

# EXCELLENCE IN MATHEMATICS

## **SEVENTH GRADE TEST**

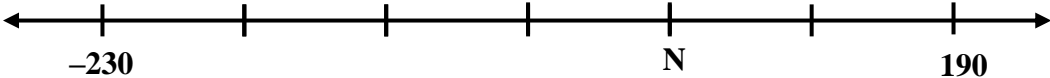
CHANDLER-GILBERT COMMUNITY COLLEGE'S

ELEVENTH ANNUAL MATHEMATICS CONTEST  
SATURDAY, JANUARY 22<sup>nd</sup>, 2011

1. DO NOT OPEN YOUR TEST BOOKLET OR BEGIN WORK UNTIL YOU ARE TOLD TO DO SO BY YOUR PROCTOR.
2. LISTEN CAREFULLY AS YOUR PROCTOR EXPLAINS WHERE TO WRITE YOUR NAME, THE NAME OF YOUR SCHOOL, YOUR GRADE LEVEL, AND HOW TO MARK YOUR ANSWERS.
3. YOU MAY USE YOUR CALCULATOR. YOU ONLY NEED A FOUR-FUNCTION CALCULATOR, BUT YOU MAY USE ANY NONGRAPHING, NONPROGRAMMABLE CALCULATOR. IF YOUR CALCULATOR CAN BE PROGRAMMED OR CAN GRAPH, GIVE IT TO THE PROCTOR.
4. YOUR SCORE WILL BE THE NUMBER OF QUESTIONS YOU ANSWER CORRECTLY. IN THE EVENT OF TIES, PROBLEM #40 WILL BE USED AS A TIE BREAKER; IF TIES STILL REMAIN, PROBLEM #39 WILL BE USED AS A TIE BREAKER, ETC.

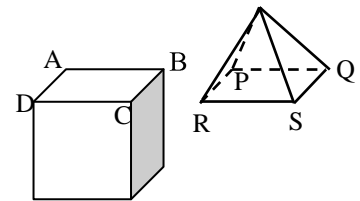
The Excellence in Mathematics Contest would like to acknowledge and thank Rick Armstrong for his help.

***Eighth Grade Test - Excellence in Mathematics Contest – 2011***

1. A restaurant has a total of thirty-six 3-legged stools and 4-legged chairs. They have three times as many chairs as stools. What is the total number of legs on these stools and chairs?  
 A. 126                      B. 128                      C. 130                      D. 132                      E. 135
2. How many integers are between  $-\frac{20}{7}$  and  $\frac{6}{5}$ ?  
 A. 1                          B. 2                          C. 3                          D. 4                          E. 5
3. The first five terms of an arithmetic sequence are ***17; 24; 31; 38; 45; ...***  
 What is the 60<sup>th</sup> term?  
 A. 420                      B. 427                      C. 430                      D. 434                      E. 437
4. What is the sum of the prime factors of 2010?  
 A. 77                          B. 79                          C. 80                          D. 208                      E. 211
5. You complete  $\frac{3}{5}$  of a job in 45 minutes. Working at the same rate, how many more minutes will it take you to complete the job?  
 A. 15                          B. 18                          C. 27                          D. 30                          E. 36
6. The marks on this number line are equally spaced. What is the value of N?  


- A. 10                          B. 40                          C. 50                          D. 60                          E. 90

7. On this cube, point A is a “*vertex*”, segment AB is an “*edge*”, and square ABCD is a “*face*”. ABCD and PQRS are congruent squares. The pyramid is glued to the top of the cube so that vertices A, B, C, D line up with vertices P, Q, R, S. On this new solid, what is the sum of the total number of distinct vertices, edges, and faces?



- A. 30                          B. 32                          C. 34  
 D. 35                          E. 36
8. In a school of 860 students, 440 are girls. One fourth of the students travel to school by bus. 300 of the boys do not ride the bus. How many of the girls ride the bus?  
 A. 95                          B. 96                          C. 100                      D. 105                      E. 110
  9. A train averaged 48 miles per hour for 80 minutes and then 72 miles per hour for 105 minutes. How many miles were travelled?  
 A. 175                      B. 180                      C. 185                      D. 190                      E. 195

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10. N is a positive integer and  $\frac{N}{24}$  is a reduced fraction less than  $\frac{11}{3}$ .  
What is the number of possible values of N?  
A. 28                      B. 29                      C. 30                      D. 31                      E. 32
11. Using any combination of nickels, dimes, and quarters, how many different ways are there to pay exactly 60 cents for a bag of popcorn? (For example, two nickels and two quarters is one such combination.)  
A. 10                      B. 12                      C. 13                      D. 14                      E. 16
12. In the seven year period 2000-2006, approximately 1.5 billion live wild animals were imported into the United States as pets and for other purposes. On the average, approximately how many per day were brought into the United States?  
A. 590                      B. 140,000                      C. 590,000                      D. 4 million                      E. 211 million
13. If 10% of a number is 60, what is 25% of the same number?  
A. 1.5                      B. 24                      C. 150                      D. 246                      E. 2400

14. In this ***Magic Product Square***, the numbers 1 through 9, without repetition, are placed in the nine cells. The product of the three numbers in each row and in each column is given. What is the number in the cell marked N?

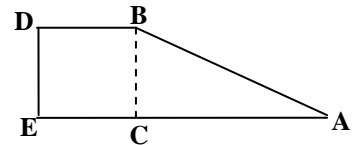
			<b>28</b>
			<b>135</b>
<b>N</b>			<b>96</b>
<b>42</b>	<b>54</b>	<b>160</b>	

- A. 1                      B. 2                      C. 3  
D. 4                      E. 6
15. Of a \$12,000 inheritance, Bianca invested  $\frac{2}{3}$  in a Certificate of Deposit paying 2.5% annual interest and the rest in a Bond Mutual Fund paying 4% annual interest. How much interest does she earn in one year?  
A. \$360                      B. \$390                      C. \$400                      D. \$520                      E. \$780
16. ***Goldbach's Conjecture*** states that every even number greater than 4 can be written as the sum of two prime numbers. How many distinct pairs of primes sum to 80? (Note: 1 is not a prime number.)  
A. 3                      B. 4                      C. 5                      D. 6                      E. 7
17. If  $x = -4$  and  $y = -5$ , determine the value of the expression:  $\frac{x^2 - 2y}{xy}$ .  
A. -0.3                      B. 0.3                      C. -1.3                      D. 1.3                      E. 7.5
18. What is the 200<sup>th</sup> letter in the sequence: **ABRACADABRAABRACADABRA.....?**  
(Note: The word "***abracadabra***" is being repeated.)  
A. **A**                      B. **B**                      C. **C**                      D. **D**                      E. **R**

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19. The first four terms of a geometric sequence are: **96; -48; 24; -12; ...**  
 What is the sum of the 10<sup>th</sup> term and the 11<sup>th</sup> term?
- A.  $\frac{3}{32}$       B.  $-\frac{3}{32}$       C.  $-\frac{9}{32}$       D.  $\frac{9}{32}$       E. 0
20. The sum of the dates of the four Saturdays in December is 58.  
 What is the sum of the dates of the five Thursdays in the same month?
- A. 75      B. 77      C. 78      D. 80      E. 85
21. Three candy bars are to be shared equally among five people, including Gail and Fred. Gail and Fred each get  $\frac{1}{2}$  of the first candy bar. If you use part of the second candy bar to complete Fred's fair share, what fraction of the second candy bar do you give Fred?
- A.  $\frac{1}{10}$       B.  $\frac{1}{5}$       C.  $\frac{1}{6}$       D.  $\frac{1}{15}$       E.  $\frac{3}{5}$
22. Rick, born on April 1, 1950 (that is, 4/1/50), asks his daughter Zan,  
 "If today is 12/12/12 (that is, Dec. 12, 2012), in how many days will it be 13/13/12?"
- A. 29 days      B. 30 days      C. 31 days      D. 32 days      E. None of These

23. The area of triangle ABC equals the area of rectangle BDCE.  
 If  $\overline{AB} = 25$  cm and  $\overline{BC} = 15$  cm, what is the length of  $\overline{AE}$ ?



- A. 30 cm      B. 35 cm      C. 40 cm
- D.  $20 + 5\sqrt{2}$  cm      E.  $20 + 4\sqrt{5}$  cm
24. Among the fourteen members of a basketball team, ten have cell phones and four do not. For Christmas, each person with a cell phone sends a text message to everyone else with a cell phone and sends a card to the others. Each person without a cell phone sends a card to everyone (except to himself or herself, of course). How many cards are sent?
- A. 46      B. 52      C. 86      D. 92      E. 96
25. The area of a rectangle is 72 square centimeters. The length of each side is an even number of centimeters. What is the largest possible perimeter of the rectangle?
- A. 34 cm      B. 36 cm      C. 44 cm      D. 76 cm      E. 146 cm

26. In this ***Magic Square***, the sums of the four numbers in each row, in each column, and in each long diagonal are all equal.  
 What is the sum of the eight numbers in the eight blank cells?

<b>10</b>			<b>4</b>
<b>-12</b>		<b>0</b>	
	<b>-10</b>		<b>2</b>
<b>-14</b>		<b>6</b>	

- A. -66      B. -74      C. -84
- D. -94      E. -100



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36. Included in the Rhind Papyrus from 3600 years ago, the Egyptians used the following rule to determine the area of a circle:

**“From the diameter, subtract  $\frac{1}{9}$  of the diameter. Square your answer.”**

Compared to the correct formula for computing the area of a circle, what is the *per cent error* when using this Egyptian formula? (Note: “*per cent error*” = “*amount of error*”/“*correct answer*”.)

- A. 0.60%      B. 0.73%      C. 0.92%      D. 1.28%      E. 1.31%
37. In mentioning the phenomenal growth of the Internet, a computer scientist wrote that the capacity is now reaching one *yottabyte*. If one *yottabyte* equals one thousand *zettabytes*; one *zettabyte* equals one million *pettabytes*; one *pettabyte* equals one million *gigabytes*; one *gigabyte* equals  $2^{10}$  *megabytes*; and one *megabyte* equals  $2^{20}$  *bytes*; then one *yottabyte* equals approximately  $10^N$  *bytes*. What is N? (Personally, I’d say, “*That’s a lotta bytes!*”)
- A. 15      B. 18      C. 21      D. 24      E. 27
38. It is 6:00 PM Tuesday in San Francisco when it is 2:00 AM Wednesday in London. Zan at the San Francisco Google office and Alec at the London Google office are scheduled to work together on a project on their computers. Zan contacts Alec at 7:40 AM San Francisco time and they begin working. They work together until Alec shuts down his computer at 7:15 PM London time. For how many minutes did they work together?
- A. 35      B. 95      C. 155      D. 215      E. 275
39. ***One-Pile Nim*** is a two-person game. Pattie and Malik take turns. There is one pile of chips. On each turn, a player takes 1, 2, 3, 4, or 5 chips from the pile. The player to take the last chip wins. At one point of the game, it is Pattie’s turn and there are 1,000 chips remaining in the pile. If both players make their best plays, there is only one winning play for Pattie. What is it?
- A. Take 1 chip    B. Take 2 chips    C. Take 3 chips    D. Take 4 chips    E. Take 5 chips
40. Alicia, Ben, and Camellia are each bicycling at a constant speed.
- At 3:00, Alicia is 100 m behind Ben and Ben is 200 m behind Camellia.
  - At 3:08, Alicia passes Ben.
  - At 3:12, Alicia passes Camellia.
- As Ben passes Camellia, how many meters are they behind Alicia?
- A. 100 m      B. 150 m      C. 200 m      D. 300 m      E. 400 m