



Candle power



How powerful is a candle?

- ❖ Is the total power (light plus heat) of a candle more or less than for a typical domestic LED lightbulb?
- ❖ What is meant by 'energy efficient lighting'?

Estimated time: 10 minutes + 2 hour wait between measurements.

No prior knowledge needed.

Instructions

Watch the video ([YouTube IPc0kIRxFts](https://www.youtube.com/watch?v=IPc0kIRxFts))

1. Use the kitchen scales to find the candle's **start mass** (in grams). Write it down.
2. Start the timer or note the time as you light the candle.
3. Don't leave your candle unattended.
4. After 2 hours of burning, blow out the candle.
5. Use the kitchen scales to find the candle's **end mass** (in grams). Include any wax that has spilled as we only want to count wax that has burnt. Write it down.
6. Do the following calculations to find the amount of **wax used**, **energy transferred** and **power**:

Wax used (in grams)

= start mass (in grams) – end mass (in grams).

E.g. 14 g – 8 g = 6 g

Chemical energy transferred (in joules) to both heat and light.

= **wax used** (in grams) x 43 000 (joules per gram).

E.g. 8 g x 43 000 J/g = 258 000 J

Total Power (in watts)

= **energy transferred** ÷ burn time (in hours) x 3600 (seconds per hour).

E.g. 258 000 J ÷ (2 x 3600) s = 36 W

7. Enter results below or into NPL webpage:

npl.co.uk/measurement-at-home/candle-power

Start candle mass (in grams)	
End candle mass (in grams)	
Wax used = start mass - end mass (in grams)	
Burn time (in hours)	
Calculated total candle power (in watts)	

#MeasurementAtHome

npl.co.uk/measurement-at-home

Equipment required

- A new candle or tealight
- A match or other lighter
- Kitchen scales
- A clock or timer
- Paper and pencil for results and calculation.

Risks

- ❖ Adult supervision as there is fire involved – candles are hot and shouldn't be left unattended.

SI measurement units

- ❖ kilogram (kg) for mass
- ❖ second (s) for time
- ❖ candela (cd) for luminous intensity

Challenge Topics

- ❖ Measurement Science, Maths, Energy, Physics.

Thoughts, tips and information

- ❖ Do all candles burn at the same rate? You can repeat this experiment with different candle types.
- ❖ Total candle power can be more than typical LED lightbulbs, though candles transfer most of their energy as heat, not light.
- ❖ Electric lighting was the first main reason electricity was brought into UK homes.

Adult direction or supervision is required. All experiments are carried out at your own risk.
For more experiments, visit [NPL Measurement at Home](https://npl.co.uk/measurement-at-home).