

2012-2013  
State Qualifiers' Challenge Meet  
Accounting Test

**GROUP 1**

On August 3, 2012, Sunsing Electronics borrowed \$61,715 from Vesta Bank by signing a 180-day, 7% interest-bearing promissory note. (This is the only time the company has ever had to borrow money from any source.)

Sunsing Electronics has the following accounting policies and procedures:

- Uses the accrual basis of accounting
- Fiscal year-end is December 31
- Adjusting and closing entries are prepared only at fiscal year-end
- Uses reversing entries
- Uses 360-day year for promissory note calculations
- Always round interest calculations to zero decimals at each stage

Use the identifying letter of the correct account to record the debit(s) and credit(s) in the transactions that follow. The question numbers are found in the debit and credit columns. Some entries may require more than one debit and/or credit (all or nothing on your answer—no partial credit given)

<b>A</b>	<b>Cash in Bank</b>
<b>B</b>	<b>Interest Receivable</b>
<b>C</b>	<b>Accounts Payable</b>
<b>D</b>	<b>Notes Payable</b>

<b>E</b>	<b>Interest Payable</b>
<b>F</b>	<b>Income Summary</b>
<b>G</b>	<b>Interest Expense</b>
<b>H</b>	<b>Interest Income</b>

	Debit	Credit
<b>Entry on August 3 when note is signed</b>	<b>1.</b>	<b>2.</b>
<b>Adjusting entry on December 31, 2012</b>	<b>3.</b>	<b>4.</b>
<b>Closing entry on December 31, 2012 for Interest Expense</b>	<b>5.</b>	<b>6.</b>
<b>Reversing entry on January 1, 2013</b>	<b>7.</b>	<b>8.</b>
<b>Payment of the maturity value on the maturity date</b>	<b>9.</b>	<b>10.</b>

Continue to use the above information. For questions 11 through 15, write the correct amount on your answer sheet.

11. What amount of interest expense is incurred in 2012?
12. What amount of interest expense is incurred in 2013?
13. What is the balance in the Interest Expense account after reversing entries (include Dr or Cr) ?
14. What is the maturity date for this note?
- \* 15. When the maturity value is paid, what amount is posted to the Interest Expense account?

**GROUP 2**

Blueberry Corp was completely destroyed by a Tsunami on December 28, 2012. The following year-to-date information for 2012 was the only record that could be salvaged:

<b>Inventory, December 31, 2011</b>	<b>\$84,105</b>	<b>Contra Cost totals</b>	<b>\$ 4,100</b>
<b>Net Purchases</b>	<b>\$65,750</b>	<b>Contra Revenue totals</b>	<b>\$ 6,750</b>
<b>Sales</b>	<b>\$136,750</b>	<b>Transportation charges</b>	<b>\$ 4,250</b>

Blueberry's gross profit percentage is 46% based on net sales per historical records found. Provide amounts for the following:

16. Cost of Goods Available to sell during 2012
17. Inventory on December 31, 2012
18. Cost of Goods Sold during 2012
19. Cost of Delivered Goods purchased during 2012
20. Purchases

**GROUP 3**

Various accrual and deferral transactions are listed below with the question numbers 21 – 30 appearing in the debit and credit columns. Use the following chart of accounts to indicate what type of account is debited and credited for each transaction. Write the identifying letter of the correct response on your answer sheet.

<b>A</b>	<b>Asset</b>
<b>B</b>	<b>Liability</b>
<b>C</b>	<b>Capital</b>

<b>D</b>	<b>Revenue</b>
<b>E</b>	<b>Expense</b>

	<b>Debit</b>	<b>Credit</b>
<b>When a previously deferred expense has now been used</b>	21.	22.
<b>When a previously unearned revenue has now been earned</b>	23.	24.
<b>When an unearned revenue is received</b>	XXXX	25.
<b>When a deferred expense is purchased</b>	26.	XXXX
<b>When a revenue has been earned but not yet received</b>	27.	28.
<b>When an expense has been incurred but not yet paid</b>	29.	30.

**GROUP 4**

Appleseed Techtronics bought a delivery van on December 28, 2008 that had an original cost of \$46,750 with an estimated salvage value of \$2,950 and an estimated useful life of 5 years. (round to zero cents on all calculations)

31. What was the depreciation expense for the year 2010 using the double-declining balance method?
32. What was the book value as of 12-31-09 using the straight-line method?
33. What was the January 1, 2012 balance in accumulated depreciation using the double-declining balance method?

**GROUP 5** (Refer to Table 1 for this problem -- the table will not be graded)

Nokima, Inc. customizes cell phone cases that are then resold to various cell phone providers. Blank cell phone cases are purchased and then customized and resold. Nokima is authorized to issue 20,000 shares of \$100 par, preferred 8% stock and 150,000 shares of \$10 par common stock. The following selected amounts appeared on the Balance Sheet section of the company's work sheet for the year ended December 31, 2012. All account balances are normal balances.

<b>Dividends Payable—Preferred</b>	12,000
<b>Dividends Payable—Common</b>	203,500
<b>Preferred Stock</b>	300,000
<b>Common Stock</b>	1,250,000
<b>Paid-in Capital in Excess of Parr--Common</b>	300,000
<b>Retained Earnings</b>	855,000
<b>Dividends--Preferred</b>	24,000
<b>Dividends--Common</b>	325,750

Nokima's work sheet indicates a net income for the year of \$330,000. The general ledger also showed that both dividend payable accounts had a zero balance as of January 1, 2012.

Write the number of shares of stock issued as of January 1, 2012 for the following:

34. Common Stock
35. Preferred Stock

Write the correct dollar amount of the beginning balance as of January 1, 2012 for each of the following:

36. Dividends Payable—Preferred
37. Dividends—Common
38. Paid-in Capital in Excess of Par—Common
39. Retained Earnings
40. Preferred Stock
41. Common Stock

After all end of year work was completed, write the correct dollar amount for the following:

- \* 42. What was the amount of net change, increase or <decrease>, in the Retained Earnings account for 2012?
- \*\* 43. What was the balance of Retained Earnings after the 12-31-2012 closing entries were posted?
- \* 44. How much was the dividend amount per share of common stock declared on June 1, 2012? (Round cents to 2 decimals)
- \* 45. How much was the dividend amount per share of common stock declared on December 1, 2012? (Round cents to 2 decimals)

**GROUP 6** (Continue to use any information from Group 5 that you need for this section. Always round to 2 decimal places for currency calculations)

Nokima, Inc. had the following information related to inventory and purchases for 2012. During the year, 7,400 cell phones were sold for \$40 each and 5,000 were sold for \$44.80 each. (There were some sales discounts but for this group **only**, we will ignore them) The company uses the periodic inventory method. The physical inventory agreed to the accounting records and no inventory was obsolete or damaged.

		QUANTITY	COST	
1/1/2012	Beginning Inventory	5,000	\$10.00	
Feb	Purchase	2,150	\$10.50	
Mar	Purchase	3,500	\$10.35	
May	Purchase	1,500	\$10.80	
Jun	Purchase	800	\$10.80	
Aug	Purchase	1,050	\$11.00	
Oct	Purchase	2,500	\$10.75	
Dec	Purchase	2,250	\$10.50	

46. What will the gross profit for the year be if the LIFO method of inventory valuation is used?
  
47. What will the cost of goods available be if the Average-Cost method of inventory valuation is used?
  
48. What will the gross profit be if the FIFO method of inventory valuation is used?
  
49. What will the cost of goods sold be based on using the Specific-Identification method of valuing ending inventory if 1,200 units came from the beginning inventory, 2,100 came from the October purchase and the rest were purchased in March?
  
50. What value would be assigned to ending inventory if the Average-Cost method of inventory valuation is used?

**\*Nokima elected to use the LIFO costing method for calculating ending inventory (you will use this later)**

Page 13VF-1 **Virtual State Qualifiers' Challenge Meet**

13VF-1.  $(1.49 \times 5.97) + 7.8$  ----- 1= \_\_\_\_\_

13VF-2.  $(-0.183 + 0.0351 - 0.0328) \times 0.573$  ----- 2= \_\_\_\_\_

13VF-3.  $\frac{(-3.86)(-2.77)(-8.32)}{-3.79} + 19.3$  ----- 3= \_\_\_\_\_

13VF-4.  $\{(28.5 - 16.9 + 25.9)(9.98)(-9.88)\} - 3460$  ----- 4= \_\_\_\_\_

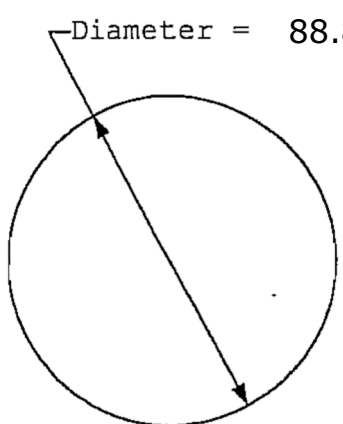
13VF-5.  $16900 + 14600 - 24300 + \frac{(-60600 + 33600)}{(0.232)(-9.68)}$  ----- 5= \_\_\_\_\_

13VF-6. What is the ratio of  $17e$  to  $13\pi$ ? ----- 6= \_\_\_\_\_

13VF-7. How many cubic inches are in one liter? ----- 7= \_\_\_\_\_  $\text{in}^3$

13VF-8. If Deborah can take 6 33-inch steps in 4 seconds, how far could she hike in one hour at the same speed? ----- 8= \_\_\_\_\_ miles

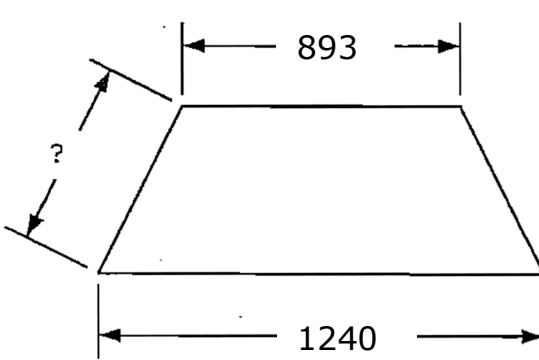
9. CIRCLE



Area = ?

9 = \_\_\_\_\_

10. ISOSCELES TRAPEZOID



Perimeter = 3200

10= \_\_\_\_\_

13VF-11.  $\frac{(0.376 + 0.318)(-1.53 - 1.46 + 1.77)}{(-0.0723)(-3.27) - 0.00644}$  ----- 11= \_\_\_\_\_

13VF-12.  $\frac{\{1.80 \times 10^7 + (-558)(-692)(73.5)\}}{(0.344 + 0.998)(-973)(\pi + 0.296)}$  ----- 12= \_\_\_\_\_

13VF-13.  $\frac{\{(-0.682 + 0.507)(53.7 + 74.9) + (-29.5)\}(1.92)}{(-9.24)(7.15 + 21.7)(-2.59)}$  ----- 13= \_\_\_\_\_

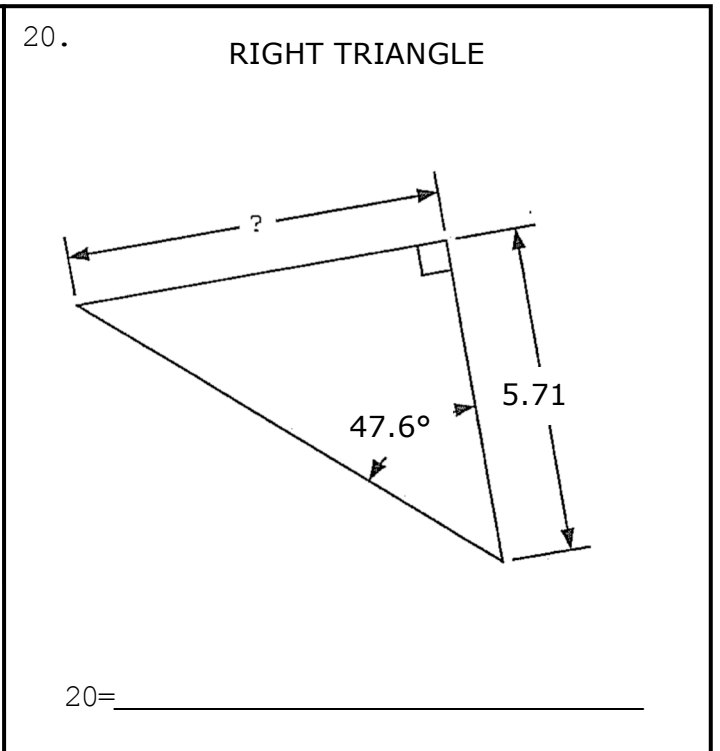
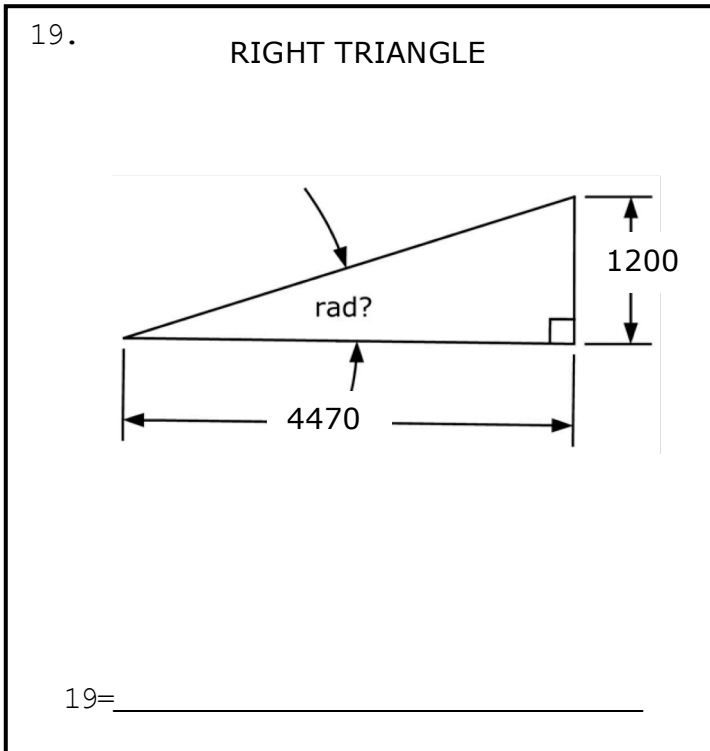
13VF-14.  $\frac{(98.2 + 64.2)(3.21 + 5.68)(46.4 - 78.9)}{(4.21 + 2.51)(1.38)\{(-4.6)/(-4.57)\}}$  ----- 14= \_\_\_\_\_

13VF-15.  $\frac{30200 + 95300 - (29900 + 43500)(1.3 - 0.75)}{(-748)(3.9)(-2.22)(700 - 477 + 776)}$  ----- 15= \_\_\_\_\_

13VF-16. Chisam ran 35 laps around a  $\frac{1}{4}$  mile track in one hour. What was his average speed? ----- 16= \_\_\_\_\_ mph

13VF-17. The product of three consecutive even integers is -1,906,128. What is their sum? ----- 17= \_\_\_\_\_ integer

13VF-18. Marcus bought an 18 ounce box of cereal for \$4.79. Eric bought ribeye steaks on sale for \$3.99 per pound. What is the percent difference between the unit prices of these items? ----- 18= \_\_\_\_\_ %



Page 13VF-5 **Virtual State Qualifiers' Challenge Meet**

13VF-41.  $10^{-\{(0.36 - 0.724)/(0.734 + 0.619)\}}$  ----- 41= \_\_\_\_\_

13VF-42.  $-0.0707 e^{0.556} + (-0.0226) e^{-0.362}$  ----- 42= \_\_\_\_\_

13VF-43.  $(16.9 - 22.5) \ln\{(-68)(-81)\}$  ----- 43= \_\_\_\_\_

13VF-44.  $(134 + 765)^{1/3} + 1/\{(120)^{-0.0863}\}$  ----- 44= \_\_\_\_\_

13VF-45. (deg)  $\sin \left[ 90^\circ \times \frac{(49400)}{(88000)} \right] + \cos \{155^\circ - 90.6^\circ\}$  ----- 45= \_\_\_\_\_

13VF-46. A metal company makes signs out of the same thickness of metal. If a 5 ft by 8 ft sign weighs 150 pounds, what is the weight of a circular sign that has a radius of 3 feet?----- 46= \_\_\_\_\_ lbs

13VF-47. Liu was practicing hitting golf balls in increasing distances by one foot increments. If Liu started attempting at 5 feet and got the following actual distances 5.1 ft, 6.3 ft, 7.2 ft, 8.3 ft, and 9.1 ft, what is the estimate for attempting a 20 ft putt? ----- 47= \_\_\_\_\_ ft

13VF-48. (rad) Solve for the value of x if  $7\cos(x) = x^3$ .----- 48= \_\_\_\_\_

49. **CYLINDER AND HEMISPHERES**

Total Volume = 415

49= \_\_\_\_\_

50. **TRUNCATED ISOSCELES TRIANGULAR PYRAMID**

Volume = ?

50= \_\_\_\_\_

13VF-51.  $\frac{10^{(0.952)} \times 10^{-(0.801)} + 0.375}{10^{(1.47 + 0.892)}} \dots\dots\dots 51 = \underline{\hspace{2cm}}$

13VF-52.  $\frac{1 + e^{\{0.576 + (0.341)(1.15)\}}}{(-1.00 \times 10^5)(1.9 - e^{(-0.582)})} \dots\dots\dots 52 = \underline{\hspace{2cm}}$

13VF-53.  $\frac{\text{Ln}(150 + 209)}{3.91} + \frac{\text{Ln}(859)}{61.4 - 55.7} \dots\dots\dots 53 = \underline{\hspace{2cm}}$

13VF-54.  $\frac{(-3.98 \times 10^{-4} + 4.25 \times 10^{-4})^{-0.553}}{(7.15 \times 10^{-4})^{-(0.242 + 0.273)}} \dots\dots\dots 54 = \underline{\hspace{2cm}}$

13VF-55. (rad)  $\arctan \left[ \frac{(7710)(0.824)}{(6.44)(49.9)} \right] + (0.959)(2.33) \dots\dots\dots 55 = \underline{\hspace{2cm}}$

13VF-56. Calculate the slope of the curve  $f(x) = 5(3)^{(6-x)}$  at  $x = 4.2$ . ----- 56 =                                 

13VF-57. A man who is 72 inches tall is walking away from a lamp post at a rate of 1 foot per 12 seconds. The lamp post is 20 feet tall. The person casts a shadow on the ground in front of him. How fast is the shadow growing when the man is 17 meters from the lamp post? - 57 =                                  ft/min

13VF-58. Calculate  $W_3$  if  $W = 3UV$  if  $U = \begin{bmatrix} 5 & 2 & -3 \\ 4 & 1 & 2 \\ -2 & 2 & 7 \end{bmatrix}$  and  $V = \begin{bmatrix} 3 \\ 4 \\ 7 \end{bmatrix}$ ? ----- 58 =                                 

59. SOLID OF REVOLUTION ( $X = 0.75$ )

$y = -4x + 5$

59 =                                 

60. EQUILATERAL TRIANGLE AND QUARTER CIRCLES

60 =



2013 Virtual State Qualifiers' Challenge Meet

Note: Correct responses are based on Java, J2sdk v 7.0, from Sun Microsystems, Inc. All provided code segments are intended to be syntactically correct, unless otherwise stated (i. e. `error` is an answer choice) and any necessary Java 2 Standard Packages have been imported. Ignore any typographical errors and assume any undefined variables are defined as used.

<b>QUESTION 1</b>	
What is $23_8$ plus $36_8$ ?	
A. $48_{10}$	B. $110001_2$ C. $110011_2$ D. $101110_2$ E. $302_4$
<b>QUESTION 2</b>	
What is output by the code to the right?	<pre>int a = 6 * 6; System.out.println(a);</pre>
A. 12      B. 11      C. 36      D. 1      E. 30	
<b>QUESTION 3</b>	
What is output by the code to the right?	<pre>int b = 5; int c = b + 2; System.out.println( b );</pre>
A. 5      B. 7      C. 4      D. 6      E. 0	
<b>QUESTION 4</b>	
What is output by the code to the right?	<pre>String d = "fun"; char let = d.charAt(2); System.out.print(let + d);</pre>
A. fund                      B. nfun C. funn                      D. dfun E. There is no output due to a syntax error.	
<b>QUESTION 5</b>	
What is output by the code to the right?	<pre>int[] array = {2, 4, 3, 1, 5}; System.out.print(array[3] + 4);</pre>
A. 5      B. 4      C. 7      D. 2      E. 9	
<b>QUESTION 6</b>	
What is output by the code to the right?	<pre>int e = 3; double f = 1.5; e -= f; System.out.print( (int)e );</pre>
A. 1      B. 2      C. 0      D. -3 E. There is no output due to a runtime error.	
<b>QUESTION 7</b>	
What is output by the code to the right?	<pre>boolean g = true; boolean i = false; boolean h = g &amp;&amp; (!i    !g); System.out.println(h);</pre>
A. true B. 1 C. false D. 0 E. There is no output due to a runtime error.	
<b>QUESTION 8</b>	
What is output by the code to the right?	<pre>int k = 4; int m = 5; if ( k * m &lt; 20 )     System.out.print(0); if ( k * 7 &gt; m * 5 )     System.out.print(1); System.out.print(2);</pre>
A. 013 B. 03 C. 012 D. 3 E. 12	

<p><b>QUESTION 9</b></p> <p>Which of the following could replace <b>&lt;*1&gt;</b> in the client code at right?</p> <p>A. <code>new Trophy();</code>  B. <code>new Trophy(3, "rd");</code>  C. <code>new Trophy(1);</code>  D. A and B only  E. A, B, and C</p>	<pre>public class Trophy {     private String suffix;     private int place;      public Trophy(int p, String s)     {         place = p;         suffix = s;     }      public String toString()     {         return place + suffix;     } }</pre> <pre>//////////////////////////////////// //client code Trophy t = &lt;*1&gt;</pre>
<p><b>QUESTION 10</b></p> <p>What type of method is method <code>toString()</code>?</p> <p>A. modifier  B. fixerupper  C. accessor  D. A and B only  E. A, B, and C</p>	<pre>//////////////////////////////////// //client code Trophy t = &lt;*1&gt;</pre>
<p><b>QUESTION 11</b></p> <p>What is output by the code to the right?</p> <p>A. TH\\ \\ \\ \\AT  B. THAT  C. TH\AT  D. TH     AT  E. TH\\ \AT</p>	<pre>System.out.print("TH\\ \\ \\ \\AT");</pre>
<p><b>QUESTION 12</b></p> <p>What is output by the code to the right?</p> <p>A. 0  B. 21  C. 42  D. 85  E. 10</p>	<pre>int shift = 0b1010101; System.out.print(shift &gt;&gt; 2);</pre>
<p><b>QUESTION 13</b></p> <p>What is output by the client code to the right?</p> <p>A. -1  B. 0  C. 2  D. There is no output due to a syntax error in the code.  E. There is no output due to a runtime error.</p>	<pre>public static String su(String a) {     return a + "abc"; }  //////////////////////////////////// //client code String first = "dog"; String second = su(first); System.out.print(first.indexOf(second));</pre>

**QUESTION 25**

What is the output by the method call `whoot(5, 6)`?

- A. 10
- B. 12
- C. 14
- D. 16
- E. 18

```
public static int whoot(int a, int b){
    if(b <= 0)
        return 1;
    if(a % 2 == 0)
        return whoot(a - 1, b) + b;
    else
        return whoot(a - 1, b - 1) - a;
}
```

**QUESTION 26**

Which of the following could replace `<*1>` in the code to the right so that `names` would refer to properly instantiated list?

- A. `<>`
- B. `<String>`
- C. `[String]`
- D. A and B only
- E. B and C only

Assume question 26 was filled correctly.

```
LinkedList<String> names;
names = new LinkedList <*1> ();
```

**QUESTION 27**

What is output by the line marked `//1` in the code to the right?

- A. `[Duck, Birdy, Turkey, Raven, It]`
- B. `[Turkey, Birdy, Raven, Duck, It]`
- C. `[Duck, Turkey, Raven, Birdy, It]`
- D. `[Duck, Turkey, Birdy, Raven, It]`
- E. `[Duck, Raven, Birdy, Turkey, It]`

```
names.addFirst("Turkey");
names.addFirst("Birdy");
names.addLast("Raven");
names.addLast(names.removeFirst());
names.addLast("It");
names.addFirst("Duck");

System.out.println(names); //1

for(int i = 0; i < names.size(); i++){
    int temp = names.get(i).length() % 5;
    names.add(temp, names.remove(i));
}
```

**QUESTION 28**

What is output by the line marked `//2` in the code to the right?

- A. `RavenTurkeyDuckIt`
- B. `BirdyRavenTurkeyDuckIt`
- C. `TurkeyRavenBirdyItDuck`
- D. `RavenTurkeyDuckItBirdy`
- E. `RavenItTurkeyDuck`

```
ListIterator<String> it;
it = names.listIterator();

if(it.next().equals("It"))
    System.out.print("Found");

while(it.hasNext())
    System.out.print(it.next()); //2
```

**QUESTION 29**

What is the output by the the call jc () ?

- A. QDEFD
- B. ABCDEF
- C. QDBEFD
- D. QBDQFD
- E. QBDEFD

```
public static String wx(String a, String b){
    a = a.substring(0, a.length() - 1);
    b += b.charAt(0);
    String c = a.replaceAll("[AEI]","Q") + b;

    return c;
}
```

```
public static String dn(String a, String b){
    a = a.substring(a.indexOf("E"));
    String d = b.substring(1);
    b = wx(b, a);
```

```
    if(a.compareTo(b) > 0)
        return a + b;
```

```
    return b + a;
}
```

```
public static void jc(){
    System.out.print( wx("ABC","DEF") );
}
```

```
public static void nu(){
    System.out.print( dn("EAT","MET") );
}
```

```
public static void fa(){
    String c = wx("UNIV","INTE");
    c = dn(c, "LEAG");
    System.out.print(c);
}
```

**QUESTION 30**

What is the output by the the call nu () ?

- A. EATMET
- B. EATQEATE
- C. MEATEEAT
- D. MQEATEEAT
- E. QEATEEAT

**QUESTION 31**

What is the output by the the call fa () ?

- A. LQEIEEI
- B. LQQEIEEI
- C. QQEIEEI
- D. EIQQEIE
- E. LEIQQEI

**QUESTION 32**

What is output by the code to the right?

- A. true false true
- B. true true true
- C. false true true
- D. false false true
- E. false false false

```
Double d1 = 1.0;
Double d2 = 1.0;
Double d3 = d1;
```

```
System.out.print(d1.equals(d2) + " ");
System.out.print( (d1 == d2) + " ");
System.out.print( (d1 == d3) + " ");
```

**QUESTION 33**

What is output by the code to the right?

- A. 1.2
- B. 1.0
- C. 1
- D. There is no output due to a syntax error in the code.
- E. There is no output due to a runtime error.

```
float num1 = 4.0;
double num2 = 5.0;
double num3 = num2 / num1;
System.out.print( num3 );
```

**2012 – 2013**  
**Virtual State Qualifier's Challenge Meet**  
**Current Events Test**

1. In what has been called the worst disaster ever for the nation's \$ 20 billion per year garment industry, the death toll in \_\_\_\_\_ is reaching the hundreds following collapse of a multi-story building that was home to several clothing manufacturing facilities.  

A. India	C. Sri Lanka
B. Pakistan	D. Bangladesh
  
2. The following quotation, "The world has lost one of the great champions of freedom and liberty, and America has lost a friend" was part of a statement issued by \_\_\_\_\_ on the passing of former British Prime Minister Margaret Thatcher.  

A. President Obama	C. former president George H. W. Bush
B. former first lady Nancy Reagan	D. former Secretary of State William Baker
  
3. Marine biologists are attempting to determine why more than 1000 dehydrated and dying sea lions are being washed onto beaches in \_\_\_\_\_.  

A. Florida	C. Oregon
B. California	D. Alaska
  
4. As part of an effort to encourage more "side-by-side" workplace exchange, \_\_\_\_\_ CEO Marissa Mayer issued a ban on working at home for members of her company's workforce.  

A. Microsoft	C. Yahoo
B. Google	D. Amazon
  
5. President Barack Obama and all of the currently living former presidents attended the dedication of the George W. Bush presidential library on the campus of \_\_\_\_\_.  

A. the University of Texas	C. Yale University
B. Southern Methodist University	D. Texas Tech University
  
6. *Mercosur* is a regional trade organization located in \_\_\_\_\_.  

A. South America	C. Africa
B. Southeast Asia	D. Eastern Europe

7. Max Baucus, who represents \_\_\_\_\_ in the U.S. Senate, announced that he will not seek reelection making him the sixth Democrat who will be leaving the Senate next year
- A. Idaho  
B. Wyoming  
C. Montana  
D. Nebraska
8. The nations of Turkey and \_\_\_\_\_ continue to battle over control of the Mediterranean Island nation of Cyprus.
- A. Italy  
B. Egypt  
C. Portugal  
D. Greece
9. In spite of a declining crime rate in the city, a group of rights activists are challenging the stop-and-frisk policy in \_\_\_\_\_ because they claim it constitutes racial profiling.
- A. Boston  
B. Chicago  
C. New York City  
D. Los Angeles
10. Voters in Venezuela elected \_\_\_\_\_ as president during the aftermath of the death of the nation's long-serving leader Hugo Chavez.
- A. Tibisay Lucena  
B. Nicolas Maduro  
C. Henrique Capriles Radonski  
D. Jorge Arreaza
11. A 7.8 magnitude earthquake caused more than 30 deaths along the border between Pakistan and \_\_\_\_\_.
- A. Iran  
B. Afghanistan  
C. Bangladesh  
D. India
12. Based on data from the U.S. Census Bureau, Texas is home to four of the ten counties nationwide with the largest population growth over the past year. Which of the following counties leads not only the state, but the entire nation as well, in terms of population increase?
- A. Harris  
B. Dallas  
C. Tarrant  
D. Travis
13. All of the following are true **EXCEPT** \_\_\_\_\_.
- A. North Korean President Kim Jong Un raised concerns recently when he renounced his nation's 1953 armistice with South Korea, announced the opening of a closed nuclear facility that can generate fuel for bombs, and threatened to launch a "barrage of missiles" against the United States  
B. the number of "zero TV" households has more than doubled since 2007  
C. former Congressman Anthony Weiner is reportedly contemplating a return to politics by running for governor of his home state, New York  
D. medical officials in China are concerned about a new strain of avian flu that has claimed several lives in the eastern region of their nation

14. At least 38 people were killed when heavily armed attackers stormed into the nation's Supreme Court complex in Mogadishu, \_\_\_\_\_.
- A. Sudan  
B. Kenya  
C. Burundi  
D. Somalia
15. An extensive investigation was underway after two letters, one addressed to President Barack Obama and the other addressed to U.S. Senator \_\_\_\_\_ from Mississippi, that appeared to contain the poison ricin, were intercepted in Washington, D.C.
- A. Roger Wicker  
B. Christopher Murphy  
C. Tim Johnson  
D. Mark Pryor
16. Emeritus Pope Benedict XVI, former leader of the Roman Catholic Church, is now residing in \_\_\_\_\_.
- A. Germany  
B. France  
C. the Vatican  
D. Poland
17. An infestation of a highly destructive invasive species, the giant African land snail, is causing growing concern in south \_\_\_\_\_ where at least 1,000 of the snails are being caught in one county alone.
- A. Texas  
B. California  
C. Louisiana  
D. Florida
18. Jay Carney currently serves as the White House \_\_\_\_\_.
- A. press secretary  
B. national security advisor  
C. deputy chief of staff  
D. legal counsel
19. Angela Merkel, an increasingly influential European political figure, currently holds elective office in \_\_\_\_\_.
- A. Norway  
B. the Czech Republic  
C. Germany  
D. Sweden
20. Prosecutors in \_\_\_\_\_ announced their intention to seek the death penalty during the trial of James Holmes who is accused of killing 12 persons during a July, 2012 mass shooting at a movie theater in the state.
- A. Missouri  
B. Colorado  
C. Florida  
D. Connecticut
21. By stating that, "I'm here with the people I love to tell the city I love that I will leave the job that I love," Thomas Menino announced that he would not be seeking an historic sixth term as mayor of \_\_\_\_\_.
- A. Boston  
B. Philadelphia  
C. Baltimore  
D. San Francisco

22. Ted Cruz of \_\_\_\_\_ is gaining popularity among conservatives during his first term in the U.S. Senate.
- A. Iowa  
B. Florida  
C. Texas  
D. Arizona
23. Following a substantial government reorganization, the new prime minister of Italy is \_\_\_\_\_.
- A. Romano Prodi  
B. Enrico Letta  
C. Mario Monti  
D. Silvio Berlusconi
24. President Obama recently announced the nomination of Anthony Foxx to the cabinet position of \_\_\_\_\_ Secretary.
- A. Transportation  
B. Commerce  
C. Agriculture  
D. Education
25. Anthony Foxx, the individual noted in the previous question, was serving as mayor of \_\_\_\_\_ at the time of his appointment.
- A. Orlando, Florida  
B. Provo, Utah  
C. Charlotte, North Carolina  
D. Reno, Nevada
26. Who is Salam Fayyad?
- A. an outspoken Syrian journalist, who has been jailed multiple times because of his support for rebel groups who currently oppose the nation's president Bashar al-Assad  
B. prime minister of the Palestinian Authority who resigned following an extended period of tension between himself and the organization's president, Mahmoud Abbas  
C. an Egyptian banker, born in the United States, who is attempting to create a major African trade organization  
D. a former member of the Libyan government who is currently in exile in Iran and believed to be a close friend of several high-ranking Iranian leaders
27. Who is the current Texas Secretary of State?
- A. David Dewhurst  
B. Joe Strauss  
C. Jim Pitts  
D. John Steen
28. The Middle East nation of \_\_\_\_\_ recently blocked a visit by the United Nations' torture commission and claimed that progress was already being made in protecting human rights.
- A. Bahrain  
B. Syria  
C. Kuwait  
D. Abu Dhabi
29. Which of the following is the current U.S. Trade Representative?
- A. Sylvia Burwell  
B. Alan Krueger  
C. Demetrios Marantis  
D. Karen Mills



## 2012-2013 Virtual State Qualifiers' Challenge Meet Literary Criticism Test

### Part I. Knowledge of Literary Terms and of Literary History 30 Items (1 point each)

1. Not among the four elements which W. H. Abrams discerns in critical theories in *The Mirror and the Lamp* is
  - A) the artist.
  - B) the universe.
  - C) the work.
  - D) the genre.
  - E) the audience.
2. A configuration such that the whole possesses properties not derivable from its parts or their simple sum is
  - A) metonymy.
  - B) gestalt.
  - C) hermeneutic circle.
  - D) synecdoche.
  - E) litotes.
3. Shakespeare's "tragicomedies" are *Cymbeline*, *The Winter's Tale* and
  - A) *Troilus and Cressida*.
  - B) *As You Like It*.
  - C) *Twelfth Night*.
  - D) *Romeo and Juliet*.
  - E) *The Tempest*.
4. A kind of pun in which language is so used that it has two different but appropriate meanings as in "*Nothing is too good for him*" which sounds like a compliment but is intended as a condemnation
  - A) proem.
  - B) binary opposition.
  - C) homograph.
  - D) polysemantic.
  - E) equivoque.
5. A light form of verse promoted by Anthony Hecht where in two quatrains the first line must be a jingle, the second line a name, the last lines of each of the two required stanzas must rhyme, and the second stanza must have one line that is a single word is called
  - A) limericks.
  - B) double dactyls.
  - C) macaronic.
  - D) clerihew.
  - E) *vers de société*.
6. **Not** a witty, concise statement instilling some practical advice is
  - A) adage.
  - B) aphorism.
  - C) mantra.
  - D) maxim.
  - E) axiom.
7. One of the most complex French verse forms about a heroic subject in sixty lines with five stanzas of eleven lines each and an envoy of five lines which usually contains an invocation as in a ballade is called a
  - A) chant royal.
  - B) ottava rima.
  - C) rhyme royal.
  - D) rhyme couée.
  - E) rodомontade.
8. Rhetorical augmentation, either a piling on of detail in no particular order or a climactic arrangement advancing from small to great is
  - A) auxesis.
  - B) rhopalic.
  - C) pleonastic.
  - D) attemperation.
  - E) asynartete.
9. Any bitter speech or harangue is
  - A) esoteric.
  - B) philippic.
  - C) recondite.
  - D) pedantic.
  - E) didactic.
10. Originally, an award presented to an author who had written the most eminent piece of work in the field of idealist literature but now is a reward for a body of work in a total career is the
  - A) Pulitzer Prize.
  - B) Booker Prize.
  - C) Caldecott Medal.
  - D) Nobel Prize.
  - E) Newbery Award.
11. A rhetorical term for the sort of argument that is clearly subject to demonstration and proof is
  - A) enallage.
  - B) aporia.
  - C) excursus.
  - D) exemplum.
  - E) apodictic.
12. America's first great creative period in literature with novelists Hawthorne and Melville, poets Emerson and Longfellow, transcendental essays by Thoreau and Fuller was the
  - A) Revolutionary.
  - B) Romantic.
  - C) Conformity and Criticism.
  - D) Realistic.
  - E) Naturalistic.
13. An element in a title dealing with return is
  - A) redux.
  - B) reduplication.
  - C) récit.
  - D) redundant.
  - E) renaissance.

14. The period in British literature that began in the latter portion of the reign of Queen Victoria, continued into the reign of Edward VII, and was led poetically by Tennyson and Browning is known as
- A) Neoclassic.                      D) Romantic  
B) Modernist.                      E) Renaissance.  
C) Realistic.
15. A type of satire that deals with mental attitudes, uses plot loosely to present the world in controlled patterns, and loads up facts presented through intellectual principle is
- A) Horatian.                      D) Menippean.  
B) Augustan.                      E) Juvenalian.  
C) Aristotelian.
16. Not among William Faulkner's works is
- A) *Light in August*.                      D) *A Fable*.  
B) *The Hamlet*.                      E) *On the Road*  
C) *The Mansion*.
17. A figure in which two different senses of a single word are exploited, as in the adage attributed to Vince Lombardi:
- "If you aren't fired with enthusiasm, you will be fired with enthusiasm."
- Is known as
- A) antimasque.                      D) antanaclasis.  
B) antimeria.                      E) antanagogue.  
C) antiphon.
18. A group of Scottish writers whose work dealt idealistically with village life in Scotland, with J. M. Barrie the best-known member, is the
- A) Kailyard School.                      D) Inkhornists.  
B) Scottish Chaucerians.                      E) Hedge Club.  
C) Phosphorists.
19. Humanist scholars as Sir Thomas More and Erasmus who wanted to effect reforms in the Church using reason rather than emotions were
- A) Scholastics.                      D) University Wits.  
B) Purists.                      E) Roundheads.  
C) Oxford Reformers.
20. Winner of the 2005 Pulitzer Prize for Poetry for *Delight and Shadows* is
- A) Ted Kooser.                      D) Mark Strand.  
B) W. S. Merwin                      E) Louise Glück.  
C) Natasha Trethaway.
21. Not a multiple Pulitzer winner in drama is
- A) George S Kaufman.                      D) August Wilson  
B) Archibald MacLeish.                      E) Edward Albee  
C) Tennessee Williams.
22. The three stanzas in a Pindaric ode are strophe, antistrophe, and
- A) homostrophic.                      D) epode.  
B) epyllion.                      E) colophon.  
C) sapphic.
23. Not among the American Nobel winners that also won a Pulitzer is
- A) Ernest Hemingway.                      D) Pearl Buck.  
B) William Faulkner.                      E) John Steinbeck.  
C) Isaac Bashevis Singer.
24. A flexible lyric form, in a small number of couplets with or without rhyme, first used in Middle Eastern literature and enjoying a vogue among Americans just recently is
- A) samoyedic.                      D) ab ovo  
B) ghazal.                      E) anacalasis  
C) satem.
25. When these great figures sat down to play cards together, an anachronism would be created by
- A) Edgar Allan Poe.  
B) Abraham Lincoln.  
C) James Fenimore Cooper.  
D) Ralph Waldo Emerson.  
E) Cotton Mather.
26. The relationship between such syllables as "pal" and lap" also known as "ox plowing" is
- A) *rime couée*.                      D) *rime royal*.  
B) *rime retournée*.                      E) *rime repartee*.  
C) *rime riche*.
27. The Pulitzer Prize poetry winner in 1947 for *Lord Weary's Castle* and in 1974 for *The Dolphin* is
- A) Carl Sandburg.                      D) Robert Frost.  
B) Robert Lowell.                      E) W. S. Merwin  
C) Stephen Vincent Benét.
28. A handbook, manual, or *vade mecum* is
- A) enchiridion.                      D) eisteddfod.  
B) enantiomorph.                      E) ekphrasis  
C) elision.

29. A series of quotations—not necessarily linked in the manner of chained verse—used decoratively, such as the group of Old Testament passages preceding the Dedication of the 1655 edition of Henry Vaughn’s *Silex Scintillans* is

- A) catalexis.                      D) causerie.  
 B) catachresis.                  E) cento.  
 C) catena.

30. The intelligible use of a foreign language that one does not know is

- A) vorticism.                      D) yapp  
 B) synaeresis.                    E) xenoglossia  
 C) virgule.

**Part II. UIL Reading List**  
**20 items (2 points each)**

***The Importance of Being Earnest* by Oscar Wilde**

31. Not among the belongings Algernon brings to Jack’s country home would be

- A) three portmanteaus.        D) a dressing-case.  
 B) two hat boxes.                E) a Pullman trunk.  
 C) a large luncheon basket.

32. Gwendolyn uses a lorgnette, or

- A) a pink parasol.  
 B) eyeglasses on a handle.  
 C) a necklace with a key.  
 D) a watch pinned to her blouse.  
 E) a hat with a net to cover her face.

33. Speaker 1: “And you do not seem to realize ...that by persistently remaining single, a man converts himself into a permanent public temptation.”

Speaker 2: “But is a man not equally attractive when married?”

Speaker 1: “No married man is ever attractive except to his wife.”

Speaker 2: “”And often, I’ve been told, not even to her.”

Speaker 1 and 2 are, respectively,

- A) Jack and Algernon.  
 B) Cecily and Gwendolyn.  
 C) Prism and Chausable.  
 D) Cecily and Algernon.  
 E) Jack and Gwendolyn.

34. The character who says, “If I am occasionally a little over-dressed, I make up for it by being always immensely over-educated” is

- A) Jack.                              D. Miss Prism.  
 B) Gwendolyn.                    E. Algernon.  
 C) Cecily.

35. When Jack was missing his cigarette case, he had “been writing frantic letters to \_\_\_ about it.”

- A) Lady Bracknell.  
 B) the Crown.  
 C) Scotland Yard.  
 D) Gwendolyn.  
 E) the bobbies.

36. Algernon says, “\_\_\_\_\_ is not your forte, my dear fellow. Don’t try it. You should leave that to people that haven’t been at a University.”

- A) Bunburying.                    D) Marriage.  
 B) Literary criticism.            E) Christening.  
 C) Tea time

37. In the First Act, Algernon plans to use Bunbury to extricate himself from Aunt Augusta so that he can dine at

- A) Willis’s.                            D) Lady Harbury’s.  
 B) Cecily’s.                            E) Chasuble’s.  
 C) Jack’s.

***The Heart is a Lonely Hunter* by Carson McCullers**

38. “If you could choose the time in history you could have lived, what era would you choose?” The speaker and character spoken to are

- A) Harry to Mick.  
 B) Copeland to Singer.  
 C) Mick to Bubber.  
 D) Brannon to Blount.  
 E) Blount to Copeland.

39. When Brannon notices his special dinner on display to entice customers has a fly stuck in the dessert, he changes the display to

- A) a loaf of bread and a bottle of wine.  
 B) a cheese tray, crackers, and beer.  
 C) a reindeer with a red nose.  
 D) a red pottery bowl and fruit.  
 E) a neon sign flashing “welcome.”

40. Initially, Dr. Copeland was interested in talking to Mr. Singer because

- A) Singer paid Portia too much for ironing.
- B) Singer took Blount's side in the NY Cafe.
- C) he needed help with a deaf mute child.
- D) Singer had Copeland's cigarettes.
- E) Copeland wanted Singer to pay his bill.

41. The pharmacist Dr. Copeland uses is

- A) Marshall Nicolls.
- B) John Robert.
- C) Lancy Davis.
- D) Buddy Patter
- E) B. F. Mason

42. Mick's dad's first name is

- A) Charles.
- B) Ralph.
- C) Bill.
- D) Pete.
- E) Wilbur.

43. After Mick announces she will try for the job, her dad

- A) cries.
- B) does a magic trick for George.
- C) argues with her about the job.
- D) encourages her to ask for more money.
- E) dances a jig.

44. At the end of the novel, Brannon hears a foreign voice on the radio. He cannot determine the nationality, but historically it is probably

- A) French.
- B) German.
- C) Spanish.
- D) Cajun.
- E) Creole.

**The Eolian Harp by Samuel Taylor Coleridge**  
Composed at Clevedon, Somersetshire

My pensive Sara! thy soft cheek reclined  
Thus on mine arm, most soothing sweet it is  
To sit beside our Cot, our Cot o'ergrown  
With white-flowered Jasmin, and the broad-leaved Myrtle,  
(Meet emblems they of Innocence and Love!) 5  
And watch the clouds, that late were rich with light,  
Slow saddening round, and mark the star of eve  
Serenely brilliant (such would Wisdom be)  
Shine opposite! How exquisite the scents  
Snatched from yon bean-field! and the world so hushed! 10  
The stilly murmur of the distant Sea  
Tells us of silence.

And that simplest Lute,  
Placed length-ways in the clasping casement, hark!  
How by the desultory breeze caressed, 15  
Like some coy maid half yielding to her lover,  
It pours such sweet upbraiding, as must needs  
Tempt to repeat the wrong! And now, its strings  
Boldlier swept, the long sequacious notes  
Over delicious surges sink and rise, 20  
Such a soft floating witchery of sound

As twilight Elfins make, when they at eve  
Voyage on gentle gales from Fairy-Land,  
Where Melodies round honey-dropping flowers,  
Footless and wild, like birds of Paradise, 25  
Nor pause, nor perch, hovering on untamed wing!  
O! the one Life within us and abroad,  
Which meets all motion and becomes its soul,  
A light in sound, a sound-like power in light,  
Rhythm in all thought, and joyance everywhere— 30  
Methinks, it should have been impossible  
Not to love all things in a world so filled;  
Where the breeze warbles, and the mute still air  
Is Music slumbering on her instrument.

And thus, my Love! as on the midway slope 35  
Of yonder hill I stretch my limbs at noon,  
Whilst through my half-closed eyelids I behold  
The sunbeams dance, like diamonds, on the main,  
And tranquil muse upon tranquility:  
Full many a thought uncalled and undetained, 40  
And many idle flitting phantasies,  
Traverse my indolent and passive brain,  
As wild and various as the random gales  
That swell and flutter on this subject Lute!

And what if all of animated nature 45  
Be but organic Harps diversely framed,  
That tremble into thought, as o'er them sweeps  
Plastic and vast, one intellectual breeze,  
At once the Soul of each, and God of all?

But thy more serious eye a mild reproof 50  
Darts, O beloved Woman! nor such thoughts  
Dim and unhallowed dost thou not reject,  
And biddest me walk humbly with my God.  
Meek Daughter in the family of Christ!  
Well hast thou said and holily dispraised 55  
These shapings of the unregenerate mind;  
Bubbles that glitter as they rise and break  
On vain Philosophy's aye-babbling spring.  
For never guiltless may I speak of him,  
The Incomprehensible! save when with awe 60  
I praise him, and with Faith that inly *feels*;  
Who with his saving mercies healèd me,  
A sinful and most miserable man,  
Wildered and dark, and gave me to possess  
Peace, and this Cot, and thee, heart-honored Maid!

45. The use of o'ergrown in line 3 is

- A) aphaerisis.
- B) apocope.
- C) elision.
- D) asyndeton.
- E) brachylogia.

46. The Sara spoken to in line 1 refers to

- A) Sara Fricker.
- B) Coleridge's niece.
- C) Sarah Hutchinson.
- D) Sara Teasdale.
- E) a Greek muse.

**2012-2013**  
**Virtual State Qualifiers Challenge Meet**  
**Mathematics - Test**

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1. Evaluate  $2 \times 3 \div 5 + [7 - (11 - 13)]$

- A. 10                      B.  $10\frac{1}{5}$                       C.  $-15\frac{4}{5}$                       D.  $11\frac{3}{5}$                       E.  $12\frac{2}{5}$

2. Each set of flashcards cost \$8.00. If a teacher buys between 11 and 20 sets, the cost for each set is discounted 10%. If a teacher buys between 21 and 30, the price for each set is discounted 15%. How much more does it cost to buy 24 sets than 12 sets?

- A. \$85.40                      B. \$69.80                      C. \$38.40                      D. \$91.20                      E. \$76.80

3.  $\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix} \times \begin{bmatrix} -\frac{1}{2} & \frac{3}{2} \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  is an example of which of the following properties?

- A. additive inverse      B. additive identity      C. multiplicative inverse      D. multiplicative identity  
E. associativity

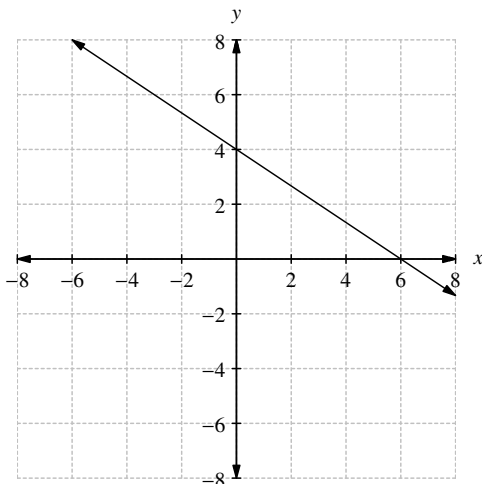
4. Alejandra is two years older than Alaina. In 2013, the ratio of their ages was 0.9. How old was Alejandra in 2005?

- A. 20                      B. 10                      C. 18                      D. 12                      E. 14

5. Let  $S$  be the set of fractions in the form  $\frac{p}{q}$ , where  $p$  is an integer and  $q$  is an odd integer. The set of integers is a subset of  $S$  since each integer  $z$  can be written as  $\frac{z}{1}$ . Under which of the following operations is  $S$  closed?

- A. +, -                      B.  $\times, \div$                       C. +, -,  $\times$                       D. +, -,  $\times, \div$                       E. +,  $\times$

6. The line perpendicular to the line shown has an  $x$ -intercept of  $-6$  and a  $y$ -intercept of  $k$ . Find  $k$ .



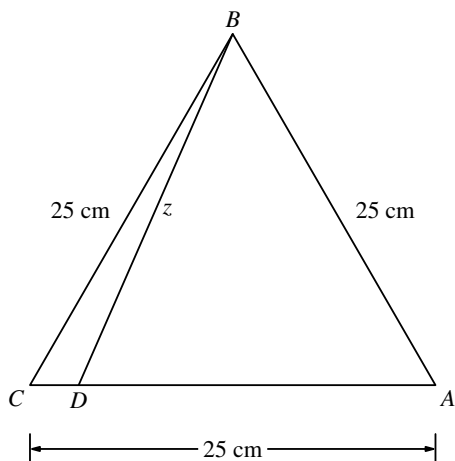
- A. -4  
B. -12  
C. 12  
D. 9  
E. 4

7. Simplify  $\left(\frac{x^3 + 1}{x^2 + 2x + 1}\right) \div \left(\frac{x^3 + x^2 + x}{x^2 - x}\right)$
- A.  $\frac{x^3 + 2x^2 + 2x + 1}{x^3 - 2x^2 + 2x - 1}$     B.  $\frac{x^3 - 2x^2 + 2x - 1}{x^3 + 2x^2 + 2x + 1}$     C.  $\frac{x^2 + x + 1}{x^2 - x + 1}$     D.  $\frac{x^2 - x + 1}{x^2 + x + 1}$     E.  $\frac{x - 1}{x + 1}$
8. Which mathematician worked on number theory and advanced the work on the proof of Fermat's Last Theorem through correspondence with Lagrange, Legendre, and Gauss only because she was not permitted to study because of her gender?
- A. Emmy Noether    B. Freda Porter    C. Ada Byron    D. Sophie Germain    E. Alicia Stott
9. If  $A$  varies inversely with  $B$  and directly with the square of  $C$  and  $A = 8$  when  $B = 3$  and  $C = 2$ , find  $B$  when  $A = 75$  and  $C = 5$ .
- A. 2    B.  $\frac{1}{2}$     C. 6    D.  $\frac{1}{6}$     E.  $\frac{1}{3}$
10. Which of the following functions is invertible?
- A.  $y = \sin x$   
 B.  $y = \frac{x-2}{x^2-4}$   
 C.  $y = |x - 3|$   
 D.  $y = [x]$ , the greatest integer function  
 E.  $y = \frac{x^2-2}{x^2+4}$
11. The probability that statement  $P$  is true is  $58\frac{1}{3}\%$ , and the probability that statement  $Q$  is true is  $10\%$ . Determine the probability that  $P \rightarrow Q$  is true. Statements  $P$  and  $Q$  are independent.
- A.  $33\frac{1}{3}\%$     B.  $37\frac{1}{2}\%$     C.  $47\frac{1}{2}\%$     D.  $52\frac{1}{2}\%$     E.  $58\frac{1}{3}\%$
12. Find the sum of the positive integral divisors of  $(7!)$ .
- A. 8160    B. 23762    C. 19344    D. 9360    E. 14105
13. How many vertices does the Platonic solid whose dihedral angle is  $\cos^{-1}\left(-\frac{1}{3}\right)$  have?
- A. 20    B. 12    C. 10    D. 8    E. 6

26. Let  $f(x) = ax^5 + bx^3 + cx + 3$ , where  $a$ ,  $b$ , and  $c$  are constants. If  $f(7) = -2$ , then  $f(-7) =$  \_\_\_\_\_
- A. 8                      B. 2                      C. -5                      D. -2                      E. 11

27. Find the volume of the Platonic solid regular dodecahedron whose sides each measure 8 cm. (Round.)
- A.  $1117 \text{ cm}^3$               B.  $3924 \text{ cm}^3$               C.  $2477 \text{ cm}^3$               D.  $241 \text{ cm}^3$               E.  $1876 \text{ cm}^3$

28. Find  $z$  if  $AD = 22$  cm. (Round.)



- A. 22.3 cm  
 B. 22.6 cm  
 C. 22.9 cm  
 D. 23.3 cm  
 E. 23.6 cm

29. The function  $f(x) = x^9 e^x$  has inflection points  $(0, 0)$ ,  $(x_1, y_1)$ , and  $(x_2, y_2)$ , with  $x_1 < x_2$ . Find  $x_1 + x_2$ .
- A. -6                      B. -9                      C. -12                      D. -15                      E. -18

30. A boat sailed from port due south for 30 minutes. Then, it turned and headed N  $40^\circ$  E for 50 minutes. At this point, the boat was 42 miles from port. Assuming the boat traveled at a constant speed, how fast was the boat traveling? (Round.)

- A. 62.1 mph              B. 65.8 mph              C. 68.7 mph              D. 72.6 mph              E. 75.9 mph

31. If  $\sqrt{x^3 \left( \sqrt[5]{x^4 \left( \sqrt[3]{x^2} \right)} \right)} = x^{n/k}$ , where  $n$  and  $k$  are relatively prime, then  $n + k =$  \_\_\_\_\_
- A. 77                      B. 89                      C. 93                      D. 105                      E. 117

32. It takes 3 fence painters 2 hours to paint 120 feet of fence. How long would it take 4 fence painters to paint 150 feet of fence?

- A.  $1\frac{5}{12}$  hr              B.  $1\frac{1}{2}$  hr              C.  $1\frac{3}{4}$  hr              D.  $1\frac{7}{8}$  hr              E.  $1\frac{5}{6}$  hr

33. For  $0 < \varphi < \frac{\pi}{2}$ , if  $\tan \varphi = A$ , what is  $\tan\left(\frac{1}{2}\varphi\right)$ ?
- A.  $\frac{A}{1+A}$       B.  $\frac{\sqrt{1+A^2}}{1+A}$       C.  $\frac{A + \sqrt{1+A^2}}{1+A}$       D.  $\frac{A}{1 + \sqrt{1+A^2}}$       E.  $\frac{A}{1+A^2}$
34. How many distinguishable arrangements can be made from the letters “DIHEDRALANGLE”?
- A. 389,188,800      B. 194,594,400      C. 97,297,200      D. 48,648,600      E. 24,324,300
35. How many solutions are there for the equation  $11x + 61y = 2013$  where both  $x$  and  $y$  are non-negative integers?
- A. 1      B. 2      C. 3      D. 4      E. 5
36. Bob is 120 feet from the base of a building. He looks up to the top of the building through an angle of  $35^\circ$ . If he walks 30 feet closer to the building, what angle should he look up through to see the top of the building? (Round.)
- A.  $40^\circ$       B.  $41^\circ$       C.  $42^\circ$       D.  $43^\circ$       E.  $44^\circ$
37. The series  $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{9} - \frac{1}{8} + \frac{1}{27} - \frac{1}{16} + \frac{1}{81} - \dots$  converges to \_\_\_\_\_
- A.  $\frac{1}{e}$       B.  $\varphi$       C.  $\frac{\pi}{6}$       D.  $\frac{1}{2}$       E.  $\frac{\sqrt{5}-1}{2}$
38. How many integers  $x$  are there such that  $3 \leq \log_4(x + 14) \leq 5$ ?
- A. 900      B. 961      C. 999      D. 1025      E. 1033
39. Let  $T = \{1, 3, 6, 10, 15\}$ . Let  $A$  equal the arithmetic mean of the elements of  $T$  and let  $H$  be the harmonic mean of the elements of  $T$ . What is the value of
- $$\log(A^6 + 6A^5H + 15A^4H^2 + 20A^3H^3 + 15A^2H^4 + 6AH^5 + H^6)?$$
- A. 3      B. 4      C. 6      D. 7      E. 10
40.  $\int \frac{x}{\sqrt{x^2 + 1}} dx = \text{_____} + C$ , where  $C$  is a constant
- A.  $x^2 + 1$       B.  $\sqrt{x^2 + 1}$       C.  $x\sqrt{x^2 + 1}$       D.  $\frac{2}{3}(x^2 + 1)^{3/2}$       E.  $\frac{1}{\sqrt{x^2 + 1}}$



# 2012-2013 Virtual Challenge State Qualifiers'

## Number Sense Test

Name _____
Grade _____
School _____
Classification _____

1 <sup>st</sup> _____	_____
2 <sup>nd</sup> _____	_____
3 <sup>rd</sup> _____	_____
Score	Initials

Directions: Do not turn this page until the proctor gives the signal to begin. This is a ten-minute test. There are 80 problems. Solve accurately and quickly as many as you can in the order in which they appear. All problems are to be solved mentally without the help of paper, pencil, or calculator. Write only the answer in the space provided at the end of each problem. Problems marked with an (\*) require approximate integral answers; any answer to a problem with an asterisk that is within five percent of the exact answer will be scored correct; all other problems require exact answers.

### STOP – WAIT FOR SIGNAL

- |  |   |
|--|---|
| <p>(1) <math>3102 - 2013 + 18 =</math> _____</p> <p>(2) <math>84 \times 75 =</math> _____</p> <p>(3) <math>8\frac{1}{16}\% =</math> _____ (Decimal)</p> <p>(4) <math>2375 \div 6</math> has a remainder of _____</p> <p>(5) <math>1\frac{4}{9} \div \frac{1}{3} =</math> _____ (Mixed Number)</p> <p>(6) <math>27^2 =</math> _____</p> <p>(7) <math>2013 \div 11 =</math> _____</p> <p>(8) <math>7\frac{1}{4} =</math> _____ %</p> <p>(9) <math>(8 \times 5) - 4^2 \div 2 + 3 =</math> _____</p> <p>*(10) <math>41235 + 1527 - 18347 =</math> _____</p> <p>(11) <math>\text{LCM}(45, 55) \times \text{GCD}(45, 55) =</math> _____</p> <p>(12) <math>432 \times 13 =</math> _____</p> <p>(13) The largest prime factor of 174 is _____</p> <p>(14) How many positive integer divisors divide 80? _____</p> <p>(15) 8 rods = _____ feet</p> <p>(16) <math>5\frac{2}{3} + 3\frac{3}{4} =</math> _____ (Mixed Number)</p> <p>(17) <math>21 \times \frac{21}{25} =</math> _____ (Mixed Number)</p> <p>(18) <math>(1 + 3 + 5 + 7 + \dots + 35) - 12^2 =</math> _____</p> <p>(19) The average of 23, 34, and 52 is _____</p> <p>*(20) <math>2012934 \div 329 =</math> _____</p> | <p>(21) The multiplicative inverse of <math>-3\frac{1}{5}</math> is _____</p> <p>(22) If 4 blips cost \$8.35, then a dozen blips cost \$ _____</p> <p>(23) <math>(13 + 17 \times 6) \div 5</math> has a remainder of _____</p> <p>(24) <math>.434343\dots + .202020\dots =</math> _____ (Fraction)</p> <p>(25) <math>17 \times 17 \times 17 =</math> _____</p> <p>(26) <math>35 \times 35 + 105 \times 105 =</math> _____</p> <p>(27) 62.5% of 80 minus 60 is _____</p> <p>(28) 184 base 10 is equivalent to _____ base 8</p> <p>(29) If <math>2x - 5 = 12</math>, then <math>6x =</math> _____</p> <p>*(30) <math>\sqrt{3135} \times \sqrt{4090} =</math> _____</p> <p>(31) If <math>a = 7</math> and <math>b = 4</math>, then <math>(a - b)(a^2 + ab + b^2) =</math> _____</p> <p>(32) <math>3\frac{1}{2} \times 4\frac{1}{3} =</math> _____ (Mixed Number)</p> <p>(33) If <math>x + y = 18</math> and <math>x - y = 22</math>, then <math>x^2 - y^2 =</math> _____</p> <p>(34) <math>43_7 \times 3_7 =</math> _____<sub>7</sub></p> <p>(35) <math>2 + 7 + 9 + 16 + 25 + \dots + 107 + 173 =</math> _____</p> <p>(36) If <math>\sqrt{75} - \sqrt{12} = \sqrt{x}</math>, then <math>x =</math> _____</p> <p>(37) <math>3!5! - 5! + 2! - 0! =</math> _____</p> <p>(38) Let <math>R = \{r, h, o, m, b, u, s\}</math>, <math>S = \{s, q, u, a, r, e\}</math> and <math>Q = \{q, u, a, r, t, s\}</math>, then the number of distinct elements in <math>S \cap Q \cap R</math> is _____</p> <p>(39) Find <math>xy</math> given the geometric sequence:<br/> <math>\frac{8}{3}, 4, x, 9, y, \dots</math> _____</p> |
|--|---|

\*(40)  $28\frac{4}{7}\% \times 3598 \div \frac{1}{14} =$  \_\_\_\_\_

(41)  $\frac{1}{8}(31^2 - 9^2) =$  \_\_\_\_\_

(42)  $\frac{7}{9} - \frac{27}{37} =$  \_\_\_\_\_

(43) An exterior angle of a regular octagon has a measure of  $k\pi$  radians, then  $k =$  \_\_\_\_\_

(44)  $\frac{7}{5} + \frac{7}{45} + \frac{7}{117} =$  \_\_\_\_\_ (Improper Fraction)

(45) The roots of  $3x^3 + 2x^2 - 7x + 5 = 0$  are P, Q, and R.  
Find  $(P + Q + R)(PQ + PR + QR)$ . \_\_\_\_\_

(46)  $\sqrt{16129} =$  \_\_\_\_\_

(47) 24% of  $416\frac{2}{3} =$  \_\_\_\_\_

(48) If  $\frac{x+11}{4-x} + \frac{4-x}{x+11}$  is written as the mixed number  $A\frac{B}{C}$ , then  $B =$  \_\_\_\_\_

(49) 90 miles per hour = \_\_\_\_\_ feet per second

\*(50)  $161.8 \times e^3 \times 3.14 =$  \_\_\_\_\_

(51)  $92^2 + 11^2 =$  \_\_\_\_\_

(52) The sum of the 8<sup>th</sup> pentagonal number and the 8<sup>th</sup> triangular number is \_\_\_\_\_

(53) If  $(3-2i)(5+2i) = a + bi$ , then  $a + b =$  \_\_\_\_\_

(54) If  $\log_x 32 = \frac{5}{3}$ , then  $x =$  \_\_\_\_\_

(55)  ${}_{11}C_3 =$  \_\_\_\_\_

(56) The number of positive integral divisors of  $3! \times 2^3 \times 3$  is \_\_\_\_\_

(57) A class has 14 seniors, 6 juniors, and  $k$  sophomores. If the probability of choosing a senior at random is  $\frac{7}{12}$ , then  $k =$  \_\_\_\_\_

(58) If  $\frac{3x}{7}$  has a remainder of 4 and  $\frac{2y}{7}$  has a remainder of 5, then  $\frac{xy}{7}$  has a remainder of \_\_\_\_\_

(59)  $6^9 \div 7$  has a remainder of \_\_\_\_\_

\*(60)  $21^2 \times 43^2 =$  \_\_\_\_\_

(61)  $(125_8 \times 234_8) \div 7$  has a remainder of \_\_\_\_\_

(62) The first 4 digits of the decimal of  $\frac{59}{90}$  is 0. \_\_\_\_\_

(63) If  $\frac{5}{9} + \frac{9}{5} + k = 3$ , then  $k =$  \_\_\_\_\_

(64) If  $\log_b 4 = 7$  and  $\log_b x = 21$ , then  $x =$  \_\_\_\_\_

(65) The area of the circumscribed circle in a 5, 12, 13-right triangle is  $k\pi$ , then  $k =$  \_\_\_\_\_

(66)  $17 \times \frac{19}{20} =$  \_\_\_\_\_ (Mixed Number)

(67) If  $\sin^2(43^\circ) + \sin^2 \theta = 1$ ,  $0^\circ \leq \theta \leq 90^\circ$ , then  $\theta =$  \_\_\_\_\_<sup>o</sup>

(68) If  $f(x) = x^4 - 4x^3 + 6x^2 - 4x + 1$ , then  $f(3) =$  \_\_\_\_\_

(69) A factory has markers that are green, red, blue, black, yellow, purple, and brown. How many different sets of 2 markers can be formed? \_\_\_\_\_

\*(70)  $18^4 =$  \_\_\_\_\_

(71) Change  $.34_5$  to a base 10 fraction. \_\_\_\_\_

(72)  $53 \times 1111 =$  \_\_\_\_\_

(73)  $f(x) = 2(x+1)^5$ ,  $f'(1) =$  \_\_\_\_\_

(74) Find  $k$ ,  $0 \leq k \leq 6$ ,  $\frac{6!}{4!} = k \pmod{7}$  \_\_\_\_\_

(75) Given the sequence 2, 3, 11, 38, 102,  $k$ , 443, ...,  $k =$  \_\_\_\_\_

(76)  $\int_1^3 (3x^2 - x) dx =$  \_\_\_\_\_

(77) If  $\arctan\left(2\cos\frac{\pi}{6}\right) = k\pi$ , then  $k =$  \_\_\_\_\_

(78)  $g(x) = 2x - 5$  and  $h(x) = 2^{x+1}$ , then  $g(h(2)) =$  \_\_\_\_\_

(79) The graph of  $f(x) = \frac{x^2 - 4x + 5}{3x - 1}$  has \_\_\_\_\_ asymptotes

\*(80) 30210 degrees = \_\_\_\_\_ radians

**Biology Questions 1-20**

1. The smooth ER is responsible for synthesizing
  - A) nucleic acids
  - B) steroids
  - C) proteins
  - D) ribosomes
  - E) ribose sugars
2. Eukaryotic cells contain lysosomes that contain
  - A) their own DNA molecules
  - B) starch molecules for energy
  - C) photosynthetic pigments
  - D) the cells' waste
  - E) digestive enzymes
3. An example of a transmembrane protein would be?
  - A) an ion channel
  - B) an LDL receptor site
  - C) a recognition signal
  - D) effector protein
  - E) glycoproteins
4. In the ABO blood groups in humans,  $I^A$  and  $I^B$  are
  - A) incompletely dominant to each other
  - B) dominant to  $I^O$
  - C) codominant to each other
  - D) both a and b
  - E) both b and c
5. A gene occupies a region on the chromosome referred to as a
  - A) phenotype
  - B) genotype
  - C) allele
  - D) loci
  - E) hot spot
6. What molecule functions to break hydrogen bonds between nucleotide bases during DNA replication?
  - A) DNA polymerase
  - B) Helicase
  - C) DNAases
  - D) ribonucleases
  - E) nucleoside triphosphates

7. Oxytocin secretions directly cause
  - A) mammary glands to produce breast milk
  - B) uterine contractions
  - C) ovulation
  - D) reabsorption of water by the kidney
  - E) both a and b
  
8. Fungal cell walls contain the polysaccharide called?
  - A) lignin
  - B) cellulose
  - C) chitin
  - D) silica
  - E) pectin
  
9. Plant cells walls are comprised mostly of
  - A) chitin
  - B) phospholipids
  - C) lectin
  - D) cellulose
  - E) plastids
  
10. After spermatogenesis, mature sperm are stored in the
  - A) epididymis
  - B) vas deferens
  - C) prostate gland
  - D) seminiferous tubule
  - E) Cowper's gland
  
11. In neurons, the action potential can be characterized as
  - A) simultaneous changes in potential along the axon
  - B) brief depolarization of the membrane potential
  - C) being blocked at certain nodes
  - D) having slowed movement down myelinated nerve cells
  - E) having different magnitudes along the same neuron
  
12. Evolution between interacting species is called
  - A) convergent evolution
  - B) mutualism
  - C) commensalism
  - D) coevolution
  - E) adaptive radiation

27. How many resonance structures does the hydrogen carbonate ion have?  
A) 0      B) 1      C) 2      D) 3      E) 4
28. Which of the following is the strongest base?  
A)  $\text{Br}^-$       B)  $\text{F}^-$       C)  $\text{NO}_3^-$       D)  $\text{Cl}^-$       E) none are bases
29. What is the pH of a solution containing 50.0 mL of 0.020 M of a weak acid ( $\text{pK}_a = 2.97$ ) and 30.0 mL of 0.020 M NaOH?  
A) 2.12      B) 7.00      C) 11.26      D) 3.15      E) 12.30
30. Consider the following electrochemical cell:  $\text{Pt(s)} \mid \text{H}_2(1 \text{ atm}) \mid \text{H}^+(? \text{ M}) \parallel \text{Ag}^+(1 \text{ M}) \mid \text{Ag(s)}$   
If the cell voltage is measured at 1.04 V at 25 C, and the standard cell potential for  $\text{Ag}^+/\text{Ag}$  is +0.80 V, what is the  $[\text{H}^+]$  in this cell?  
A) 1.0 M      B)  $9.4 \times 10^{-3} \text{ M}$       C)  $4.6 \times 10^{-10} \text{ M}$       D)  $3.7 \times 10^{-8} \text{ M}$       E)  $8.2 \times 10^{-5} \text{ M}$
31. Potassium sulfate is soluble in water. A 0.100 m aqueous solution of the compound freezes at -0.432 C. What is the percent dissociation of the salt in this solution based on the freezing point data? ( $K_f \text{ H}_2\text{O} = -1.86 \text{ C/m}$ )  
A) 100 %      B) 75%      C) 83%      D) 66%      E) 50%
32. What is the empirical formula for a hydrocarbon that produced 5.28 g of carbon dioxide and 1.62 g of water upon complete combustion?  
A) CH      B)  $\text{CH}_2$       C)  $\text{CH}_3$       D)  $\text{C}_2\text{H}_3$       E)  $\text{C}_2\text{H}_5$
33. For a reaction  $\text{A(g)} + \text{B(g)} \rightarrow \text{C(g)}$ ,  $\Delta H^\circ = -5.36 \text{ kJ}$  and  $\Delta S^\circ = -109.8 \text{ J/C}$ . At what Celsius temperature will the  $K_{\text{eq}} = 0.0100$ ?  
A) -198      B) 25.0      C) -237      D) 218      E) 75
34. Which of the following best explains why the pH of an aqueous solution of ammonium acetate is approximately 7?  
A) The salt is a product of a weak acid and a weak base.  
B) This salt does not react with water.  
C) Ammonium acetate is a weak electrolyte.  
D) The salt is a product of a strong acid and a strong base.  
E) Acetic acid and aqueous ammonia have nearly equal ionization constants.
35. Consider a set of ions (carrying charges 2- to 2+) that are isoelectronic with argon. Which of the following statements are true?  
I. The ion with the highest positive charge is the smallest in radius.  
II. The ion with the lowest atomic number has the least negative charge.  
III. All of the ions have a noble gas configuration.  
A) I only      B) II only      C) III only      D) I and III      E) I, II, III
36. A liquid has a molar heat of vaporization of 22.7 kJ. Its normal boiling point is 460. K. What will be its vapor pressure in torr at 70.0 C?  
A) 99.6      B) 580      C) 742      D) 56.8      E) 7.50
37. When considering the predicted molecular geometry of  $\text{IF}_2^-$ , what type of hybridization would be used by the iodine?  
A) sp      B)  $\text{sp}^2$       C)  $\text{sp}^3$       D)  $\text{dsp}^3$       E)  $\text{d}^2\text{sp}^3$

38. A gas has a measured density of 2.45 g/L at 25 C and 1.50 atm. Which of the following could be the gas?
- Nitrogen
  - Hydrogen fluoride
  - Hydrogen chloride
  - Carbon dioxide
  - Argon
39. Determine the standard enthalpy change for the decomposition of liquid hydrogen peroxide into gaseous oxygen and liquid water given the following:
- $$\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}_2(\text{l}) \quad \Delta\text{H} = -187.8 \text{ kJ}$$
- $$\text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) \quad \Delta\text{H} = -285.8 \text{ kJ}$$
- 187.8 kJ/mol
  - 473.6 kJ/mol
  - 98.0 kJ/mol
  - 383.8 kJ/mol
  - 98.0 kJ/mol
40. Consider the following reaction occurring at 300 K:  $2\text{A}(\text{g}) \rightleftharpoons 2\text{B}(\text{g}) + \text{C}(\text{g})$ . Substance A is placed in an empty container at an initial concentration of 0.128 M and the reaction is allowed to reach equilibrium. If at equilibrium the concentration of C is 0.0130 M, what is the equilibrium constant for this reaction at this temperature?
- $1.62 \times 10^{-2}$
  - $3.31 \times 10^{-3}$
  - $1.47 \times 10^{-3}$
  - $8.45 \times 10^{-4}$
  - $7.64 \times 10^{-5}$

### Physics Questions 41-60

41. According to Amir Aczel, if you assume a homogeneous, isotropic, constant-curvature universe, Einstein's equation without the cosmological constant simplifies to the scalar differential equation

$$\left(\frac{R'}{R}\right)^2 + \frac{k}{R^2} = \left(\frac{8\pi G}{3}\right)\rho$$

This model assumes a/an \_\_\_\_\_ dominated universe.

- mass
  - temperature
  - time
  - electric charge
  - magnetic field
42. The parameter determining the geometry of the universe is now partitioned as  $\Omega = \Omega_M + \Omega_\Lambda$ . The fate of the universe is determined almost entirely by  $\Omega_\Lambda$ , which is the amount of \_\_\_\_\_.
- broken symmetries
  - dark matter
  - red shift
  - curvature
  - funny energy
43. When Paul Steinhardt was revising Guth's inflationary model of the universe, he created a new model called extended inflation. In this theory, very early in the life of the universe the gravitational constant was not the same as it is today. During the early epoch called the \_\_\_\_\_ time, and lasting the first  $10^{-44}$  second from the big bang, quantum effects were present.
- Hawking
  - Heisenberg
  - Planck
  - Guth
  - Steinhardt
44. Neil Turok and Stephen Hawking proposed the existence of the \_\_\_\_\_, a particle of highly compressed space and time.
- graviton
  - Higgs boson
  - tau neutrino
  - pion
  - instanton
45. A step-up transformer increases the \_\_\_\_\_ in the secondary.
- power
  - current
  - voltage
  - frequency
  - resistance

46. A stunt car, moving 40 m/s, is to jump between two identical ramps. Find the maximum distance between the ramps so that the stunt car can just reach the second ramp.  
(A) 127 m (B) 139 m (C) 151 m (D) 163 m (E) 175 m
47. An underground cable consisting of two parallel wires develops a defect so that there is a leakage current between the wires. Each of the wires has a resistance of  $40 \Omega/\text{km}$  and is 15 km long. To find the location of the fault, the resistance between the wires is measured at one end while the other end is not connected. Then, in a similar manner, the resistance is measured at the opposite end. If the measured resistance at one end is  $700 \Omega$  and the measured resistance at the other end is  $840 \Omega$ , how far from the first end is the fault?  
(A) 6.23 km (B) 6.63 km (C) 7.03 km (D) 7.43 km (E) 7.83 km
48. A satellite is in a circular orbit around the Earth and it takes five hours to complete an orbit. If the mass of the Earth is one-fifth of its current mass and the radius was five times the current radius, the satellite's orbit would be \_\_\_\_\_ hours.  
(A) 0.04 (B) 0.20 (C) 5 (D) 25 (E) 125
49. A 2.2-kg pulley in the form of a disk is mounted on a horizontal rod. The pulley has a long thin cord wrapped around it. A 1.4-kg bucket is attached to the end of the cord and hangs down. The radius of the pulley is 12 cm. The bucket is released and accelerates downward. Find the tension in the cord.  
(A) 6.04 N (B) 6.48 N (C) 6.92 N (D) 7.36 N (E) 7.80 N
50. The focal length of the lens of a camera is 40 mm. The nearest distance the camera can focus is 80 cm. Find the total movement of the lens when changing the focal point from the nearest point to infinity.  
(A) 2.1 mm (B) 2.4 mm (C) 2.7 mm (D) 3.0 mm (E) 3.3 mm
51. A 12.0-g mass is resting on a turntable exactly 10.0 cm from the center. The turntable slowly increases its rotational speed until it reaches 48.0 rpm and the mass begins to slide off. Find the coefficient of static friction between the mass and the turntable.  
(A) 0.198 (B) 0.258 (C) 0.309 (D) 0.366 (E) 0.415
52. Mr. Ryan went to the Arlington County Fair where he decided to ride "The Drum." He found himself in a hollow cylinder with a diameter of 6.64 m and he stood with his back against the wall. The cylinder began to rotate until it reached a certain angular velocity and then the floor dropped away. The coefficient of friction between Mr. Ryan and the wall was 0.285. Find the minimum angular frequency the cylinder must achieve so that Mr. Ryan doesn't slide down the wall of the cylinder.  
(A) 4.55 rad/s (B) 4.04 rad/s (C) 3.67 rad/s (D) 3.22 rad/s (E) 2.90 rad/s
53. A mass is suspended from a vertical spring. When set into vertical oscillation, the frequency is 1.60 Hz. An additional 2.40-kg mass is added to the original mass and the new frequency is 0.800 Hz. Find the original mass.  
(A) 0.800 kg (B) 1.00 kg (C) 1.20 kg (D) 1.40 kg (E) 1.80 kg
54. A clock consists of a simple pendulum made of aluminum ( $\alpha = 25 \times 10^{-6} (\text{C}^\circ)^{-1}$ ). If it keeps perfect time when it is stored at  $18^\circ\text{C}$ , how many seconds per day is the clock off when it stored at  $24^\circ\text{C}$ ?  
( $g = 9.80 \text{ m/s}^2$ )  
(A) 3.77 s (B) 6.48 s (C) 9.33 s (D) 12.6 s (E) 15.3

41-44. God's Equation, Amir Aczel, Four Walls Eight Windows, New York, 1999

41. Page 191    42. Page 195    43. Page 197-198    44. Page 213

46.  $d = \frac{40^2}{9.8} = 163 \text{ m}$     47.  $x(40) + R + x(40) = 700$   
 $(15-x)40 + R + (15-x)40 = 840$   
 $x = 6.63 \text{ km}$     48.  $T = \sqrt{\frac{4\pi^2 r^3}{Gm}}$   
 $T = 5 \cdot \sqrt{\frac{5^3}{\frac{1}{5}}} = 125 \text{ h}$

49.  $Tr = .5Mr^2 \frac{a}{r}$   
 $T = .5Ma$   
 $mg - T = ma$   
 $a = \frac{mg}{.5M + m}$   
 $a = \frac{1.4(9.8)}{.5(2.2) + 1.4}$   
 $a = 5.488$   
 $T = .5(2.2)(5.488)$   
 $T = 6.04 \text{ N}$

50.  $\frac{1}{40} = \frac{1}{800} + \frac{1}{d_i}$   
 $d = 42.1$   
 $\frac{1}{40} = \frac{1}{\infty} + \frac{1}{d_i}$   
 $d = 40$   
 $42.1 - 4 =$   
 $2.1 \text{ mm}$

51.  $\mu mg = \frac{mv^2}{r}$   
 $v = \omega r$   
 $\mu = \frac{\omega^2 r}{g}$   
 $\omega = \frac{48(2\pi)}{60}$   
 $\mu = .258$

52.  $\frac{\mu mv^2}{r} = mg$   
 $v = \omega r$   
 $\omega = \sqrt{\frac{g}{\mu r}}$   
 $\omega = \sqrt{\frac{9.8}{.285(3.32)}}$   
 $\omega = 3.22 \text{ rad/s}$

53.  $\Delta L = 1(25 \times 10^{-6})6 = .00015$   
 $T_1 = 2\pi \sqrt{\frac{1}{9.8}} = 2.0070...$   
 $T_2 = 2\pi \sqrt{\frac{1.00015}{9.8}} = 2.0072...$   
 $1.6 = \frac{1}{2\pi} \sqrt{\frac{k}{m}}$   
 $k = m(1.6 \times 2\pi)^2$   
 $.8 = \frac{1}{2\pi} \sqrt{\frac{m(1.6 \times 2\pi)^2}{m + 2.4}}$   
 $m = .800 \text{ kg}$

54.  $24(3600) = 86,400$   
 $\frac{86400}{T_1} = 43,047.3986258 \text{ (A)}$   
 $\frac{86400}{T_2} = 43,044.170434 \text{ (B)}$   
 $A - B = 3.2281917 \text{ (C)}$   
 $C \times T_1 = 6.48 \text{ s}$

55.  $V = \frac{51 \times 10^{-9}}{680 \times 10^{-12}}$   
 $V = 75.0 \text{ V}$

56.  $\frac{1}{x^2} = \frac{4}{(4-x)^2}$   
 $x = 1.33 \text{ cm}$

57.  $136 = 10 \log \frac{I}{10^{-12}}$   
 $I = 10^{1.6}$   
 $\beta = 10 \log \frac{.5 \times 10^{1.6}}{10^{-12}}$   
 $\beta = 133 \text{ dB}$

58.  $qvB = \frac{mv^2}{r}$   
 $mv = 3.48(1.96)2.44$   
 $mv = 16.6 \text{ kg} \cdot \text{m/s}$

59.  $\frac{4}{3} \pi r^3 =$   
 $\frac{4\pi r^2 (.0005)1.22(1000) + 3.2}{1.29 - .84}$   
 $r = 4.16 \text{ m}$

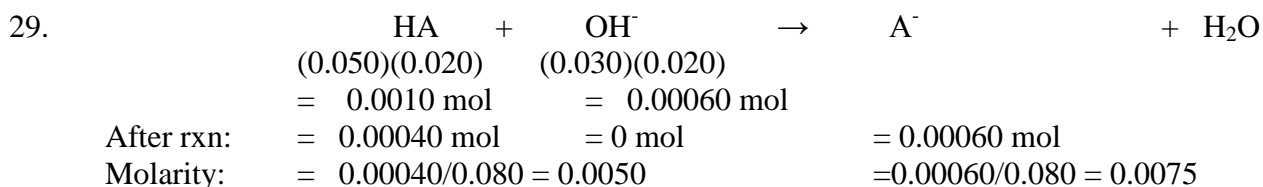
60.  $T = \frac{1}{1.44} = .69\bar{4}$   
 $\frac{10}{(.69\bar{4})^2} = \frac{14.25}{T^2}$   
 $T = .82898$   
 $f = \frac{1}{.82898}$   
 $f = 1.21 \text{ Hz}$



## Science 2012-2013 Virtual Challenge State Qualifiers' Meet Test Chemistry Solutions

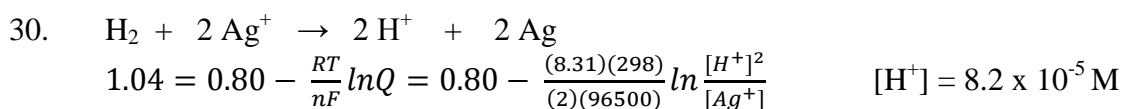
$$26. [\text{Ca}^{2+}] = (0.100)(2.0 \times 10^{-5}) / 0.200 = 1.0 \times 10^{-5} \text{ M} \quad [\text{F}^-] = (0.100)(2.0 \times 10^{-2}) / (0.200) = 1.0 \times 10^{-2} \text{ M}$$

$$Q_{\text{sp}} = [\text{Ca}^{2+}][\text{F}^-]^2 = (1.0 \times 10^{-5})(1.0 \times 10^{-2})^2 = 1.0 \times 10^{-9} < K_{\text{sp}} = 5.3 \times 10^{-9}, \text{ no ppt}$$



$$\text{HA} + \text{H}_2\text{O} \rightarrow \text{A}^- + \text{H}_3\text{O}^+ \quad K_{\text{a}} = 10^{-2.97} = 1.07 \times 10^{-3}$$

$$K_{\text{a}} = \frac{(0.0075+x)(x)}{(0.0050-x)} = 1.07 \times 10^{-3} \quad x = \text{H}_3\text{O}^+ = 7.13 \times 10^{-4} \quad \text{pH} = 3.15$$



$$31. -0.432 = (-1.86)[\text{free ions} + \text{remaining non-dissociated particles}]$$

$$= (-1.86)[(3)(0.100)(x) + (0.100 - 0.100(x))]$$

$$x = 0.66 = 66\% \quad 66\% \text{ of the original formula units dissociated based on the data}$$

$$32. 5.28 \text{ g CO}_2 \left( \frac{12 \text{ g C}}{44 \text{ g CO}_2} \right) = 1.44 \text{ g C} \left( \frac{1 \text{ mol}}{12 \text{ g}} \right) = 0.12 \text{ mol C}$$

$$1.62 \text{ g H}_2\text{O} \left( \frac{1 \text{ g H}}{18 \text{ g H}_2\text{O}} \right) = 0.18 \text{ g H} = 0.18 \text{ mol H}$$

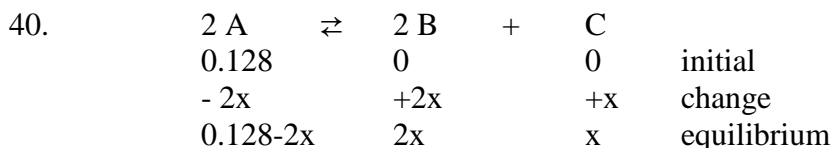
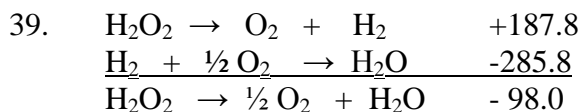
$$\text{Ratio is } 2 \text{ C} : 3 \text{ H}$$

$$33. \Delta G = \Delta H - T\Delta S = -RT \ln K \quad -5360 - (T)(-109.8) = -(8.31)(T) \ln(0.0100)$$

$$T = 75 \text{ K} = -198 \text{ C}$$

$$36. \ln \left( \frac{x}{760} \right) = \frac{22700}{8.31} \left( \frac{1}{460} - \frac{1}{343} \right) \quad x = 99.6 \text{ torr}$$

$$38. \text{MM} = \frac{dRT}{P} = \frac{(2.45)(0.0821)(298)}{1.50} = \frac{39.9 \text{ g}}{\text{mol}}$$



If  $[\text{C}]_{\text{eq}} = 0.0130 \text{ M}$ , then  $x = 0.0130 \text{ M}$ .

$$[\text{A}]_{\text{eq}} = 0.102 \text{ M} \quad [\text{B}]_{\text{eq}} = 0.0260 \text{ M} \quad [\text{C}]_{\text{eq}} = 0.0130 \text{ M}$$

$$K = \frac{[\text{B}]^2[\text{C}]}{[\text{A}]^2} = \frac{(0.0260)^2(0.0130)}{(0.102)^2} = 8.45 \times 10^{-4}$$

2013 Virtual State Qualifiers' Challenge Meet  
Social Studies Exam

**Part I: General knowledge questions (1) point each**

1. Which tribe referred to as the Mayeyes, contained a number of smaller groups including the Cava, Cantona, Emet, Sana, Toho, and Tohaha Indians?
  - a. Kiowa
  - b. Coushatta
  - c. Tonkawa
  - d. Apache
  
2. Who was the last principal chief of the Kiowa who chose not to sign the Medicine Lodge Treaty?
  - a. Old Bear
  - b. Lone Wolf
  - c. Little Turtle
  - d. Sundance
  
3. Which of the following individuals is NOT correctly matched with his tribe?
  - a. Russell Means – Chippewa
  - b. Alexander McGillivray – Creek
  - c. Miantonomo – Narragansett
  - d. Black Elk – Oglala Sioux
  - *Raised near Laguna and Acoma Pueblo Reservations*
  - *1978 National Endowment for the Arts fellowship*
  - *Poet and writer who raised the importance of women in traditional Indian culture*
  
4. Which individual is described above?
  - a. Paula Gunn Allen
  - b. Anna Mae Aquash
  - c. Winona LaDuke
  - d. Maria Martinez
  
5. All of the following were once part of the Iroquois Confederacy EXCEPT:
  - a. Mohawk
  - b. Seneca
  - c. Oneida
  - d. Mohegan
  
6. Which of the following was **NOT** a member of the Seminole tribe?
  - a. William McIntosh
  - b. Billy Bowlegs
  - c. Osceola
  - d. Betty Mae Jumper

7. The Papago were at one time called tepary-bean eaters by the Spanish and other near by tribes, but were also known as the...

- a. Navaho
- b. Pueblo
- c. Tohono O'odham
- d. Yokut

- *Chief of the Mimbrenos group of Apache of Southwest New Mexico*
- *Natural leader and unusually tall for an Apache*
- *Friends with the US when they defeated Mexico*
- *Suffered a humiliating flogging at the hands of some miners leading to continuous warfare until he was finally captured and killed by Union soldiers in 1863*

8. Which famous Native American leader is described above?

- a. Geronimo
- b. Mangas Coloradas
- c. Victorio
- d. Cochise

9. Captain Jack, leader of the Modoc tribe, led a revolt beginning in 1872 after agreeing to live on a reservation with the \_\_\_\_\_ tribe.

- a. Hoopa
- b. Pascua
- c. Havasupai
- d. Klamath

10. The Modoc tribe was originally located in which US states?

- a. Arizona/New Mexico
- b. California/Oregon
- c. Oregon/Washington
- d. Arizona/California

11. In 1618, \_\_\_\_\_ became Powhatan chief after the death of his brother Powhatan.

- a. Uncas
- b. Miantonomo
- c. Opechancanough
- d. Samson Occom

I. Big Tree and Satanta are arrested for their attack on a wagon train

II. The Northern Cheyenne escape their reservation in Oklahoma

III. The Nez Perce War began over American deaths on the Salmon River

IV. The Fifteenth amendment was ratified recognizing the right of all men to vote including Indians

12. Rank the above events beginning with the earliest.

- a. IV, I, III, II
- b. II, III, I, IV
- c. IV, III, II, I
- d. I, IV, II, III

25. Who was Wilson P. Plummer?
- a. The father of Rachel Plummer
  - b. The husband of Rachel Plummer
  - c. The infant son of Rachel Plummer
  - d. The adopted native child of Rachel Plummer
26. According to SC. Gwynne, the \_\_\_\_\_ had been the first North American Indians to understand what hunters and raiders could do with a horse; the other tribes would soon learn.
- a. Comanche
  - b. Apache
  - c. Cheyenne
  - d. Kiowa
27. Who were the only adversaries the Comanche would not scalp?
- a. Comancheros
  - b. Tonkawas
  - c. Surveyors
  - d. Buffalo soldiers
28. The Battle of Pease River was also known as the ...
- a. North Fork Fight
  - b. Coyote Creek Fight
  - c. Mule Creek Fight
  - d. Clear Creek Fight
29. After being satisfied that Cynthia Ann Parker was his niece, \_\_\_\_\_ took her and her daughter Prairie Flower home with him to live in Birdville.
- a. Silas Parker
  - b. Isaac Parker
  - c. James Parker
  - d. Daniel Parker
- She went out to a smooth place on the ground, cleaned it off very nicely and made a circle and a cross. On the cross she built a fire, burned some tobacco, and then cut a place on her breast and let the blood drop onto the fire. She then lit her pipe and blowed smoke toward the sun and assumed an attitude of the most sincere devotion.*
30. Who is the above book quote referring to?
- a. Cynthia Ann Parker
  - b. Rachel Plummer Parker
  - c. Matilda Lockhart
  - d. Malinda Ann (Minnie) Caudle
31. Quanah's second wife whom he eloped with was named \_\_\_\_\_.
- a. Weckeah
  - b. Batsena
  - c. Eckitoacup
  - d. Keechis

32. The father-in-law of Quanah's second wife who opposed the marriage was named \_\_\_\_\_.
- a. Kwihnai
  - b. Little Buffalo
  - c. Pah-hah-yuco
  - d. Old Bear
33. In 1869, Lawrie Tatum arrived in Texas. Which phrase below best describes his job title?
- a. Mule Skinner
  - b. Union General
  - c. Quaker Agent
  - d. Land Surveyor
34. Which legendary Native American leader shot and killed private Seander Gregg?
- a. Peta Nocona
  - b. Quanah Parker
  - c. Big Tree
  - d. Satanta
35. For his actions at Blanco Canyon, \_\_\_\_\_ was awarded the Congressional Medal of Honor?
- a. Ranald S. Mackenzie
  - b. A.F. Corning
  - c. Robert G. Carter
  - d. Sul Ross

**Part III: Texas State Historical Association (3) points each**

36. Richard Irving Dodge presented a somewhat inaccurate narrative of which Red River War battle in an episode of his book *Our Wild Indians* published in 1882?
- a. Battle of the North Fork of the Red River
  - b. Battle of Palo Duro Canyon
  - c. Buffalo Wallow Fight
  - d. Salt Creek Massacre
37. All of the following were considered part of the Apache Tribe EXCEPT:
- a. Lipan
  - b. Hasinai
  - c. Chiricahua
  - d. Mescalero
38. The Spanish first contacted the Apaches in 1541, when \_\_\_\_\_ and his men encountered a band of "Querechos" on the journey to Quivira.
- a. Don Juan de Ornate
  - b. Hernando Cortez
  - c. Diego Ortiz Parrilla
  - d. Francisco de Coronado
39. Fort McKavett was located in which Texas County?
- a. Menard
  - b. Limestone
  - c. Crockett
  - d. Kinney

**VIRTUAL CHALLENGE MEETS  
INVITATIONAL 6 PART IA PROOFREADING (15 POINTS)**

**SPELLING 2012-2013  
STUDENT NUMBER\_\_\_\_\_**

This portion assesses your ability to recognize misspelled words from the 2012-2013 UIL Word Power list. In each of the following sets, one word is incorrect. Errors may be in capitalization, the use of accent marks, apostrophes and hyphens, or in spelling. Do not correct words having alternate spellings if the word shown is a correct form of the word. Do not use a capital unless one is required. Write the word correctly in the blank provided. Each blank is worth **one point**.

1. printer's devil                      tryptich                      kefir                      1. \_\_\_\_\_

                    epaulette                      Van Allen belt

2. Masora                      empresment                      ihram                      2. \_\_\_\_\_

                    deism                      ichthyic

3. misattribution                      offendi                      terraqueous                      3. \_\_\_\_\_

                    decalcomania                      riposte

4. zenophile                      émigré                      gentrification                      4. \_\_\_\_\_

                    Laotian                      willy—nilly

5. plaice                      tarot                      Quetzalcoatl                      5. \_\_\_\_\_

                    acromatic                      flexitime

6. Pawtucket                      panagyrist                      ragwort                      6. \_\_\_\_\_

                    stalwart                      tête-à-tête

7. abscissa                      stickle                      doxology                      7. \_\_\_\_\_

                    accumulative                      shaloon

8. ahimsa                      incorporeal                      moyen âge                      8. \_\_\_\_\_

                    Clausewitz                      loci

**INVITATIONAL 6: PART IA PROOFREADING**

**STUDENT NUMBER** \_\_\_\_\_

9. pococurante      hardscrabble      nulle prosequi  
                         piccolo      stenophagous

9. \_\_\_\_\_

10. tandoor      maxillofacial      rorborant  
                         meroplankton      Kiddush

10. \_\_\_\_\_

11. altizimuth      semiautonomous      moulage  
                         rhytidectomy      cabretta

11. \_\_\_\_\_

12. unciform      Pampean      magniloquent  
                         primogeniter      yenta

12. \_\_\_\_\_

13. Hebraist      democratization      ossature  
                         meliorate      rabble rouser

13. \_\_\_\_\_

14. chersonese      reminiscence      pheromone  
                         Grecism      arophobia

14. \_\_\_\_\_

15. scrobiculate      lorgnette      seroconversion  
                         excimer      means test

15. \_\_\_\_\_

**TOTAL POINTS PART IA    15**  
**MINUS ERRORS            \_\_\_\_\_**  
**NET SCORE PART IA        \_\_\_\_\_**

## **PART IA - GRADER'S KEY**

**1. triptych**

**2. empressement**

**3. effendi**

**4. xenophile**

**5. achromatic**

**6. panegyrist**

**7. shalloon**

**8. moyen âge**

**9. nolle prosequi**

**10. roborant**

**11. altazimuth**

**12. primogenitor**

**13. rabble—rouser**

**14. aerophobia**

**15. lorgnette**



**VIRTUAL CHALLENGE MEETS**  
**INVITATIONAL 6: PART IB VOCABULARY (15 POINTS)**

**SPELLING 2012-2013**  
**STUDENT NUMBER \_\_\_\_\_**

This is a test to determine how well you know the meanings and origins of the words on the vocabulary portion of the *UIL Word Power*. Test words are taken from the asterisk word list, their roots, definitions, and synonyms or antonyms. Select the **best** answer from the choices given. Please use **CAPITAL** letters for your answers. Each blank is worth **one point**.

16. \_\_\_\_\_ Socioreligious groups often emphasize differences, embracing \_\_\_\_\_ followers who may even become hostile against moderate opponents within their group.
- A. **persnickety**
  - B. **resplendent**
  - C. **impious**
  - D. **factionous**
  - E. **invariable**
17. \_\_\_\_\_ *Musa paradisiaca* is a broad-leafed tropical plant also known by the names ribwort and \_\_\_\_\_.
- A. **pleuston**
  - B. **laureate**
  - C. **plantain**
  - D. **mariposa lily**
  - E. **silage**
18. \_\_\_\_\_ Survivalists who depend upon advice that moss always grows on the north side of a tree assume that such plant growth is \_\_\_\_\_.
- A. **unilateral**
  - B. **scutellate**
  - C. **peripheral**
  - D. **unilocular**
  - E. **abaxial**
19. \_\_\_\_\_ The poetic translation of the text focuses on breaking each line with commas or periods- not on rhyming or poetic structure.
- A. **meiosis**
  - B. **encomiast**
  - C. **definiens**
  - D. **chrestomathy**
  - E. **stichometry**
20. \_\_\_\_\_ From Hindi for *learned man*, a \_\_\_\_\_ is a high-class citizen responsible for teaching the Brahman Vedas to the lower classes of India.
- A. **sannyasi**
  - B. **pundit**
  - C. **pontiff**
  - D. **despot**
  - E. **haruspex**

32. trapunto (truh-**POOHN**-toh)
33. opisthagnathous (**ahp**-is-**THAHG**-nuh-thuhs)
34. nullah (**NUL**-uh)
35. **teetotaller, teetotaler**\* (tee-**TOH**-tuh-luhr) n. One who abstains completely from alcoholic beverages

7 minutes

36. glabrous (**GLAY**-bruhs)
37. **Kulturkampf**\* (kool-**toor**-**kahmf**) n. The nineteenth-century struggle between the Roman Catholic Church and the German government under Bismarck for control over school and ecclesiastical appointments and civil marriage; a conflict between secular and religious authorities
38. popinjay (**PAHP**-in-jay)
39. corroborating (kuh-**RAHB**-uh-rayt-ing)
40. **politburo**\* (pol-iht-**byoor**-oh, puh-liht-**byoor**-oh) n. The chief political and executive committee of a Communist party

8 minutes

41. avuncular (uh-**VUNG**-kyuh-luhr)
42. ring-necked pheasant (**RING**-nekt **FEZ**-uhnt)
43. **vichyssoise**\* (vish-ee-**SWAHZ**, vee-shee-**SWAHZ**) n. A thick creamy potato soup flavored with leeks or onions, usually served cold
44. oxbow (**AHKS**-boh)
45. Kierkegaard (**KIR**-ki-gahrd, -gawr)

9 minutes

46. parotitis (**par**-uh-**TII**-tis)
47. stogy, stogie (**STOH**-gee)
48. gaucherie (**goh**-shuh-**REE**)
49. **bivouacked**\* (bih-**voo**-acked, **BIHV**-wacked) intr. v. Temporarily encamped, often in an unsheltered area
50. communiqué (kuh-**myoo**-ni-**KAY**, -**MYOO**-ni-kay)

10 minutes

51. phlox, Phlox (flahks)
52. double indemnity (DUB-uhl in-DEM-ni-tee)
53. redivivus (red-uh-VII-vuhs, -VEE-)
54. **Kshatriya**\* (kuh-shat-ree-uh, kuh-chat-ree-uh) n. A member of the second highest of the four castes of traditional Indian society, responsible for upholding justice and social harmony, including people in governing and military positions
55. vernissage (ver-ni-SAHZH)

11 minutes

56. eschew (es-CHOO)
57. phosphorus (noun) (FAHS-fuhr-uhs)
58. gulag, Gulag (GOO-lahg)
59. **insouciant**\* (in-SOO-see-uhnt, ahns-syan) adj. Marked by blithe unconcern; nonchalant
60. mise en scène (sing.) (meez ahN SEN)

12 minutes

61. **wherewithal**\* (war-with-ol, hwar-with-ol) n. The necessary means, especially financial means
62. Augean (aw-JEE-uhn)
63. countercoup (KOUN-tuhr-koo)
64. Yuchi (YOO-chee)
65. bullion (BOOHL-yuhn)

13 minutes

66. **molybdenum**\* (muh-lihb-duh-nuhm) n. A hard, silvery-white metallic element used to toughen steels and in corrosion-resistant nickel alloys; an essential trace element in plant nutrition
67. x-ray astronomy (EKS-ray uh-STRAHN-uh-mee)
68. barberry (BAHR-ber-ee)
69. prestidigitation (pres-ti-dij-i-TAY-shuhn)
70. **ornithischian**\* (or-nuh-THIHS-kee-uhn) adj. Any of various herbivorous dinosaurs, including hadrosaurs and stegosaurs, having a pubic bone that points down and backward like that of modern birds, usually a horny beak or bill

14 minutes