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| **LESSON PLAN Ref:** | **MASK DANGERS** | **Course Ref:** | **all teachers USA** |

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| **Subject / Course:** | **BREATHING (FACTS FINDING)** | | |
| **Topic:** | **NORMAL VS RESTRICTED BREATHING** | | |
| **Lesson Title:** | **DO MASKS IMPAIR BREATHING?** | | |
| **Level:** |  | **Lesson Duration:** | **10 -50 minutes** |

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| **Lesson Objectives:** |
| Determine normal breathing volumes and rates for children.  Investigate pertinent facts related to flow volumes and rates in common facial masks.  Determine what size the possible particulates (viruses and bacteria) and gases are in the air we breathe.  Determine what fits through pores in a mask and what doesn't.  Determine what factors change, alter or impair breathing.  Investigate physiological effects of impaired breathing or reduced airflow using simple math. |

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| **Summary of Tasks / Actions:** |
| Answer these Questions:  BREATHING: 1) How many breaths do adults breathe in one minute? 2) How many breaths do children breathe in one minute? 3) What is the Tidal Volume (TV) of a single human breath and in one minute? 4) How many liters does a child breathe in one minute? 5) How many liters does a child breathe in one day? 6) Do humans normally breathe through only the nostrils?  MASKS: 1) What is the number of pores per inch (ppi) in an N95 mask? in a cloth mask? 2) What are N95 masks made of? 3) What is the flow rate of two layers of Polypropylene fiber? 4) What is the flow rate per inch of your mask?  PARTICULATES & MOLECULES In AIR: 1) What is the size and order of magnitude of Oxygen and Carbon Dioxide molecules? 2) What is the median size and order of magnitude of a SARS COV-2 virus? 3) What is the average size and order of magnitide of bacteria?  BREATHING IMPAIRMENTS: 1) What factors alter breathing and the volume of oxygen? 2) What instinctive reaction to your breathing rate happens if you place your attention on breathing? 3) What other factors might impair breathing while masked (i.e. particulate build up) ?  PHYSIOLOGICAL EFFECTS OF BREATHING 1) How long can you hold your breath safely? 2) How long can you stay underwater without breathing? 3) What response does your body have when you are underwater longer than a minute? 4) If you decrease your breathing (number of breaths) by 15%, 30% or 50% each minute, how many liters of oxygen less per hour will you take and how many liters less C02 will you expel? 5) What causes normal breathing to slow? |

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| **Materials / Equipment:** |
| Oxygen ~ 292 picometers 10^-12;  CO2 ~232 picometers 10^-12  N95 pore size ~200 nanometers 10 ^-9  SARS COV-2 ~100 nanometers 10^-9  BACTERIA 1-100 micrometers 10^-6  Tidal Volume (TV) of nornal adult breath is 500mL  Adult breaths/minute ~12 breaths |

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| **References:** |
| https://covid19criticalcare.com/wp-content/uploads/2020/12/ FLCCC-Protocols-%E2%80%93-A-Guide-to-the-Management-of-COVID-19.pdf (see Figure 4)  e-breathing.com  https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7161499/  https://www.webmd.com/a-to-z-guides/is-it-safe-to-hold-your-breath  https://multimedia.3m.com/mws/media/1425070O/3m-particulate-respirator-8210-n95-technical-specifications.pdf  https://www.pall.com/content/dam/pall/microelectronics/literature-library/non-gated/PFLT008ENc\_160701.pdf  http://www.fao.org/3/m2845e/m2845e00.htm  https://www.engineeringtoolbox.com/met-metabolic-rate-d\_733.html |

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| **Take Home Tasks:** |
| How many metabolic functions occur in your cells every minute? in every second?  What effect does lower Oxygen have on brain, kidney and liver function?  What if the flow rate of the masks decreases to 50%? (Does moist air and bacteria reduce the pores thus reduce the flow rate of masks?) |