```
//data types:
//1. primitive data types: all are reserved data types


//Numeric Type:
    //Integral value
            //Integer: byte, short, int, long
            //floating-type: float, double
    //character: char: $ a 1
//Boolean type: boolean(true/false)


//2. non primitive data types: class, interface, arrays, object
```

Same variable name declared twice- Error.

class1.java

```
1  package com.day2;
2
3  public class class1 {
4
5      public static void main(String[] args) {
6          //cannot redeclare the same variable again.
7          byte b=10;
8          byte b=20; //Duplicate local variable
9      }
10
11 }
12
```

This is allowed- reinitialise.

class1.java | class2.java

```java
package com.day2;

public class class2 {

    public static void main(String[] args) {

        //can reinitialise the same variable again.

        byte b1=10;
        b1=20;

        System.out.println(b1); //20
    }

}
```

Print byte value-

covered above.

```
//1. byte:
//size: 1 byte = 8 bits
//range: -128 to 127
```

Try storing more than limit-

class3.java

```java
package com.day2;

public class class3 {

    public static void main(String[] args) {

        //cannot store more than the storage limit of byte.


        byte c=100;
        byte c1=-32434; //Type mismatch: cannot convert from int to byte
        byte cw=3434; //Type mismatch: cannot convert from int to byte
    }

}

```

Print c1-

covered above.

The value of variable not used-

Declare but don’t use it, that time it will come.

Short –

size limits.

```java
        //2. short:
        //size: 2 bytes = 2x8 = 16 bits
        //range: -32768 to 32767
        short sh = 600;
        short bh = 120;
        System.out.println(sh);
```

class4.java

```java
package com.day2;

public class class4 {

    //short variable.

    public static void main(String[] args) {

        short s1=434;
        System.out.println(s1); //434
    }

}
```

Range updated-

```java
        //1. byte:
        //size: 1 byte = 8 bits
        //range: -128 to 127 (-2^7 to 2^7-1 )
        byte b = 10;
         b = 20;
        System.out.println(b);
        byte c = 100;
        byte c1 = -20;
        //byte c2 = -130;
        System.out.println(c1);
        System.out.println(c);

        //2. short:
        //size: 2 bytes = 2x8 = 16 bits
        //range: -32768 to 32767 (-2^15 to 2^15-1)
        short sh = 600;
        short bh = 120;
        System.out.println(sh);
        short gh = 1;//2 bytes
        short h = 400;


        //3. int
        //size: 4 bytes = 4x8 = 32 bits
        //range: -2147483648 to 2147483647 (-2^31 to 2^31-1)

        int i = 10000;
```

Int-

size and range given.

```
44
45          //3. int
46          //size: 4 bytes = 4x8 = 32 bits
47          //range: -2147483648 to 2147483647 (-2^31 to 2^31-1)
48
49          int i = 10000;
50          int j = 1;//4 bytes
```

class5.java

```
1  package com.day2;
2
3  public class class5 {
4
5      public static void main(String[] args) {
6
7          //integer variable.
8
9          int i=-3434;
10         System.out.println(i); //-3434
11     }
12
13 }
14
```

Long-

size and range.

```
50          int j = 1;//4 bytes
51
52          //4. long
53          //size: 8 bytes = 8x8 = 64 bits
54          //range: -2^63 to 2^63-1
55          long l = 1;//1000 x 8 = 8000 bytes
56          System.out.println(l);
57
```

class6.java

```
1  package com.day2;
2
3  public class class6 {
4
5      public static void main(String[] args) {
6
7          //long variable.
8
9          long l1=3434;
10
11         System.out.println(l1); //3434
12     }
13
14 }
15
```

Explicitly tell it’s a long variable-

Small l or capital L is ok.

In output L wont be printed.

```
51
52          //4. long
53          //size: 8 bytes = 8x8 = 64 bits
54          //range: -2^63 to 2^63-1
55          long num = 19898877776L;
56          System.out.println(num);
57
```

class6.java × class7.java ×

```
1  package com.day2;
2
3  public class class7 {
4
5      public static void main(String[] args) {
6
7          //long with small "l" in end.
8          //"l" wont be printed in output.
9
10         long l1=343243243241;
11         System.out.println(l1); //34324324324
12
13     }
14 }
15
```

class8.java ×

```
1  package com.day2;
2
3  public class class8 {
4
5  public static void main(String[] args) {
6
7          //long with small "L" in end.
8          //"L" wont be printed in output.
9
10         long l1=34324324324L;
11         System.out.println(l1); //34324324324
12
13     }
14
15 }
16
```

Don’t store aadhar etc in numbers-

Numbers only for mathematical operations.

Float-

Write f in end else compile error.

Or use casting to avoid compile error.

class9.java

```
1  package com.day2;
2
3  public class class9 {
4
5      public static void main(String[] args) {
6
7          //float.
8          //without f in end.
9          //we get error.
10
11         float f1=34.2343; //Type mismatch: cannot convert from double to float
12         System.out.println(f1);
13     }
14
15 }
16
```

class9.java | class10.java

```
1  package com.day2;
2
3  public class class10 {
4
5  public static void main(String[] args) {
6
7          //float.
8          //with small "f" in end.
9
10         float f1=34.2343f;
11         System.out.println(f1); //34.2343
12     }
13
14 }
15
```

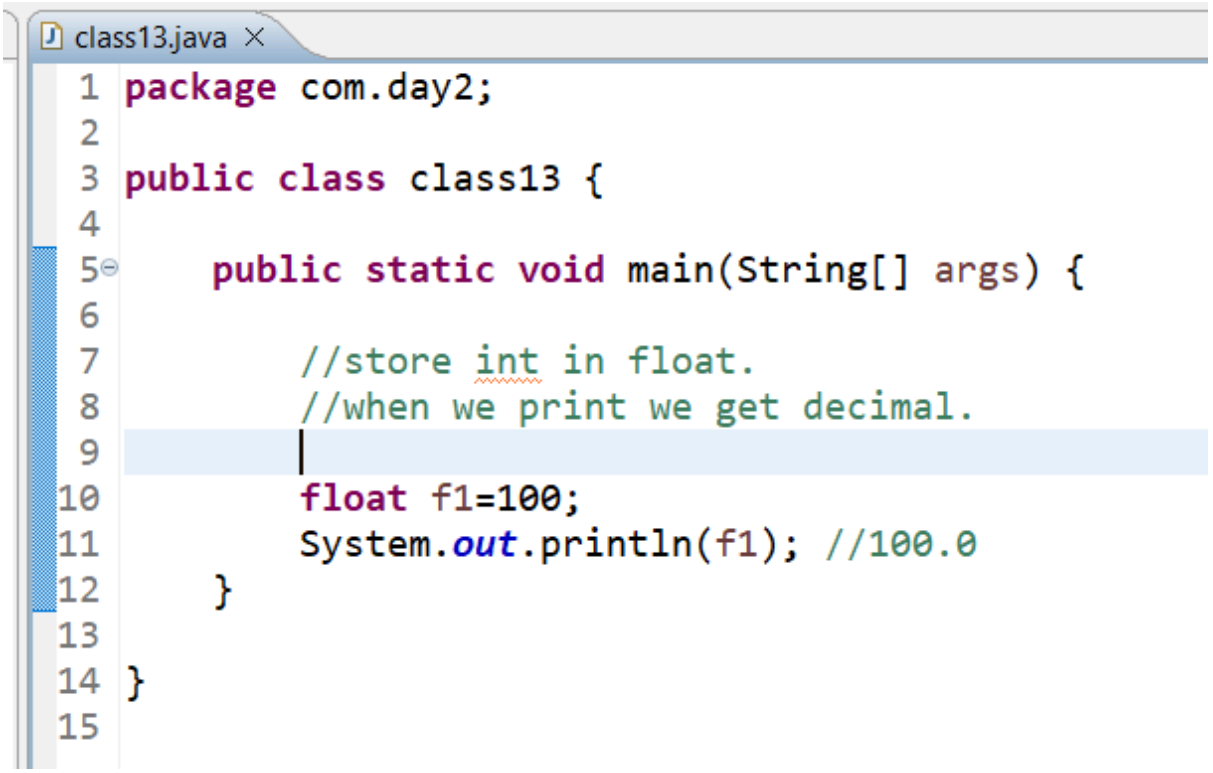
class11.java

```java
package com.day2;

public class class11 {

    public static void main(String[] args) {

        // float.
        // with capital "F" in end.
        // works fine.

        float f1 = 34.2343F;
        System.out.println(f1); // 34.2343
    }

}
```

class12.java

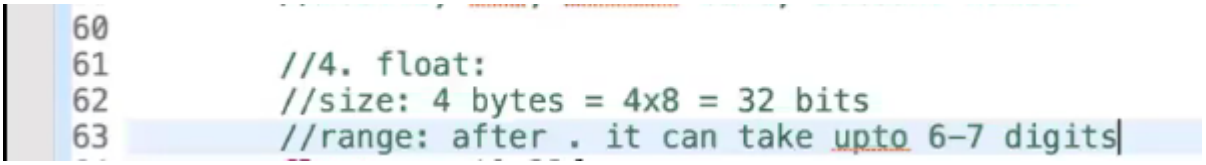
```java
package com.day2;

public class class12 {

    public static void main(String[] args) {

        // float.
        //cast explicitly to float.

        float f1 = (float)34.2343;
        System.out.println(f1); // 34.2343
    }

}
```

Store int in float and print-



It will convert it to decimal.

float size and range.



This is also valid though not mandatory-

*class14.java

```java
package com.day2;

public class class14 {

    public static void main(String[] args) {

        //store int in float.
        //when we print we get decimal.
        //we can store in this way also, int into float.

        float f1=100f;
        System.out.println(f1); //100.0

        float f2=200f;
        System.out.println(f2); //200.0
    }

}

```

Double-

size and range.

```java

        //5. double:
        //size: 8 bytes = 64 bits
        //range: after . it can take upto 15 decimal digits
        double de = 12.33; //8 bytes

```

class15.java

```java
package com.day2;

public class class15 {

    public static void main(String[] args) {

        //double.
        double d1=32434.324324;
        System.out.println(d1); //32434.324324
    }

}
```

This is allowed-

class15.java | class16.java

```java
package com.day2;

public class class16 {

    public static void main(String[] args) {

        // double.
        // converted to decimal.
        double d1 = 32434;
        System.out.println(d1); // 32434.0
    }

}
```

It will convert to decimal.

With integer family we cannot store decimals-

Example

Int I =233.34234;

Character-

class17.java

```java
package com.day2;

public class class17 {

    public static void main(String[] args) {

        //character.
        //only one char allowed.
        //else error.

        char c1='a';
        System.out.println(c1); //a
    }

}
```

Char a = “aw34234”

This is not allowed.

Only one digit allowed for character.

class18.java

```
1  package com.day2;
2
3  public class class18 {
4
5  public static void main(String[] args) {
6
7          //character.
8          //only one char allowed.
9          //else error.
10
11         char c1='a23434'; //Invalid character constant
12         System.out.println(c1);
13     }
14
15 }
16
```

More examples-

```
86         char ch1 = '1';
87         char ch2 = '$';
88         System.out.println(ch2);
89     }
```

```
81
82         //6. char: 1 digit value: unicode values + ASCII value
83         //size: 2 bytes = 16 bits
```

2 bytes needed keeping in mind all special characters and alphabets.

Not allowed –

class18.java *class19.java

```
1  package com.day2;
2
3  public class class19 {
4
5  public static void main(String[] args) {
6
7          //character.
8
9          char c1='-8'; //Invalid character constant
10         System.out.println(c1);
11     }
12
13 }
14
```

This is allowed-

Char c = 56

This is because of ascii concept.

class18.java class19.java class20.java

```
1  package com.day2;
2
3  public class class20 {
4
5  public static void main(String[] args) {
6
7          //character.
8      //we can store int in character due to ascii format.
9
10         char c1=18;
11         System.out.println(c1);  //
12     }
13
14 }
15
```

class18.java | class19.java | class20.java | class21.java | *class22.java

```java
package com.day2;

public class class21 {
public static void main(String[] args) {

        //character.
    //negative int not allowed.

        char c1=-18; //Type mismatch: cannot convert from int to char
        System.out.println(c1);
    }

}
```

class18.java | class19.java | class20.java | class21.java | class22.java

```java
package com.day2;

public class class22 {

public static void main(String[] args) {

        //character.
    //float not allowed.

        char c1=10.28; //Type mismatch: cannot convert from double to char
        System.out.println(c1);
    }

}
```

class18.java | class19.java | class20.java | class21.java | class22.java | class23.java

```java
package com.day2;

public class class23 {

public static void main(String[] args) {

        //character.
    //negative float not allowed.

        char c1=-10.28; //Type mismatch: cannot convert from double to char
        System.out.println(c1);
    }
}
```

Run and see this outputs-

class24.java

```java
package com.day2;

public class class24 {

    public static void main(String[] args) {

        //chars work on ascii number concept.

        System.out.println('t'); //t
        System.out.println('t'+10); //126
    }

}
```

First will give t.

Second will give 126 because of ascii concept.

Boolean-

*class25.java

```java
package com.day2;

public class class25 {

    public static void main(String[] args) {

        //boolean.

        boolean b1=true;
        System.out.println(b1); //true
    }

}
```

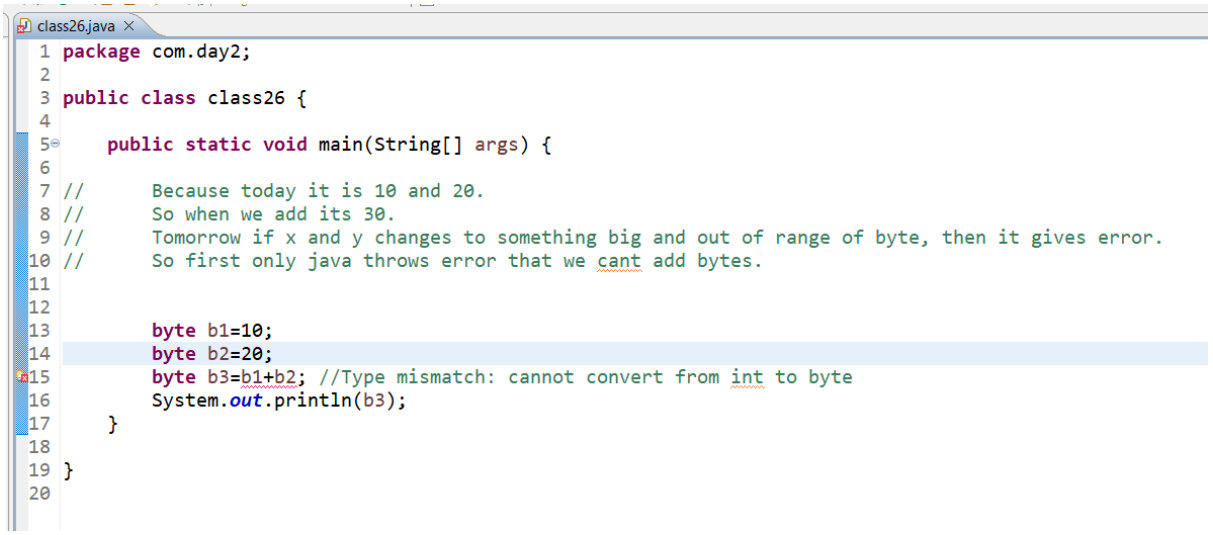
range and size of boolean.

```java
        //7. boolean: true/false
        //size:
        boolean bl = false;
        System.out.println(bl);
```

```java
        //size: ~1 bit
```

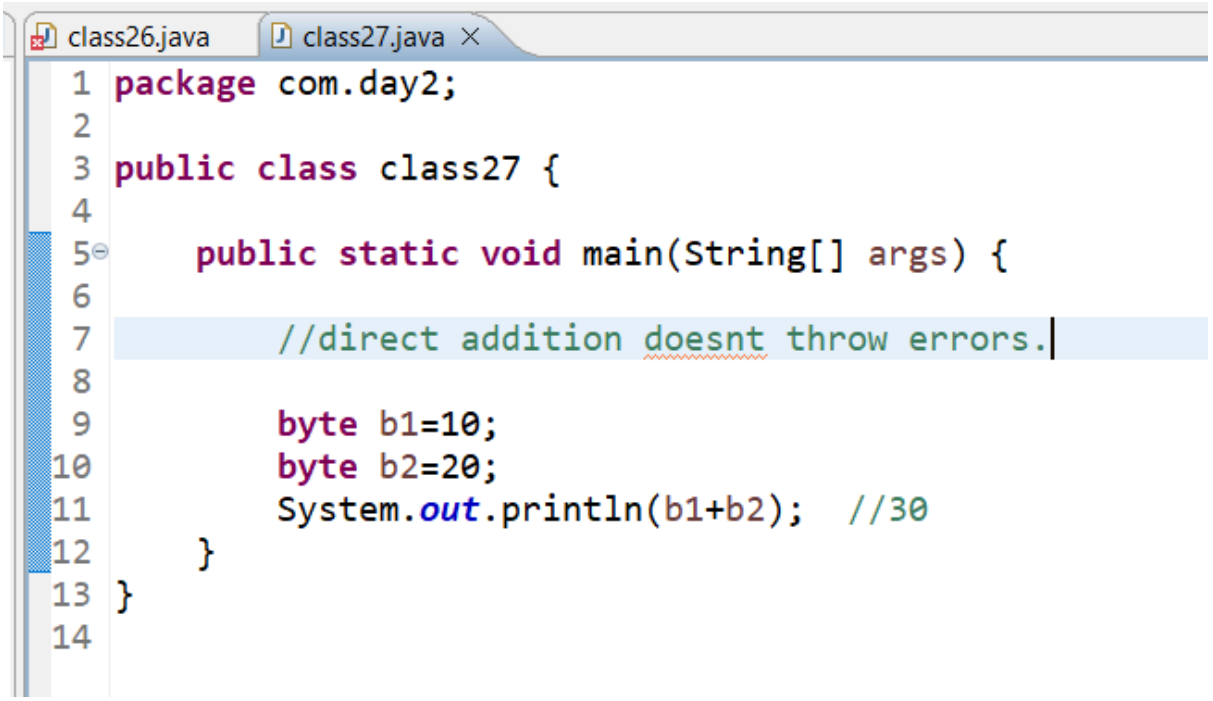
```java
        //range: true/false
```

Byte will give error-



class26.java

```
1  package com.day2;
2
3  public class class26 {
4
5      public static void main(String[] args) {
6
7  //      Because today it is 10 and 20.
8  //      So when we add its 30.
9  //      Tomorrow if x and y changes to something big and out of range of byte, then it gives error.
10 //      So first only java throws error that we cant add bytes.
11
12
13         byte b1=10;
14         byte b2=20;
15         byte b3=b1+b2; //Type mismatch: cannot convert from int to byte
16         System.out.println(b3);
17     }
18
19 }
20
```



class26.java | class27.java

```
1  package com.day2;
2
3  public class class27 {
4
5      public static void main(String[] args) {
6
7          //direct addition doesnt throw errors.
8
9          byte b1=10;
10         byte b2=20;
11         System.out.println(b1+b2);  //30
12     }
13 }
14
```

Why?

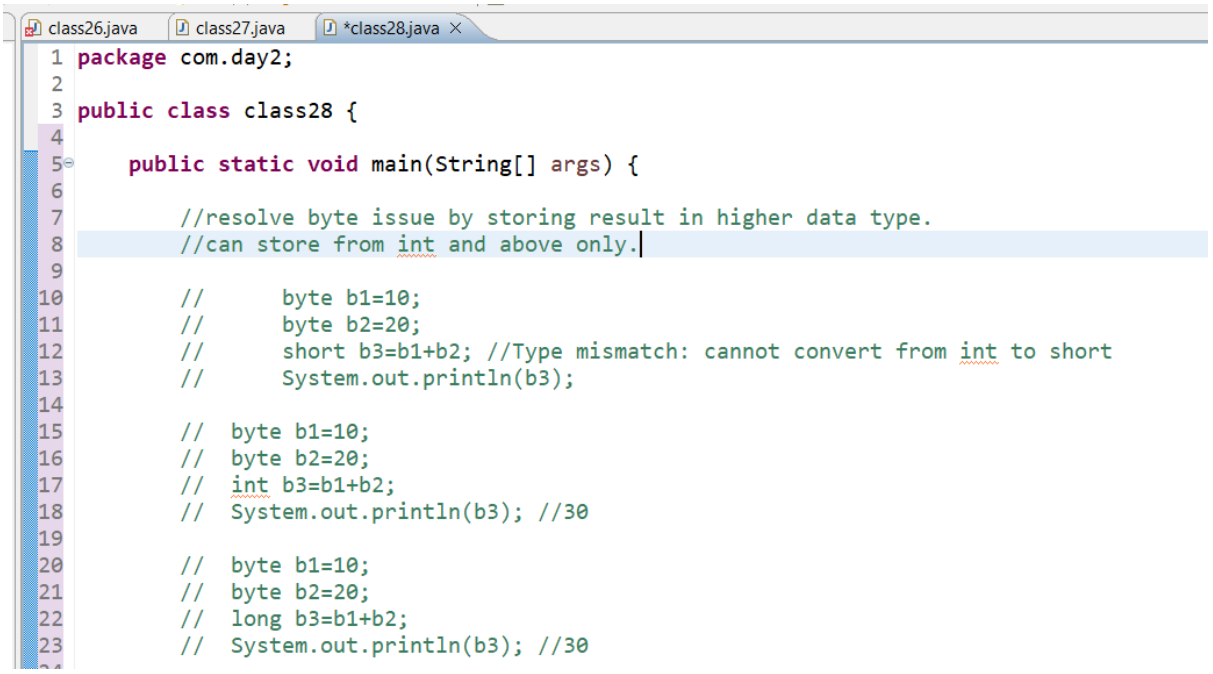
Because today it is 10 and 20.

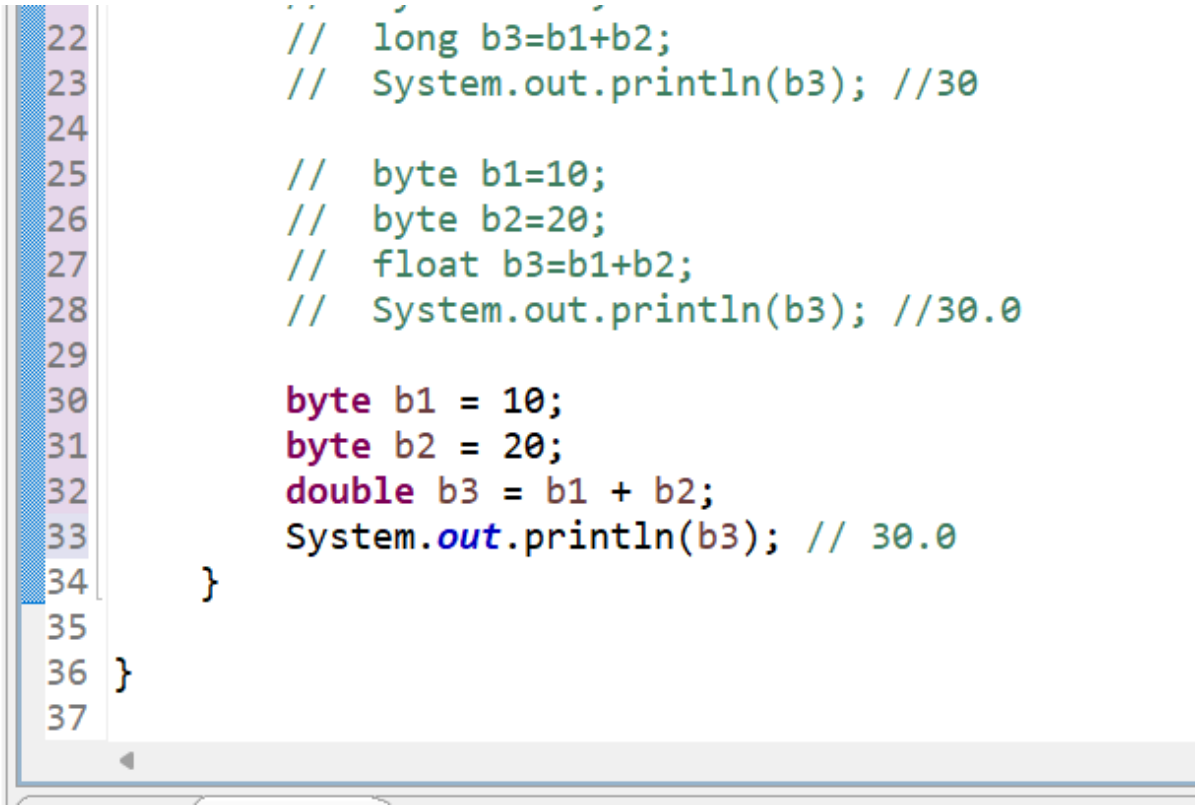
So when we add its 30.

Tomorrow if x and y changes to something big and out of range of byte, then it gives error.

So first only java throws error that we cant add bytes.

This can help resolve the above issue-





Same use case as byte for two short also-

class28.java class29.java

```
1  package com.day2;
2
3  public class class29 {
4
5      public static void main(String[] args) {
6
7          //resolve short issue by storing result in higher data type.
8          //can store from int and above only.
9          //same as byte.
10
11 //              short b1=10;
12 //              short b2=20;
13 //              short b3=b1+b2; //Type mismatch: cannot convert from int to short
14 //              System.out.println(b3);
15
16 //      short b1=10;
17 //      short b2=20;
18 //          int b3=b1+b2;
19 //          System.out.println(b3); //30
20
21 //          short b1=10;
22 //          short b2=20;
23 //          long b3=b1+b2;
24 //          System.out.println(b3); //30
```

```
23 //          long b3=b1+b2;
24 //          System.out.println(b3); //30
25
26 //          short b1=10;
27 //          short b2=20;
28 //          float b3=b1+b2;
29 //          System.out.println(b3); //30.0
30
31          short b1 = 10;
32          short b2 = 20;
33          double b3 = b1 + b2;
34          System.out.println(b3); // 30.0
35      }
36
37 }
38
```