

# CTE Math Assessment

## Part 1: Short Answer

You may use a scientific calculator (a calculator that has parentheses) for this test. For each question, use equations, complete sentences, and pictures or charts (where appropriate) to explain your solution.

1. You receive a gift card for \$75 for a local sandwich shop. You always order the same thing, and the total cost of each lunch is \$5.19. How many completely free lunches can you get with your gift card? How much money will be left on the card?

**14 free lunches with \$2.34 left over on the gift card.**

2. On Monday, you start work at 9:10 AM and finish work at 1:25 PM. Your rate of pay is \$10.25 per hour. How much money should you be paid for Monday's work?

**About \$43.56 for 4.25 hours of work (rounded down from \$43.5625).**

3. You currently pay \$700 per month to rent a rectangular office space for your small business. Your office is 13 yards long and 17 yards wide. You recently heard that a new office complex is offering space for small businesses at a rate of \$4.50 per square foot per year. If you rent an office in the new complex which is the same size as your current office, what would your monthly rent be? Would it be worthwhile to move?

**There are many ways to figure this out. One way is to calculate the total cost per year for the current office space and the new office complex space. The current cost per year is  $\$700 \times 12 = \$8400$ . Comparable space in the new office complex would be  $(13 \times 3) \times (17 \times 3) \times 4.50 = \$8950.50$  per year, or about \$745.88 per month. This is \$550.50 more per year, so it is not worthwhile to move (unless the location is fabulous!).**

4. Tom wants to buy items costing \$27.96, \$104.25, and \$51.17. He earns \$6.75 an hour doing odd jobs. If fifteen percent of his income is put aside for other purposes, how many hours must he work to earn the money he needs for his purchases?

**Tom wants to purchase items costing a total of \$183.38. After setting aside 15% of his hourly salary, he earns about \$5.74 per hour which can be used towards his purchases. He must work about 32 hours to earn the money he needs (rounded up from 31.947735 hours).**

5. It costs \$4.19 for a whole box of Cheerios containing 32 cups of cereal. You use  $1\frac{1}{8}$  of a cup of Cheerios in your trail mix. What is the cost of the Cheerios that you used in your mix?

**The cost of the Cheerios in the mix is about \$0.15 (rounded up from 0.14730469). (One way to figure this out is to find the price per cup by dividing \$4.19 by 32, and then multiply by  $1\frac{1}{8}$  to find the price for the amount used. This could also be solved using a proportion.**

6. Create a situation described by  $5x + 71 = 366$ . Include a question whose answer is  $x$ . Solve the problem and explain what your answer means in the context of the problem you wrote.

**There are many reasonable answers for this problem. Here is one example. “Sharon rented a car during her five-day vacation. The base rate was \$71, and Sharon thought that was the amount that she would be paying (before taxes). She forgot that there was also a daily rental rate. The total for the daily rental plus the base rate was \$366 (before taxes). How much was the daily rental rate?  $x = 59$  is the solution. This answer means that the daily rental rate was \$59.**

7. Use a scientific calculator to work the following problems. You should be able to use operations and parentheses so that you enter the entire expression and only press the equal or enter button once. Round each answer to two decimal places.

(a)  $\sqrt{21^2 - 4^2} \approx \mathbf{20.62}$

(b)  $\frac{261}{\frac{673}{15}} \approx \mathbf{0.03}$

(c)  $\frac{261}{\frac{673}{15}} \approx \mathbf{5.82}$

(d)  $\pi \left(8\frac{3}{4}\right)^2 \left(9\frac{1}{2}\right) \approx \mathbf{2285.02}$

(e)  $\frac{0.02 \cdot 815.16}{1 - (1 + 0.02)^{-3}} \approx \mathbf{282.66}$

## Part 2: Performance Assessments

For this portion of the exam, you will need access to a computer with a spreadsheet, metric and U. S. customary length measuring devices (meter sticks / yard sticks / tape measures / rulers), scissors, and string or yarn.

1. **Write a Memo.** You work for a day care program, and your boss wants you to plan a 2-week summer day camp for 50 elementary school students. Your cost estimate should include staff time, meals and snacks, two field trips, and craft and activity supplies for each day. You do not need to worry about the building or operational costs of the day care.

Write a memo to your boss explaining how much this program will cost. Explain your computations and your answer. How much do you think your day care program should charge for each student?

**There are many reasonable solutions for this performance task. There is a sample on the next page.**

Dear Director,

You asked me to estimate the cost for a two-week summer day camp for fifty elementary school students. I will consider the cost of staff time, food, two field trips, and activity supplies for each day. I am assuming that the day camp will run from 8 AM to 5:30.

We will need five full time staff members for this program. According to the Bureau of Labor Statistics (<http://www.bls.gov/oes/CURRENT/oes399011.htm>), the median hourly pay rate for childcare workers is \$9.42. We should probably pay our staff \$12 per hour so that we can attract reliable and capable employees. Staff members will need to arrive at 7:30 AM to get ready for the day, and will need to stay until 6 PM. Each employee will work for 10.5 hours each day or 52.5 hours each of the two weeks. Since this is more than 40 hours during one week, we will need to pay an additional 50% for overtime for the extra 12.5 hours. This means that the total weekly pay will be  $40 \cdot \$12 + 12.5 \cdot \$18 = \$705$  per week. Doubling this amount, we obtain \$1410 per employee for the two weeks. We must add on about 11% of this amount to cover employee benefits, taxes, and unemployment insurance. This brings the total for each employee to \$1565.10 for the two weeks. Since there are five employees, the total staff cost will be \$7825.50.

To feed 50 students and five staff members, I assume that we are feeding everyone breakfast and lunch plus a morning and afternoon snack. We already have a cook here at the day care center (though our staff will need to help with some of the preparation since we will have so many more children). The cook tells me that each meal costs about \$4 per person, and each snack costs about \$1 per person. This means that we will spend about \$10 per person. For all ten days of the program, and for 55 people, this brings the total price to \$5500.

We plan to take the students to the zoo the first Friday, and to the beach at Indiana Dunes the second Friday. We will leave at 10 AM and return at 4 PM each day, and we will take our lunches and snacks in coolers so that we do not need to pay extra for food. We will need to hire a bus and driver for each field trip. I estimate that this will cost approximately \$500 per day since we are just renting a school bus. This estimate is based on the web page at <http://www.kgbanswers.com/what-is-the-average-cost-of-4-hour-school-bus-rental/18724507>. Admission prices at Indiana Dunes are \$2 per person according to the webpage at <http://www.in.gov/dnr/parklake/5062.htm>. Admission prices at the Zoo are \$5.50 per child and \$6.50 per adult (<https://potawatoomizoo.org/visit-potawatomi-zoo-edzoocation/field-trips>). This brings our total cost for the two field trips to  $\$500 \cdot 2 + \$2 \cdot 55 + \$5.50 \cdot 50 + \$6.50 \cdot 5 = \$1417.50$ .

I am assuming that since we have many toys and games already, we will only need to spend \$1 per child for each of the 8 days when we do not have a field trip. This brings the total to  $\$8 \cdot 50 = \$400$ .

The overall cost for staff, food, field trips, and activity supplies will be approximately \$15,143.00. Dividing this by 50 students, the total cost is about \$302.86. If we charge each student \$400 for the two weeks, this will allow the day care center to cover overhead expenses. \$200 per week, or \$40 per day is actually a very affordable rate compared with many other programs, so this seems like a reasonable amount to charge each student.

Sincerely,

Your Dutiful Summer Program Coordinator

2. **Create an Invoice.** You own an advertising firm, and a new nightclub that is opening in downtown South Bend has hired you to design a multi-media marketing campaign for them. Make an invoice that includes at least 5 different ways to advertise their grand opening weekend. In your spreadsheet, include a column for the service description, the rate for each service, the quantity of time or items provided, and the subtotal listing the cost of each service. At the bottom of the spreadsheet, include a total of all items, taxes, and the grand total. Invent a name and find a clip art logo for your company. Your invoice should also include a (fictitious) address, phone number, and email address so that your client can contact you with questions.

**There are many reasonable solutions for this performance task. There is a sample PDF on the next page. All of the numbers in the Total Price column should be obtained using formulas – none of those numbers should be entered by hand. See the spreadsheet document to view the formulas.**



# Modern Media

314 Technology Way  
 South Bend, IN 46613  
 modern\_media@gmail.com  
 574-234-5571

The Rave Nightclub  
 412 S. Michigan Street  
 South Bend, IN 46614

INVOICE # 217

Date: April 29, 2014

Date	Description	Rate	Units	Quantity	Total Price
04/01/14	Client Consulting Meeting	\$30.00	per hour	2	\$60.00
04/05/14	Poster Design	\$50.00	per hour	6	\$300.00
04/06/14	Poster Printing	\$2.00	per poster	1000	\$2,000.00
04/08/14	Poster Placement	\$20.00	per hour	10	\$200.00
04/10/14	Internet Calendars	\$5.00	per post	50	\$250.00
04/11/14	Mass Email Campaign	\$0.05	per email	5000	\$250.00
04/15/14	Radio Announcements	\$10.00	per 30-s spot	50	\$500.00
04/20/14	Texting Campaign	\$0.05	per text	5000	\$250.00
				<b>Subtotal</b>	<b>\$3,810.00</b>
				<b>Sales Tax (7%)</b>	<b>\$266.70</b>
				<b>Invoice Total</b>	<b>\$4,076.70</b>

3. **Measurement Challenge.** Measure strings with the lengths indicated below and cut them to the correct length.

(You should be able to select appropriate measuring tools for each challenge.)

Challenge 1. Length:  $\frac{5}{4}$  foot

To find  $\frac{5}{4}$  foot, we first calculate  $\frac{1}{4}$  foot. Since one foot has twelve inches,  $\frac{1}{4}$  foot is 3 inches. This means that  $\frac{5}{4}$  foot is five copies of 3 inches for a total of 15 inches. As long as the cut string is within  $\frac{1}{8}$  inch of the correct length, it is close enough.

Challenge 2. Length: 16.1 centimeters

16.1 centimeters is 1 millimeter past 16 centimeters. As long as the cut string is within 3 millimeters of the correct length, it is close enough.

Challenge 3. Length: 0.2 meters

0.2 meters (or two tenths of a meter) is equal to 20 centimeters. As long as the cut string is within 3 millimeters of the correct length, it is close enough.

Challenge 4. Length  $6\frac{7}{8}$  inches

$6\frac{7}{8}$  inches is just one eighth of an inch less than 7 inches. As long as the cut string is within  $\frac{1}{8}$  inch of the correct length, it is close enough.

Challenge 5. Length:  $\frac{2}{9}$  yard

To find  $\frac{2}{9}$  yard, we first calculate  $\frac{1}{9}$  yard. Since one yard has thirty-six inches,  $\frac{1}{9}$  yard is 4 inches. This means that  $\frac{2}{9}$  yard is two copies of 4 inches for a total of 8 inches. The cut string should be within  $\frac{1}{8}$  inch of the correct length.

Challenge 6. Length: 76 millimeters

Note that 76 millimeters is equal to 7.6 centimeters, or 4 millimeter less than 8 centimeters. The cut string should be within 3 millimeters of the correct length.