

## Peters Problem 2016-Sample Solution

Q1. Preferred route :

Athlone, Tullamore, Portlaoise, Mountrath, Freshford, Urlingford, Nenagh, Rathkeale, Lismore, Youghal, Enniscorthy, Kilcullen, Greystones, Balbriggan, Drogheda, Virginia, Carrick-on-Shannon, Swinford, Westport, Headford, Oranmore, Athlone.

Or the reverse journey may also be outlined.

The distances (in km) are taken from the Distance Chart supplied:

Athlone to Tullamore: 40  
To Portlaoise: 34  
To Mountrath: 14  
To Freshford: 39  
To Urlingford: 15  
To Nenagh: 65  
To Rathkeale: 68  
To Lismore: 98  
To Youghal: 29  
To Enniscorthy: 129  
To Kilcullen: 87  
To Greystones: 73  
To Balbriggan: 75  
To Drogheda: 23  
To Virginia: 63  
To Carrick-on-Shannon: 86  
To Swinford: 63  
To Westport: 44  
To Headford: 53  
To Oranmore: 32  
To Athlone: 78

Q2. Total Distance travelled is **1208** km.

Q3. Most popular 152-registered car:

From the site [www.simi.ie](http://www.simi.ie) the tab BeepBeep Stats brings the search to [www.beepbeep.ie/stats](http://www.beepbeep.ie/stats). Using the year 2015 and Months from July to December the relevant result may be found.

The most popular 152-registered car was the **VW Golf**

**From the site <http://www.volkswagen.ie/en.html> select Models/Golf/Brochures and Prices to find where the Golf Product & Price Guide may be accessed or downloaded.**

**Specifications for Petrol car: 1.4 litre, 150hp engine; 5-door; Manual:**

From the Listing '*Effective from 28 October, 2015*' or the listing '*Effective from 1 February, 2016*' this is item No. 36 on the list:

5G14PX Golf HL BMT ACT 1.4 TSI 5DR 150 HP M6F Highline Petrol 115 (CO<sub>2</sub>)

**Specifications for Diesel car: 1.6 litre, 90hp engine; 5-door Manual:**

This is item No. 7 on the same list:

5G122V Golf TL BMT 1.6 TDI 5DR 90HP M5F Trendline Diesel 101 (CO<sub>2</sub>)

**Q4. Petrol usage:**

The figures for petrol usage are given on the Technical Data (pages 19, 20 of the specifications).

Under Environmental Information for Manual gearbox Combined driving, 1.4 TSI 150HP:  
4.8 litres per 100km

Petrol usage: 1208km @ 4.8 litres/100km = **57.984 litres**

**Q5. Diesel usage:**

The figures for diesel usage are given on the Technical Data (pages 21,22 of the specifications)

Under Environmental Information for Manual gearbox Combined driving, 1.6 TDI 90HP:  
3.8 litres per 100km

Diesel usage: 1208km @ 3.8 litres/100km = **45.904 litres**

**Q6. Difference in costs:**

***Take an example:***

Let the price of the diesel be €1. This implies the petrol costs €1.102.

Using these values the cost of the trip for the diesel car is €45.904.

The cost of the petrol is  $57.984 \times 1.102 = €63.898368$ .

The difference is  $€(63.898368 - 45.904) = €17.994368 = €18.00$  rounded to the nearest 5c.

We note that the difference is not constant since it depends on the price of fuel.

A mathematical model is required.

Let the price of diesel be €x per litre => the price of petrol is €(x+0.102) per litre.

The cost of diesel is €45.904(x) and the cost of petrol is €57.984(x + 0.102).

Difference is  $€(57.984x + 5.914368 - 45.904x)$

Difference is **€(12.08x + 5.914368), where €x is the cost of diesel per litre.**

**OR**

Let the price of petrol be €y per litre => the price of diesel is €(y-0.102)

The cost of diesel is €(45.904(y-0.102)) and the cost of petrol is €57.984(y).

The difference is  $€(57.984y - 45.904(y - 0.102))$  which is  $€(57.984y - 45.904y + 4.682208)$

Difference is **12.08y + 4.682208, where y is the cost of petrol per litre .**

**Q7. CO<sub>2</sub> Emissions:**

The specifications for the models identified in Section 3 above are 101 g/km for diesel and 115 g/km for petrol. The difference is 14 g/km in favour of diesel.

NOTE: On the Technical Data pages the CO<sub>2</sub> emissions figure for diesel is given as 98 g/km while the figure for petrol is 112 g/km. (These are also the figures listed for the 3-door model of the same specification.) However, the difference is also 14 g/km in favour of diesel.

Difference in emissions is 14 g/km => for the journey the difference is  $1208 \times 14 = 16912\text{g}$  in favour of the diesel model.