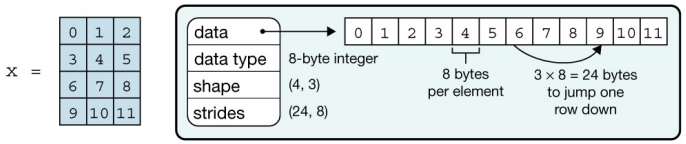
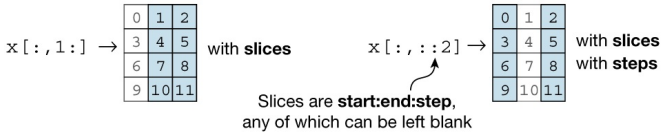
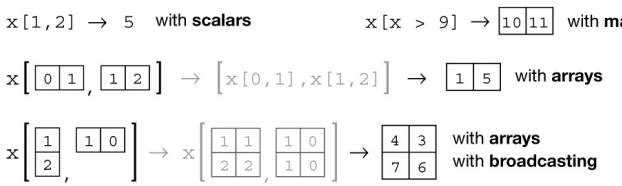
a Data structure



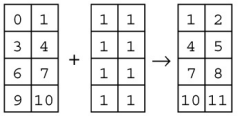
b Indexing (view)



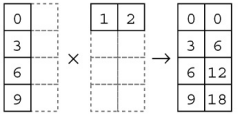
c Indexing (copy)



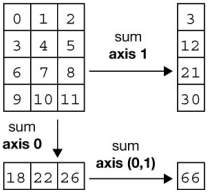
d Vectorization



e Broadcasting



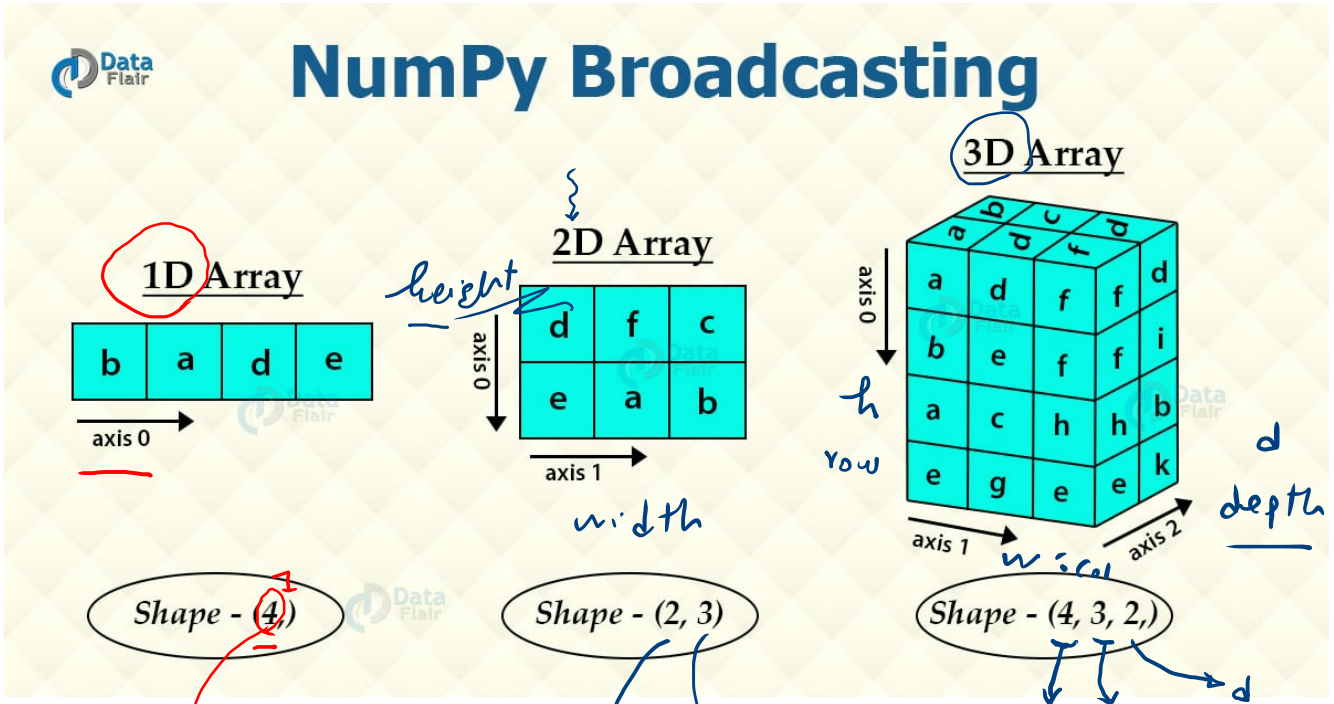
f Reduction



g Example

```
In [1]: import numpy as np

In [2]: x = np.arange(12)

In [3]: x = x.reshape(4, 3)

In [4]: x
Out[4]:
array([[ 0,  1,  2],
       [ 3,  4,  5],
       [ 6,  7,  8],
       [ 9, 10, 11]])

In [5]: np.mean(x, axis=0)
Out[5]: array([4.5, 5.5, 6.5])

In [6]: x = x - np.mean(x, axis=0)

In [7]: x
Out[7]:
array([[-4.5, -4.5, -4.5],
       [-1.5, -1.5, -1.5],
       [ 1.5,  1.5,  1.5],
       [ 4.5,  4.5,  4.5]])
```

NumPy Broadcasting



OOP : object
oriented
program.

basic calculator :

→ + add

→ - sub

→ X\ mult

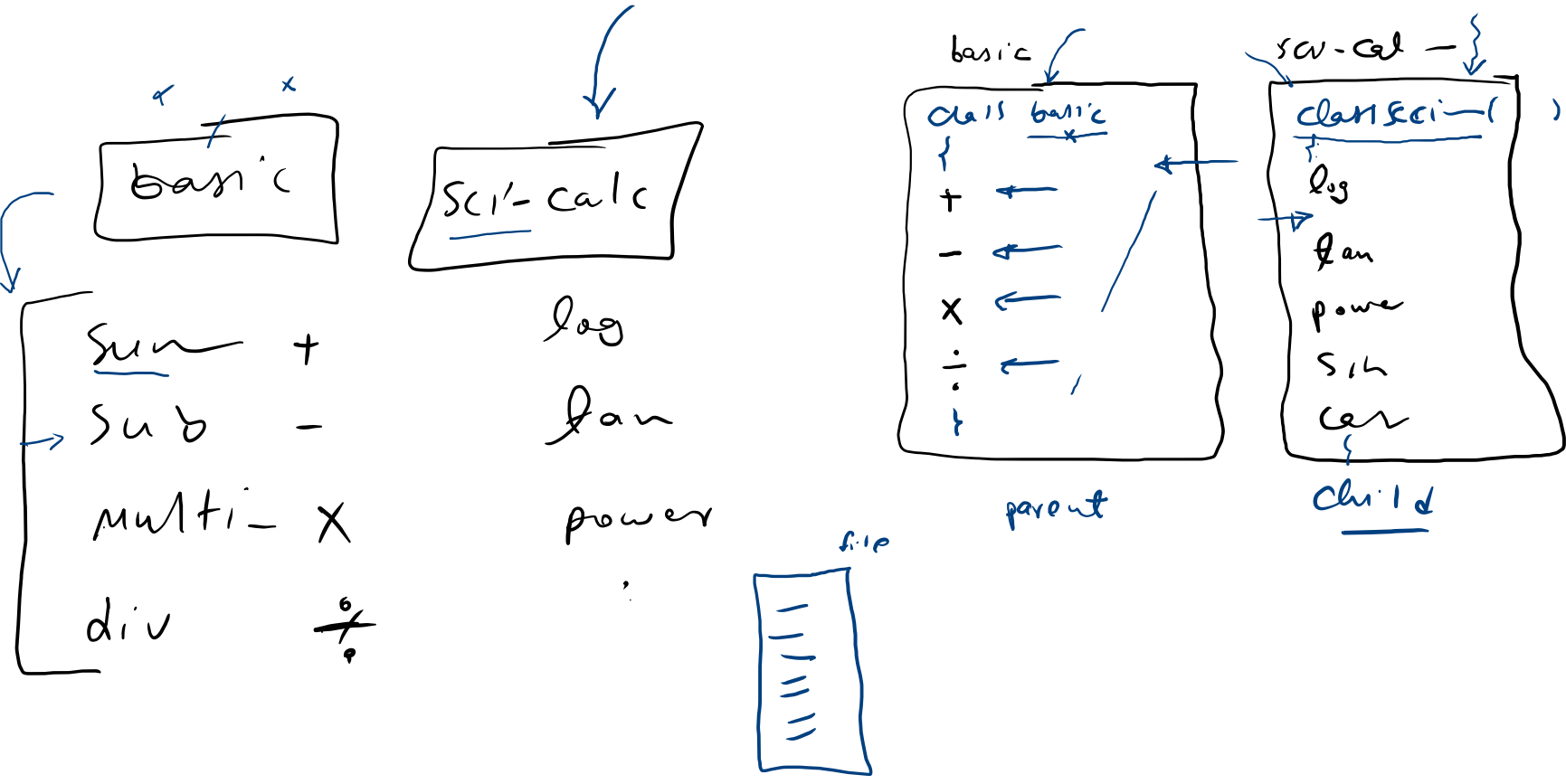
→ / divi

basic | Sci cal

Scientific cal —

∝ power ∝ sin ∝ tan

∝ log ∝ (a) ∝ cot —


basic
sci-calc
sum +
sub -
multi- X
div %
log
ban
power
basic
class basic
+
-
X
÷
parent
sci-cal
class sci-
log
ban
powe
sin
cos
Child
file