

# EXPERIMENTS

to determine the effects of smoking on the lungs



courtesy of:

SASKATCHEWAN LUNG ASSOCIATION  
1231 8th Street East  
Saskatoon, Saskatchewan  
S7H 0S5

(306) 343-9511 or 1-800-667-LUNG



## EXPERIMENT: Demonstration of the effect of smoking on the pulse rate.



### MATERIALS:

- wrist watch or stop watch
- smoker
- cigarette
- partner

### METHOD:

- Read this instruction sheet. Answer the pre-experiment questions on the next page. Make sure the smoker does not do any activities that would speed up his/her heart rate during this experiment.
- Take the pulse rate of the smoker. Take his/her pulse rate 2-3 times for accuracy. Enter this information in column E of the data chart.
- Decide who will take the pulse and who will time/record the pulse. Get ready to take the smoker's pulse for 15 seconds, once every minute. You will do this for 20 minutes. Begin the stopwatch as the cigarette is lit. After the smoker has smoked for the first minute, begin taking the pulse. Count the heartbeats aloud. Your partner will tell you when the 15 seconds are up (record in column B) and when to take the next pulse.
- Continue for 20 minutes if pulse rate has not returned to normal (D=E). Use only one cigarette. Make a note of when the cigarette was completely smoked.
- Thank your guest for his/her patience, and ask them how many cigarettes they smoke in one day. Tell them to stick around for the results. Complete the data chart.
- Plot a graph: Beats/minute vs. time (in minutes) on the sheet provided  
x axis: 0 to time required for pulse rate to return to normal, in one-minute intervals  
y axis: 0 to maximum number of beats/minute
- Record the answers of the following questions on the sheet provided. Calculate the extra beats one cigarette caused the smoker by adding all the items of column F. Calculate the extra beats caused per pack and the extra beats caused in a year.
- Smoking is BAD NEWS for the lungs but it also forces the heart to work much harder. Since with each beat, the heart pumps approximately 70 ml of blood, calculate the extra volume of blood that is pumped by the heart induced by smoking 1 cigarette/1 pack/one year of cigarettes.

### OBSERVATION:

- Compare data collected by other classmates.  
What may cause differences in the curves of your graphs?

# EXPERIMENT:

## Demonstration of the effect of smoking on the pulse rate

POST EXPERIMENT

Graph: Beats/minute vs. Time (in minutes)

**Per cigarette**

Number of extra beats  
(total of column F)

**Per pack**

Number of extra beats  
(1 pack = 25 cigarettes)

**Per year**

Number of extra beats  
How many cigarettes do  
you smoke in a day?  
(1 year = 365 days)

**Per cigarette**

Extra blood pumped  
(1 beat = 70 ml of blood)

**Per pack**

Extra blood pumped  
(1 beat = 70 ml of blood)

**Per year**

Extra blood pumped  
(1 beat = 70 ml of blood)

## DATA CHART:

Demonstration of the effect of smoking on the pulse rate

| A                  | B                           | C                                       | D                    | E                   | F                   |
|--------------------|-----------------------------|---|----------------------|---------------------|---------------------|
| ELAPSED TIME (MIN) | BEATS COUNTED IN 15 SECONDS | MULTIPLYING FACTOR TO GIVE BEATS/MINUTE | BEATS/MINUTE (B X C) | NORMAL BEATS/MINUTE | EXTRA BEATS (D - E) |
| 1                  |                             | 4                                       |                      |                     |                     |
| 2                  |                             | 4                                       |                      |                     |                     |
| 3                  |                             | 4                                       |                      |                     |                     |
| 4                  |                             | 4                                       |                      |                     |                     |
| 5                  |                             | 4                                       |                      |                     |                     |
| 6                  |                             | 4                                       |                      |                     |                     |
| 7                  |                             | 4                                       |                      |                     |                     |
| 8                  |                             | 4                                       |                      |                     |                     |
| 9                  |                             | 4                                       |                      |                     |                     |
| 10                 |                             | 4                                       |                      |                     |                     |
| 11                 |                             | 4                                       |                      |                     |                     |
| 12                 |                             | 4                                       |                      |                     |                     |
| 13                 |                             | 4                                       |                      |                     |                     |
| 14                 |                             | 4                                       |                      |                     |                     |
| 15                 |                             | 4                                       |                      |                     |                     |
| 16                 |                             | 4                                       |                      |                     |                     |
| 17                 |                             | 4                                       |                      |                     |                     |
| 18                 |                             | 4                                       |                      |                     |                     |
| 19                 |                             | 4                                       |                      |                     |                     |
| 20                 |                             | 4                                       |                      |                     |                     |

" F " TOTAL =