

# Quantitative Literacy Assessment Study Guide

*Dear Emory & Henry Student:*

Welcome! We hope that you are settling in to life here on campus and finding it to be an exciting and challenging new home. In an effort to assist you in understanding Emory & Henry's Quantitative Literacy Program and what it means to you we have developed this study guide. You should use this when preparing for the Quantitative literacy Assessment that you will soon take during the fall semester of your freshman year.

## **What is Quantitative Literacy?**

Quantitative Literacy (QL) is the ability to apply mathematical skills when solving real world problems. We feel that in order to perform as professionals and responsible citizens, students must be able to read and understand numerical data that is presented in graphs, tables, and formulas. Students must also be fluent in using mathematical skills and their understanding of the scale of numbers to make decisions or form opinions about the world around them. Emory & Henry is developing a QL program that will present students with the opportunity to develop and strengthen their quantitative skills throughout their college career. Incoming freshmen will encounter QL learning components in their Transitions I course during the fall semester. Students will also encounter QL learning components in courses throughout the curriculum as well as extracurricular lectures and learning opportunities.

## **What is the Quantitative Literacy Assessment and what happens if I don't do well on it?**

The QL Assessment is a test given to all incoming freshmen that will measure quantitative skills, including your ability to read and understand information presented in formulas, tables, and graphs and to solve real world problems that deal with numbers and data. The testing dates will be made available to you by your Transitions I instructors but will generally be scheduled for mid-October. The test has three parts that measure different quantitative skills such as ratios and statistics, logic and finance, and spatial reasoning and number sense. If you do not pass the QL Assessment you will need to enroll in a QL course (QUAN 101 Ratios and Statistics, QUAN 102 Logic and Finance or QUAN 103 Spatial Reasoning and Number Sense) in the spring semester of your freshman year. These 1 credit hour courses will run for approximately 5 weeks and will help students gain the appropriate skills needed to solve quantitative problems they encounter in the future. If you do not do well, the QL Assessment will provide us with information on which QUAN course or courses you need to enroll in. This information will be provided to your advisors prior to course enrollment for the spring semester.

## **Can I prepare for the Quantitative Literacy Assessment?**

You certainly can! This study packet contains review problems that are similar to those that you will see on the test. Short answers are provided for each problem. Complete, worked-out solutions are provided for each problem as well. We suggest that you take your time and work through the practice problems without the use of notes or other external references. Once you have completed the problems you should check your answers and determine which types of problems you need additional help with.

## **Where can I go for extra help or ask questions about the Quantitative Literacy Assessment?**

If you have further questions about the Quantitative literacy Assessment or need extra help reviewing for the assessment please contact Mark Hainsworth, Director of Quantitative Learning, at (276) 944-6828 or Tammy Sheets, Administrative Assistant, at (276) 944-6893.

## **How do I begin preparing for the Quantitative Literacy Assessment?**

We have provided a practice examination on the next several pages followed by answers to the question and detailed worked out solutions. We recommend that you take the test at your leisure without the help of notes or outside sources. You may use a calculator, pencil and scrap paper. Work through the problems slowly and carefully and record the best answer for each of the problems. After you have completed the practice exam check the answers to see which ones you answered incorrectly. Then refer to the written solutions in order to understand the correct procedure. If you continue to have problems please stop by the Quantitative Learning Center (Wiley 214) and ask for assistance.

Good Luck!

## Emory & Henry College

### Practice Quantitative Literacy Assessment

Please read all question completely and choose the best answer that is provided. You may use a calculator while attempting these problems but be aware that during the test you will use a standard scientific calculator that is provided to you by test proctors.

- 1) A market researcher might find a negative relationship (or negative correlation) between which two variables?
  - a. Money spent on advertising aimed at teens and clothing sales to teens.
  - b. Temperature increases in the summer and the volume of ice cream sold.
  - c. An Increase in the unemployment rate and the number of newly built house purchases
  - d. A person's height and a person's weight.
  
- 2) Suppose a restaurant is set up so that there are 6 people per table and they can serve 20 tables per hour. How many people can they serve per hour?
  - a. 3.33 people per hour
  - b. 120 people per hour
  - c. 12 people per hour
  - d. 60 people per hour
  
- 3) If a classroom is filled with 16 males and 5 females what is the percentage of females in the class?
  - a. 0.25
  - b. 0.313%
  - c. 31.3%
  - d. 23.8%
  
- 4) If a business sells 150 television sets in July and then 212 television sets in August what was the percent increase in sales from July to August?
  - a. 50.7%
  - b. 41.3%
  - c. 70.7%
  - d. 25%

- 5) It takes  $\frac{3}{4}$  of a cup of flour to make 6 pancakes. You have many visitors one weekend and determine that you must make 72 pancakes to feed everyone. How many cups of flour will you need?
- 9 cups
  - $1\frac{3}{4}$  cups
  - $4\frac{1}{2}$  cups
  - 6 cups
- 6) If you have a rectangle with a width of 2 ft and a length of 4 ft and you double each side what happens to the area of that rectangle?
- The area doubles.
  - The area triples
  - The area increases by a factor of two.
  - The area increases by a factor of four.
- 7) A 3 in. x 5 in. index card can be covered by how many  $\frac{3}{4}$  in. x 1 in. stamps?
- 3 stamps
  - 18 stamps
  - 15 stamps
  - 20 stamps
- 8) If the average healthy person is advised to walk 10,000 steps per day, and the average step covers about 2 feet, what distance should he or she have walked in a year?
- 7,300,000 feet/ year
  - 3,650,000 feet/ year
  - 1,040,000 feet/ year
  - 700,000 feet/ year

9) If the average healthy person is advised to walk 10,000 steps per day, and the average step covers about 2 feet, what distance in miles should he or she have walked in a week? (1 mile=5280 feet)

- a. 24.05 miles/ week
- b. 3.79 miles/ week
- c. 26.5 miles/ week
- d. 13.25 miles/ week

10) You want to paint a wall that is 8 feet high and 12 feet wide, with no doors or windows. You predict that one gallon of paint will cover approximately 40 square feet. How many quarts of paint will you need to buy?

- a. 3 quarts
- b. 10 quarts
- c. 1 quart
- d. 8 quarts

11) If 40% of a class failed the first test, and 80 percent of those who passed earned less than an A, what percentage of the students earned an A?

- a. 20%
- b. 12%
- c. 60%
- d. 2%

12) Billy Bob's Burger Market offers a combo containing a burger, fries, and large drink for \$5.15. However, you really don't want the fries. You would be better off

- a. Purchasing the burger separately at \$3.00 and the drink separately at \$1.50.
- b. Purchasing the combo anyway because it is cheaper.
- c. It does not matter because both options are the same.

13) You have just purchased a new home in a nice neighborhood in which you hope home values will appreciate. You know that you will be moving back to your parent's town to take over the family business in 5 years.

- a. You would be better off to purchase a 30-year fixed-rate mortgage at 5% because rates have never been so low and are expected to rise.
- b. You would be better off purchasing an adjustable-rate mortgage that is locked in at 4.5% for the first seven years.
- c. You would be better off purchasing an adjustable-rate mortgage at 4.4% that resets to whatever the current market rate is in 2 years.

14) Based on obtaining a new job that is now further from your home, you will be traveling 200 miles per week vs. 100 miles per week before. If you switch from a truck that provides 15 miles per gallon to a new car that provides 40 miles per gallon, assuming that the cost of gas is \$3.00

- a. You will be spending more money with the new commute even after switching to the new car.
- b. You will be spending the same amount of money per week.
- c. You will be spending less per week with the new car and commute vs. the truck and the old commute.

15) If a baby can crawl 30 inches in 3 minutes, how many feet can it crawl in 5 minutes?

- a. 3 feet
- b. 4 feet
- c. 4.2 feet
- d. 5.2 feet

16) If the statement 'Everyone in the freshmen class has at least two roommates' is false, which of the following is true?

- a. Someone in the freshman class only has one roommates
- b. No one in the freshman class has two roommates
- c. Someone in the freshman class doesn't have two roommates
- d. Someone in the freshman class has less than two roommates.

17) If nobody I invited comes to my party, then I'm not going to be happy is logically equivalent to which of the following?

- a. If someone comes to my party then I will be happy.
- b. If I'm happy, then someone came to my party
- c. If everyone I invited comes to my party, then I'll be happy
- d. No one will come to my party unless I am happy

18) In the last poll commissioned before the 2008 election, Obama held a 4 point lead with a margin of error of 3 points calculated at a .95 confidence level. Which of the following is true?

- a. There is a probability of .95 that Obama is going to win
- b. There is a probability of .95 that if this sample is sufficiently representative that the margin of the sample is within 3 points of the true margin.
- c. There is a probability of .95 that Obama's lead is between 1 and 7 points
- d. There is a probability of .95 that the true margin is between a 2point lead for McCain and a 10 point lead for Obama.

19) The escape velocity of the newly designated Pluton Ceres is 1,478 ft/s. About how many km/hr is this? (Remember that there are 1609 m in a mile and 5280 feet in a mile.)

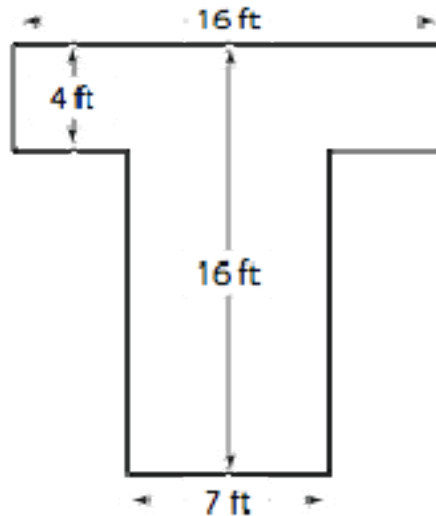
- a. 31,200 km/hr
- b. 1,620 km/hr
- c. 9,700 km/hr
- d. 8,100 km/hr

20) The angle between the two lines shown in the figure below is (in degrees)?



- a.  $80^\circ$
- b.  $120^\circ$
- c.  $160^\circ$
- d.  $135^\circ$

21) Below is a diagram of a wooden platform you need to paint. In order to purchase the correct amount of this paint you need to determine the platform's area.



That area is

- a. 256 sq. ft.
- b. 148 sq. ft.
- c. 176 sq. ft.
- d. 120 sq. ft.

22) You need to cover the top half of a circle (3 feet in radius) with a plastic cover. What's the area of the plastic needed?

- a. 4.50 sq. ft.
- b. 9.42 sq. ft.
- c. 14.1 sq. ft.
- d. 28.3 sq. ft.

23) The artist Christo has decided to cover a small island with a giant white sheet. If that island is roughly rectangular, measures 2200 yd by 1500 yd and the sheet costs \$1.52 per sq. yd, how much will the sheet for this project cost him?

- a. \$5 million
- b. \$7.7 million
- c. \$3.3 million
- d. \$1 million

**STOP!!!**

Check your answers with the key provided on the next page. If you missed any questions try to determine what you did wrong and then look at the problem solutions.

## Quantitative Literacy Assessment Answers

Problem 1:	C	Problem 20:	B
Problem 2:	B	Problem 21:	B
Problem 3:	D	Problem 22:	C
Problem 4:	B	Problem 23:	A
Problem 5:	A		
Problem 6:	D		
Problem 7:	D		
Problem 8:	A		
Problem 9:	C		
Problem 10:	B		
Problem 11:	B		
Problem 12:	A		
Problem 13:	B		
Problem 14:	C		
Problem 15:	C		
Problem 16:	D		
Problem 17:	B		
Problem 18:	B		
Problem 19:	B		

## Quantitative Literacy Assessment Solutions

**Solution Problem 1:** When two variables are said to have a positive relationship it means that as one variable increases the other variable increases as well. Example: When money spent on advertising for teens increases you will see and increase in teen sales. That is an example of two variables that have a positive relationship between them. When two variables have a negative relationship it means that as one variable increases the other decreases. Example: As the unemployment rate increases we would expect that the purchases of newly built houses to decrease. That is an example of two variables that have a negative relationship between them.

**Solution problem 2:** Sometimes it helps to draw a picture of what is happening in the problem. Draw a round table with six people around it. If the restaurant can serve 20 of these tables in one hour how many people would be served? Draw 20 tables and count the people or recognize the fact that there would be  $(20)(6) = 120$  people served in one hour.

Sometimes you can use a technique called unit analysis. It utilizes the idea that the units must work out at the end of the problem. We were given  $6 \frac{\text{people}}{\text{Table}}$  and  $20 \frac{\text{Tables}}{\text{Hr}}$ . If we multiply these factors you can see that the "Tables" units will cancel and the units  $\frac{\text{people}}{\text{Hr}}$  will be left, which is what we were asked to find.

**Solution Problem 3:** Percentage problems are approached by finding the ratio of the number of items of interest (in this case females) to the number to total items (in this case students in the class). In this problem that ratio would be  $\frac{\text{\# of females}}{\text{\# of students in class}} = \frac{5}{21} \times 100 = 23.8\%$

**Solution Problem 4:** The percent increase is a measure of how much a quantity has increased from its original value. We see in this problem that the original value of TV sets sold is 150. We also see that there was an increase of 62 more TV sets sold in August than were sold in July ( $212 - 150 = 62$ ). We calculate percent increase by using the following ratio  $\frac{\text{amount of increase}}{\text{Original amount}} = \frac{62}{150} \times 100 = 41.3\%$

**Solution Problem 5:** You have to make a lot of pancakes!! We know that 6 pancakes requires  $\frac{3}{4}$  cup of flour. Seventy two pancakes will surely require more. How much more? Well, 72 is 12 times greater than 6 isn't it ( $72 \div 6 = 12$ ). Then we should expect to use 12 times more flour.

$$12 \times \frac{3}{4} = 9 \text{ cups.}$$

**Solution Problem 6:** You may want to draw a picture of what is happening in this problem. Draw a rectangle with width of 2 ft and length of 4 ft. Draw another rectangle with the sides doubled (width 4 ft and length 8 ft). The area of the first rectangle is  $2 \times 4 = 8 \text{ ft}^2$ . The area of the second rectangle has increased and is  $4 \times 8 = 32 \text{ ft}^2$ . As you can see the area  $8 \text{ ft}^2$  has increase by a factor of 4 to  $32 \text{ ft}^2$ .

**Solution Problem 7:** Again, you may want to draw a picture of what is happening in this problem. Draw a rectangular index card that has a width of 3 inches and a length of 5 inches. If we were to lay down the stamps on the index card so that the  $\frac{3}{4}$  in. dimension of the stamp matches the 3 in side of the index card you will see that we can fit 4 stamps down the side. Five stamps could then be laid down across the index card for each row. The total stamps would then be  $4 \times 5 = 20 \text{ stamps}$ .

Another way to approach this problem would be to calculate the area of the index card ( $3 \times 5 = 15 \text{ in}^2$ ) and the area of the stamp ( $\frac{3}{4} \times 1 = \frac{3}{4} \text{ in}^2$ ) and divide the index card area by the stamp area ( $15 \div \frac{3}{4} = 20 \text{ stamps}$ )

**Solution Problem 8:**  $10,000 \text{ steps/ day} \times 2 \text{ feet/ step} \times 365 \text{ days/ year} = 7,300,000 \text{ feet/ year}$

**Solution Problem 9:**  $(10,000 \text{ steps/ day} \times 2 \text{ feet} \times 7 \text{ days / week}) / 5280 \text{ feet/ mile} = 26.5 \text{ miles/week}$

**Solution Problem 10:**  $\text{area} = 8 \times 12 \text{ feet} = 96 \text{ square feet}$

$$96 \text{ sq ft} / 40 \text{ sq ft/gallon} = 2.4 \text{ gallons}$$

$$2.4 \text{ gallons} \times 4 \text{ quarts/ gallon} = 9.6 \text{ quarts} \rightarrow \text{round up to } 10$$

**Solution Problem 11:** If 40% failed, then 60% passed.

$$80\% \text{ of } 60\% = 48\% \text{ passed with less than A}$$

Total # of students (100%) = those failing (40%) + those who passed with less than A (48%) + those who passed with A (x)

$$X = 100 - 48 - 40 = 12\% \text{ of students in the class earned an A on the test}$$

**Solution Problem 12:** It is a very common marketing practice for companies to offer product combinations in which portions of the combinations are priced lower than they would be on their own, but allowing for a greater overall sale for the company when the combination is

purchased. What is needed here is some quick arithmetic to determine that the combo discount is still not as much as the burger and drink when each is purchased separately.

**Solution Problem 13:** This problem calls for some logic, a basic understanding of mortgages, and the use of judgment. You would not want to purchase a 30-year fixed rate mortgage because the rate will be higher and you will be moving in five years. At the same time it is not worth the risk of accepting a rate of 4.4% which is just .1% better than the 7 year option knowing that you will have to accept the going rate in two years which could be significantly higher.

**Solution Problem 14:** Based on the answer choices you are asked to compare using the new car with better gas mileage and a longer commute to your truck and the old commute. You first divide 200 by 40 for the new car to determine the number of gallons needed to make the weekly commute and then multiply this amount by \$3.00 which is the cost of gas per gallon. This result is \$15 dollars per week. To compare you divide 100 by 15 for the truck to determine the number of gallons needed to make the old weekly commute and then multiply this amount by \$3.00 which is the cost of gas per gallon. The result is \$20 dollars per week which is more than the new car and commute.

**Solution Problem 15:** This problem calls for you to convert inches into feet. Knowing that 12 inches equals 1 foot you can divide 30 by 12 to determine that a baby can travel 2.5 feet in 3 minutes. Dividing 2.5 feet by 3 minutes gives you a distance of .833 feet traveled per minute. Multiply this amount by 5 minutes and you obtain a distance of 4.2 feet traveled. This assumes the baby does not get tired halfway there!

**Solution Problem 16:** Answer: d. If a statement about everyone in a group is false, then it must be true for at someone. The negation of the phrase "at least two roommates" is the phrase "less than two roommates"

**Solution Problem 17:** The answer is b. It is the contrapositive of the original statement. Note that the negation of nobody coming to my party is someone comes to my party, not 'everyone comes to my party'. This is why c. is incorrect. b. is the contrapositive of the converse. A statement and its converse are not equivalent. d. is also equivalent to the converse of the statement.

**Solution Problem 18:** The answer is b. The margin of error is one half the radius of the interval into which 95% (in this case) of all samples of a given size will fall - if they are chosen in such a way that any sample of that size is equally likely to be chosen as any other. If the sample is not among those 95%, then it could be considerably farther away from the true margin. This is why c. is not correct.

**Solution Problem 19:** The answer is b. You calculate it by using 'unit analysis' in the following way:

$$1,478\text{ft/s} \times 1\text{mile}/5280\text{ft} \times 3600\text{s/hr} \times 1.609\text{km/mile} = 1,620\text{ km/hr}$$

**Solution Problem 20:** We can easily eliminate some of these answers. It can't be  $80^\circ$  because that's smaller than a right angle.  $135^\circ$  is  $90^\circ + 45^\circ$  and that would result in a line that goes up as much as it extends horizontally.  $160^\circ$  is even bigger. So the answer must be *b*  $120^\circ$ .

**Solution Problem 21:**

You can think of this diagram as being composed of two rectangles, one with dimensions of 7 ft by 12 ft and the other 4 ft by 16 ft. Finding the area of each and adding gives 148 sq. ft

$$7 \times 12 + 4 \times 16 = 148$$

So *b* is the correct answer.

**Solution Problem 22:** The area of a circle is  $\pi$  times the radius squared. But we only need half that area, so

$$\text{Area} = \frac{\pi r^2}{2} = \frac{3.142 \times (3\text{ ft})^2}{2} = 14.1\text{ ft}^2$$

or *c*.

**Solution Problem 23:** You first need the area of the sheet, which is 2200 yd times 1500 yd = 3,300,000 sq. yd. Since each sq. yd costs \$1.52 then the cost of the whole thing is 3,300,000 sq. yd times \$1.52 = \$5,016,000 or \$5 million or *a*.