

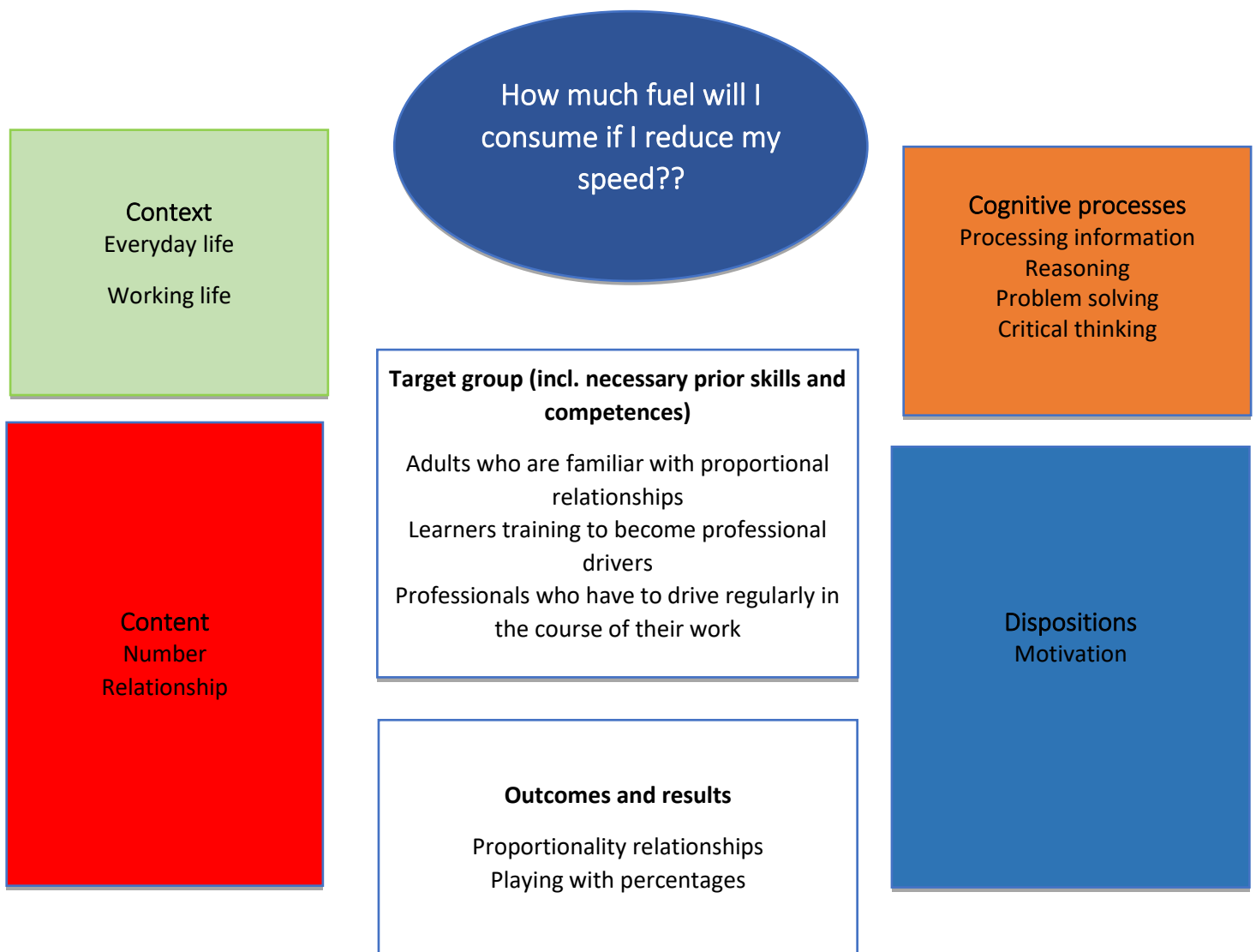
Drive slower to save more!

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?"



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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> • Proportionality relationships • Playing with percentages
Reference to National Qualification Frame	Optional (country's decision)



Working plan

Time (lessons)	Description of content/activities	Material	Methodical and didactic information ¹
15'	<p>Introduction</p> <p>The teacher introduces the topic of the day by projecting the images in Appendix 1.</p> <p>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?</p>	Appendix 1	Questioning Discussing
30'	<p>The teacher suggests the wording at the top of appendix 2.</p> <p>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?</p> <p>Then he explains the calculations used to obtain these results, taking care to break down the steps in the reasoning.</p> <p>Each learner is then asked to carry out the calculations for the 4 situations proposed.</p>	Appendix 2	Explicit teaching Questioning Individual

¹ for description and explanation of kinds of tasks, HITs and other background information please consult the teachers'/user's guide



25'	<p>In sub-groups, learners search the Internet to find the average fuel consumption of their vehicles in extra-urban situations.</p> <p>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.</p>	<p>Appendix 3 Internet connexion</p>	<p>Collaborative learning</p>
25'	<p>Based on the average fuel tariffs observed (appendix 4), they complete the table above by indicating the cost represented in the 3 situations</p>	<p>Appendix 4</p>	<p>Collaborative learning</p>
20'	<p>Each learner then completes the tables in Appendix 5, based on the fuel consumption of their own vehicle.</p>	<p>Appendix 5</p>	<p>Individual</p>
15'	<p>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?</p>		<p>Discussing</p>
	<p><i>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.</i></p>		



Appendix 1



Image [IADE-Michoko](#) / [Pixabay](#)



Image [Smartsuz](#) / [Pixabay](#)



ADEME – Agence de la Transition Energétique



Appendix 2

What is the relationship between speed and fuel consumption?

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

Let's check these figures :

- Going from 130 to 145 km/h represents a percentage increase of :
 $(145 - 130) / 130 \times 100 = 11,5 \%$
- Kinetic energy increases by :
 $(145^2 - 130^2) / 130^2 \times 100 = 24,4 \%$
- Please note that these figures are only indicative, as a vehicle's fuel consumption is not only linked to the energy required to set it in motion, it also depends on other factors, such as the condition of the road, the condition of the vehicle, its laden weight, weather conditions, etc.

Apply this formula to the following situations :

<p>I go from 110 to 130 km/h</p> <ul style="list-style-type: none"> ○ Increase in speed = ○ Increase in kinetic energy = 	<p>I go from 130 to 110 km/h</p> <ul style="list-style-type: none"> ○ Decrease in speed = ○ Decrease in kinetic energy =
<p>I go from 130 to 120 km/h</p> <ul style="list-style-type: none"> ○ Increase in speed = ○ Increase in kinetic energy = 	<p>I go from 50 to 30 km/h</p> <ul style="list-style-type: none"> ○ Increase in kinetic energy = ○ Decrease in kinetic energy =



Appendix 3

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



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 €/l + 0,90 %	+ 3,2 €/l + 1,70 %	- 4,8 €/l - 2,40 %
Super 98 (E10)	1,897 €/l	0 €/l 0	0 €/l 0	0 €/l 0
Sans Plomb 95 (E5)	1,898 €/l	+ 1,9 €/l + 1,00 %	+ 3,3 €/l + 1,80 %	- 2,9 €/l - 1,50 %
Sans Plomb 95 (E10)	1,888 €/l	+ 2,8 €/l + 1,50 %	+ 4,2 €/l + 2,30 %	- 2,7 €/l - 1,40 %
BioEthanol E85	0,900 €/l	+ 0,3 €/l + 0,30 %	- 0,5 €/l - 0,60 %	- 24,0 €/l - 21,10 %
Gazole (B7)	1,815 €/l	+ 1,8 €/l + 1,00 %	- 1,2 €/l - 0,70 %	- 3,5 €/l - 1,90 %
GPL	0,993 €/l	- 0,5 €/l - 0,50 %	- 0,7 €/l - 0,70 %	- 2,4 €/l - 2,40 %
GNV	1,078 €/l	0 €/l 0	0 €/l 0	0 €/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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