

SI A&P - Full Discipline Demo - Digital

Physiology of the Respiratory System - No Materials

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI A&P - Full Discipline Demo - Digital
Course	SI A&P - Full Discipline Demo - Digital
Instructor	Sales SI Demo

Test Your Knowledge

Match each term with the best description.

❖ Expiration	A measure of the thermodynamic activity of an individual gas in a mixture of gases	1
❖ External respiration	The movement of oxygen from the capillaries into body cells and of carbon dioxide from the body cells into the capillaries	2
❖ Inspiration	Air movement into the alveoli of the lungs	3
❖ Internal respiration	Expulsion of air out of the lungs	4
❖ Partial pressure	The movement of oxygen from the alveoli into the pulmonary capillaries and carbon dioxide from the pulmonary capillaries into the alveoli	5

Correct answers:

- 1 Partial pressure 2 Internal respiration 3 Inspiration 4 Expiration
5 External respiration

Categorize each statement as true or false.

⚡ Common asthma triggers include exercise, pollution, and allergens.	
⚡ Spirometry is a common pulmonary function test that measures both the volume and speed of air exhaled from the lungs.	
⚡ Emphysema and chronic bronchitis are the most frequent causes of asthma.	
⚡ Spirometry measurements are only taken at rest.	
True	False
1	2

Correct answers:

1 Common asthma triggers include exercise, pollution, and allergens.

Spirometry is a common pulmonary function test that measures both the volume and speed of air exhaled from the lungs.

2

Emphysema and chronic bronchitis are the most frequent causes of asthma.

Spirometry measurements are only taken at rest.

Exploration

Gases inherently diffuse from areas of a high partial pressure to areas of low partial pressure.

- ☒ True
- ☐ False



_____ is an umbrella term for any progressive, chronic respiratory disease.

- ☐ Asthma
- ☐ Bronchitis
- ☐ Emphysema
- ☒ COPD



The _____ represents the percentage of the patient's lung capacity they are able to exhale in one second.

- ☐ tidal volume
- ☐ minute ventilation
- ☒ FEV₁/FVC ratio
- ☐ forced vital capacity



Exercise 1

How are FVC and FEV₁ values impacted by exercise in healthy individuals? Include the definition for each value in your explanation.

FVC and FEV₁ remain relatively unchanged after exercise in healthy individuals. The FVC is the amount of air a patient can forcibly breathe out after breathing in as deeply as possible, and the FEV₁ is the amount of air a patient can force out of their lungs in one second. From the values obtained through the forced expiratory volume measurements, predictions can be made for the volume of air that the lungs can maximally hold.

How is asthma detected from the results of spirometry testing? Which of the four patient graphs indicated symptoms of asthma?

Asthma results in bronchoconstriction in response to a trigger, such as exercise. Spirometry results post-exercise that indicate reduced lung volume and air flow compared to results pre-exercise that appear normal suggest the patient is suffering from asthma. Patient 2 in this exercise produced graphs consistent with asthma.

How is COPD detected from the results of spirometry testing? Which of the four patient graphs indicated symptoms of COPD?

COPD includes conditions such as chronic bronchitis and emphysema that result in reduced pulmonary function both pre and post exercise in the absence of triggers. Unlike asthma, COPD symptoms do not improve with the administration of a bronchodilator. Patient C testing results are indicative of COPD.

Data Table 1: Patient A Spirometry Data
(SAMPLE ANSWER BELOW)

Measurement	Predicted Values	Resting Value	Exercise Value
FVC	4.93-5.91	5.319	5.012
FEV ₁	4.88	4.63	4.02
FEV ₁ /FVC	83.3%	87%	80.2%

Panel 1: Patient A Spirometry Graph Observations
(SAMPLE ANSWER BELOW)

Both spirometry graphs display normal curves for pre and post exercise lung pulmonary function.

Data Table 2: Patient B Spirometry Data
(SAMPLE ANSWER BELOW)

Measurement	Predicted Values	Resting Value	Exercise Value
FVC	2.16-2.74	2.69	2.48
FEV ₁	2.45	2.48	0.86
FEV ₁ /FVC	89.7%	92.3%	34.7%

Panel 2: Patient B Spirometry Graph Observations
(SAMPLE ANSWER BELOW)

Spirometry graphs before exercise displays a normal curve, but spirometry graphs after exercise has a smaller peak and a much more convex curve indicating reduced pulmonary function.

Data Table 3: Patient C Spirometry Data
(SAMPLE ANSWER BELOW)

Measurement	Predicted Values	Resting Value	Exercise Value
FVC	2.52-3.17	2.02	2.06

FEV ₁	2.47	1.06	1.09
FEV ₁ /FVC	78.9%	52.5%	52.3%

Panel 3: Patient C Spirometry Graph Observations
(SAMPLE ANSWER BELOW)

Both spirometry graphs display a low peak and a convex curve pre and post inhaler application.

Data Table 4: Patient D Spirometry Data
(SAMPLE ANSWER BELOW)

Measurement	Predicted Values	Resting Value	Exercise Value
FVC	2.29-2.97	2.89	2.82
FEV ₁	2.68	2.48	2.40
FEV ₁ /FVC	88.6%	85.8%	85.1%

Panel 4: Patient D Spirometry Graph Observations
(SAMPLE ANSWER BELOW)

Both spirometry graphs display a normal curve for pre and post exercise pulmonary function.

Competency Review

Partial pressure is determined by the ____.

- ☐ moles of gas
- ☐ container volume
- ☐ temperature
- ☒ All of the above



____ is the process of moving air out of the lungs.

- ☐ Internal respiration
- ☐ Inspiration
- ☒ Expiration
- ☐ Inhalation



Symptoms of asthma are not present at all times.

- ☒ True ✓
- ☐ False

Symptoms of asthma include ____.

- ☐ shortness of breath
- ☐ coughing
- ☐ wheezing
- ☒ All of the above ✓

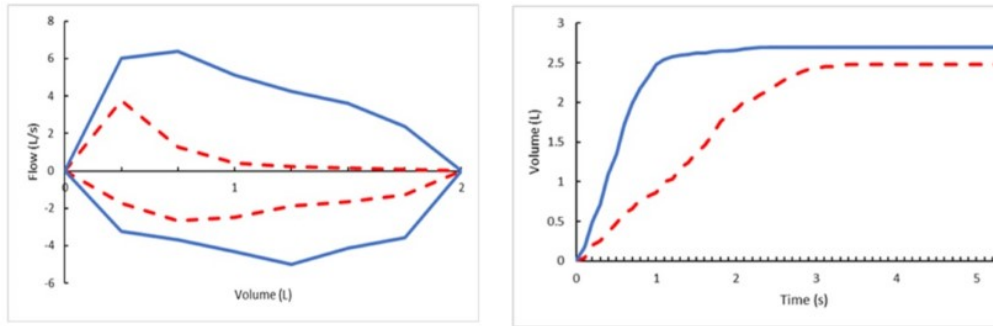
Spirometry measurements are typically taken at rest and immediately after exercise.

- ☒ True ✓
- ☐ False

A FEV₁/FVC ratio that is lower than ____% indicates a blockage of the airway.

- ☐ 100
- ☒ 70 ✓
- ☐ 50
- ☐ 30

The spirometry data and graphs below are indicative of a healthy patient.



	Predicted Values	Resting Value	Exercise Value
FVC	2.16-2.74	2.69	2.48
FEV ₁	2.45	2.48	0.86
FEV ₁ /FVC	89.7%	92.3%	34.7%

☐ True

☐ False



Extension Questions

Patients should avoid eating a large meal 2 hours prior to performing a spirometry test. Apply your knowledge of the respiratory cycle and spirometry testing to explain how an overextended stomach could influence spirometry test results. (SAMPLE ANSWER BELOW)

An overextended stomach would leave little room for the diaphragm to contract, which would limit how much the pleural cavity could expand to allow for proper inhalation/inflation of the lungs. Results of a spirometry test would likely indicate lower than actual air volume readings.