Lists
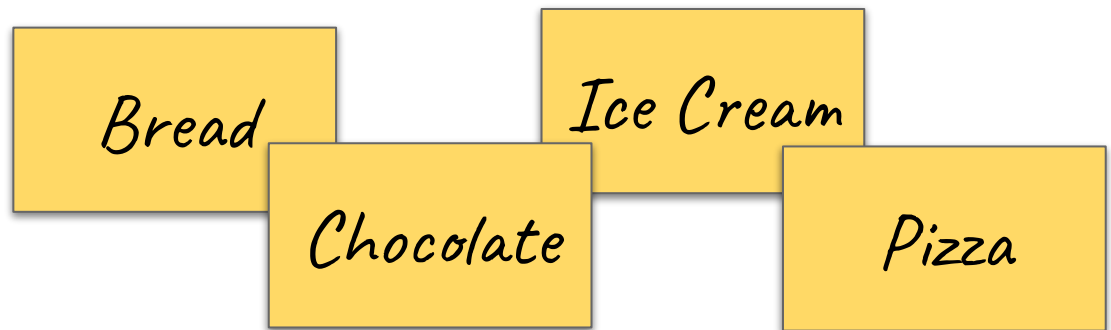
Lists

When we go shopping, we write down what we want to buy!

But we don't store it on lots of little pieces of paper!

Bread

Chocolate

Ice Cream

Pizza

We put it in one big shopping list!

- Bread
- Chocolate
- Ice Cream
- Pizza

Lists

It would be annoying to store it separately when we code too

```
>>> shopping_item1 = "Bread"
>>> shopping_item2 = "Chocolate"
>>> shopping_item3 = "Ice Cream"
>>> shopping_item4 = "Pizza"
```

So much repetition!

Instead we use a python list!

```
>>> shopping_list = ["Bread", "Chocolate", "Ice Cream", "Pizza"]
```
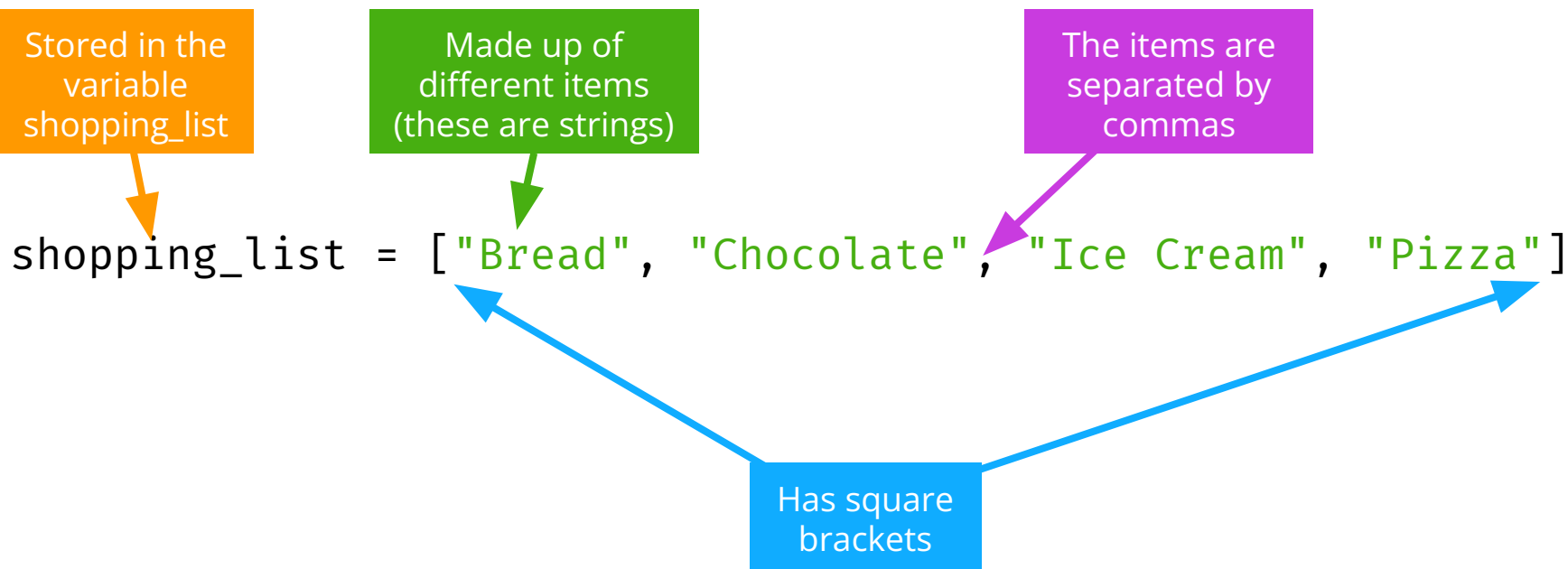
You can put (almost) anything into a list

- You can have a list of `int`egers
    ```
    >>> primes = [1, 2, 3, 5, 11]
    ```

- You can have `lists` with mixed `int`egers and `str`ings
    ```
    >>> mixture = [1, 'two', 3, 4, 'five']
    ```

- But this is almost never a good idea! You should be able to treat every element of the `list` the same way.

List anatomy

Stored in the variable shopping_list

Made up of different items (these are strings)

The items are separated by commas

```
shopping_list = ["Bread", "Chocolate", "Ice Cream", "Pizza"]
```

Has square brackets

Try this!

1. Make a list of your favourite things
   ```
   >>> faves = ['books', 'butterfly', 'chocolate',
                'skateboard']
   ```

2. Use `print` to print out your favourite things list

3. Can you make it print on one line?
   ```
   These are a few of my favourite things ['books',
   'butterfly', 'chocolate', 'skateboard']
   ```

   >> **Hint: use print with a comma!**

Accessing Lists!

The favourites `list` holds four strings in order.

We can count out the items using index numbers!

0   **1**   **2**   **3**

Remember: Indices start from zero!
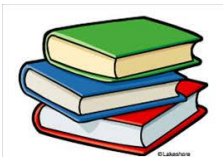
Accessing Lists

We access the items in a `list` with an index such as `[0]`:

```
>>> faves[0]
'books'
```

What code do you need to access the second item in the list?

Accessing Lists

We access the items in a `list` with an index such as `[0]`:

```
>>> faves[0]
'books'
```

What code do you need to access the second item in the list?

```
>>> faves[1]
'butterfly'
```

0   **[1]**   2   3

Going Negative

Negative indices count backwards from the end of the `list`:

```
>>> faves[-1]
'skateboard'
```

What would `faves[-2]` return?

Going Negative

Negative indices count backwards from the end of the `list`:

```
>>> faves[-1]
'skateboard'
```

What would `faves[-2]` return?

```
>>> faves[-2]
'chocolate'
```

| -4 | -3 | **[-2]** | -1 |

Falling off the edge

Python complains if you try to go past the end of a `list`

```
>>> faves = ['books', 'butterfly', 'chocolate',
                'skateboard']
>>> faves[4]
```

```
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
IndexError: list index out of range
```

Updating items!

We can also update things in a list:

```
>>> faves = ['books', 'butterfly',
                'chocolate', 'skateboard']
>>> faves[2]
'chocolate'
>>> faves[2] = 'lollipops'
>>> faves
```

Updating items!

We can also update things in a list:

```
>>> faves = ['books', 'butterfly',
                'chocolate', 'skateboard']
>>> faves[2]
'chocolate'
>>> faves[2] = 'lollipops'
>>> faves
['books', 'butterfly', 'lollipops', 'skateboard']
```

Removing items!

We can remove items from the list if they're no longer needed!

What if we decided that we didn't like butterflies anymore?

```
>>> faves
['books', 'butterfly', 'lollipops', 'skateboard']
>>> faves.remove('butterfly')
```

What does this list look like now?

Removing items!

We can remove items from the list if they're no longer needed!

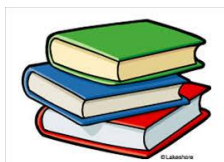What if we decided that we didn't like butterflies anymore?

```
>>> faves
['books', 'butterfly', 'lollipops', 'skateboard']
>>> faves.remove('butterfly')
```

What does this list look like now?

```
['books', 'lollipops', 'skateboard']
```

Adding items!

We can also add new items to the list!

What if we decided that we also liked programming?
```
>>> faves
['books', 'lollipops', 'skateboard']
>>> faves.append('programming')
```

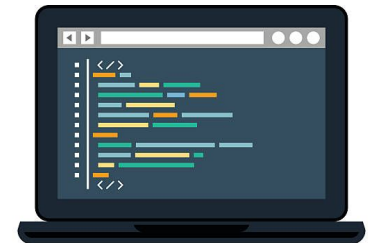What does this list look like now?

Adding items!

We can also add new items to the list!

What if we decided that we also liked programming?
```
>>> faves
['books', 'lollipops', 'skateboard']
>>> faves.append('programming')
```

What does this list look like now?

```
['books', 'lollipops', 'skateboard', 'programming']
```

List of lists!

You really can put anything in a list, even more lists!

We could use a list of lists to store different sports teams!

```
tennis_pairs = [
    ["Alex", "Emily"], ["Kass", "Annie"], ["Amara", "Viv"]
]
```

Get the first pair in the list

```
>>> first_pair = tennis_pairs[0]
>>> ["Alex", "Emily"]
```

Now we have the first pair handy, we can get the first the first player of the first pair

```
>>> fist_player = first_pair[0]
>>> "Alex"
```

Project time!

You now know all about lists!

Let's put what we learnt into our project

Try to do the next Part

The tutors will be around to help!