

Math Strand 4: Measurement

CLE: 4.2 Apply appropriate techniques, tools, and formulas to determine measurements.

Health Profession: Respiratory Therapist

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References:

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Objectives:

At the completion of this presentation the high school student will be able to:

1. State two reasons why a Respiratory Therapist would want to know how much oxygen is left in the tank.
2. Show how to figure the amount of oxygen remaining in the oxygen tank.
3. Identify the importance of this information to a Respiratory Therapist.

Background Summary of Information as Related to Respiratory Therapy and CLE

Job Description:

Respiratory Therapists are a vital part of any acute care setting. Therapists assess and treat patients who suffer from respiratory and cardiovascular problems. There are numerous tasks that the therapist are trained to perform. Some of the tasks they perform are maintaining a patient on mechanical ventilation, administering breathing treatments, drawing blood gases to measure acid/base balance, and pulmonary function tests. See additional information included at the end of this packet.

Tank Factors:

Define as: A constant expressed in liters per psi (pounds per square inch) that is used to determine the duration of oxygen cylinder content.

•D-Cylinder = 0.16 L/psi

•E-Cylinder = 0.28 L/psi

•M-Cylinder = 1.37 L/psi

•H-Cylinder = 3.14 L/psi

Scenario:

Frank Jones a 68 year old man who wears oxygen and requires 3 liters of oxygen per minute. Frank is at Pulmonary Rehab working with the Respiratory Therapist Jenna. Frank and Jenna are walking in the hall and they notice that Frank's E oxygen tank has 250 psi of oxygen left. How long does Frank have until his tank is out of oxygen?

$250 \text{ psi} \times 0.28 = 70 \text{ Liters remaining}$

$70 \text{ liters} / 3 \text{ lpm} = 23.33 \text{ minutes}$

Answer: 23.33 minutes

OR

Andrea, a respiratory therapist, is assisting to transport a patient on oxygen to another hospital via ambulance. The patient requires the use of oxygen during the transport at 15 liters per minutes. If the H cylinder tank has 1500 psi and the duration of the trip is 2 hour and 30 minutes will there be enough oxygen in the tank to make the trip?

$1500 \text{ psi} \times 3.14 = 4710 \text{ Liters remaining}$

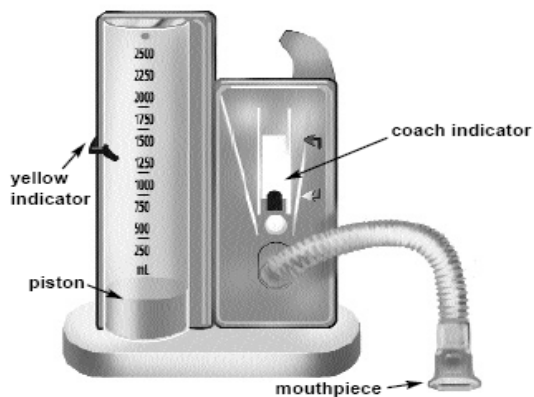
$4710 \text{ L} / 15 \text{ LPM} = 314 \text{ minutes}$

$2(60) + 30 = 150 \text{ minutes}$

Answer: Yes, there is enough oxygen to make the trip.

Activities

- Have students take turns using an incentive spirometer to measure their lung capacity.
- Use individual adapter tips or antimicrobial wipes for each student to prevent the spread of germs.



How to use an Incentive Spirometer

- 1. Sit up as straight as possible.**
- 2. Hold the incentive spirometer upright.**
- 3. Breathe out normally.**
- 4. Put the mouthpiece in your mouth and tightly seal your lips around it.**
- 5. Breathe in slowly and deeply. This will raise the yellow piston to the top of the column. The yellow indicator should be in the little blue box.**
- 6. Hold your breath as long as possible (at least five seconds), allowing the piston to fall to the bottom of the column.**
- 7. Position the yellow indicator on the outside of the column to mark your best effort. This should be your goal to reach with each repetition.**

OR

See next Page for Worksheet

ANSWER KEY

TANK FACTOR WORKSHEET

Name _____ Answer Key _____

Directions: Use the following Tank Factors to determine how long each tank can last.

Tank Factors

•D-Cylinder = 0.16 L/psi

•E-Cylinder = 0.28 L/psi

•M-Cylinder = 1.37 L/psi

•H-Cylinder = 3.14 L/psi

1. An E-Cylinder has 100 psi remaining. The patient is using 4 liters per minute of oxygen.

$$100 \text{ psi} \times 0.28 = 28$$

$$28 / 4 = 7 \text{ minutes}$$

Answer: 7 minutes

2. A H-Cylinder has 900 psi remaining. The patient is using 15 liters per minute of oxygen.

$$900 \text{ psi} \times 3.14 = 2826$$

$$2826 / 15 = 188.4$$

Answer: 188.4 minutes or 3 hours 8 minutes

3. A D-Cylinder has 150 psi remaining. The patient is using 2 liters per minute of oxygen.

$$150 \text{ psi} \times 0.16 = 24$$

$$24 / 2 = 12 \text{ minutes}$$

Answer: 12 minutes

4. A M-Cylinder has 1500 psi remaining. The patient is using 10 liters per minutes of oxygen.

$$1500 \text{ psi} \times 1.37 = 2055$$

$$2055 / 10 = 205.5 \text{ minutes}$$

Answer: 205.5 minutes or 3 hours 25 minutes

**Metropolitan Community College
Respiratory Therapy Program, Kansas City**

MCC Degrees and Certificates: Health Careers

Respiratory Care

Associate in Applied Science

Location:

This is a cooperative program with Johnson County Community College (JCCC). Some required prerequisite courses are available at MCC-Penn Valley, while others targeting the clinic year are held only at Johnson County Community College. Electives and general education courses are also available at other MCC campuses.

Contact:

**Respiratory Therapy Program office,
Johnson County Community College
913-469-2583.**

[JCCC RSPT Department Web site.](#)

Overview:

How long does it take to earn a degree?

If you're a full-time student with no prior college course work, it will take you two years to complete the Associate of Applied Science degree in respiratory care. The program is offered in cooperation with JCCC. Missouri students attend classes at MCC-Penn Valley or another MCC school for the first year and then transfer to JCCC for their second year. This allows Missouri residents to enroll without paying costly out-of-state tuition fees. The program includes 75 credit hours of classes, hands-on training and clinical field experience.

How much money can I make?

With a two-year degree as a respiratory therapist, you can earn an annual starting salary of \$30,000 to \$35,000. Your earnings will grow along with your experience.

What's the job outlook for someone in this field?

The job market for respiratory therapists continues to be very good throughout the Kansas City area. The MCC Research department maintains a publication detailing the [career outlook for Respiratory Therapist](#) (PDF) program graduates.

What about opportunities for a four-year degree?

A two-year degree is now required for a career in respiratory therapy. To advance in the field, we encourage our graduates to pursue four-year degrees in respiratory care. These programs are offered by both the University of Missouri-Columbia and the University of Kansas.

Where can I work?

Respiratory therapists primarily work in hospitals, but you'll also find them in home health care, physician's offices, outpatient clinics, and rehabilitation and skilled nursing facilities.

What's the learning environment like at MCC-Penn Valley and JCCC?

We provide a very hands-on, interactive learning environment that is both supportive and challenging. At both campuses, we believe in a high-tech, yet holistic approach to health care.

What kinds of training will I receive?

Students learn in the classroom and practice their career skills in our laboratories and during clinical rotations at several area hospitals and health care facilities, such as the University of Kansas Medical Center, St. Luke's, Children's Mercy and several H.C.A. medical centers. After completing the program, our graduates are prepared to take both the entry-level and advanced credentialing exams, earning the Registered Respiratory Therapist (RRT) credential.

Is your program accredited?

We meet the highest standards in the field of respiratory therapy. Our program is accredited by the Commission on Accreditation of Allied Health Education Programs in collaboration with the Committee on Accreditation for Respiratory Care.

Respiratory Care

Offered at Johnson County Community College. Coordinated at MCC-Penn Valley

A.A.S. Respiratory Care 75-78 Credits

This program, offered under the auspices of Johnson County Community College (JCCC), leads to an Associate in Applied Science degree and qualifies the student for the National Board for Respiratory Care examination process. Additional program information may be acquired from the counseling office at MCC-Penn Valley and from the academic director at JCCC. Students must be accepted into the program by both MCC and JCCC. The student is awarded the degree from JCCC upon successful completion of all requirements. It is the student's responsibility to check with an MCC counselor or advisor before enrollment.

Eligibility

To be considered for admission to the program, a student must complete all required college courses in English, mathematics, and science with a minimum grade of C and must have minimum overall college GPA of 2.0.

Admission to the Program

The number of MCC students admitted to the program is limited. In order to

be certain that they will be considered for admission to the class, which begins its specialized course work in June, an MCC student must complete the application process by the previous October 15. Applications are not considered until all required material has been submitted. If openings remain for MCC students after the initial applications have been reviewed, students who have missed the deadline will be considered if their applications are completed by February 15. Further information is available in the counseling office at MCC-Penn Valley and from the academic director at JCCC.

Selection of students for the program is determined by the ranking of applications according to the interview score, the overall college GPA, and the GPA in prerequisite courses. Further information is available from the Director of the Respiratory Care Program at JCCC.

Note: All English, mathematics, and science courses must be completed successfully before the student is eligible for the clinical courses at JCCC. Students may make application, however, if coursework will be completed by the clinical year.

A.A.S. Respiratory Care

600301 - Revised: 8/2007

Specific Program Requirements <i>Must be taken at one of the MCC campuses</i>	Credits	Semester Taken	Prerequisites
BIOL 110 Human Anatomy [^]	5		
BIOL 208 Microbiology [^]	5		BIOL 100 or CHEM 105 or higher, plus one of the following courses: BIOL 101, 104, 106, 108, 109, or 110.
BIOL 210 Human Physiology [^]	5		BIOL 110, either BIOL 100 or CHEM 105
CHEM 105 Introductory Chemistry [^]	5		
ENGL 101 Composition and Reading I [^]	3		ENGL 30 or appropriate placement test score
MATH 110 Intermediate Algebra or MATH 120 College Algebra or higher [^]	3		MATH 40 or 43 (MATH 110) MATH 110 (MATH 120)
Social Science/Economics Elective	3		
Communications Elective	3		See Courses section of this catalog for individual course prerequisites.
Humanities Elective	3		
Specific Program Requirements			
<i>Must be taken at Johnson County Community College</i>			
EMS 121 CPR I Basic Life Support Healthcare Provider	1		
HC 101 Introduction to Health Care Delivery ^{**}	3		
RC 125 Beginning Principles of Respiratory Care [*]	4		
RC 130 Respiratory Care Equipment [*]	4		
RC 135 Cardiopulmonary Medicine I [*]	1		
RC 220 Clinical Cardiopulmonary Physiology [*]	2		
RC 230 Clinical Topics and Procedures I [*]	4		
RC 231 Clinical Topics and Procedures II [*]	4		
RC 233 Respiratory Care of Children [*]	2		
RC 235 Cardiopulmonary Medicine II [*]	2		
RC 236 Cardiopulmonary Medicine III [*]	2		
RC 240 Cardiopulmonary Pharmacology [*]	2		
RC 271 Clinical Practice I [*]	6		
RC 272 Clinical Practice II [*]	6		
Total Credit Hours Required	75-78		

[^] Indicates prerequisite courses, which must be completed prior to the clinic year at Johnson County Community College. The elective courses must be completed for the AAS degree, which establishes eligibility for the National Board for Respiratory Care examinations.

^{**}HC 101 is not a required course for the degree but is strongly encouraged. See the program application packet for details on how this course may be used to meet clinic-year eligibility requirements.

Economic and Social Science Elective must be one of the following: ANTH 100, 110, ECON 110, 210, 211, GEOG 111, 112, HUSC 162, POLS 135, 136, 137, PSYC 140, SOCI 160, 162, 163, 170

Communications Elective must be one of the following: SPDR 100, 102, 103, 133, ENGL 102, 175, BSAD 221

Humanities Elective must be one of the following: ART 108, 150, 151, 159, ENGL 120, 121, 122, 124, 127, 128, 142, 150, 151, 165, 167, 220, 221, 222, 223, FREN 203, HIST 120, 121, 133, 134, 140, HUMN 133, 134, 140, 145, MUSI 108, PHIL 100, 101, 200, 201, 203, SPAN 203, 204, SPDR 114, 128

Non-Degree Related Courses _____

Advisor/Counselor/Evaluator _____ Date _____

_____ Hrs Earned _____ MCC GPA _____ Hrs Enrolled _____ Hrs in Res _____ Hrs Needed

TO GRADUATE THE STUDENT MUST SUCCESSFULLY COMPLETE THE FOLLOWING:

- _____ Apply for Graduation
- _____ Missouri Constitution Requirement
- _____ Raise/Maintain GPA to 2.000
- _____ Additional courses to meet the 15 credit hour residency requirement
- _____ Additional courses to meet total credit hour requirement (including current coursework)
- _____ Any course substitutions/waivers must be approved using an "Student Exception to Graduation" form