# Background

The Australian men's basketball national team is preparing for the 2024 Paris Olympics and are about to get into training camp. The fitness and body composition of the athletes are of interest to the coaches and they have developed several metrics to help them evaluate the athletes.

The metrics used to evaluate the players are BMI (body mass index) and VO2 max (volume of oxygen maximum). The bmi is calculated using pre-measured known athlete heights and the VO2 maximum is calculated from inputs of maximum heart rate in a timed activity and the measured resting heart rate of the athletes. The maximum heart rate they can have is 200 beats per minute and the minimum resting heart rate is 45 as they are athletes and this minimum is lower than that of the normal human being.

There are 5 positions each with 2 athletes at each position: point guards, shooting guards, small forwards, power forwards and centres. Each of these players will have their BMI and VO2 max data recorded over their time in training camp and eventually be used to determine their fitness levels at the end by comparing them to international standards.

# Business rules

a. Problem at Hand

The Volume of Oxygen Max theoretical value needs to be calculated, the BMI also needs to be calculated. **There are 5 positions on the team and for each position there are 2 players i.e. 2 point guards, 2 shooting guards, 2 small forwards, 2 power forwards and 2 centres.**

b. Input and outputs

A list of the athletes and their heights,

| Athlete | Height (cm) |
|---|---|
| Point guard 1 | 188 |
| Point guard 2 | 183 |
| Shooting guard 1 | 191 |
| Shooting guard 2 | 193 |
| Small forward 1 | 198 |
| Small forward 2 | 190 |
| Power forward 1 | 201 |
| Power forward 2 | 203 |

| Centre 1 | 213 |
|----------|-----|
| Centre 2 | 212 |

The weight of the athletes as recorded at the start of the training session, the resting heart rate before an exercise, the max heart rate during the timed run.

The outputs are BMI and VO2 max.

**Manual calculation:**
For point guard 1: assuming the weight input is 85kgs, maximum heart rate is 185 and resting heart rate is 50 the BMI and VO2 max can be calculated as:

BMI = Weight/ (height/100) $^2$

= 85/ (1.88 x 1.88)

BMI = 25.95 kg/m^2

VO2 max = Max heart rate/ resting heart rate * 15.3

= (185 / 50) * 15.3

= 56.61

**Pseudocode**
Program: Basketball Players fitness and health calculator
Start
Print welcome message on screen
Print (display) menu on the screen = Player options
Input player (or exit program)
If player input is valid:

Input weight
If weight < 75kgs

Print ("invalid weight")
Input weight
Calculate BMI as:
BMI formula: **Weight / height $^2$**
Print BMI

Input Max heart rate
If Max heart rate > 200 bpm

Print ("invalid max heart rate")
Input resting heart rate
If Resting heart rate < 45

Print ("invalid resting heart rate")
Input resting heart rate
Calculate VO2 max as:

VO2 max formula: **Max heart rate/ resting heart rate * 15.3**
Print VO2 max
Else:

Display error message

Input player (or exit program)

Print exit message
Exit

```python
def main():
    cityDict = createDictionary("fiveCities.txt")
    print("Enter the name of City from the following")
    print("list to view its population:")
    printCities(cityDict)
    city = input("\nCity: ")
    print()
    population(city, cityDict)

def createDictionary(fileName):
    infile = open(fileName, 'r')
    textList = [line.rstrip() for line in infile]
    infile.close()
    return dict([x.split(',') for x in textList])

def population(city, cityDict):
    pop = int(cityDict.get(city, cityDict[city]))
    print("The Population of {0:s} is: {1:,d}".format(city, pop))

def printCities(cityDict):
    for key in cityDict:
        print(key)
main()
```