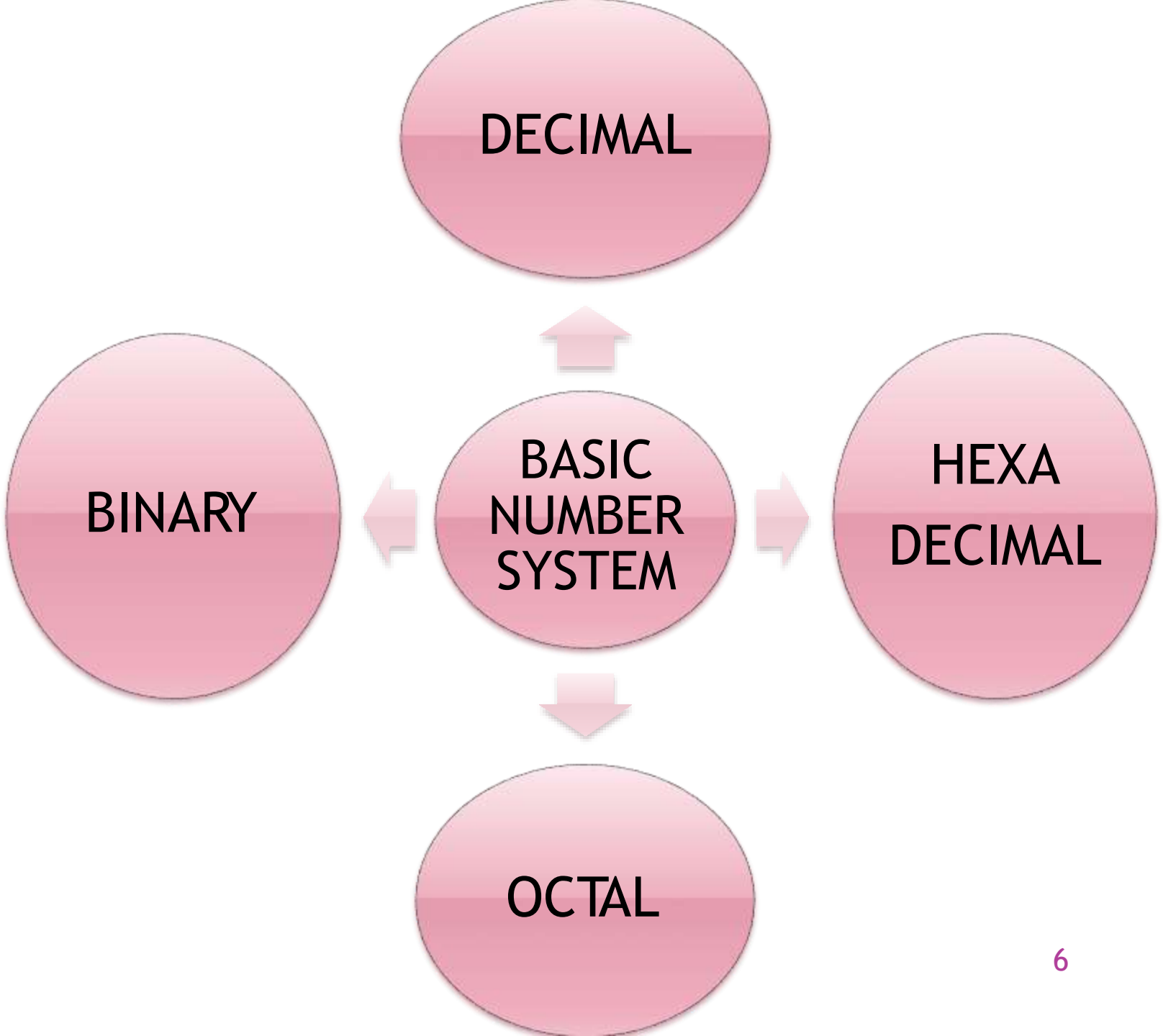


- A computer understands information composed of only zeros and ones.
- The decimal number system is convenient for the programmer.
- The computer uses binary digits for its operation.

Radix or base-

MSD (Most Significant Digit)-

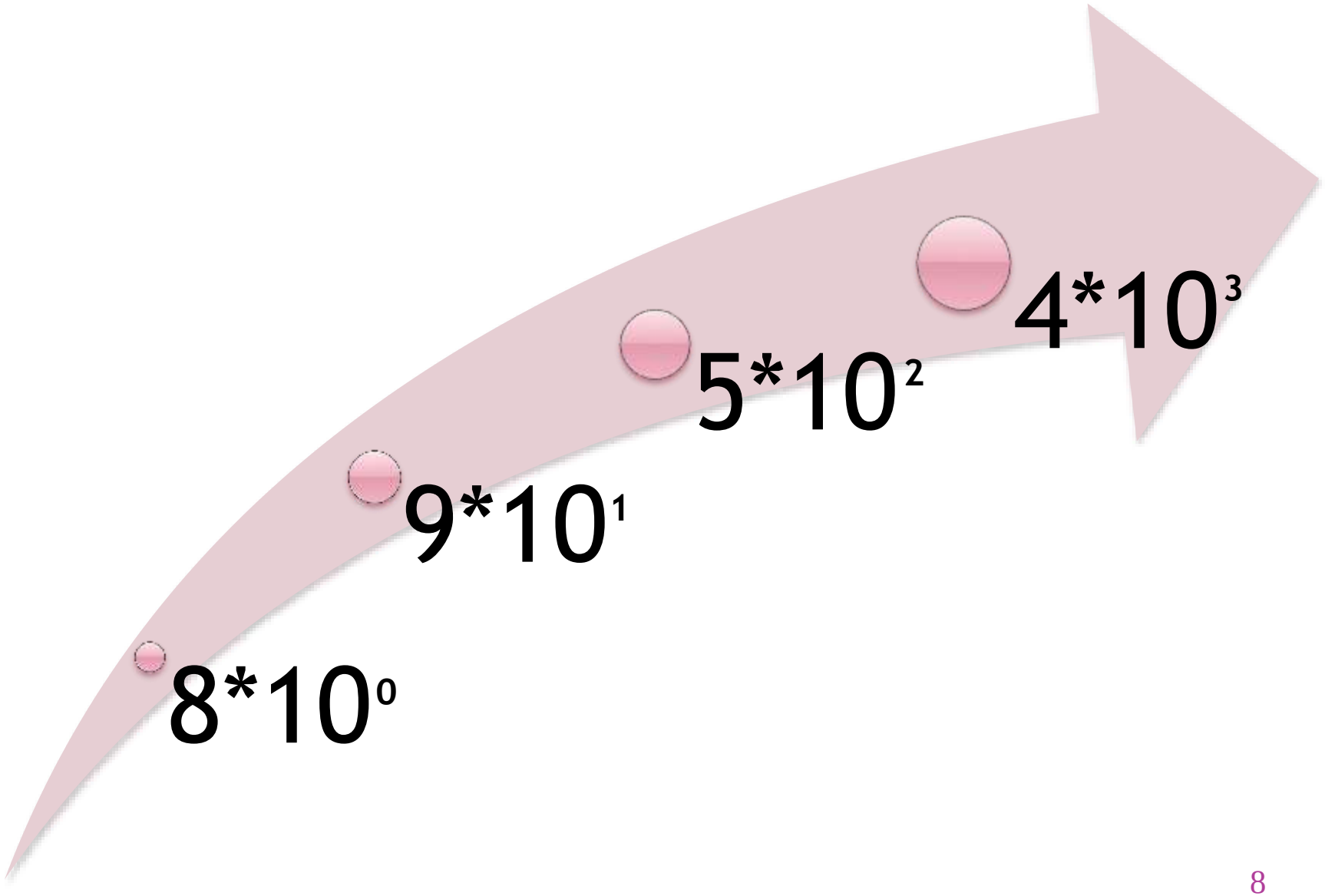
LSD (Least Significant Digit)-


DECIMAL
BINARY
BASIC NUMBER SYSTEM
HEXA DECIMAL
OCTAL

DECIMAL NUMBER SYSTEM

DIGITS	• 0,1,2,3,4,5,6,7,8,9.
BASE	• 10

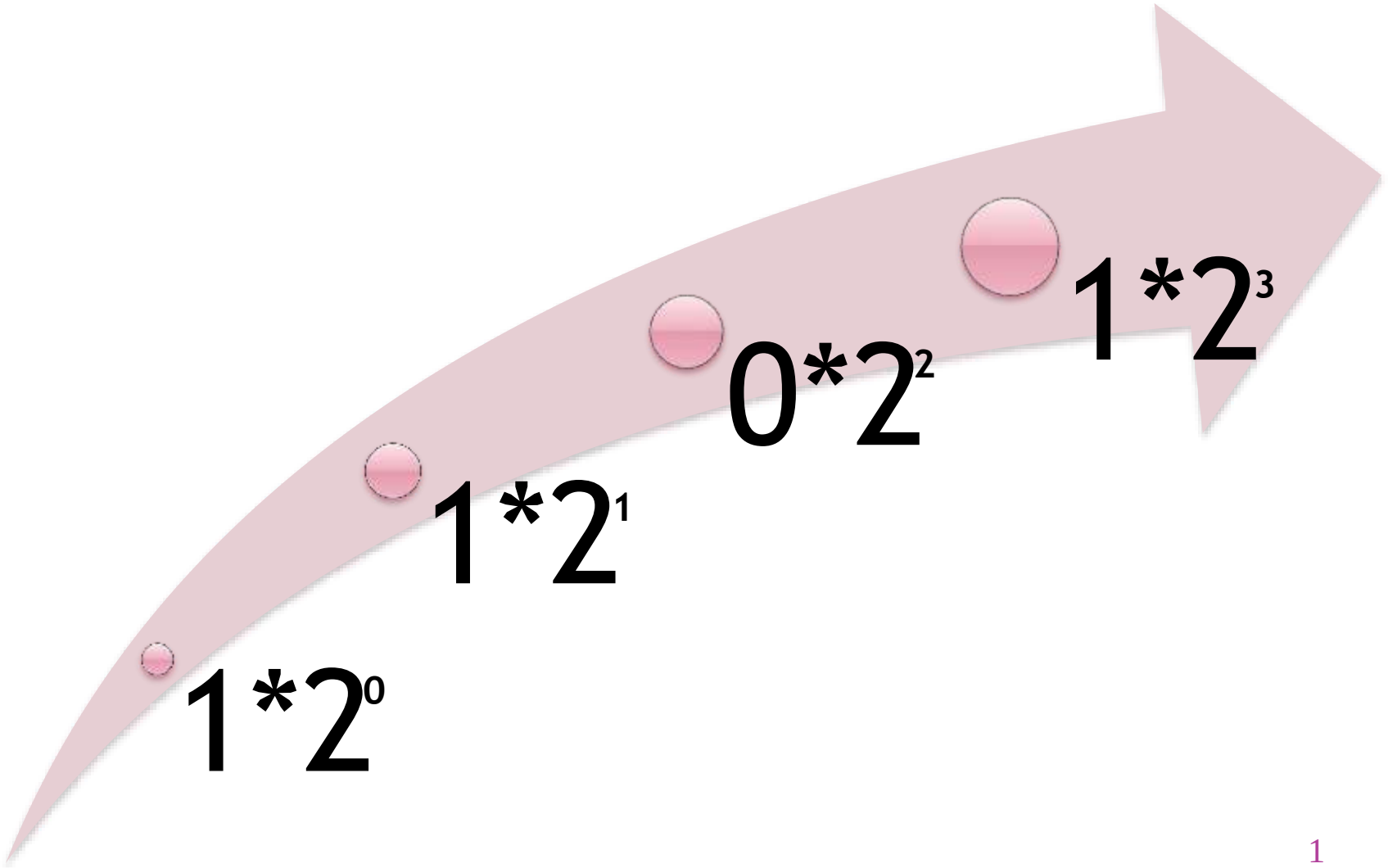
DECIMAL NUMBER 4598



BINARY NUMBER SYSTEM

DIGITS	•0,1
BASE	•2

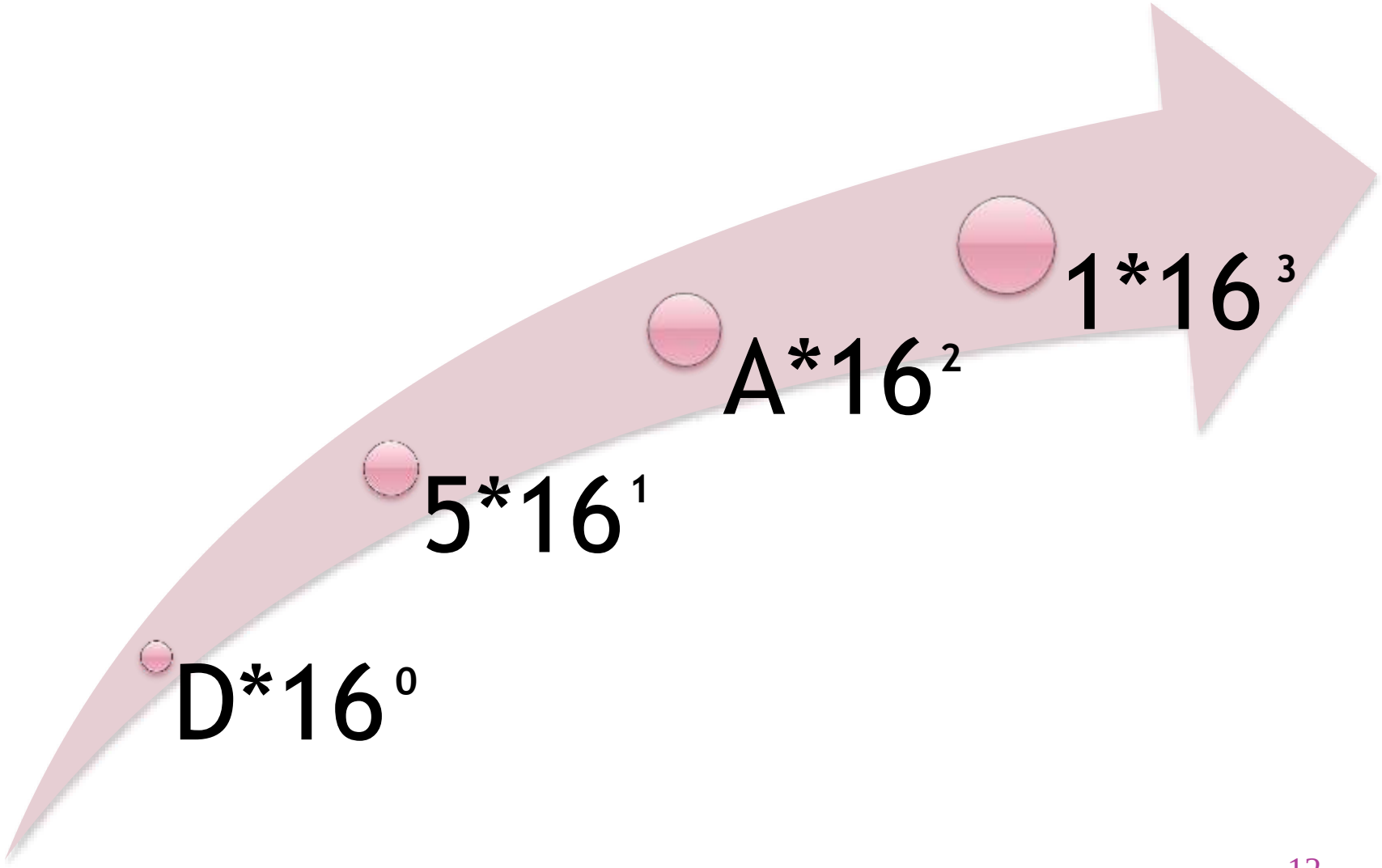
BINARY NUMBER 1011



HEXADECIMAL NUMBER SYSTEM

DIGITS	• 0,1,2,3,4,5,6,7, • 8,9,A,B,C,D,E,F.
BASE	• 16

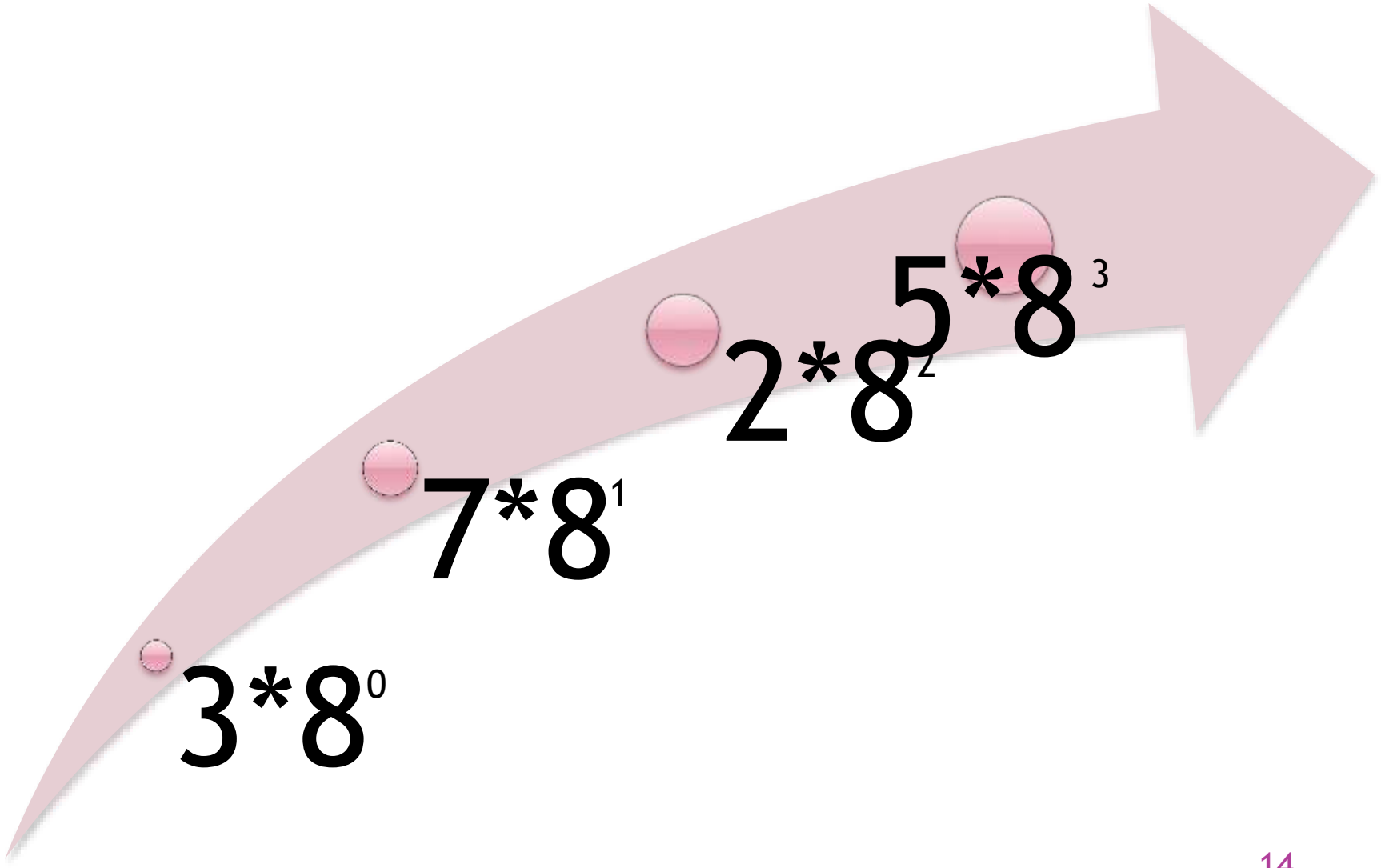
HEXADECIMAL NUMBER 1A5D



OCTAL NUMBER SYSTEM

DIGITS	•0,1,2,3,4, •5,6,7.
BASE	•8

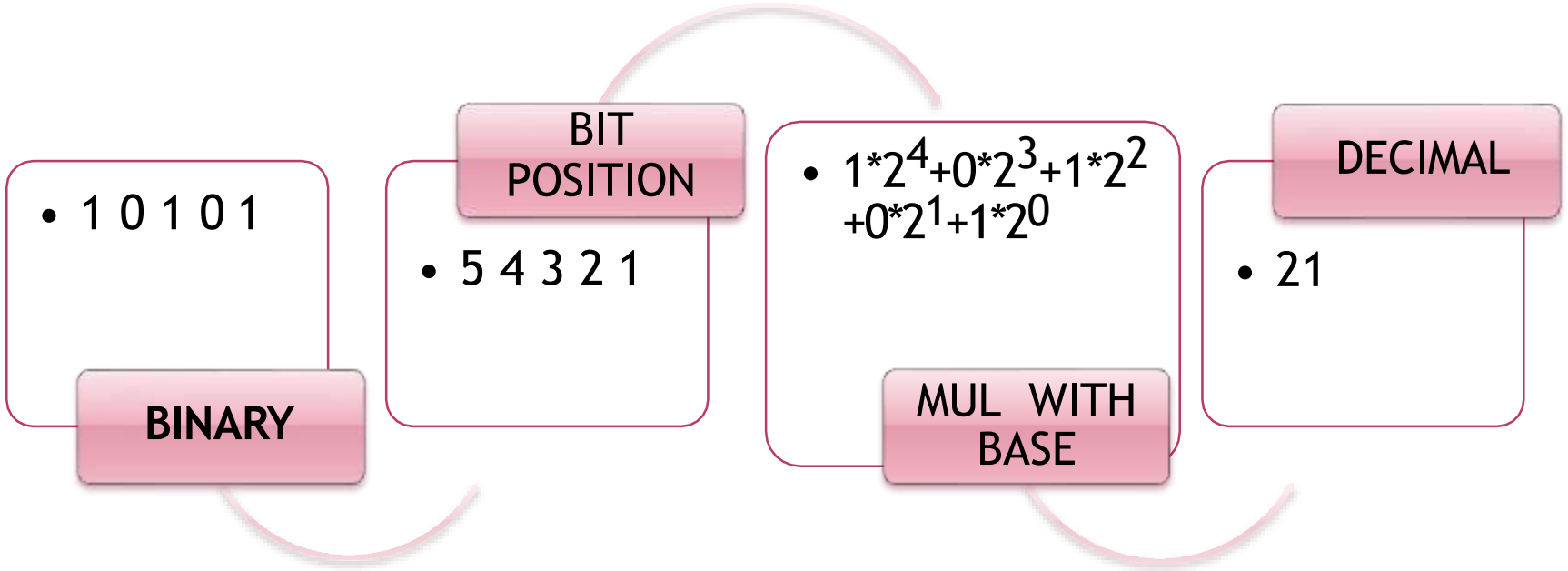
OCTAL NUMBER 5273



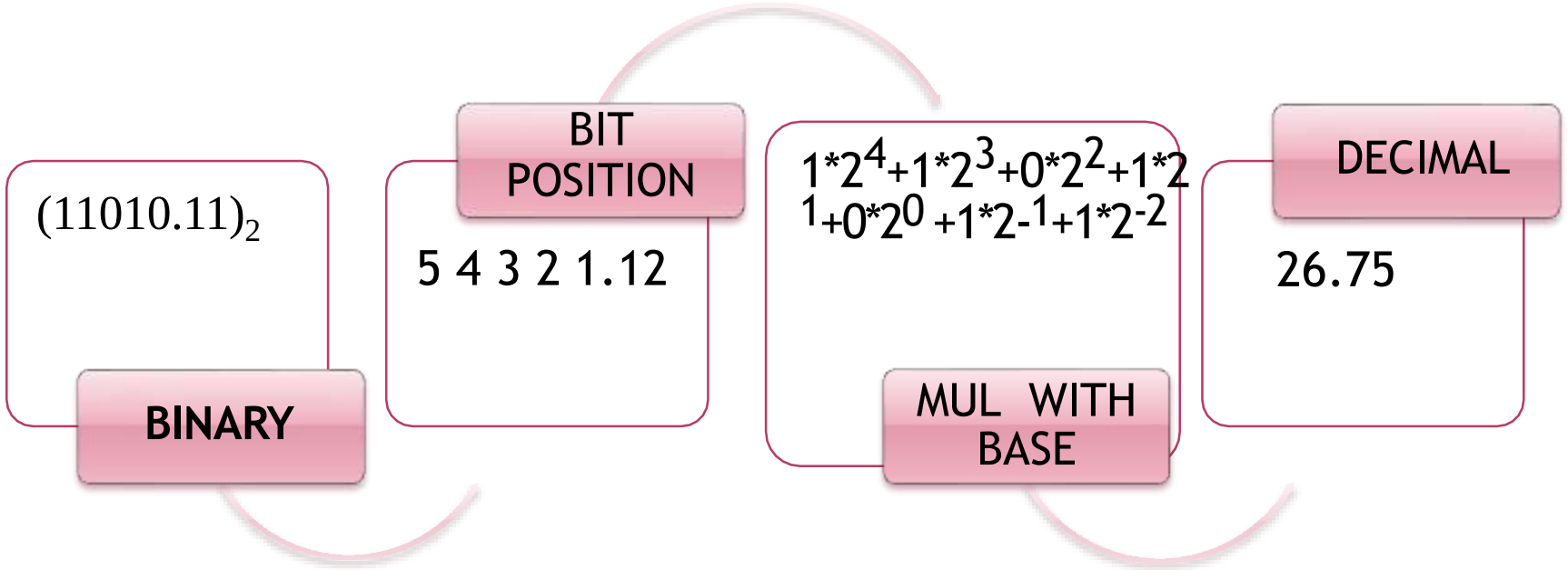
CONVERSIONS IN BASIC NUMBER SYSTEM

Decimal Number Convertor Table			
Decimal Number	Binary Number	Hexadecimal Number	Octal Number
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	8	10
9	1001	9	11
10	1010	a	12
11	1011	b	13
12	1100	c	14
13	1101	d	15
14	1110	e	16
15	1111	f	17

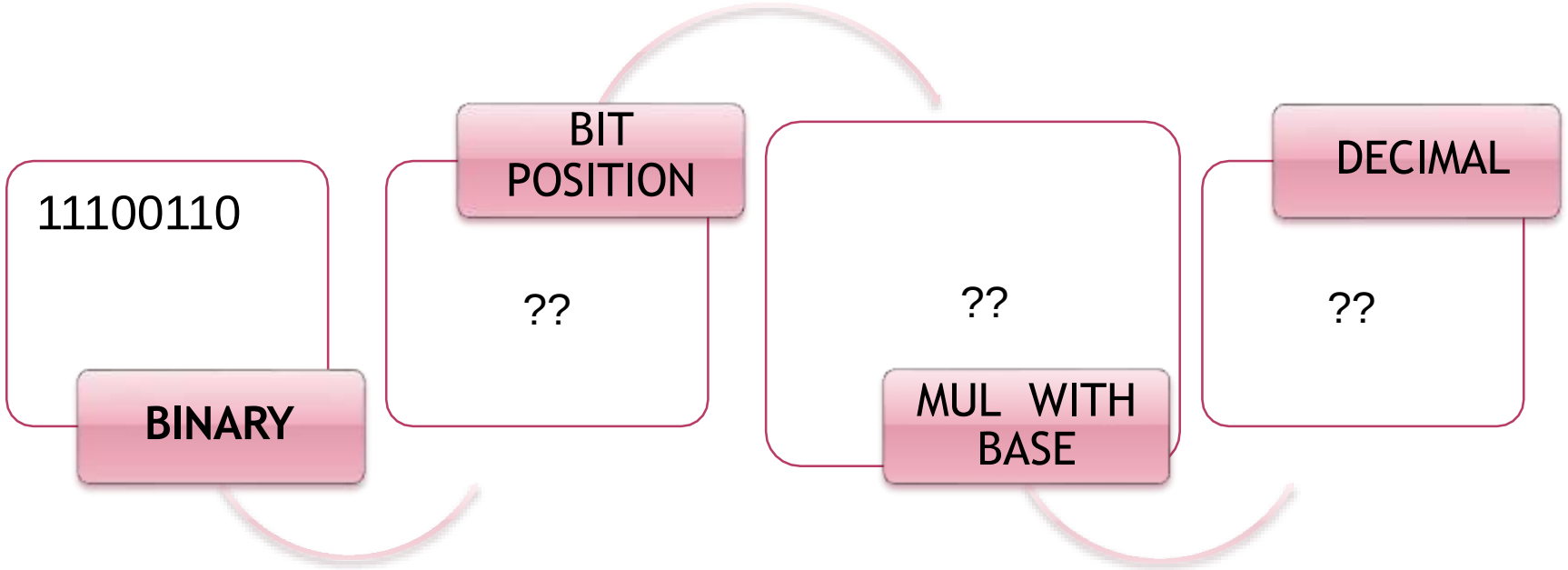
BINARY TO DECIMAL



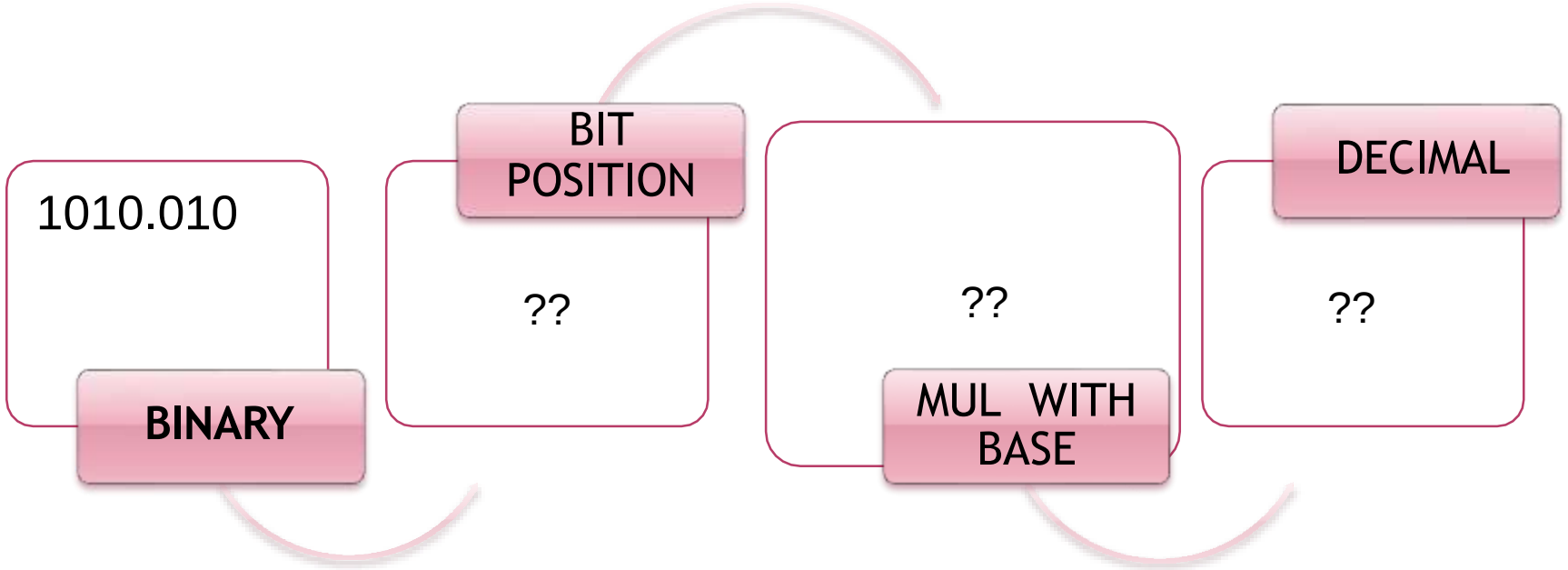
BINARY TO DECIMAL



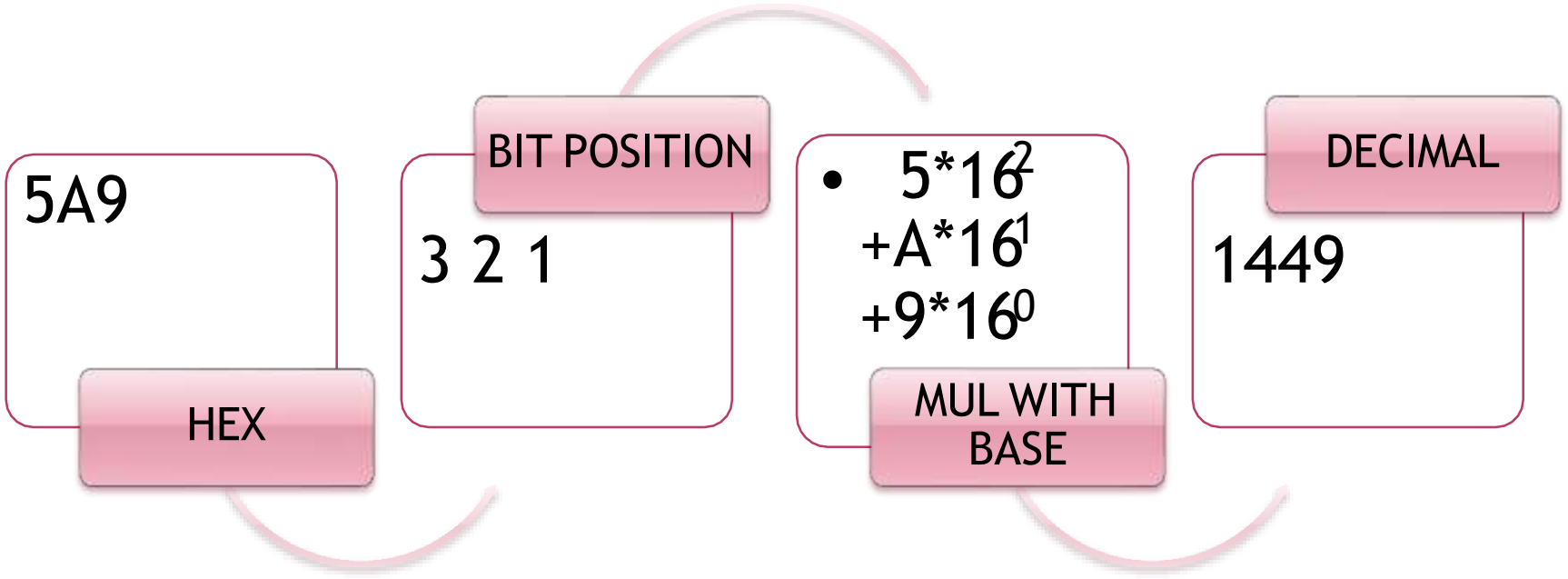
BINARY TO DECIMAL



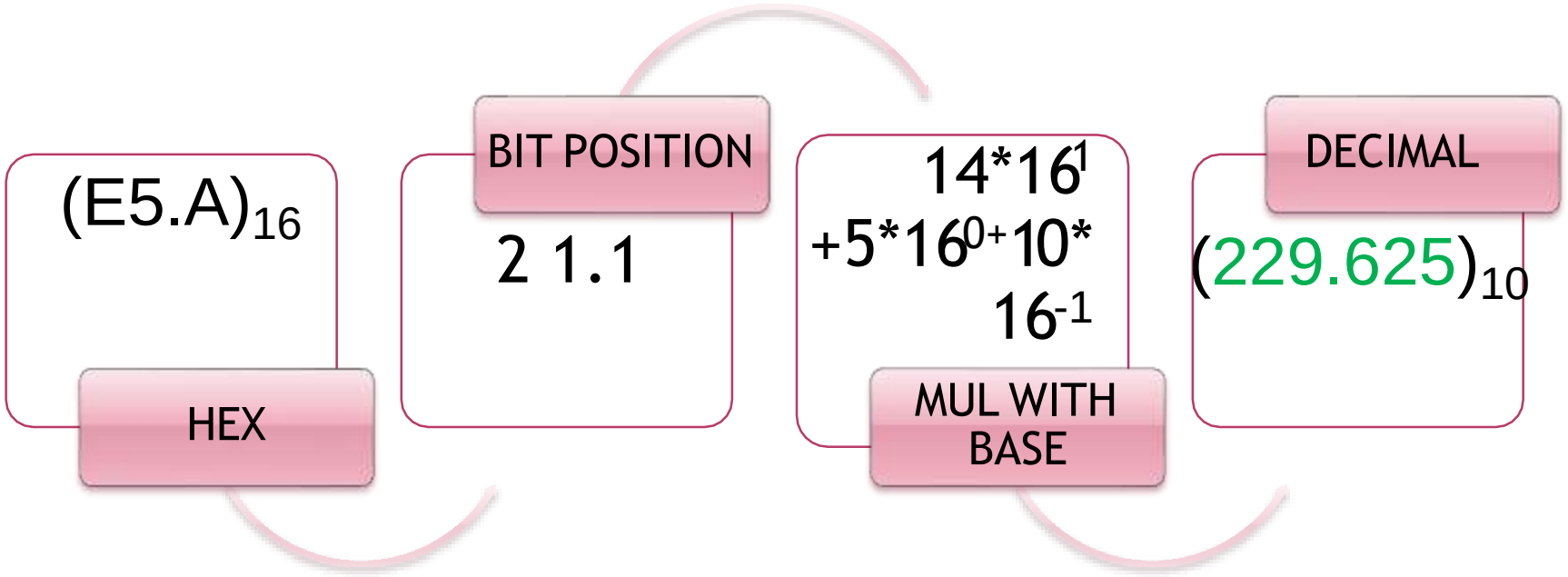
BINARY TO DECIMAL



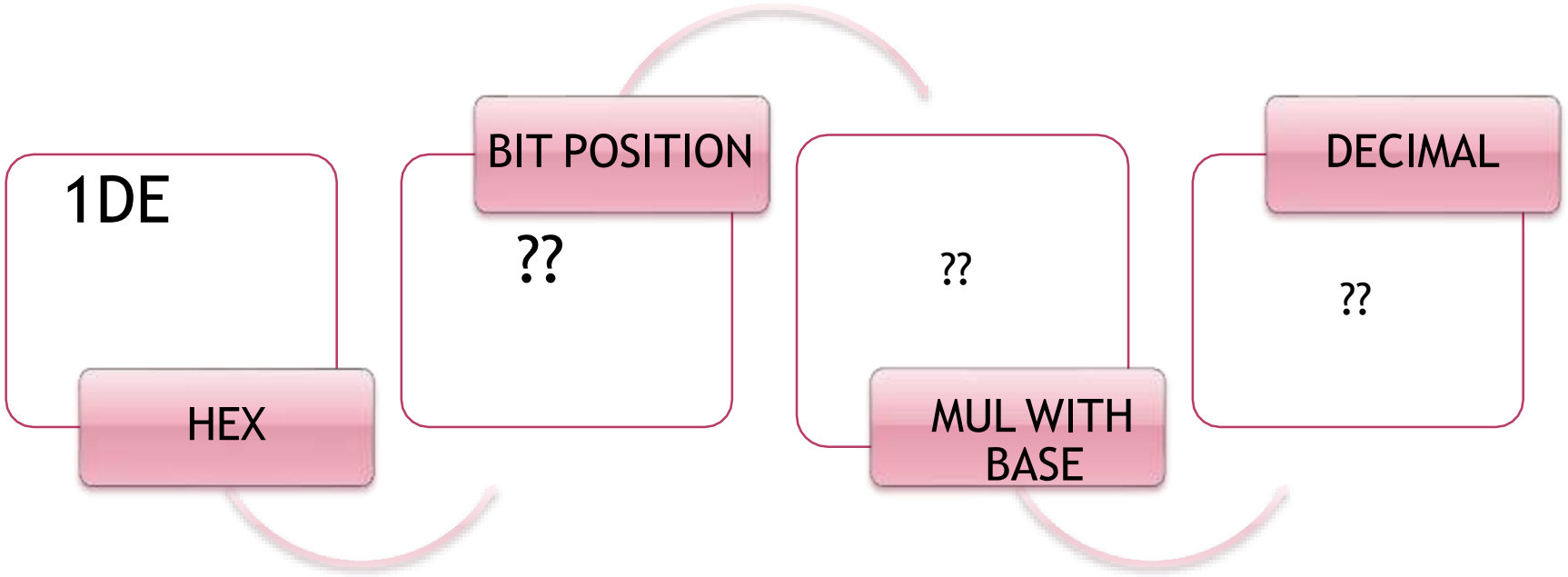
HEXADECIMAL TO DECIMAL



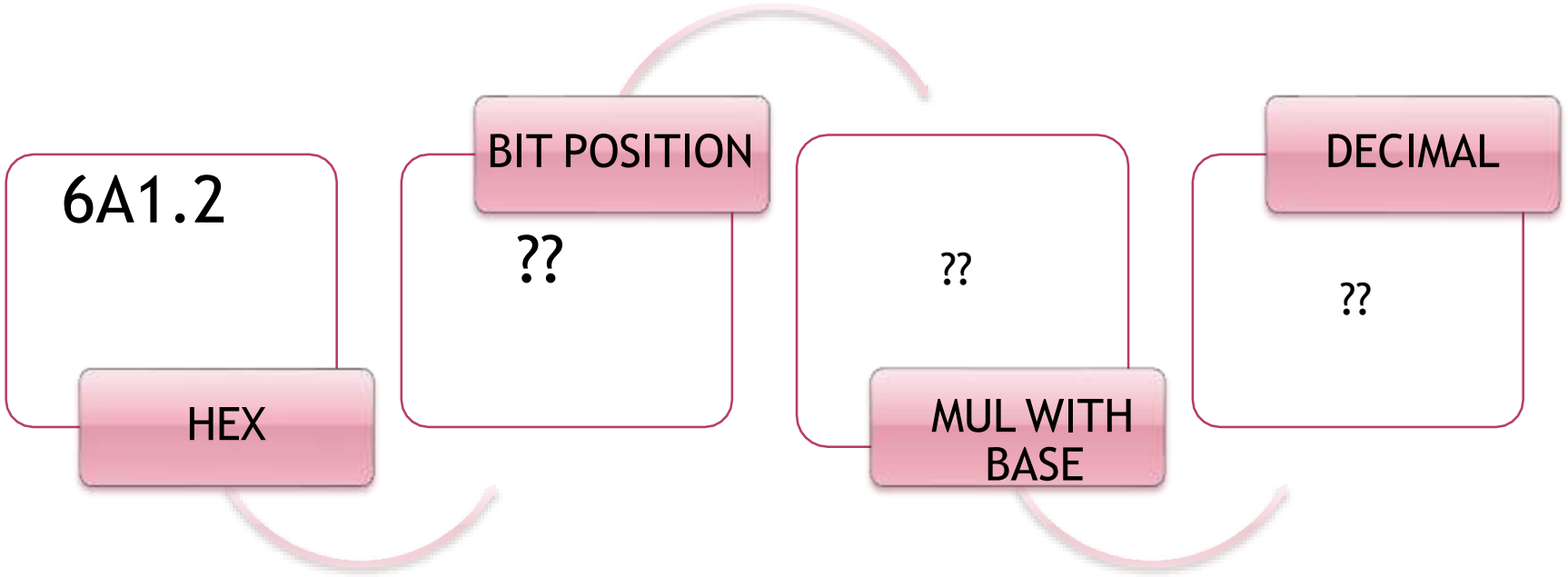
HEXADECIMAL TO DECIMAL



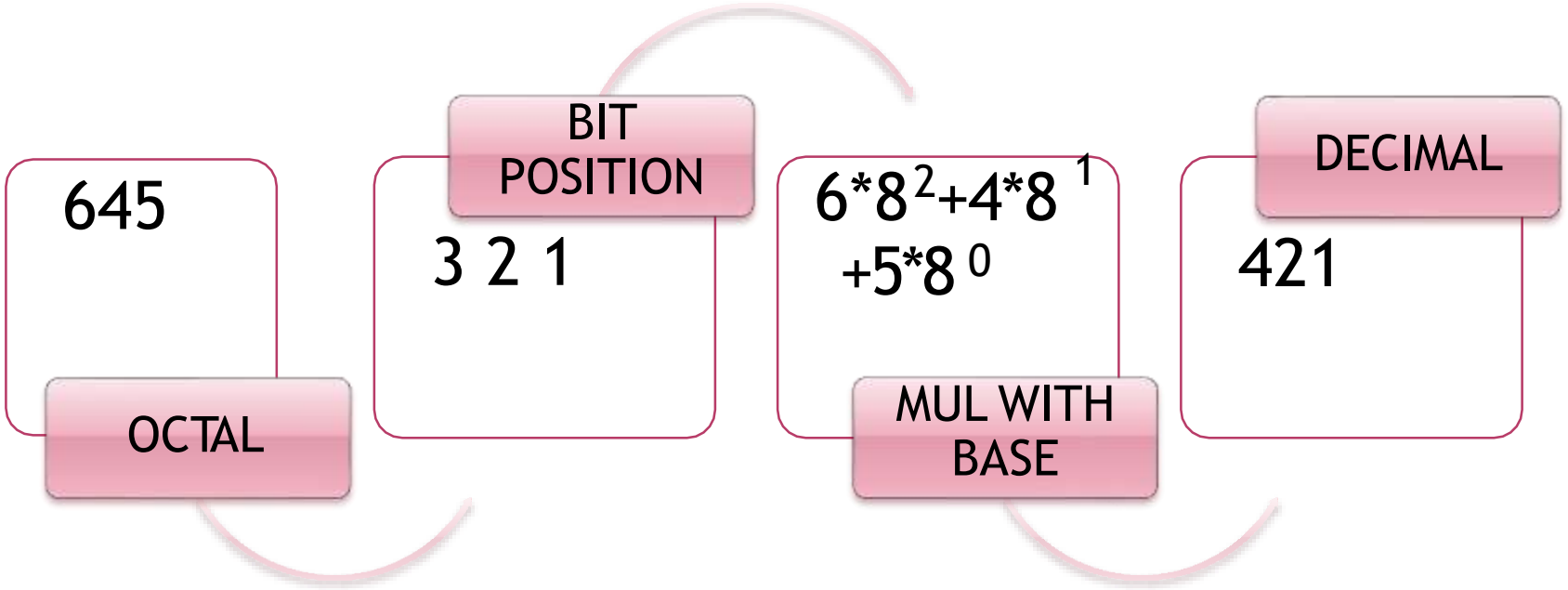
HEXADECIMAL TO DECIMAL



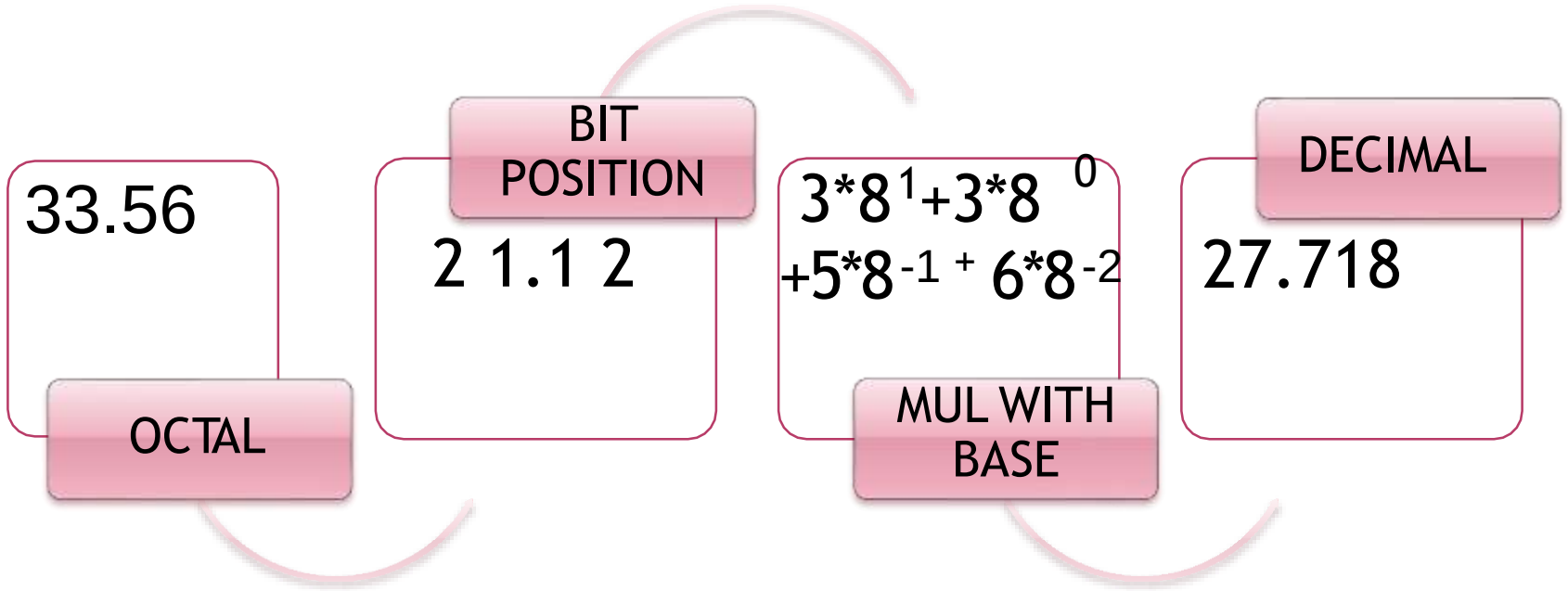
HEXADECIMAL TO DECIMAL



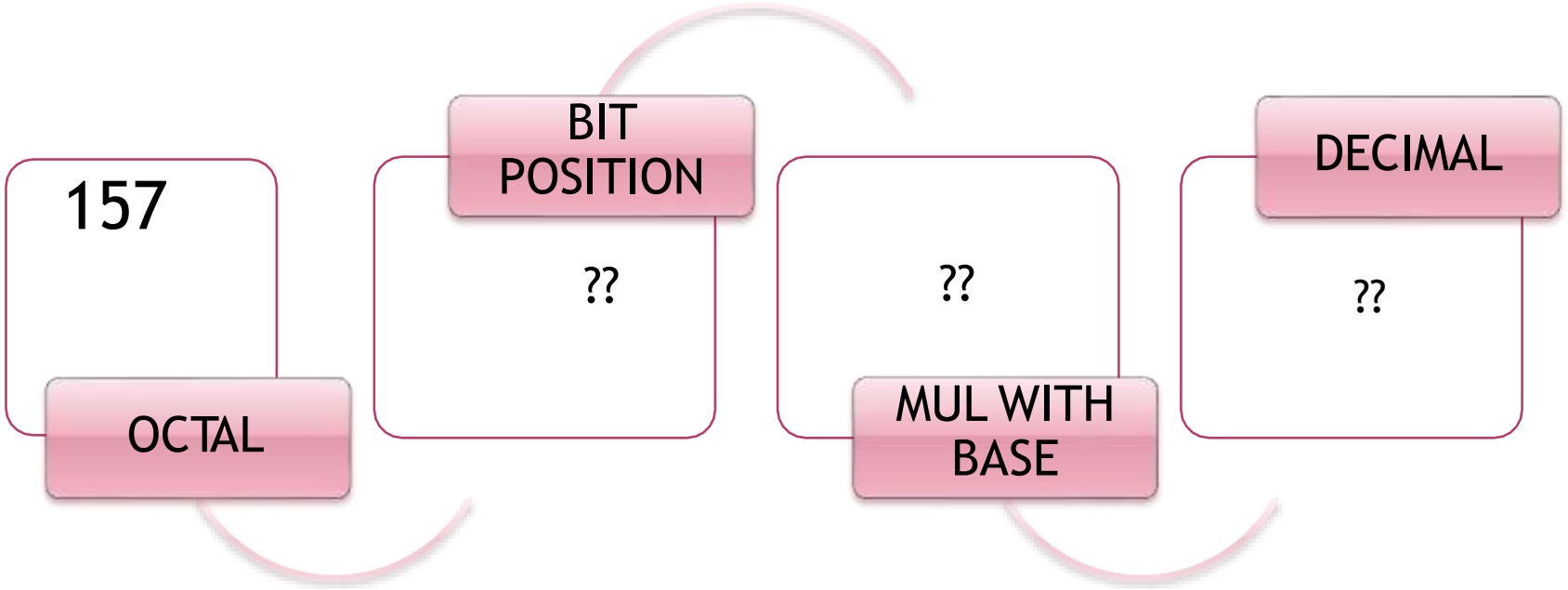
OCTAL TO DECIMAL



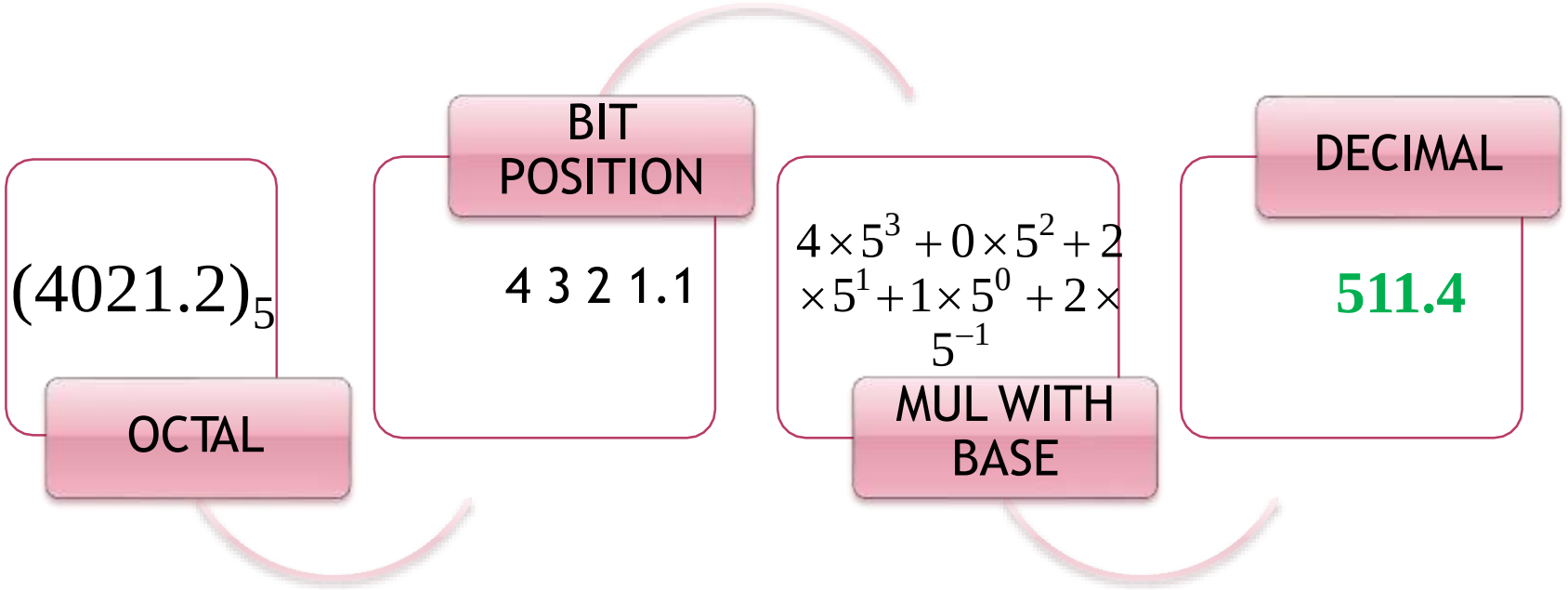
OCTAL TO DECIMAL



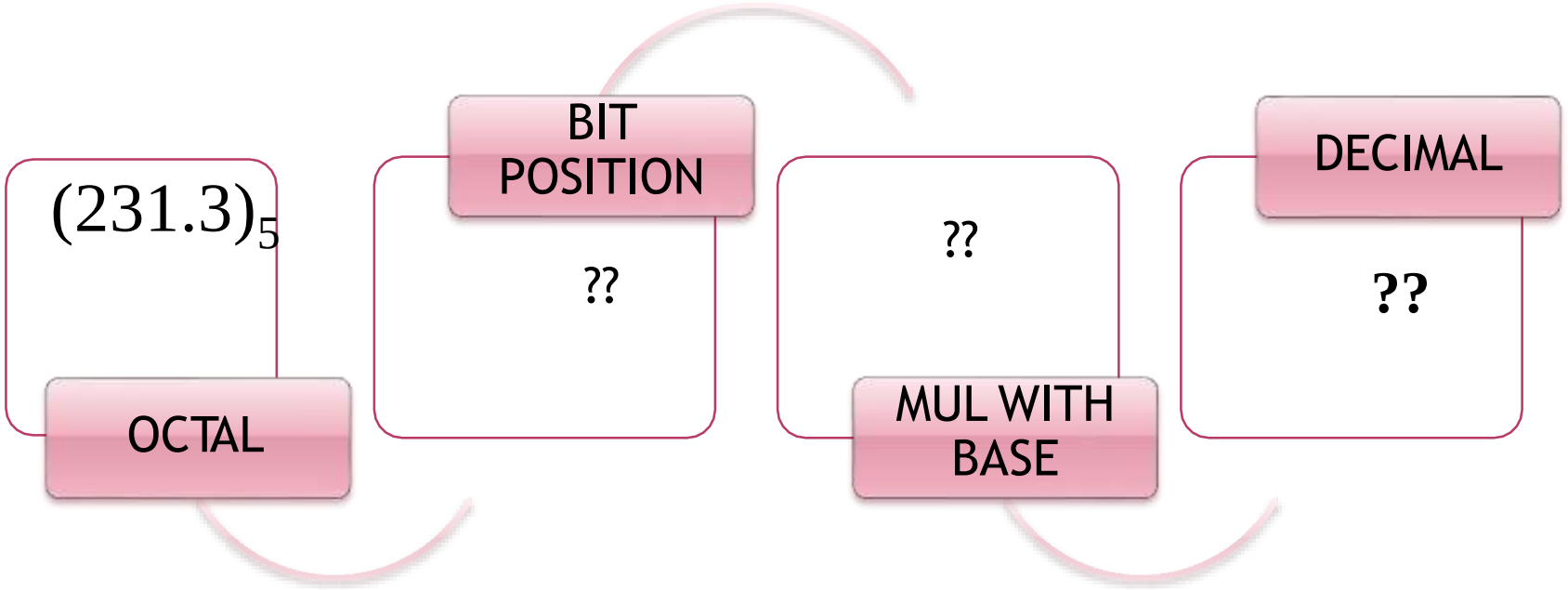
OCTAL TO DECIMAL



Base 5 TO DECIMAL

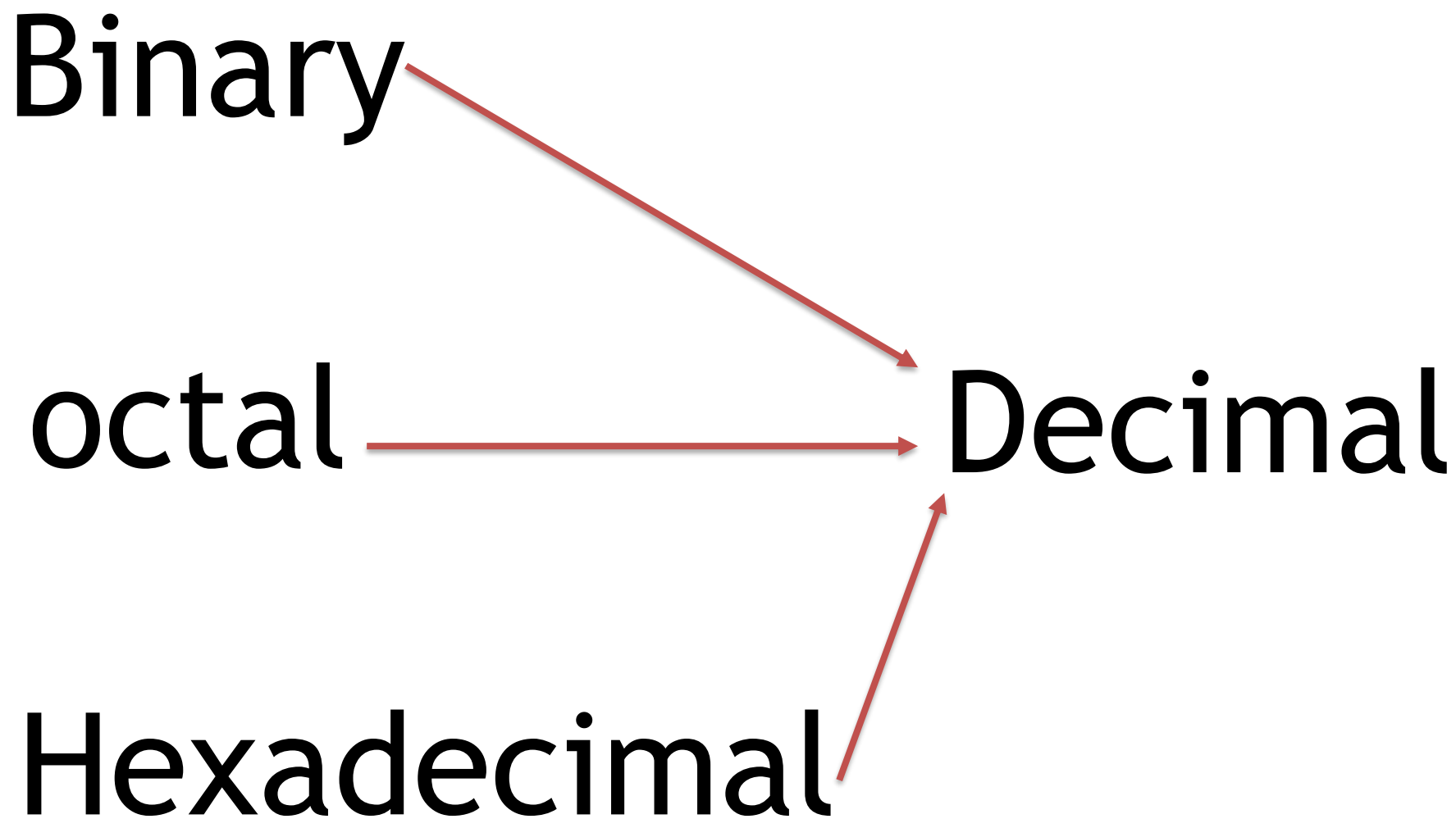


Base 5 TO DECIMAL



CONVERSION IN DECIMAL

Note-NUMBER MULTIPLY WITH BASE VALUE



DECIMAL TO BINARY

DECIMAL = 34.625 convert into binary

	Remainder	
2)34	0	LSB
2)17	1	
2) 8	0	
2) 4	0	
2) 2	0	
2) 1	1	
0		MSB

	Carry	
Fraction		625
x Radix		x2
Result	1	250
x Radix		x2
Result	0	500
x Radix		x2
Result	1	000

BINARY = 100010.101

DECIMAL TO BINARY

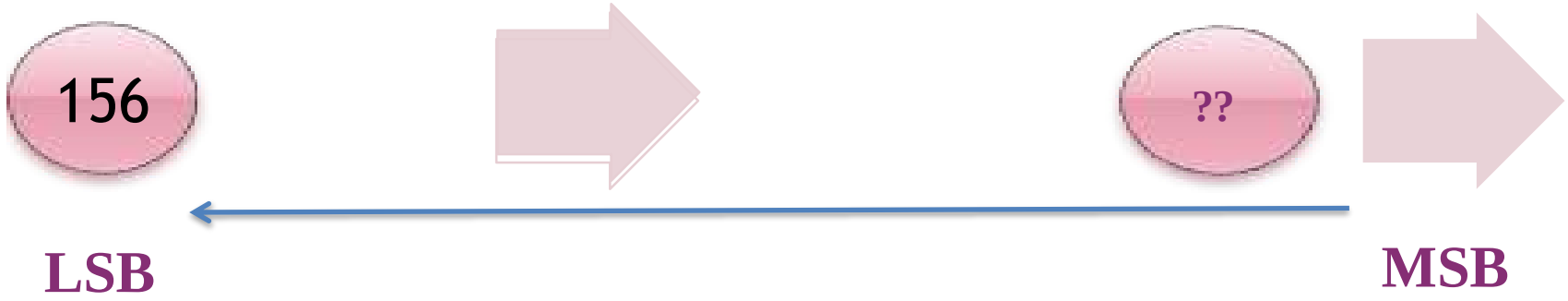
Divide through out by 2

DECIMAL = 39
BINARY = 100111

Q= Quotient
R=Remainder

DECIMAL TO BINARY

Divide through out by 2

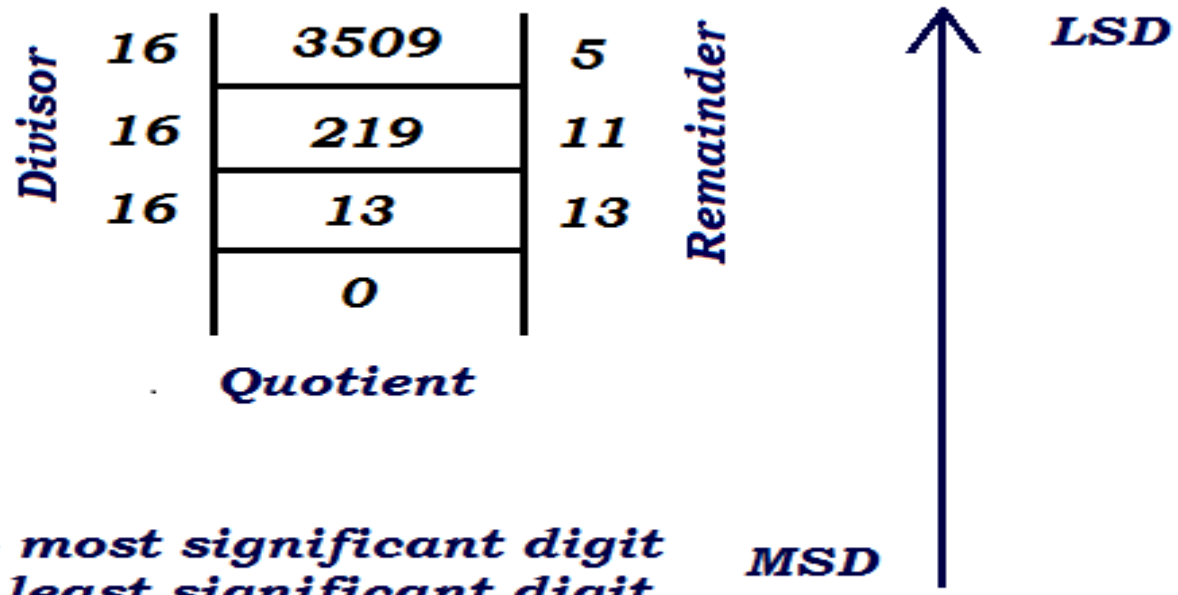


DECIMAL = 156
BINARY = ??

Q= Quotient
R=Remainder

DECIMAL TO HEX

Find the Hex equivalent for the Decimal 3509



MSD - most significant digit
LSD - least significant digit

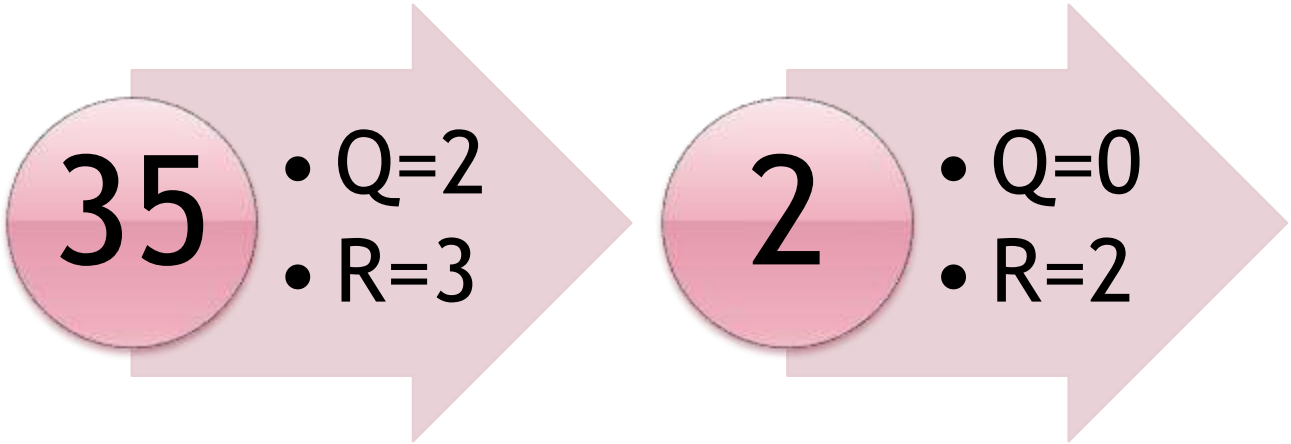
For Hex value 13 = D, 11 = B & 5 = 5
Therefore, the equivalent Hex number for decimal 3509 is DB5

DECIMAL = 3509

HEX = DB5

DECIMAL TO HEX

Divide through out by 16

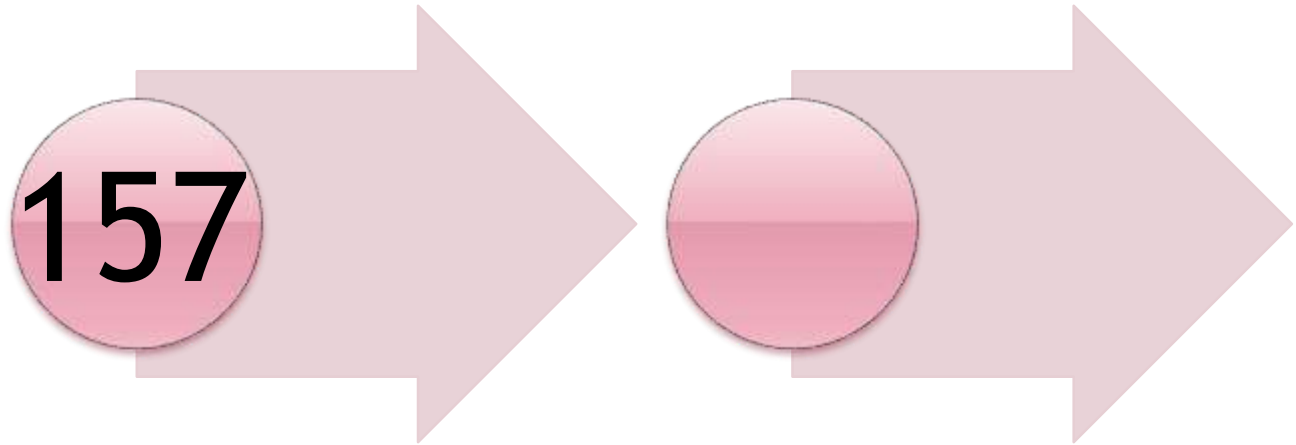


LSB **MSB**

DECIMAL = 35
HEX = 23

DECIMAL TO HEX

Divide through out by 16

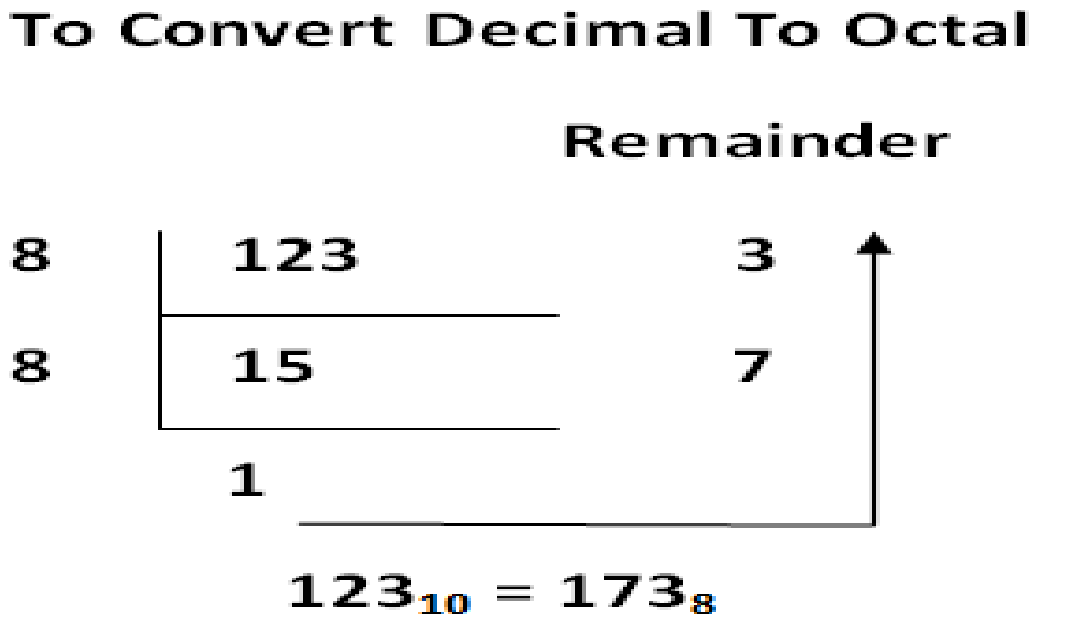


LSB **MSB**

DECIMAL =157
HEX = ??

DECIMAL TO OCTAL

Divide through out by 8

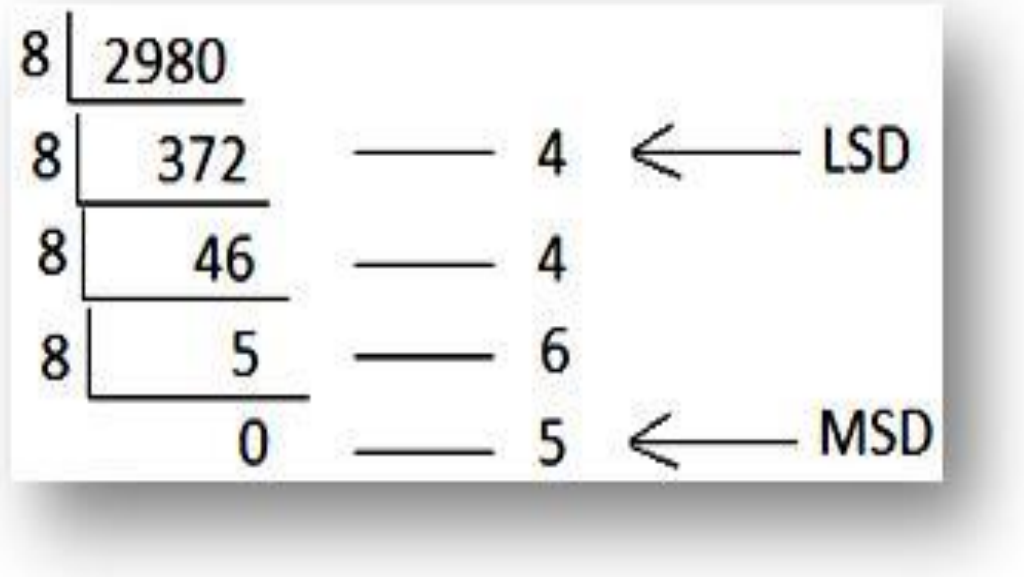


DECIMAL = 123

OCTAL = 173

DECIMAL TO OCTAL

Divide through out by 8

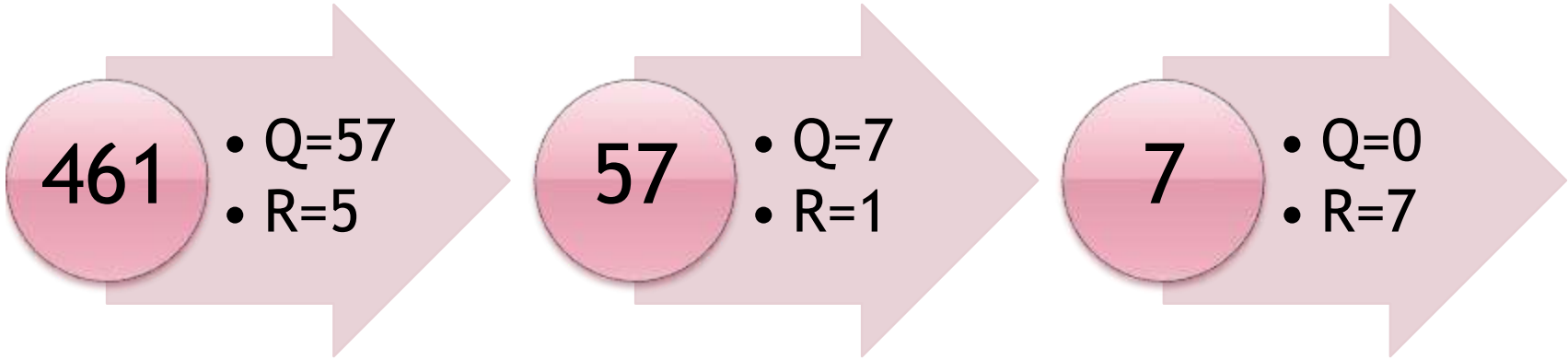


DECIMAL = 2980

OCTAL = 5644

DECIMAL TO OCTAL

Divide through out by 8



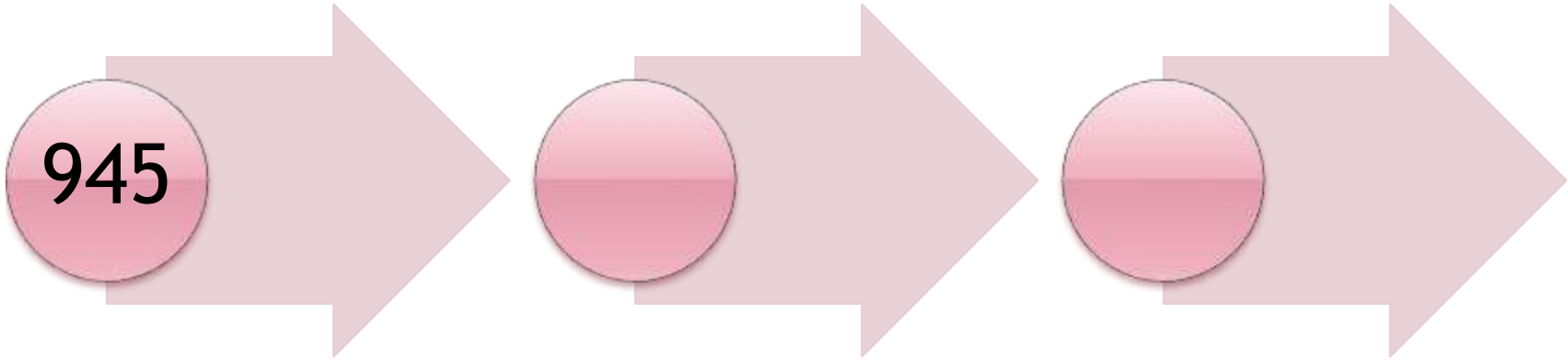
LSB

MSB

DECIMAL = 461
OCTAL = 715

DECIMAL TO OCTAL

Divide through out by 8



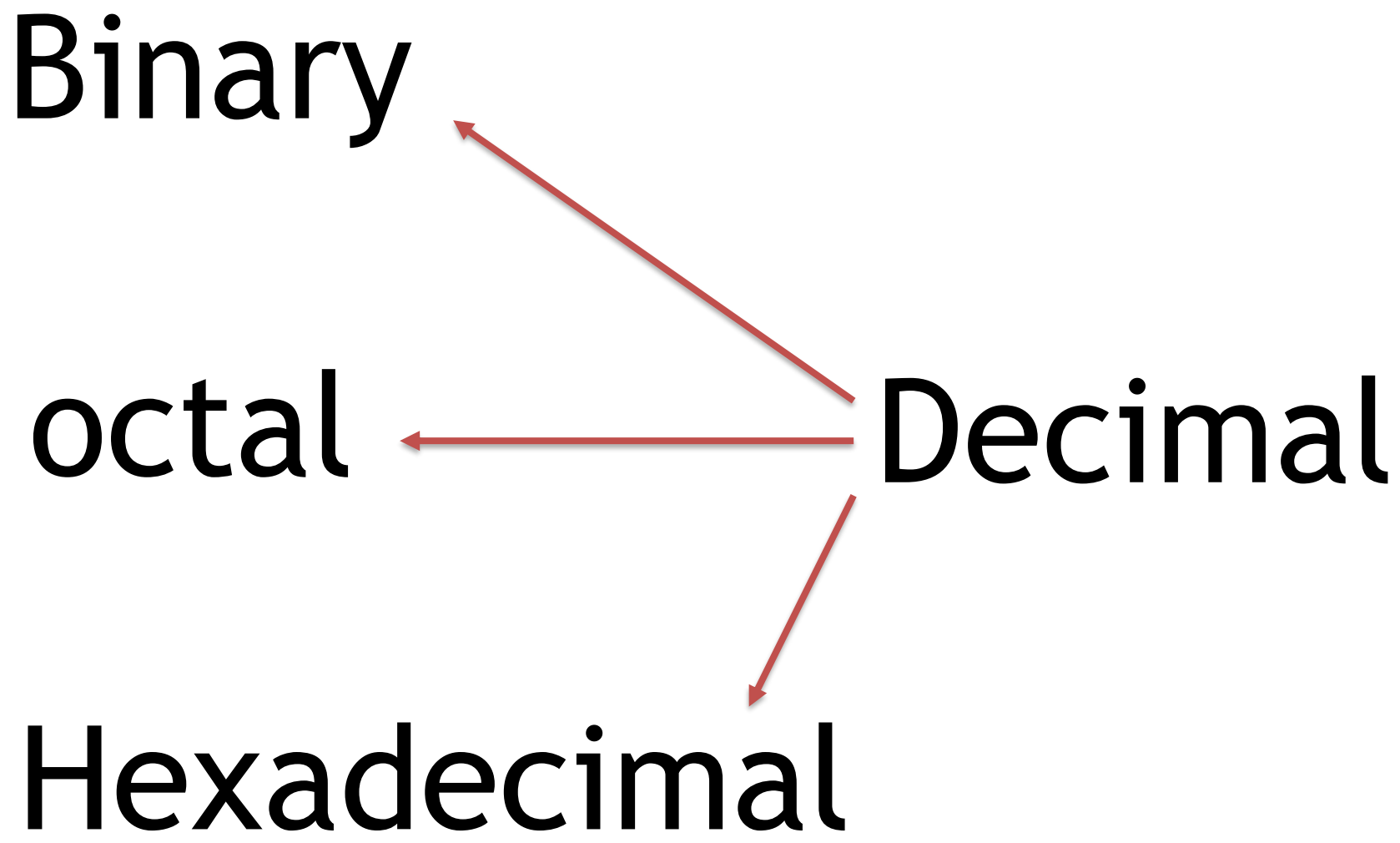
LSB

MSB

DECIMAL = 945
OCTAL = ??

CONVERSION from DECIMAL

Note-DECIMAL NUMBER DIVIDE BY BASE VALUE



BINARY TO HEXADECIMAL

BINARY	4BITS DIV	HEX
• $(010111011001)^2$	• (0101)(1101)(1001)	• (5) (D) (9) $=(5D9)^{16}$

BINARY TO HEXADECIMAL

BINARY	4BITS DIV	HEX
• (1001001.10)	(0100)(1001).(1000)	(4) (9).(8) =(49.8)

BINARY TO HEXADECIMAL

BINARY	4BITS DIV	HEX
$(1111001010.111101)^2$	??	??

BINARY TO HEXADECIMAL

BINARY

- $(101010101)^2$

4BITS DIV

??

HEX

??

BINARY TO OCTAL

BINARY	3BIT DIV	OCTAL
• $(101111100)_2$	• (101)(111)(100)	• (5) (7) (4) $=(574)_8$

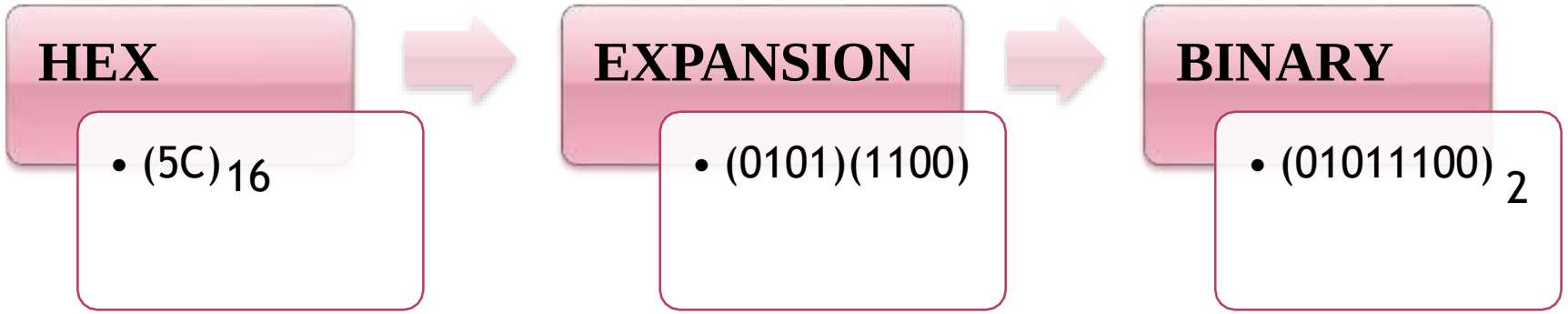
BINARY TO OCTAL

BINARY	3BIT DIV	OCTAL
• $(11010101.1)_2$	• (011)(010)(101).(100)	$=(325.4)_8$

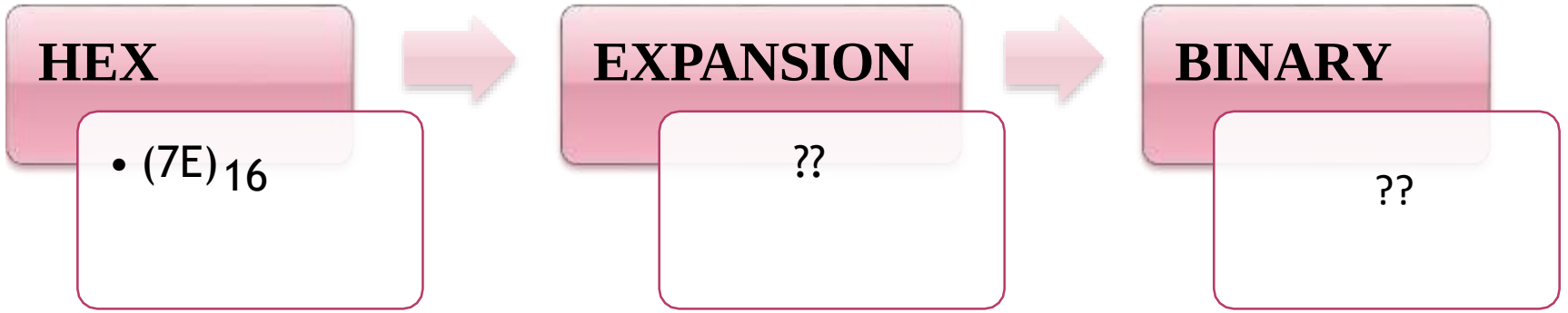
BINARY TO OCTAL

BINARY	3BIT DIV	OCTAL
• $(101010101)_2$	??	??

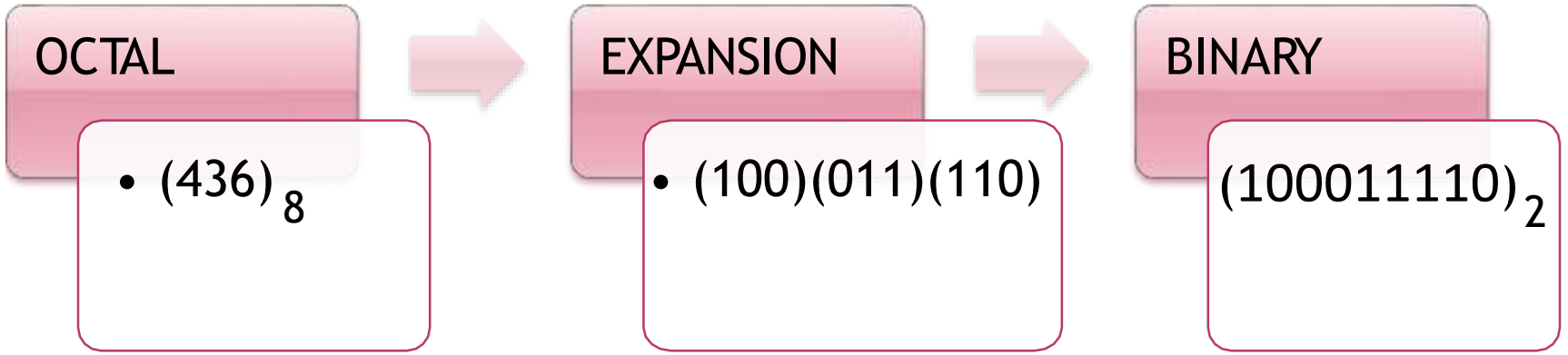
HEXADECIMAL TO BINARY



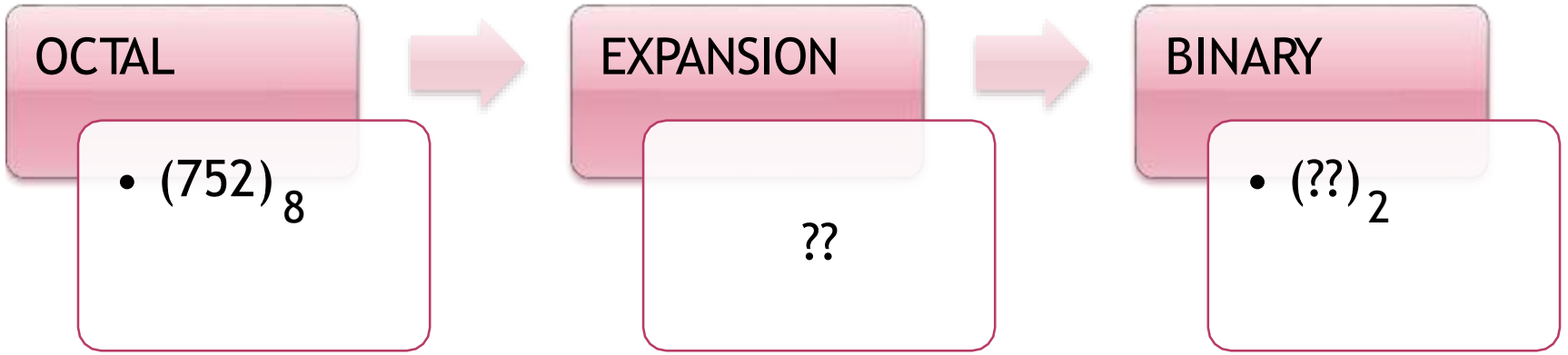
HEXADECIMAL TO BINARY



OCTAL TO BINARY



OCTAL TO BINARY



HEXADECIMAL TO OCTAL

HEX	• $(4DF)_{16}$
EXP	• (0100)(1101)(1111)
BINARY	• $(010011011111)_2$
3BIT DIV	• (010)(011)(011)(111)
OCTAL	• $(2337)_8$

HEXADECIMAL TO OCTAL

HEX	• $(1EA)_{16}$
EXP	• (----)(----)(----)
BINARY	• $(-----)_2$
3BIT DIV	• (---)(---)(---)(---)
OCTAL	• $(-----)_8$

HEXADECIMAL TO OCTAL

HEX	• $(9AE1)_{16}$
EXP	• (----)(----)(----)(----)
BINARY	• $(----------)_2$
3BIT DIV	• (---)(---)(---)(---)
OCTAL	• $(-----)_8$

OCTAL TO HEXADECIMAL

OCTAL	• $(456)_8$
EXP	• (100)(101)(110)
BINARY	• $(100101110)_2$
4BIT DIV	• (0001)(0010)(1110)
HEX	• $(12E)_{16}$

OCTAL TO HEXADECIMAL

OCTAL	• $(6371)_8$
EXP	• (---)(---)(---)
BINARY	• $(---------)_2$
4BIT DIV	• (----)(----)(----)
HEX	• $(---)_{16}$