Drive slower to save more!

In the current economic climate, it seems essential to control your vehicle's fuel consumption, especially as reducing petrol consumption also reduces the pollution emitted. So it seems to be a win-win solution.
For everyone? However, some motorists refuse to apply this rule, on the pretext that driving slower means spending more time on the road.
How do you calculate the saving in fuel consumption, and weigh it up against the loss of time, to know whether it's worth it?

Overview "How much I save by driving slower?"

How much fuel will I consume if I reduce my speed??

Context
Everyday life

Working life

Cognitive processes
Processing information
Reasoning
Problem solving
Critical thinking

Target group (incl. necessary prior skills and competences)

Adults who are familiar with proportional relationships
Learners training to become professional drivers
Professionals who have to drive regularly in the course of their work

Content
Number
Relationship

Dispositions
Motivation

Outcomes and results

Proportionality relationships
Playing with percentages

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Main information

Content	Number and relationship
Target group	All learners who already have a mathematical grounding in proportional quantities, in particular people who are training to become drivers (taxis, HGVs) or who have a job that requires them to drive on a regular basis.
Learning intention	Numeracy for personal or professional issues
Duration	1 lesson
Material and resources	Internet connection Vehicle technical data sheets (to find out how much fuel they consume) Up-to-date petrol prices
Group size	5 to 12 learners
Problem statement	Beyond the official line that we should drive slower to save fuel, how can I calculate the impact on my situation?
Working questions	- How much is a 20% reduction in petrol consumption? - And how much time am I losing by reducing my speed? - Is the balance in favour of reducing speed?
Learning outcomes and results	• Proportionality relationships • Playing with percentages
Reference to National Qualification Frame	Optional (country's decision)

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Working plan

Time (lessons)	Description of content/activities	Material	Methodical and didactic information[1]
15’	**Introduction** The teacher introduces the topic of the day by projecting the images in Appendix 1. What do they evoke in the learners? Do they see a link between speed and fuel consumption? Have they ever asked themselves whether it's worth taking their foot off the gas? In the case of professionals, are there any injunctions to this effect from their companies?	Appendix 1	Questioning Discussing
30’	The teacher suggests the wording at the top of appendix 2. The teacher checks that the terms are understood, particularly "exponential", and asks the learners how they react to these numbers: are they surprised? If so, in what way? If not, does that mean they were expecting these results, or that they don't understand them? Then he explains the calculations used to obtain these results, taking care to break down the steps in the reasoning. Each learner is then asked to carry out the calculations for the 4 situations proposed.	Appendix 2	Explicit teaching Questioning Individual
25’	In sub-groups, learners search the Internet to find the average fuel	Appendix 3	Collaborative learning

[1] for description and explanation of kinds of tasks, HITs and other background information please consult the teachers’ guide

	consumption of their vehicles in extra-urban situations. They complete the table in Appendix 3 with the data, and then carry out the calculations based on the fuel reduction percentages seen earlier, using calculators.	Internet connexion	
25’	Based on the average fuel tariffs observed (appendix 4), they complete the table above by indicating the cost represented in the 3 situations	Appendix 4	Collaborative learning
20’	Each learner then completes the tables in Appendix 5, based on the fuel consumption of their own vehicle.	Appendix 5	Individual
15’	In a large group, the trainer then asks what conclusions each person has reached: what do I gain, what do I lose, is it worth reducing speed?		Discussing
	An extension of this exercise could be to work on the benefits of E85 bioethanol, given that it increases fuel consumption by around 25%, but costs half as much, and produces less CO2.		

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Appendix 1

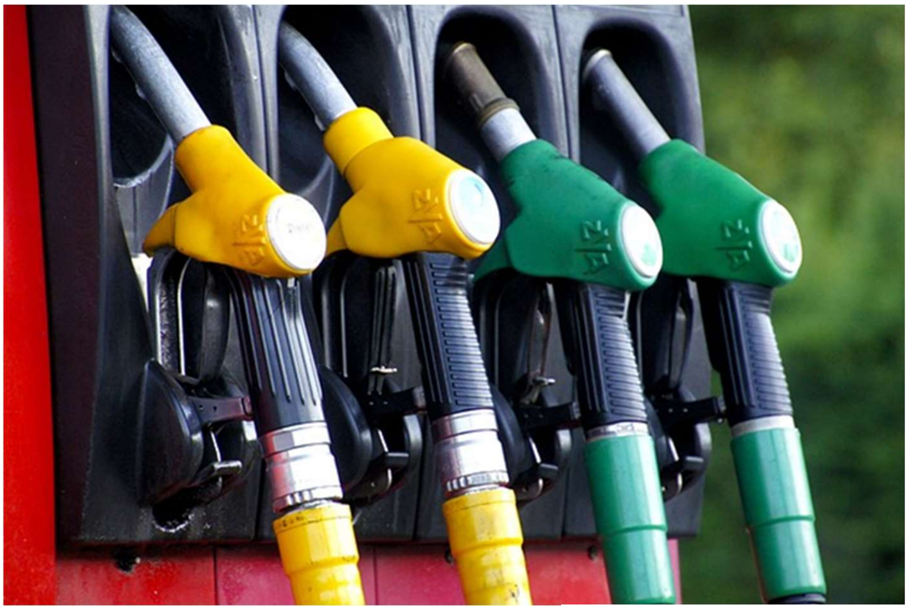

Image IADE-Michoko / Pixabay

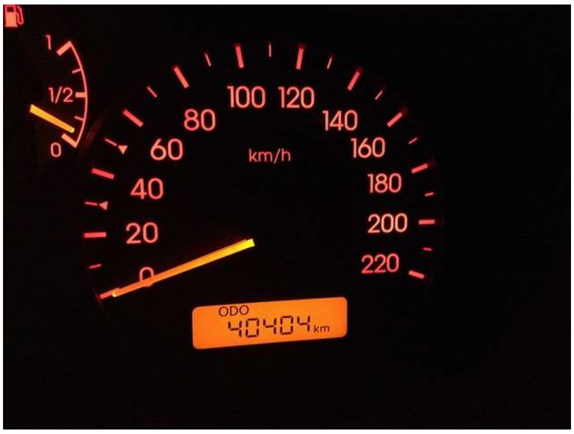

Image Smartsuz / Pixabay

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Appendix 2

Quelle est la relation entre vitesse et consommation d’essence ?

En appliquant la formule de l’énergie cinétique, on peut proposer la formulation suivante :

> **"La consommation augmente suivant la vitesse au carré et donc de façon exponentielle: si à 130 km/h j'aurais un certain besoin en carburant, à 145 km/h, soit 11% de plus, j'aurai besoin de 24% d'énergie en plus. A 160 km/h, soit 23% de plus que 130, ce besoin en carburant est 51% supérieur!"**

https://www.bfmtv.com/auto/retour-ou-pas-a-90km-h-a-quelle-vitesse-faut-il-rouler-pour-limiter-sa-consommation_AN-202001270032.html

Vérifions ces données :

- Passer de 130 à 145 km/h représente un pourcentage d’augmentation de :
  (145 – 130) / 130 x 100 = 11,5 %

- L’énergie cinétique augmente elle de :
  $(145^2-130^2) / 130^2 \times 100 = 24{,}4$ %

- Attention, ces données restent **indicatives**, car la consommation de carburant d’un véhicule n’est pas seulement liée à l’énergie nécessaire pour le mettre en mouvement, elle dépend également d’autres facteurs, notamment l’état de la route, celui du véhicule, son poids en charge, les conditions météorologiques…

Appliquez cette formule aux situations suivantes :

Je passe de 110 à 130 km/h ○ Augmentation de la vitesse = ○ Augmentation de l’énergie cinétique =	**Je passe de 130 à 110 km/h** ○ Diminution de la vitesse = ○ Diminution de l’énergie cinétique =
Je passe de 130 à 120 km/h ○ Diminution de la vitesse = ○ Diminution de l’énergie cinétique =	**Je passe de 50 à 30 km/h** ○ Diminution de la vitesse = ○ Diminution de l’énergie cinétique =

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Appendix 3

Vehicle/Model	Average consumption per 100 km	Reduction from 130 to 120 km/h	Reduction from 130 to 110 km/h

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Appendix 4

To be adapted according to the country

Average fuel prices

Evolution des prix moyens des carburants

Suivez l'évolution des prix moyens de carburants en France au cours du dernier mois ou de la dernière année.

PRIX MOYENS DES CARBURANTS	Aujourd'hui	Depuis 1 semaine	Depuis 1 mois	Depuis 1 an
Sans Plomb 98 (E5)	1,964 €/l	+ 1,8 €c/l + 0,90 %	+ 3,2 €c/l + 1,70 %	- 4,8 €c/l - 2,40 %
Super 98 (E10)	1,897 €/l	0 €c/l 0	0 €c/l 0	0 €c/l 0
Sans Plomb 95 (E5)	1,898 €/l	+ 1,9 €c/l + 1,00 %	+ 3,3 €c/l + 1,80 %	- 2,9 €c/l - 1,50 %
Sans Plomb 95 (E10)	1,888 €/l	+ 2,8 €c/l + 1,50 %	+ 4,2 €c/l + 2,30 %	- 2,7 €c/l - 1,40 %
BioEthanol E85	0,900 €/l	+ 0,3 €c/l + 0,30 %	- 0,5 €c/l - 0,60 %	- 24,0 €c/l - 21,10 %
Gazole (B7)	1,815 €/l	+ 1,8 €c/l + 1,00 %	- 1,2 €c/l - 0,70 %	- 3,5 €c/l - 1,90 %
GPL	0,993 €/l	- 0,5 €c/l - 0,50 %	- 0,7 €c/l - 0,70 %	- 2,4 €c/l - 2,40 %
GNV	1,078 €/l	0 €c/l 0	0 €c/l 0	0 €c/l 0

Prix moyens calculés sur la base des prix disponibles sur CARBU.COM

https://carbu.com/france/prixmoyens

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Appendix 5

Differences in journey times and fuel costs according to speed

- For a 100 km journey

Speed	Journey time	Fuel consumption	Cost of fuel
130 km/h			
120 km/h			
110 km/h			

- For a 80 km journey

Speed	Journey time	Fuel consumption	Cost of fuel
130 km/h			
120 km/h			
110 km/h			

- For a 250 km journey

Speed	Journey time	Fuel consumption	Cost of fuel
130 km/h			
120 km/h			
110 km/h			

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