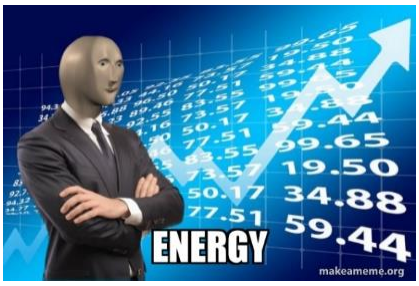
Practical work :
What's the best way to heat water?

1) Hotplate's energy efficiency



At First, we need power value which is on the hotplate

to know how much energy the hotplate is spending (power unit is the Watt).

P = ... W

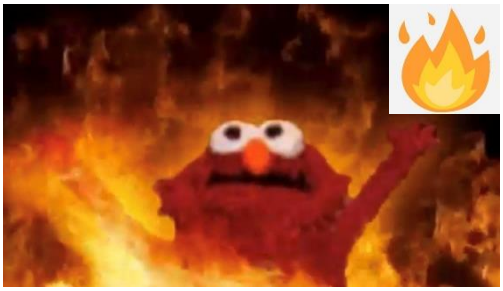
The experimentation:

➔ Heat the hotplate for a few minutes at maximum power.

➔ Meanwhile pour into a flask 200 ml of water, using a graduated cylinder.

➔ Note the initial temperature (It) of the cold water by using a thermometer:

It =



➔ Heat the 200 ml of water during exactly 5 minutes at maximum power.

➔ After 5 minutes, remove the flask from the hotplate.

➔ Shake before raising the temperature of the hot water.

➔ Note the final temperature (Ft) of the hot water by Using the thermometer:

Ft =

With these results, we can find hotplate's efficiency!

a) Calculation of electrical energy consumed during 5min:
Reminder: $E_{electric}$ = P ***(power)*** x t ***(time)*** with E in watt.min

$E_{electric}$ =.....

b) Give the value of $E_{electric}$ in Joules ***(x 60)***

.....

c) Calculate water's thermal energy $E_{thermal}$

Reminder : $E_{thermal}$ = w ***(weight)*** x c ***(capacity = 4180 J.kg^{-1} .K^{-1})*** x (Ft-It)

$E_{thermal}$ =.....

d) Finally, we can calculate hotplate's efficiency!

$Ef_1 = (E_{thermal} / E_{electric}) \times 100$

.....

Conclusion

2) Heating mantle's energy efficiency

Now, we'll do the same experimentation but with a heating mantle:

Power value (watt)	W
Initial temp. (It)	°C
Final temp. (Ft)	°C

With these results, we can find hotplate's efficiency!

a) Calculation of electrical energy consumed during 5min:

Reminder: $E_{electric}$ = P ***(power)*** x t***(time)*** with E in watt.min

.....

a) Give the value of $E_{electric}$ in Joules

.....

b) Calculate water's thermal energy $E_{thermal}$

Reminder : $E_{thermal}$ = w x c ***(= 4180 J.kg^{-1} .K^{-1})*** x (Ft-It)

.....

c) Finally, we can calculate heating mantle's efficiency!

$Ef_2 = (E_{thermal} / E_{electric}) \times 100$

.....

Conclusion