

Smoking

Now that cigarette smoking has been clearly tied to lung cancer, researchers are focusing on possible links to other diseases. The data below show annual rates of cigarette consumption and deaths from coronary heart disease for several nations. Some public health officials are urging that the United States adopt a national goal of cutting cigarette consumption in half over the next decade.

Examine these data and write a report. In your report you should:

- include appropriate graphs and statistics;
- describe the association between cigarette smoking and coronary heart disease;
- create a linear model;
- evaluate the strength and appropriateness of your model;
- interpret the slope and y -intercept of the line;
- use your model to estimate the potential benefits of reaching the “national goal” proposed for the United States.

Country	Cigarette Consumption (per adult per year)	CHD Mortality (Deaths per 100,000)
Australia	3220	238
Austria	1770	182
Belgium	1700	118
Canada	3350	212
Denmark	1500	145
Finland	2160	233
France	1410	60
Germany	1890	150
Greece	1800	41
Iceland	2290	111
Ireland	2770	187
Italy	1510	114
Mexico	1680	32
Netherlands	1810	125
New Zealand	3220	212
Norway	1090	136
Spain	1200	44
Sweden	1270	127
Switzerland	2780	125
United Kingdom	2790	194
USA	3900	257

Data Source: *American Journal of Public Health*, as cited in *Exploring Data*, Landwehr & Watkins, 1986.

	Components	Comments
Think	Demonstrates clear understanding of correlation, regression, prediction, and the concept of a linear model.	
Show	Visual: The scatterplot... <ul style="list-style-type: none"> ○ has correct explanatory/response ○ is accurate and clearly labeled ○ shows the regression line Numerical: The analysis... <ul style="list-style-type: none"> ○ has correct r and r-squared ○ has correct slope and y-intercept ○ uses the proper notation 	
Tell	Verbal: <i>All interpretations must be in context and must distinguish between the data and the model.</i> The Association <ul style="list-style-type: none"> ○ Discusses direction ○ Verifies linearity w/residuals plot ○ Describes strength w/correlation ○ Notes unusual points The Statistics - Interprets... <ul style="list-style-type: none"> ○ r-sq in context ○ slope, in context (as model) ○ y-intercept, in context (as model) The Prediction <ul style="list-style-type: none"> ○ Makes correct prediction in context ○ Clearly indicates it's a model ○ Avoids suggesting cause & effect 	

Components are scored as **Essentially correct**, **Partially correct**, or **Incorrect**

1: Graphs and Statistics: Scatterplot, numerical values, and notation

- E – Each category has all 3 requirements correct
- P – Each category has at least 2 of the requirements correct
- I – Too many errors in graph, statistics, or notation

2: Association: positive (in context), linear (w/residuals), strength (correlation), outliers

- E – All 4 requirements
- P – 2 or 3 requirements
- I – None or 1 of the requirements

3: Interpretation: r -sq, slope, y -intercept, in context, in terms of the model (not reality)

- E – All 5 requirements
- P – 3 or 4 requirements
- I – Fewer than 3 requirements

4: Prediction: correct prediction, in context, model-based, without implying causation

- E – All 4 requirements
- P – 2 or 3 requirements
- I – None or 1 of the requirements

Scoring

- E's count 1 point, P's are 1/2
- AP score = sum of 4 components; rounding based on quality of partially correct components
- Grade: A = 4, B = 3, etc. +/- based on rounding (Ex: 3.5 rounded to 3 is B+)

Name _____ AP Score _____ Grade _____