Data Types and Expressions

Data

Data

Expressions

Data

Expressions

Control Flow

Data

- int
- float
- double
- char
- string
- bool
- vector
- Programmer defined classes

Expressions

- I/O expressions
- Arithmetic expressions
- Boolean expressions

Control Flow

- Sequential
- Branching
  - if
  - if-else
  - if-else if-else
  - switch
- Iterative
  - while
  - For
- Function calls
- Exceptions

Data

Expressions

Control Flow

```
/* This program reads two integers from the user and
prints their sum */

#include <iostream>
using namespace std;

int main(){
        int num1;               //will hold the first input
        int num2;               //will hold the second input
        int sum;                //will hold the sum

        cout<<"Please enter two numbers separated by a space"<<endl;
        cin>>num1>>num2;

        sum = num1 + num2;

        cout<<num1<<" + "<<num2<<" = "<<sum<<endl;

        return 0;
}
```

Data

Expressions

Control Flow

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Control Flow

- Sequential

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- I/O expressions

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- int

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Control Flow

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The `int` Data Type

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Kind of data:

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Inner representation:

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- Each `int` data uses 4 bytes (32 bits)

```
int main(){
        int x;



        return 0;
}
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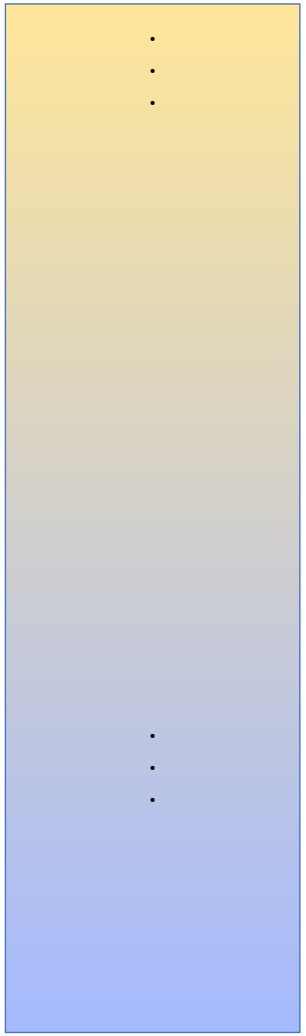

Memory

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int main(){
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        return 0;
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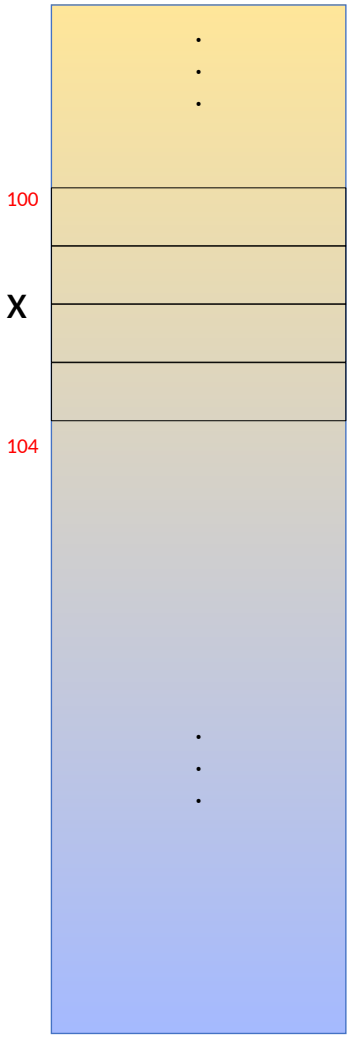
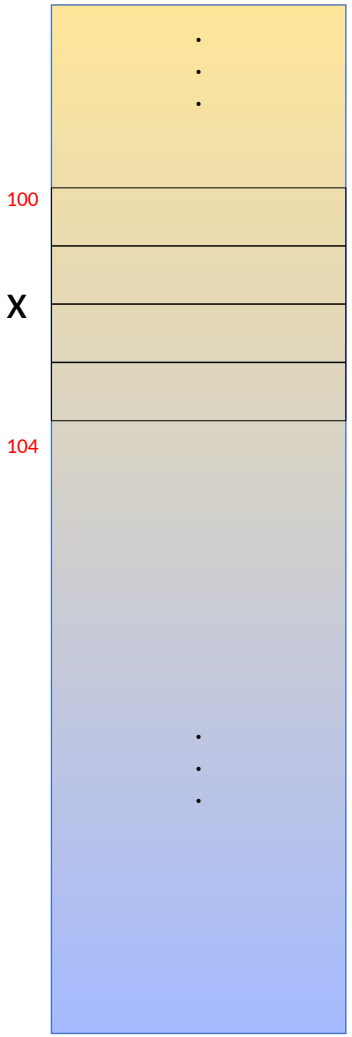


Memory

```
int main(){
        int x;
        int y;



        return 0;
}
```



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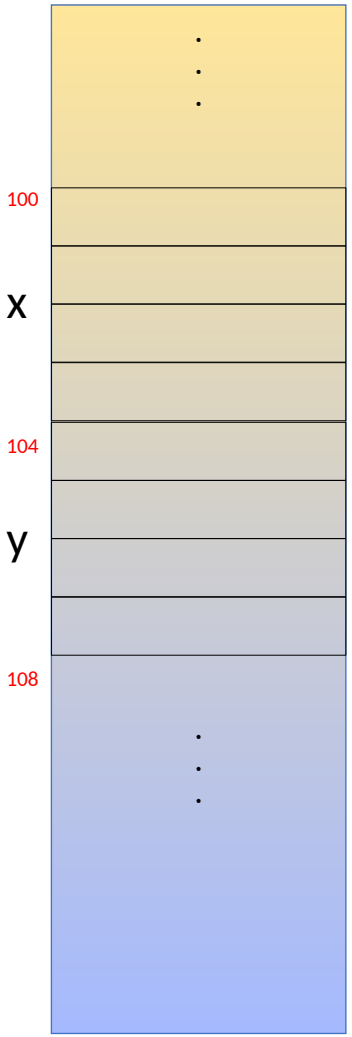

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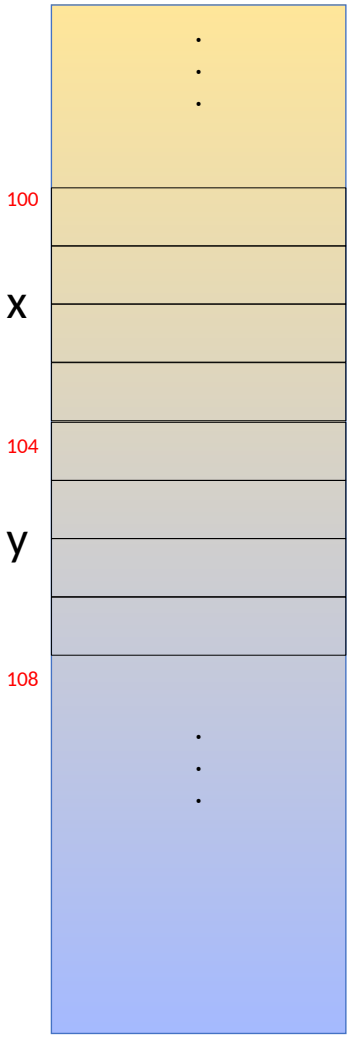

Memory

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int main(){
        int x;
        int y;

        x = 6;


        return 0;
}
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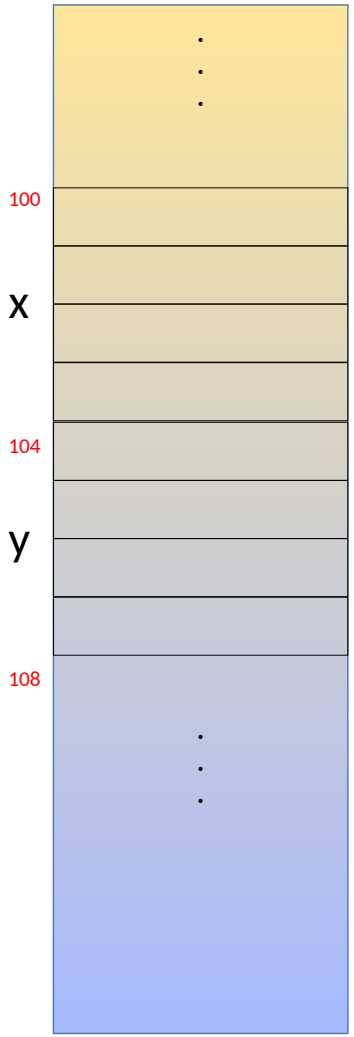

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int main(){
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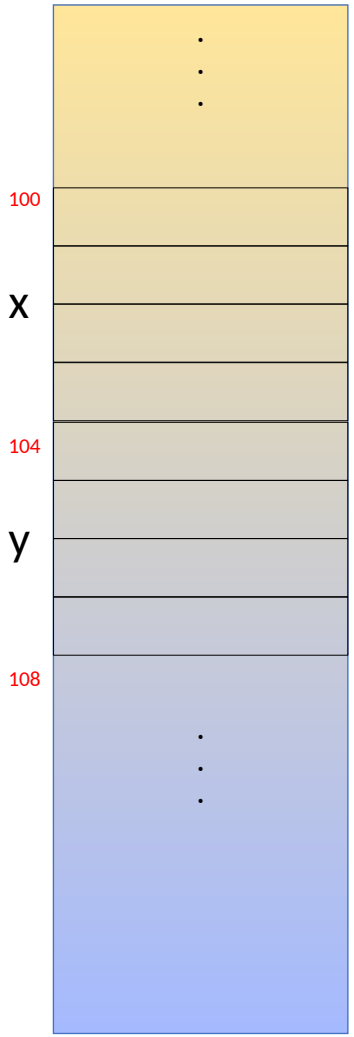
$(6)_{10} = (110)_2$



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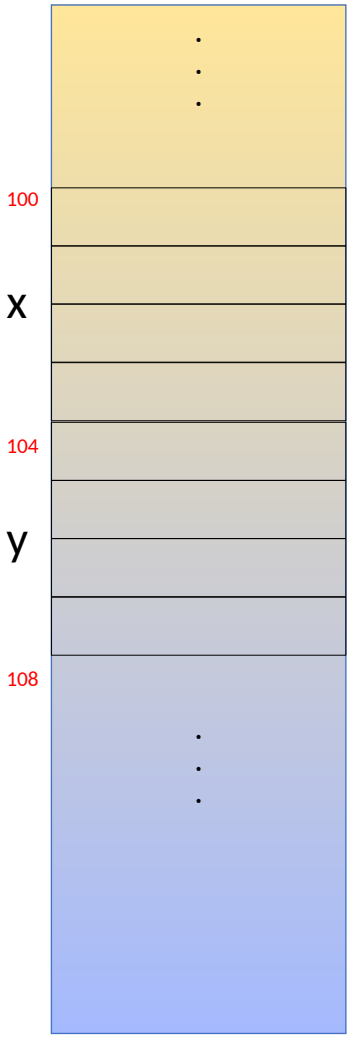

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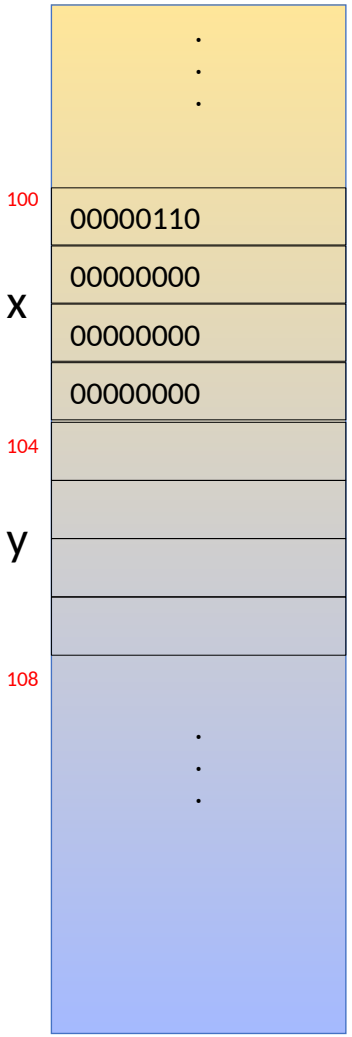

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int main(){
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        y = -6;

        return 0;
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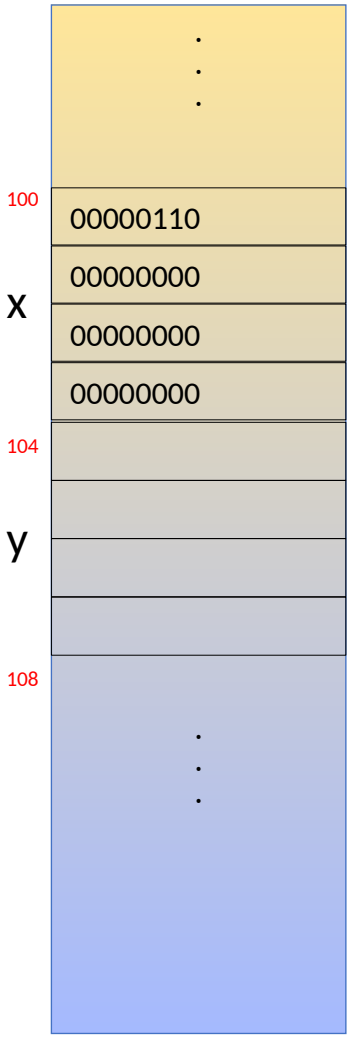

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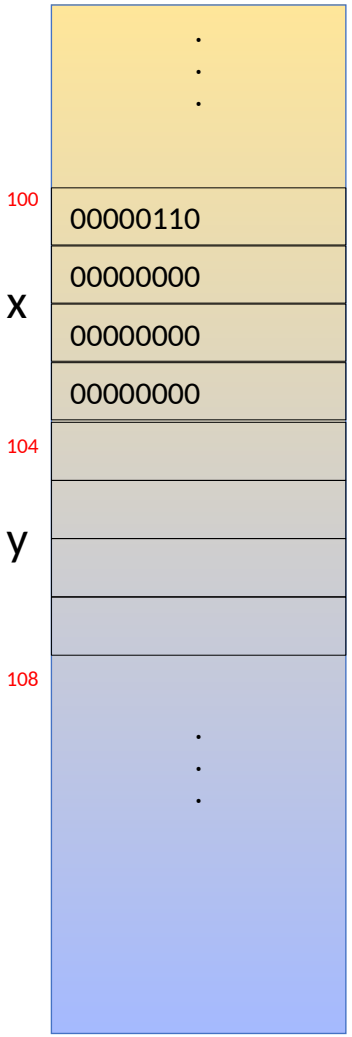

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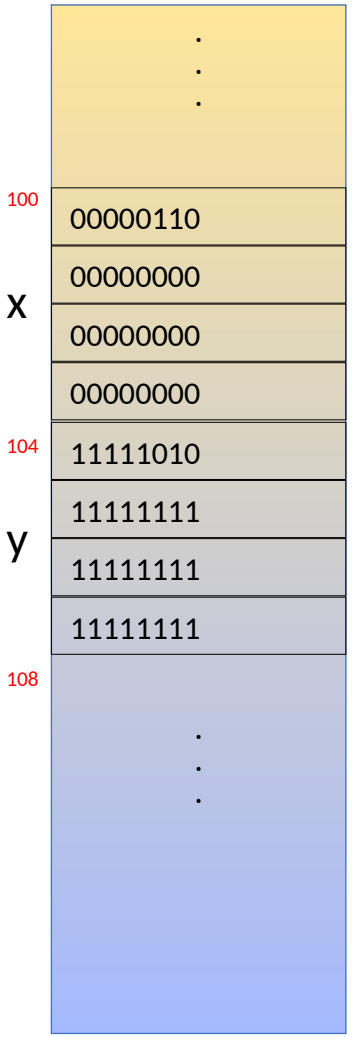


Memory

The `int` Data Type

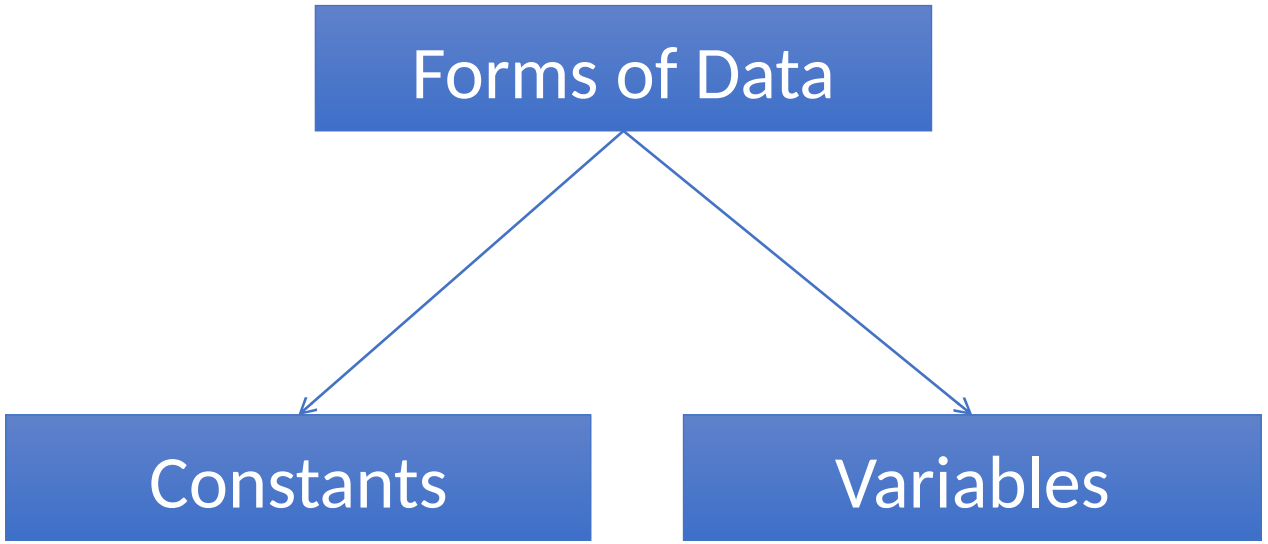
Kind of data: Integer numbers

Inner representation:

- Each `int` data uses 4 bytes (32 bits)
- The numbers are represented using the 2's complement method

C++ literals:

Forms of Data


Forms of Data
Constants
Variables

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int main(){
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        x = 6;
        y = -6;

        return 0;
}
```
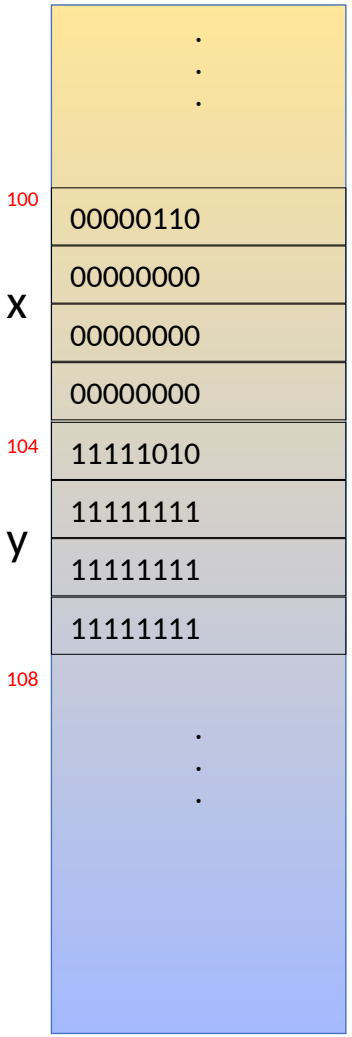
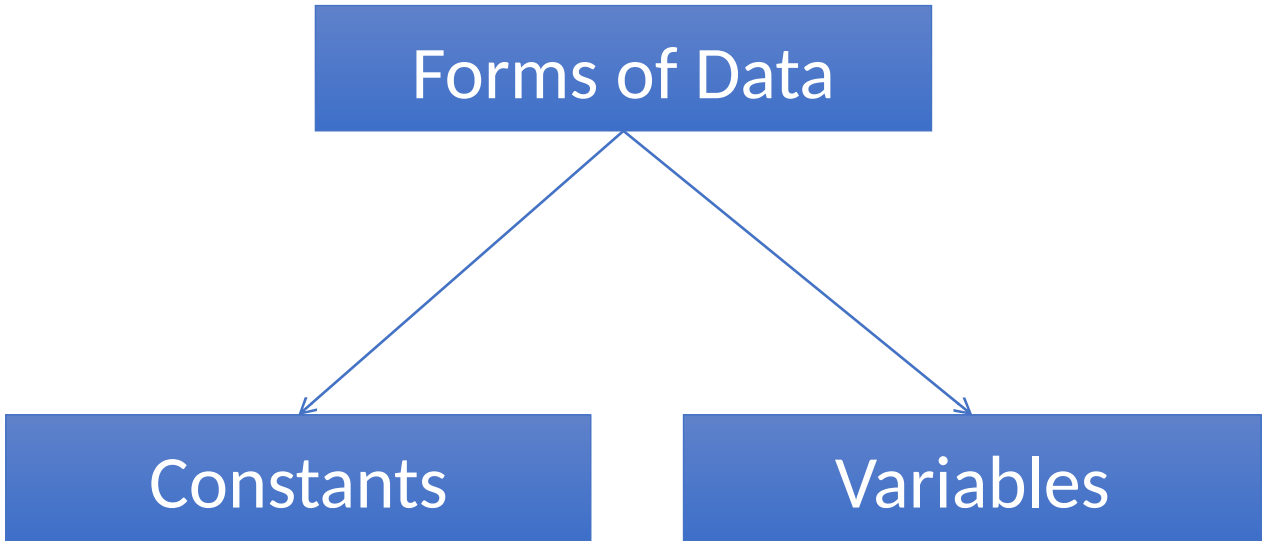
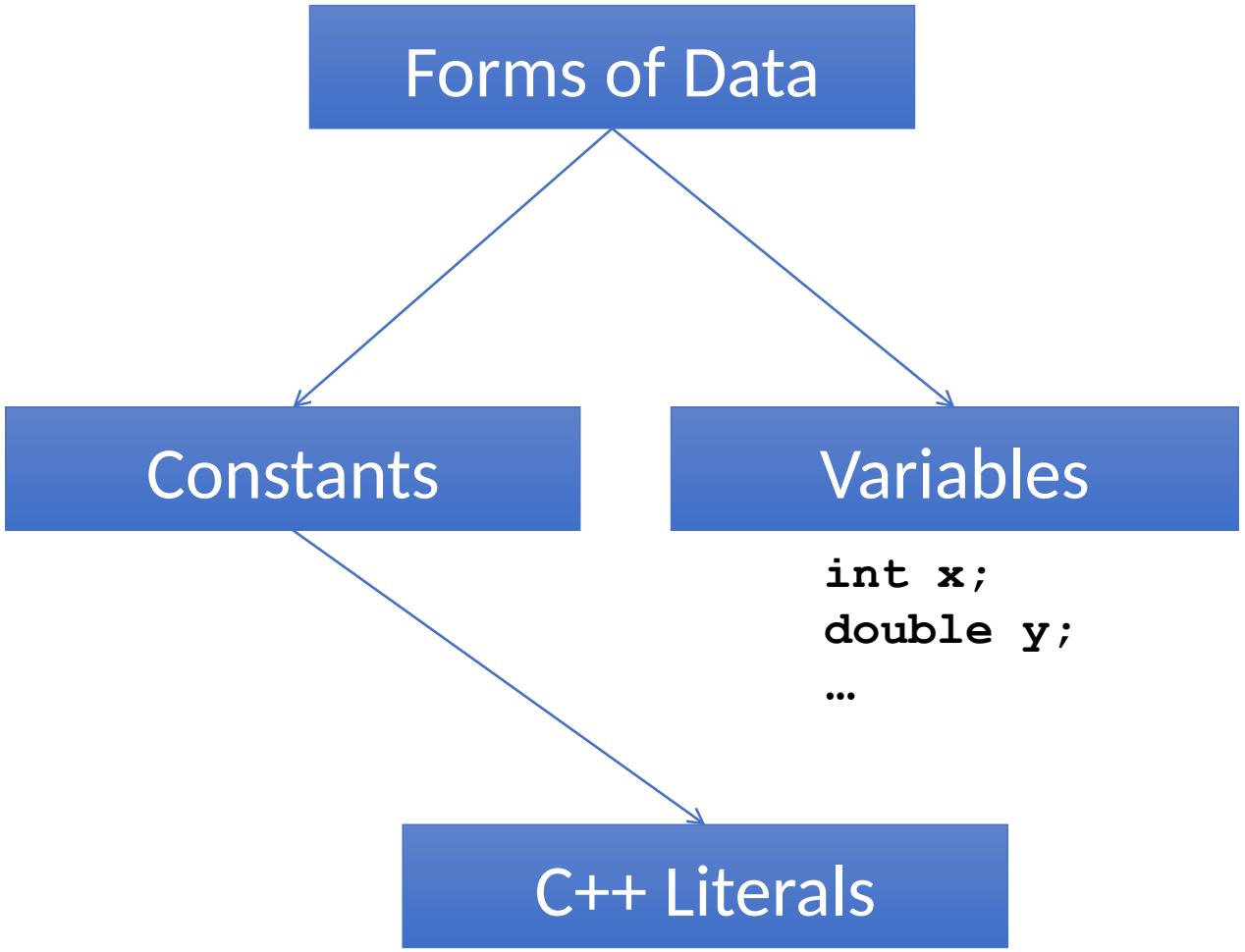



Memory




```
int x;
double y;
…
```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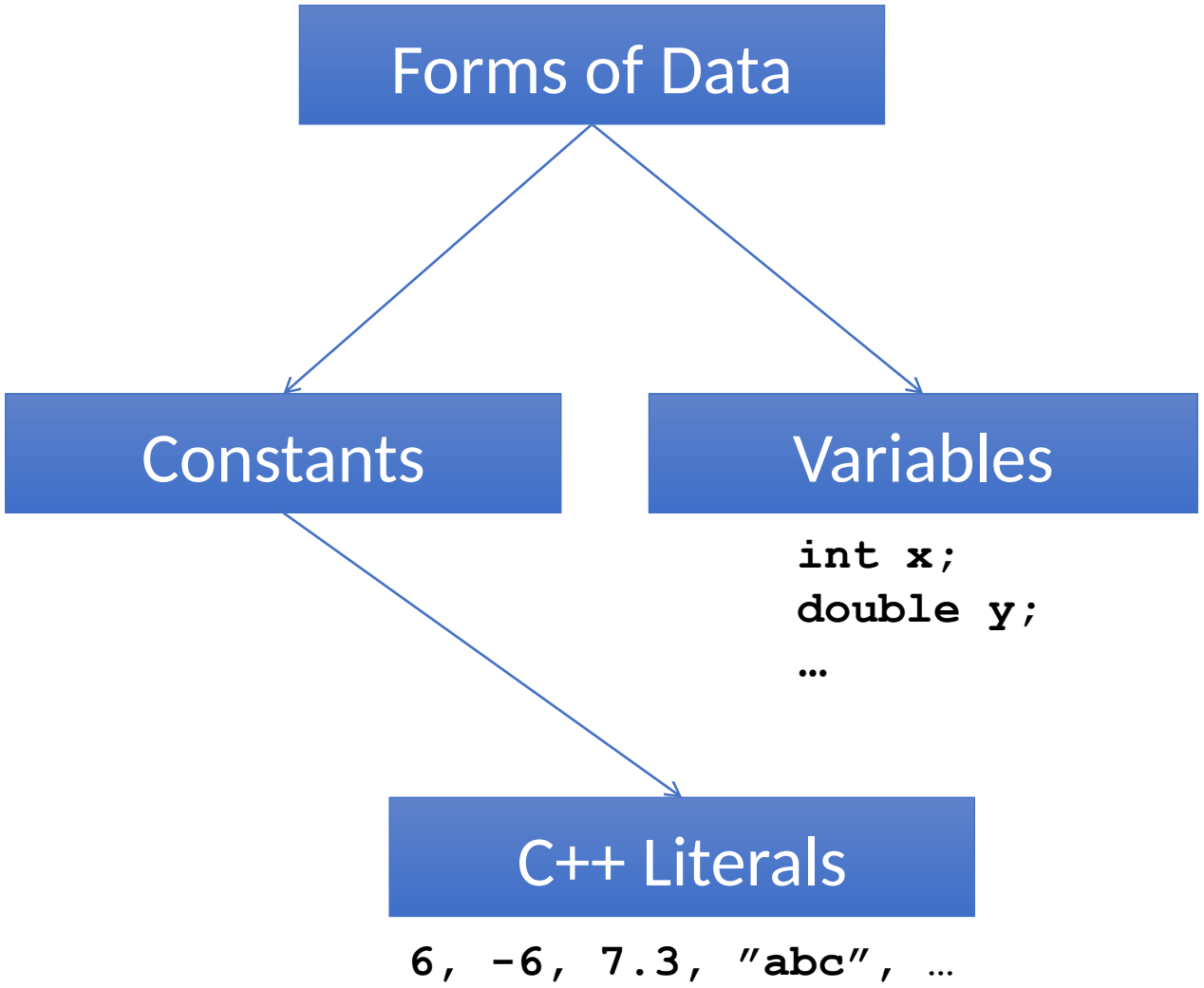
Forms of Data
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int x;
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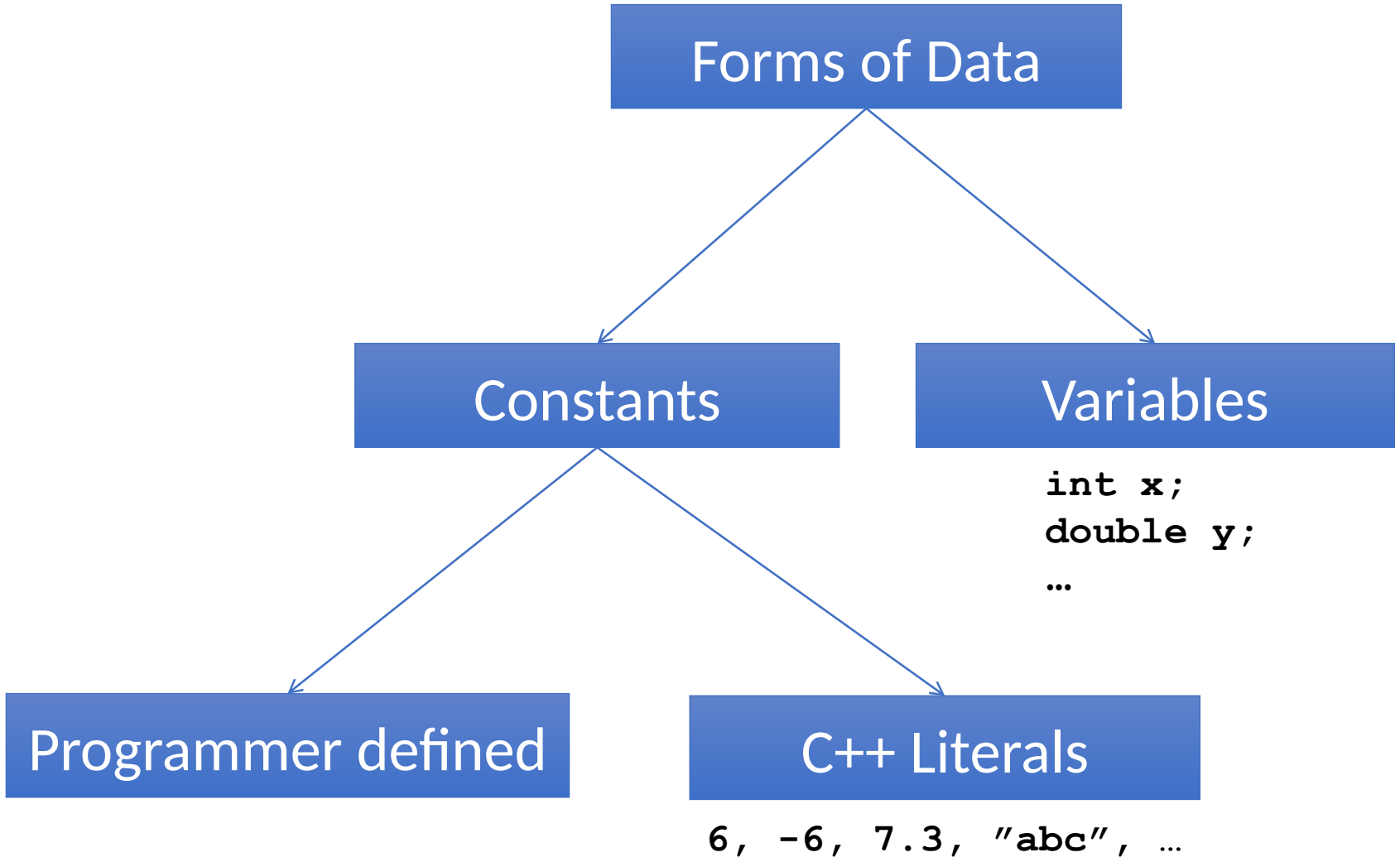
C++ Literals
6, -6, 7.3, "abc", …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Programmer defined
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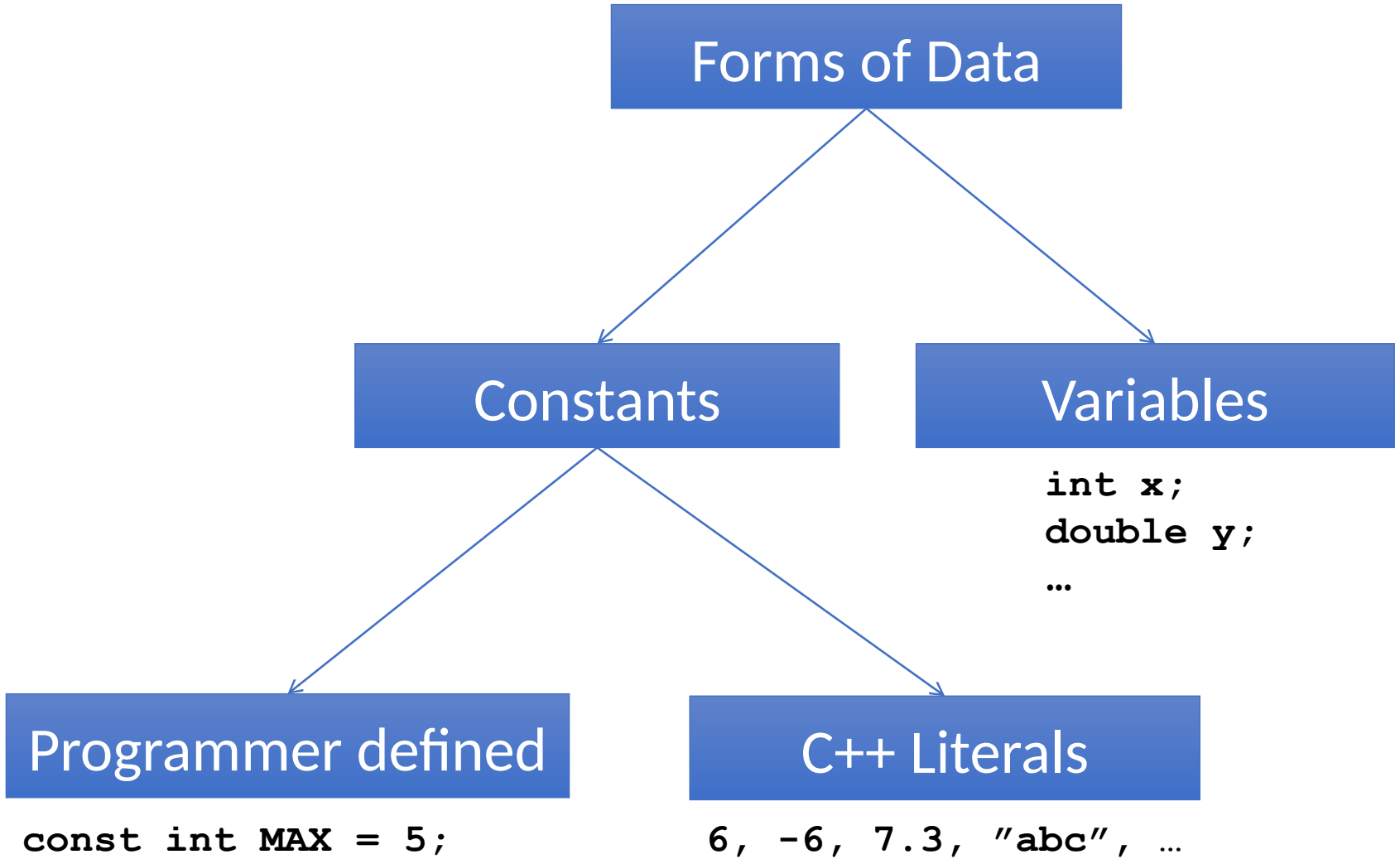
Forms of Data
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int x;
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Programmer defined
C++ Literals
const int MAX = 5;
6, -6, 7.3, "abc", …

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Arithmetic Operators:

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C++ literals: 3, 4, -6, 3954, …

Arithmetic Operators: +

```
int main(){
        int x;
        int y;

        x = 5;

        cout<<x + 2;
        y = x + 2;
        x + 2;









        return 0;
}
```

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Arithmetic Operators: +, -, *

```
int main(){
        int x;
        int y;

        x = 5;

        cout<<x + 2;
        y = x + 2;
        x + 2;

        cout<<x - 2;
        y = x * 2;





        return 0;
}
```

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Arithmetic Operators: +, -, *, /

```
int main(){
        int x;
        int y;

        x = 5;

        cout<<x + 2;
        y = x + 2;
        x + 2;

        cout<<x - 2;
        y = x * 2;

        cout<<x / 2;




        return 0;
}
```

$$13 \div 5$$

$$13 \div 5 = 2R3$$

$$13 \div 5 = 2R3$$

13 div 5 = 2

$$13 \div 5 = 2R3$$

13 div 5 = 2

13 mod 5 = 3

$13 \div 5 = 2R3$

In C++

13 div 5 = 2

13 mod 5 = 3

$13 \div 5 = 2R3$

In C++

13 div 5 = 2

13 / 5

13 mod 5 = 3

$$13 \div 5 = 2R3$$

	In C++
13 div 5 = 2	13 / 5
13 mod 5 = 3	13 % 5

```
int main(){
        int x;
        int y;

        x = 5;

        cout<<x + 2;
        y = x + 2;
        x + 2;

        cout<<x - 2;
        y = x * 2;

        cout<<x / 2;




        return 0;
}
```

```
int main(){
        int x;
        int y;

        x = 5;

        cout<<x + 2;
        y = x + 2;
        x + 2;

        cout<<x - 2;
        y = x * 2;

        cout<<x / 2;
        cout<<x % 2;




        return 0;
}
```

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```
int main(){
        int x;
        int y;

        x = 5;

        cout<<x + 2;
        y = x + 2;
        x + 2;

        cout<<x - 2;
        y = x * 2;

        cout<<x / 2;
        cout<<x % 2;

        x = 6;



        return 0;
}
```

```
int main(){
        int x;
        int y;

        x = 5;

        cout<<x + 2;
        y = x + 2;
        x + 2;

        cout<<x - 2;
        y = x * 2;

        cout<<x / 2;
        cout<<x % 2;

        x = 6;
        cout<<x = 7;


        return 0;
}
```

```
int main(){
        int x;
        int y;

        x = 5;

        cout<<x + 2;
        y = x + 2;
        x + 2;

        cout<<x - 2;
        y = x * 2;

        cout<<x / 2;
        cout<<x % 2;

        x = 6;
        cout<<x = 7;
        y = (x = 8);

        return 0;
}
```

```
int main(){
        int x;
        int y;

        x = 5;

        cout<<x + 2;
        y = x + 2;
        x + 2;

        cout<<x - 2;
        y = x * 2;

        cout<<x / 2;
        cout<<x % 2;

        x = 6;
        cout<<x = 7;
        y = (x = 8);
        y = x = 9;
        return 0;
}
```

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C++ literals: 3, 4, -6, 3954, ...

Arithmetic Operators: +, -, *, /, %, =, ...

Weeks and Days

Write a program that reads from the user the number of days they traveled.
The program will then print their traveling time in the format of full weeks and additional days.

Weeks and Days

Write a program that reads from the user the number of days they traveled.
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Example

Please enter number of days you traveled:

Weeks and Days

Write a program that reads from the user the number of days they traveled.
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Example

Please enter number of days you traveled:

19

Weeks and Days

Write a program that reads from the user the number of days they traveled.
The program will then print their traveling time in the format of full weeks and additional days.

Example

Please enter number of days you traveled:

19

19 days are 2 weeks and 5 days

Weeks and Days

Weeks and Days

$$19 \div 7$$

Weeks and Days

$$19 \div 7 = 2 \text{ R } 5$$

Weeks and Days

$$19 \div 7 = 2 \text{ R } 5$$

Full weeks

Weeks and Days

$$19 \div 7 = 2 \text{ R } 5$$

Full weeks

Remaining days

Weeks and Days

$$19 \div 7 = 2 \text{ R } 5$$

Full weeks

Remaining days

$$19 / 7 = 2$$

Weeks and Days

$$19 \div 7 = 2 \text{ R } 5$$

Full weeks

Remaining days

$$19 / 7 = 2$$

$$19 \% 7 = 5$$