

CHAPTER 2

ENCODING HEXA/BINARY



15 MIN

HOMEWORK REVIEW

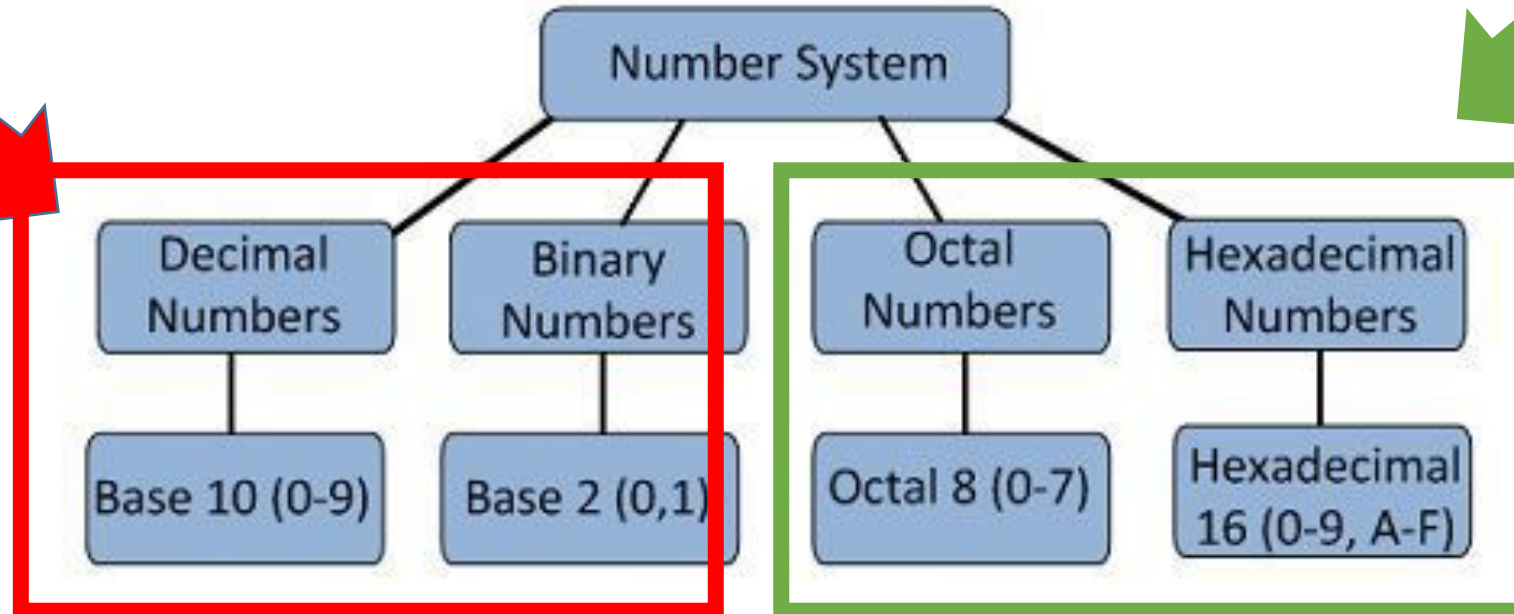
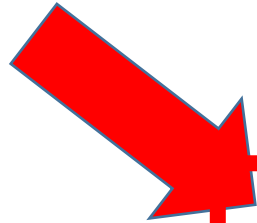


Just 1 example per question !!



OBJECTIVES FOR TODAY

LAST WEEK



TODAY



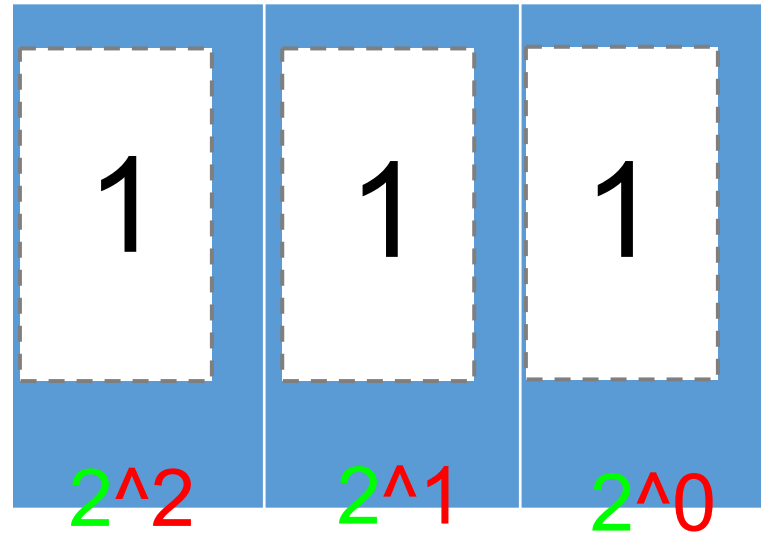
- ✓ Be able to write values in **binary** / octal / hexadecimal bases



CLASS

In base 2 (binary), a **slot** is called a **bit**

SLOT = A BIT





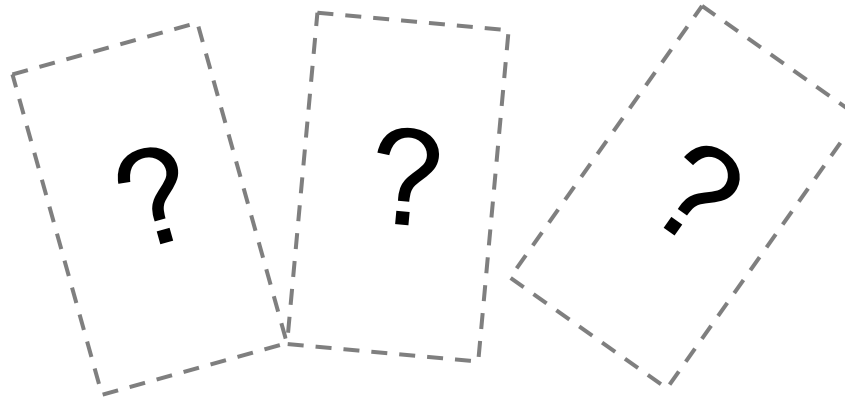
5 MIN



GROUP 2

How many bits do you need to express

A DAY OF THE WEEK





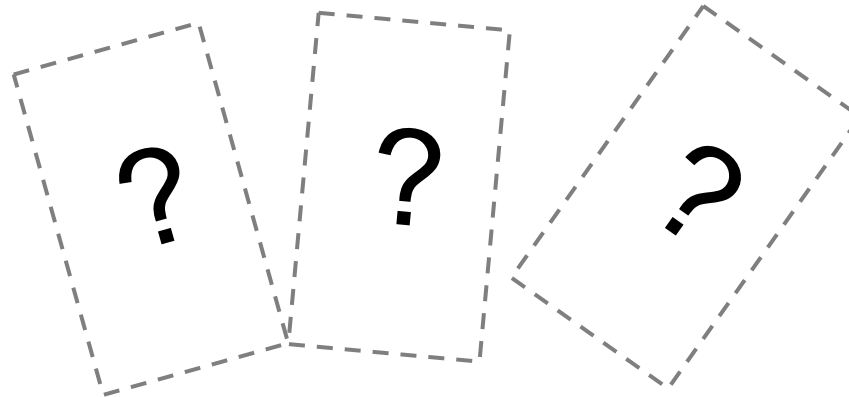
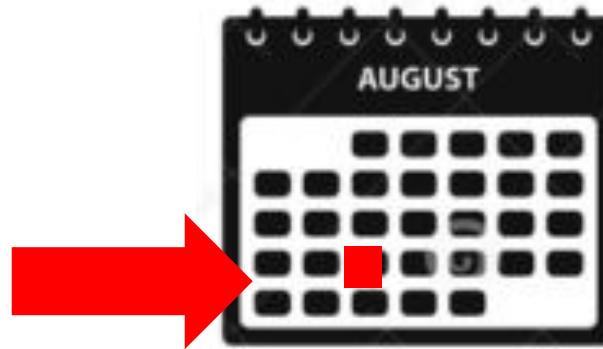
5 MIN



GROUP 2

How many bits do you need to express

A DAY OF THE MONTH ?





5 MIN

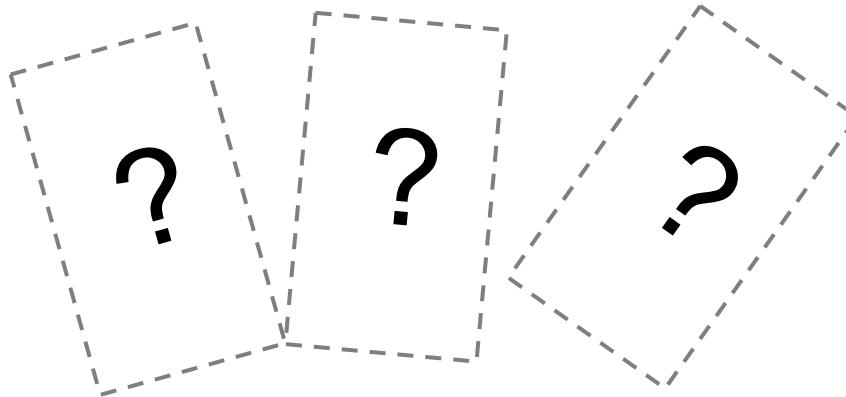
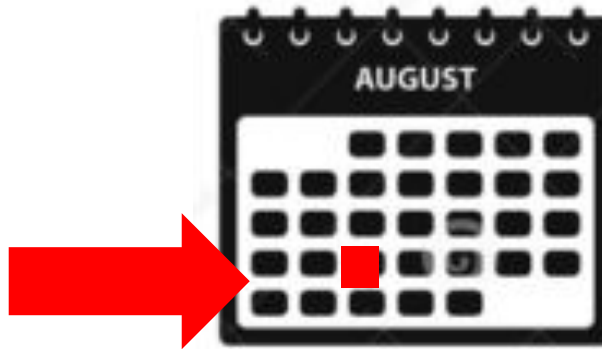


GROUP 2

How many bits do you need to express

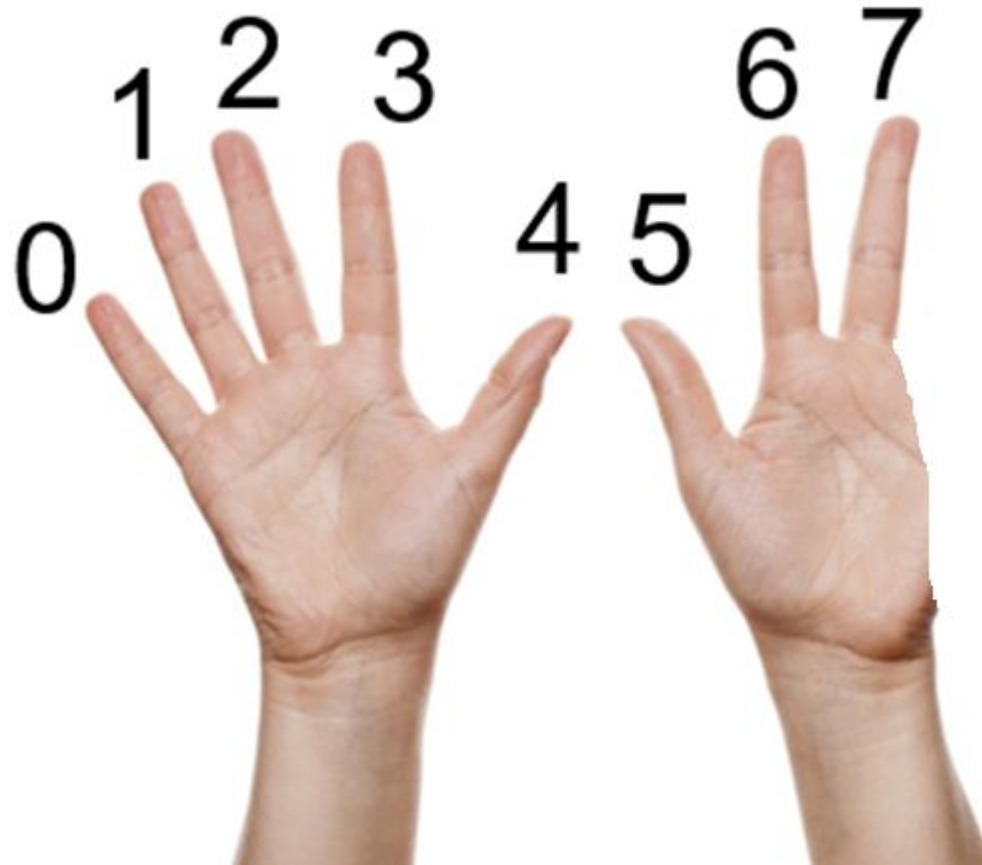
A DAY OF THE YEAR?

From 1 to 365





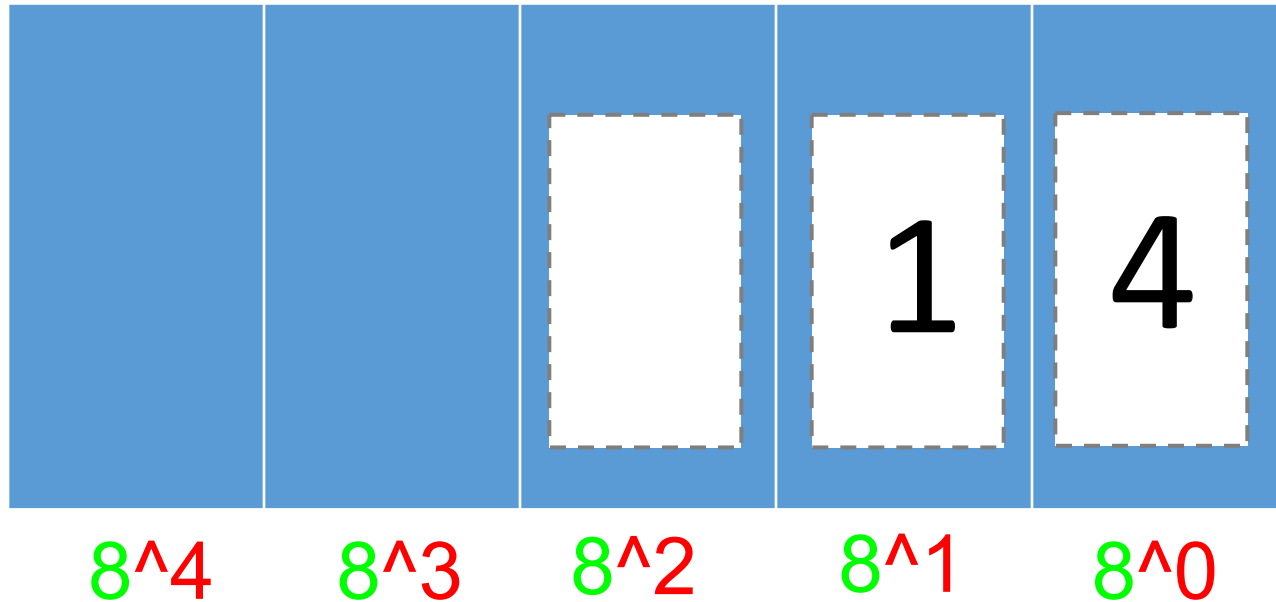
An **octal** value is expressed with 08 digits



Each SLOT contains values from 0 to 7



Base 8 (octal) to Base 10 (decimal)



14

BASE 8

$$= 1 * 8^1 + 4 * 8^0$$

$$= 8 + 4$$

$$= 12$$

BASE 10



QUESTION



5 MIN



ONE

Convert this number to **base 10**

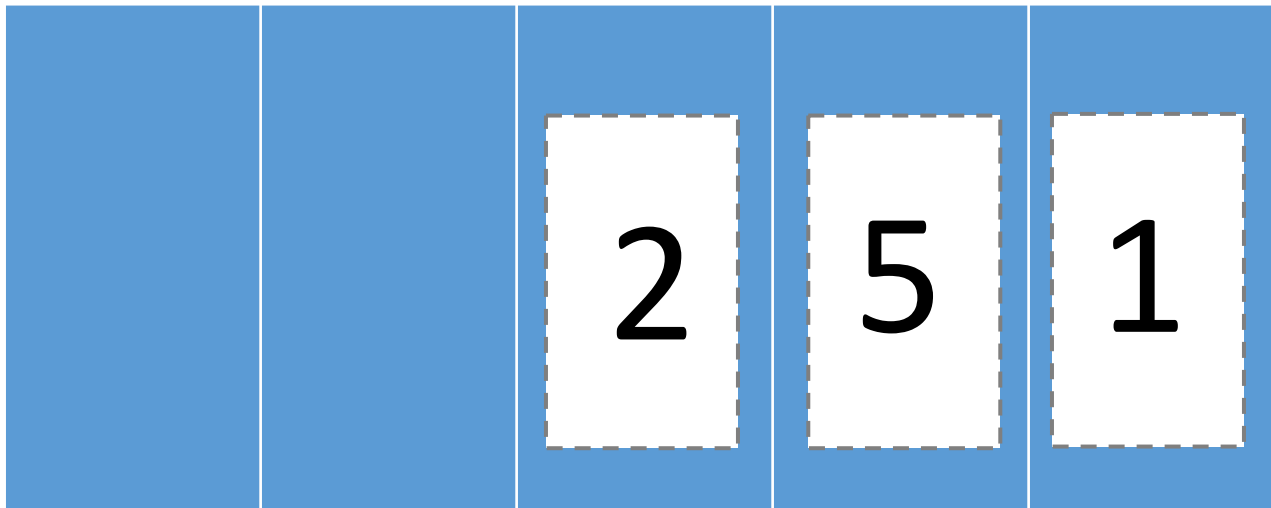
251
BASE 8

=

=

=

BASE 10



8^4

8^3

8^2

8^1

8^0





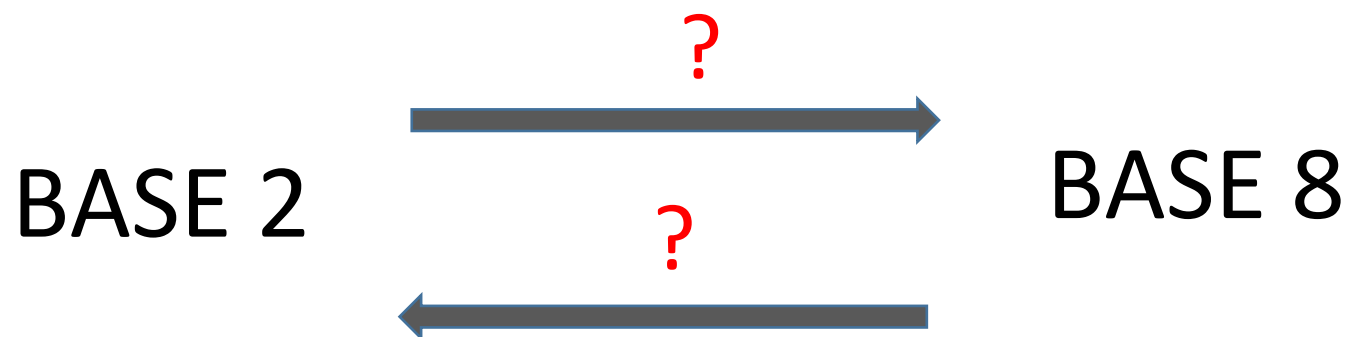
10 MIN



GROUP 2

Problem solving

How to convert binary number to octal number?



Q1 : How many **bits** (slots in base 2) do you need to convert an **octal** (1 slot in base8) ?

Q2 : **Find a way to** convert a number in base 2 to a number in base 8

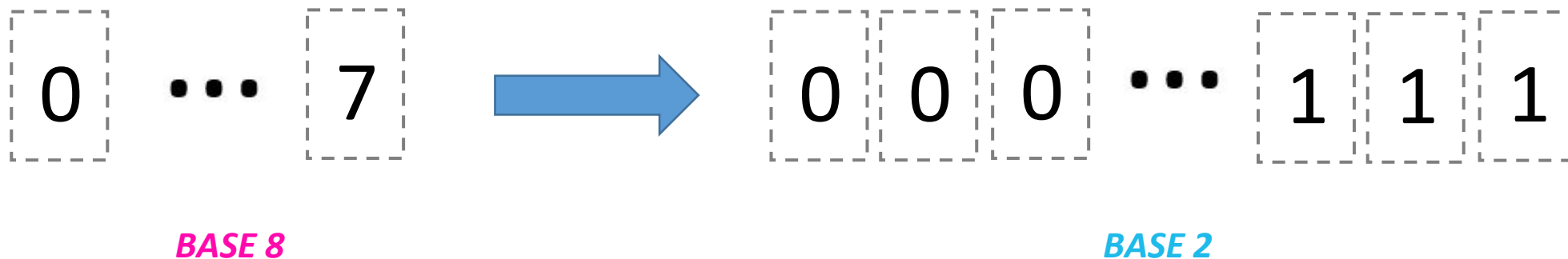
Q3 : **Find a way to** convert a number in base 8 to a number in base 2

SOLUTION !



CLASS

Q1 : How many **bits** (slots in base 2) do you need to convert an **octal** (1 slot in base8) ?



One slot in **base8** needs **3 slots** in **base2**



CLASS

Q2 : **Find a way** to convert a number in base 8 to a number in base 2

BASE 8

2	6
---	---

BASE 2



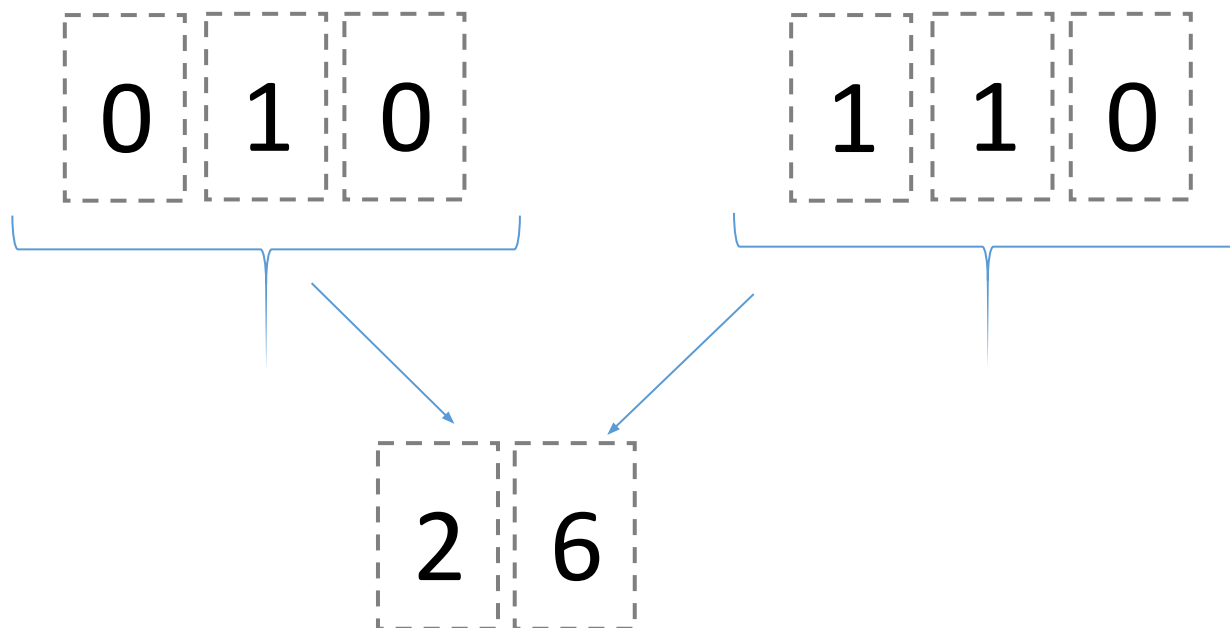
So : $(26)_{\text{base}8} \boxed{=} (010110)_{\text{base}2}$



CLASS

Q3 : Find a way to convert a number in base 2 to a number in base 8

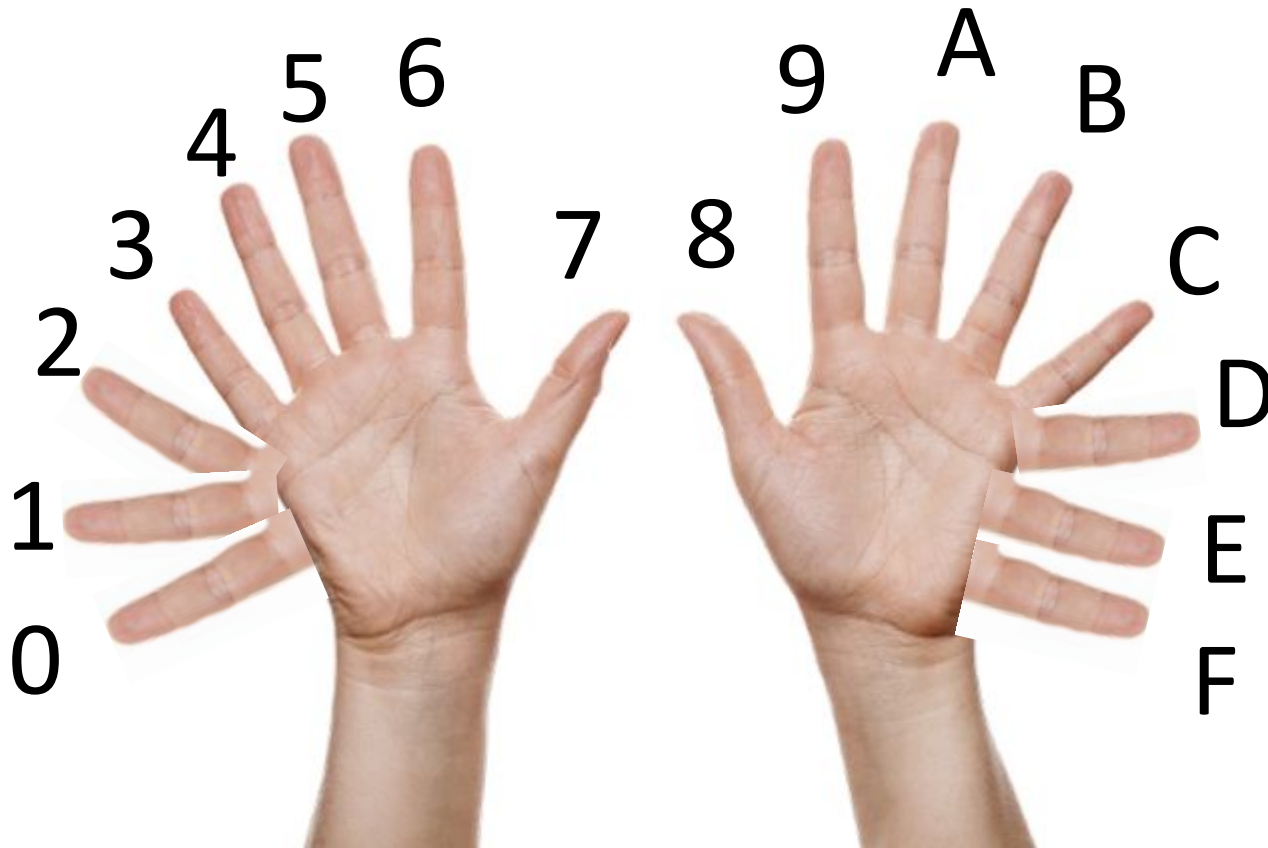
BASE 2



So : $(010110)_{\text{base}2} \rightarrow (26)_{\text{base}8}$



An **hexadecimal** value is expressed with 16 digits

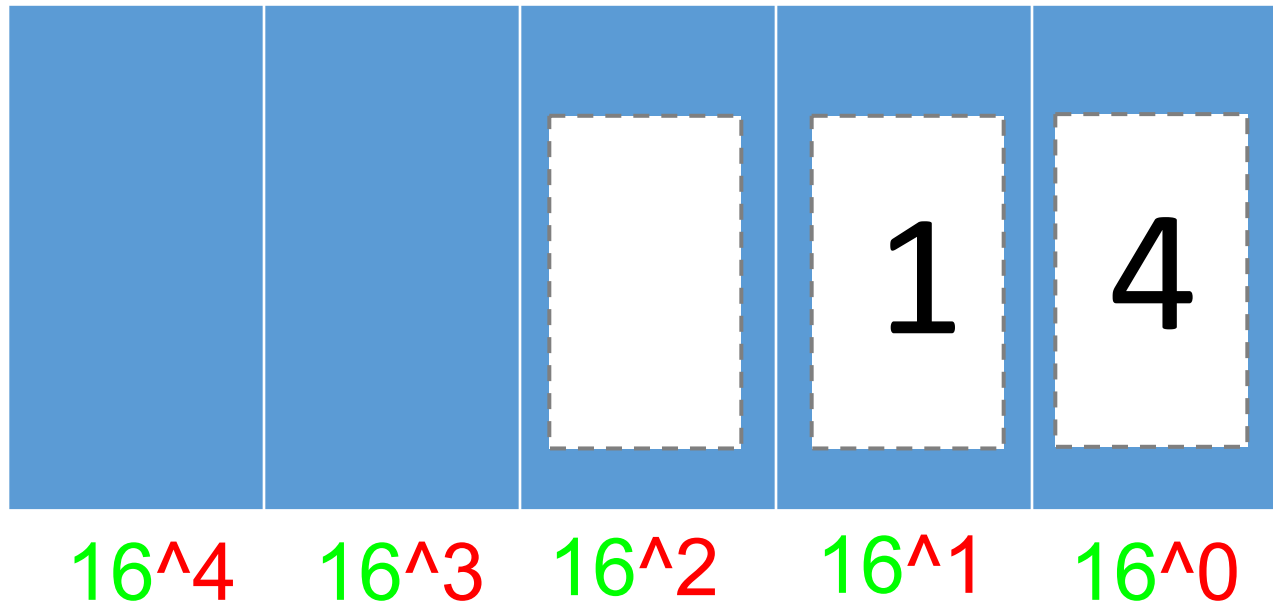


A = 10
B = 11
C = 12
D = 13
E = 14
F = 15

Each SLOT contains values from 0 to 15



Base 16 (hexa) to Base 10 (decimal)



14

BASE 16

$$= 1 * 16^1 + 4 * 16^0$$

$$= 16 + 4$$

$$= 20$$

BASE 10



QUESTION



5 MIN



ONE

Convert this number to **base 10**

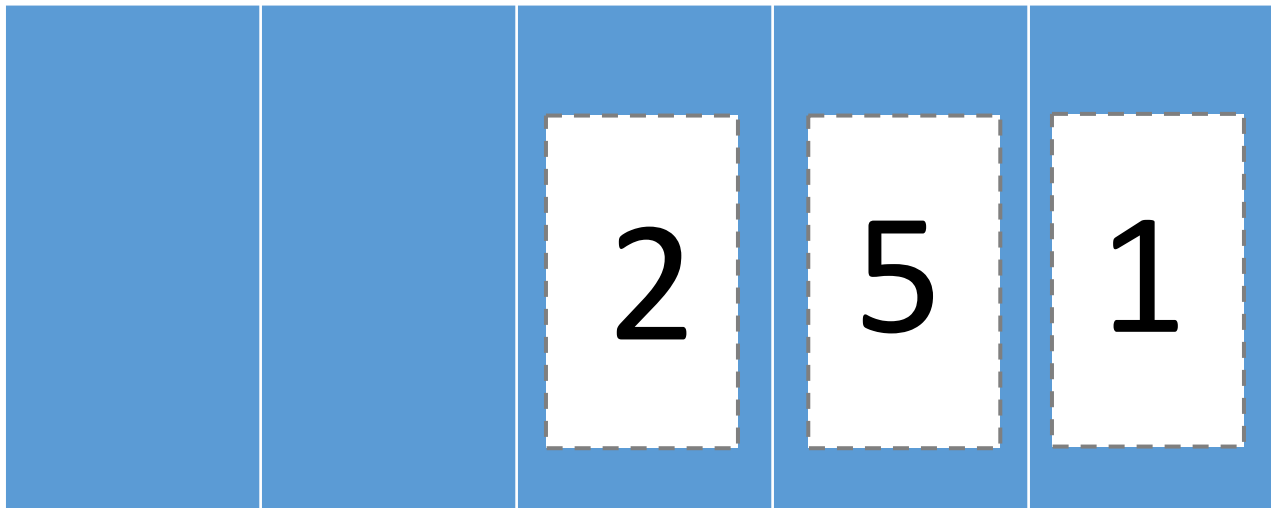
251
BASE 16

=

=

=

BASE 10



16^4

16^3

16^2

16^1

16^0

4

3

2

1

0



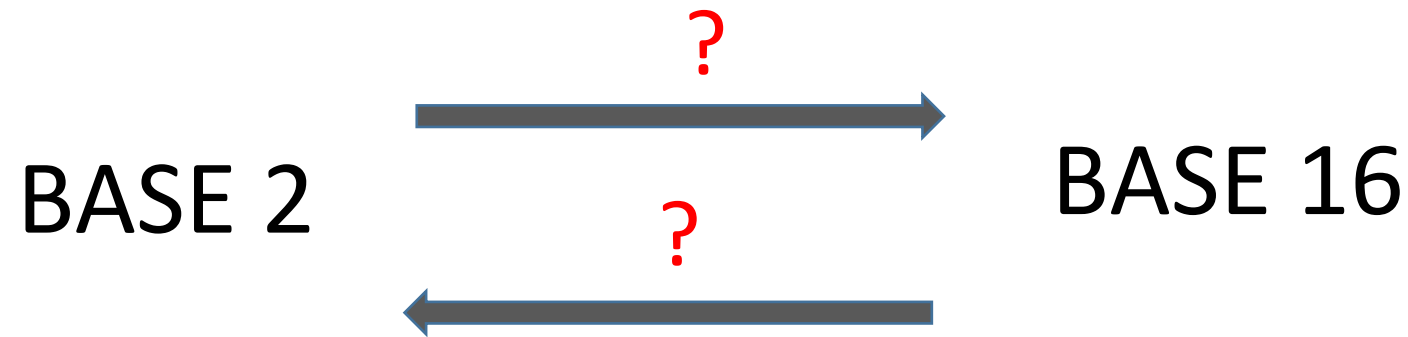
10 MIN



GROUP 2

Problem solving

How to convert binary number to hexadecimal number?



Q1 : How many **bits** (slots in base 2) do you need to convert an **hexa** (1 slot in base16) ?

Q2 : **Find a way** to convert a number in base 2 to a number in base 16

Q3 : **Find a way** to convert a number in base 16 to a number in base 2



CLASS

Q2 : **Find a way** to convert a number in base 2 to a number in base 6

BASE 16

E	6
---	---

BASE 2

1	1	1	0
---	---	---	---

0	1	1	0
---	---	---	---

So : $(E6)_{\text{base16}} \quad \boxed{?} \quad (1110 \ 0110)_{\text{base2}}$



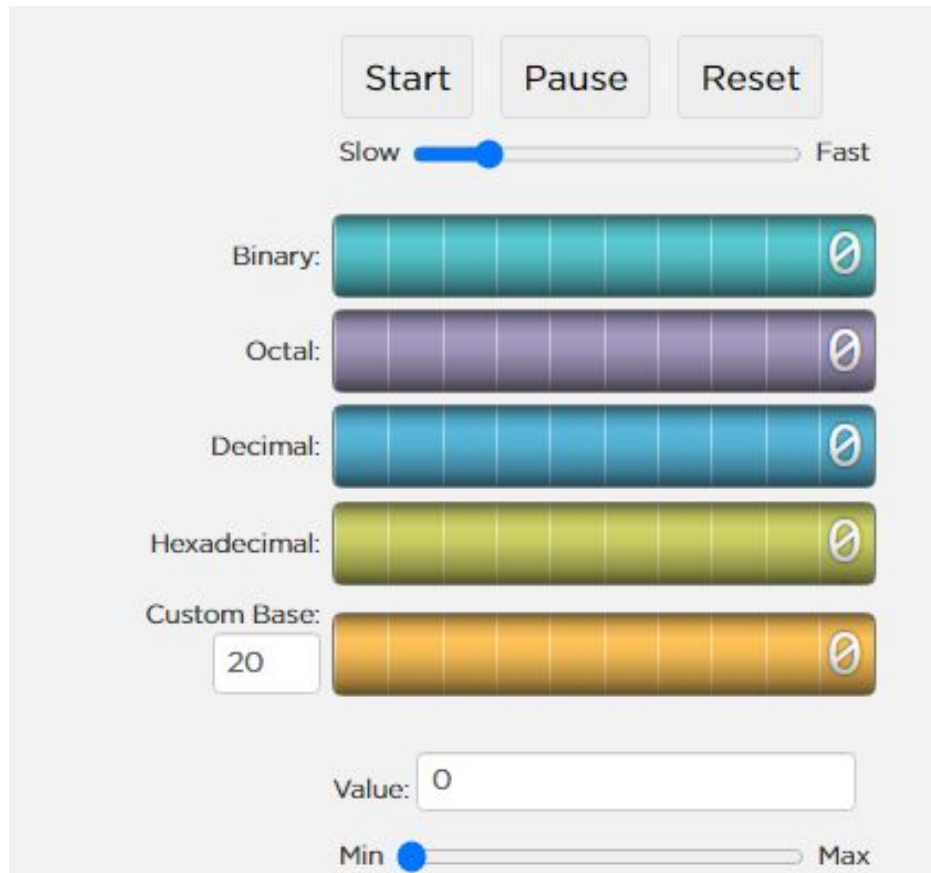
10 MIN



TEAM 2

Explore the odometer

<https://studio.code.org/s/odometer/next>



- ✓ Check the conversions between each bases are right
- ✓ "What's the largest number you can make in base 2 with the odometer ?

What did we learn today ?

Explain on whiteboard what you understood about today session

BASE 8

BASE 16

HOMEWORK



BASES CONVERSIONS