```
it@ITs-MacBook-Air 30seconds % time ./a.out
./a.out  11.51s user 0.02s system 98% cpu 11.662 total
it@ITs-MacBook-Air 75seconds % time ./a.out
./a.out  179.66s user 0.50s system 99% cpu 3:00.46 total
it@ITs-MacBook-Air 120seconds % time ./a.out
./a.out  736.19s user 1.99s system 99% cpu 12:18.68 total
```

```
it@ITs-MacBook-Air 30seconds % bash script.sh
 30seconds main Program  Running

real    0m11.620s
user    0m11.493s
sys     0m0.031s
it@ITs-MacBook-Air 75seconds % bash script.sh
75seconds main Program  Running

real    3m0.362s
user    2m59.404s
sys     0m0.836s
it@ITs-MacBook-Air 120seconds % bash script.sh
 120seconds main Program  Running

real    12m18.860s
user    12m15.979s
sys     0m2.564s
```

For Background:

```
it@ITs-MacBook-Air 30seconds % time ./a.out &
[1] 22659
it@ITs-MacBook-Air 30seconds % ps
it@ITs-MacBook-Air 30seconds % ./a.out  11.52s user 0.03s system 98% cpu 11.732 tota
it@ITs-MacBook-Air 75seconds % time ./a.out &
[1] 23166
it@ITs-MacBook-Air 75seconds % ps
it@ITs-MacBook-Air 120seconds % ./a.out  182.58s user 0.47s system 99% cpu 3:03.20 t
it@ITs-MacBook-Air 120seconds % time ./a.out &
[2] 23299
it@ITs-MacBook-Air 120seconds % ps
it@ITs-MacBook-Air 120seconds % ./a.out  739.06s user 2.78s system 99% cpu 12:22.18
```

Shell

```
#!/bin/sh
#Vitaliy Prymak
PROG1="main";
# 30 Second Program
# g++ compilation
success=$(g++ $PROG1.cpp -o  $PROG1)
# Check if compilation not fails
if [ $success == ""]
then
    echo " 30seconds $PROG1 Program  Running";    # echo output
    time $(./$PROG1);          # timing the program

else
    echo $success;
fi
```

1) What was the difference in run time for running in foreground or background Be detailed?

Generally Runtime of foreground and background process are similar. But Background Process has more resources hence it works faster.
Foreground : 11.62s
Background: 11.52s

2) What is the difference between a foreground and a background process?

Foreground Process: Runs on foreground, directly visible on main UI. a job that runs in the forefront and wait for it to finish is referred to as a foreground process.

Background Process: Runs on background, not visible on main UI. Can be seen running in process table. In this the shell does not have to wait for a background process to complete before running additional. Hence they are faster.

3) Why is there a run time difference between foreground and background process that is running the same program?

Shell does not have to wait for a background process to complete before running additional. Hence background are faster.