Name:

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| **SNC2D** | Cancer Activity |
| **Biology** |

# Part A: Who’s Stubbing Out?

Physicians for a Smoke-Free Canada call smoking “the leading cause of preventable death and illness in Canada” and “the most pressing health concern in our country.” The organization says Ontario’s health care costs due to tobacco use are enormous. For example, the cost of hospitalization due to active and passive (second-hand) smoking is more than $800 million a year. The cost of prescription drugs needed as a result of smoking is more than $500 million a year. Smoking has been clearly linked to diseases such as lung cancer, emphysema and heart disease.

For years, dozens of public health initiatives have targeted smoking-related diseases. These initiatives have included four strategic directions:

* *Protection:* reducing the number of Canadians exposed to second-hand smoke

**Prevalence of Smoking in Ontario   
(percentage of the population from 1999 to 2005)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Age** | **1999** | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** |
| **Total** |  |  |  |  |  |  |  |
| 15-19 | 25 | 25 | 19 | 19 | 13 | 16 | 17 |
| 20-24 | 34 | 28 | 31 | 29 | 29 | 21 | 24 |
| 25-44 | 29 | 28 | 21 | 24 | 22 | 22 | 26 |
| 45+ | 16 | 17 | 17 | 14 | 14 | 11 | 12 |
| **Male** |  |  |  |  |  |  |  |
| 15-24 | 32 | 27 | 26 | 25 | 22 | 21 | 23 |
| 25+ | 24 | 25 | 23 | 21 | 22 | 22 | 23 |
| **Female** |  |  |  |  |  |  |  |
| 15-24 | 27 | 26 | 24 | 23 | 20 | 16 | 18 |
| 25+ | 20 | 20 | 15 | 17 | 14 | 10 | 14 |

* *Cessation:* supporting and encouraging smokers to quit
* *Prevention:* preventing young people from taking up smoking
* *Harm reduction:* mandating changes to tobacco products to reduce their hazards

Specific initiatives have included legislation, media campaigns, pamphlets, posters, support groups, website support, toll-free help lines, and other measures. Are the initiatives successful?

**Question**

Are rates of smoking decreasing?

**Organize the Data**

1. Draw a bar graph for the data for each age group in the total population for the years 1999 to 2005.
2. Draw a bar graph to compare the percentage of smokers among males and females for ages 15 to 24 for the years 1999 to 2005.
3. Draw a bar graph to compare the percentage of smokers among males and females for ages 25 and above for the years 1999 to 2005.

**Analyze and Interpret**

1. Were males or females of ages 15 to 24 more likely to smoke in 1999 or in 2005?
2. Does it appear that campaigns to reduce smoking over the years 1999 to 2005 were successful? What assumptions do you have to make in order to draw this conclusion?
3. Would you say that the change in smoking rates during this time period was major or minor? Explain your answer.
4. Is there any evidence from the data that public health initiatives have targeted one group more than another? Explain.

# Part B: Does the Patient Have Cancer?

A physician supplied your laboratory with two samples of the same type of cells: one is normal, the other is from a patient who may have a tumour. You were asked to culture the cells, record the cells’ rates of division, and report back on any abnormalities. Your results are shown in the table.

**Number of Cells in Samples over Time**

|  |  |  |
| --- | --- | --- |
| **Time (days)** | **Normal**  **Cells** | **Patient’s Sample** |
| 15 | 2 | 2 |
| 30 | 4 | 6 |
| 45 | 8 | 10 |
| 60 | 16 | 30 |
| 75 | 32 | 92 |
| 90 | 64 | 180 |

**Question**

What will you report back to the physician who requested the test?

**Organize the Data**

Draw a line graph showing the rate of cell division of normal cells and the patient’s cells.   
Put time on the x-axis and population size on the y-axis.

**Analyze and Interpret**

1. Compare the rates of division in the patient sample and the normal sample. How would you interpret the graph?
2. All cells, whether they are normal or cancerous, need energy. Cell division actually requires more energy than many other cell activities. Imagine that each cell in your sample needs two units of energy to divide.
   1. Compare the amount of energy used by the cells in each sample at 90 days.
   2. How might this energy requirement affect an individual who has a cancerous tumour?

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| **SNC2D** | Cancer Activity – Evaluation |
| **Biology** |

\*Criteria for evaluating graphs: titles, scales/spacing, layout, accuracy, organization.

**Part A: Who’s Stubbing Out?**

1. Bar Graph of Total Population [\_\_\_\_\_/5 C]
2. Bar Graph of 15-24 by Gender [\_\_\_\_\_/5 C]
3. Bar Graph of 25+ by Gender [\_\_\_\_\_/5 C]
4. 1999 or 2005 [\_\_\_\_\_/1 A]
5. Campaign successful? [\_\_\_\_\_/2 A]
6. Major/minor? [\_\_\_\_\_/2 A]
7. One group targeted? [\_\_\_\_\_/2 A]

**Part B: Does the Patient Have Cancer?**

Line Graphs of Cell Division [\_\_\_\_\_/5 C]

1. Rates of division [\_\_\_\_\_/2 A]

2.a) Energy use [\_\_\_\_\_/3 A]

2.b)Affect of energy need [\_\_\_\_\_/2 A]