


Name: _____

Date: _____

Lets have some analytical math fun ...

1 Christmas elves packed 256 boxes of gifts. All gifts are identical in weight and dimension. Unfortunately, Santa realizes that he lost one of his heavy dirty sweaty wool sock. One of elves sadly admitted that he packed it away in additional the original gift inside of the boxes because he thought it was meant for a badly behaved kid. Now, angry Santa had to identify which box has the dirty sock as quickly as possible using a balance scale. What is the minimal number of times that he has to weigh the 256 socks?



2 Given the following rules : For every opening '{', there must be a closing '}'. For every opening '(', there must be closing ')'. There must be a ';' embedded in-between each pair.

An opening symbol must have its own closing symbol before another opening symbol is allowed. e.g.

{ (;) ; } = Pattern is broken. { (;) ; } = Pattern is complete.

Answer T or F as True or False (T=Pattern is complete or F=Pattern is broken) for the following patterns:

{ (;) ; } { }	
{ (;) ; { (;) } }	
{ (; ;) } { }	
{ ; { (;) } }	

{ { (;) ; } ; }	
{ { (; (;)) ; } (;) }	
{ { (; (;)) ; } (;) ; }	
{ { (; (;)) ; } (;) ; }	

3 Symbol '&' means "and". Symbol '|' means "or". "!" means negation. Answer T or F.

10 > 11 & 11 > 0	
10 > 11 11 > 0	
10 > 11 & 11 < 0	
10 > 11 11 < 0	

!(10 > 11 & 11 > 0)	
!(10 >= 11 & 11 > 0)	
10 < 11 & 11 != 0	
10 < 11 11 != 0	


4	<p>Alien from planet Num A=90, B=91...Z=115. Its neighbor planet Quo speaks number only too, but with different set, e.g. A=60 B=61... Z=85. Create a simple formula using '+' and/or '-' to convert ROBOTS from Alien Num language to Alien Quo language without even referencing the numbers</p>
5	<p>NEW YORK can be encrypted as PGYAQTM. What is the encrypted code for HAIWAI ?</p>
6	<p>Distance from the car to the cliff is 100 meters. A blind man is driving a car towards the cliff, but must stop right before it drops off to his demise. . His car's wheel measures 2 meters wide, and makes a sharp clunk sound after each full rotation. He has to count the number of 'clunk' sound. So, what is the maximum number of 'clunk' sound should be allowed?</p>
7	<p>If $a \blacktriangle b$ means $a + a - b$ and the value of $(5 \blacktriangle 3) \blacktriangle Z$ is 12, find Z .</p>
8	<p>If $3a = 4b = 5c$ and $a*b*c = 450$, what are a,b, and c?</p>
9	<p>The product of 3 whole numbers is 60. The numbers are all different and greater than 1. The sum of the 3 numbers is 13. What are the numbers?</p>



BONUS													
10	<p>You are in a roomful of 20 people. Everyone is asked to shake hands with everyone. How many handshakes will there be? How can you figure this out? What strategies will you use?</p>												
11	<p>Judy's clock loses 15 minutes very hour. The clock is set at the correct time at 9 am. What is the correct time when Judy's clock first shows 11am. ?</p> <table border="1"> <tr> <td></td> <td>Judy's clock</td> <td>Correct time</td> </tr> <tr> <td></td> <td>Every 45</td> <td>Every 60</td> </tr> <tr> <td>ratio</td> <td>3</td> <td>4</td> </tr> <tr> <td>From 9 to 11</td> <td>120 min</td> <td>160 min</td> </tr> </table> <p>9am + 160 minutes = 11:40 am</p>		Judy's clock	Correct time		Every 45	Every 60	ratio	3	4	From 9 to 11	120 min	160 min
	Judy's clock	Correct time											
	Every 45	Every 60											
ratio	3	4											
From 9 to 11	120 min	160 min											

Answers

<p>1</p>	<p>Christmas elves packed 256 boxes of gifts. All gifts are identical in weight and dimension. Unfortunately, Santa realizes that he lost one of his dirty sock will filled with soil. One of elves sadly admitted that he packed it away inside of the boxes because he thought it was meant for a badly behaved kid. Now, angry Santa had to identify which box has the dirty sock as quickly as possible. . What is the minimal number of times that he has to weigh the 256 socks?</p> <p>Most will say: Weigh two half groups at a time. Take the lower half... weigh again. Thus it will take 8 times : 128 64 32 16 8 4 2 1</p> <p>However, actually it is 5 or 6: 86 86 84 if 86 vs 86 weights the same, the dirty sock must be in the 84 pile 28 28 28 assuming 1st two 28 vs 28 weigh the same 10 10 8 6 6 2 1 1 done. 5 times best case</p> <p>But 6 times worst case; if the equal pairs weight differently every time.</p>																				
<p>2</p>	<p>Given the following rules : For every opening '{' , there must be a closing '}'. For every opening '(', there must be closing ')'. There must be a ';' embedded in-between each pair.</p> <p>An opening symbol must have its own closing symbol before another opening symbol is allowed. e.g. { (;) ; } = Pattern is broken. { (;) ; } = Pattern is complete.</p> <p>Answer T or F as True or False (T=Pattern is complete or F=Pattern is broken) for the following patterns:</p> <table border="1"> <tr><td></td><td>T/F</td></tr> <tr><td>{ (;) ; } { ; }</td><td>T</td></tr> <tr><td>{ (;) ; { (;) ; } { ; }</td><td>F</td></tr> <tr><td>{ (; ;) ; } { ; }</td><td>F</td></tr> <tr><td>{ ; { ; (;) ; } }</td><td>T</td></tr> </table> <table border="1"> <tr><td></td><td>T/F</td></tr> <tr><td>{ { ; (;) ; } ; }</td><td>T</td></tr> <tr><td>{ { ; (; (;) ;) ; } (;) ; }</td><td>T</td></tr> <tr><td>{ { ; (; (;) ;) ; } (;) ; }</td><td>F</td></tr> <tr><td>{ { ; (; (;) ;) ; } (;) ; ; }</td><td>T</td></tr> </table>		T/F	{ (;) ; } { ; }	T	{ (;) ; { (;) ; } { ; }	F	{ (; ;) ; } { ; }	F	{ ; { ; (;) ; } }	T		T/F	{ { ; (;) ; } ; }	T	{ { ; (; (;) ;) ; } (;) ; }	T	{ { ; (; (;) ;) ; } (;) ; }	F	{ { ; (; (;) ;) ; } (;) ; ; }	T
	T/F																				
{ (;) ; } { ; }	T																				
{ (;) ; { (;) ; } { ; }	F																				
{ (; ;) ; } { ; }	F																				
{ ; { ; (;) ; } }	T																				
	T/F																				
{ { ; (;) ; } ; }	T																				
{ { ; (; (;) ;) ; } (;) ; }	T																				
{ { ; (; (;) ;) ; } (;) ; }	F																				
{ { ; (; (;) ;) ; } (;) ; ; }	T																				
<p>3</p>	<p>Symbol '&' means "and". Symbol ' ' means "or". "!" means negation. Answer T or F.</p> <table border="1"> <tr><td>10 > 11 & 11 > 0</td><td>F</td></tr> <tr><td>10 > 11 11 > 0</td><td>T</td></tr> <tr><td>10 > 11 & 11 < 0</td><td>F</td></tr> <tr><td>10 > 11 11 < 0</td><td>F</td></tr> </table> <table border="1"> <tr><td>!(10 > 11 & 11 > 0)</td><td>T</td></tr> <tr><td>!(10 >= 11 & 11 > 0)</td><td>T</td></tr> <tr><td>10 < 11 & 11 !> 0</td><td>F</td></tr> <tr><td>10 < 11 11 !> 0</td><td>T</td></tr> </table>	10 > 11 & 11 > 0	F	10 > 11 11 > 0	T	10 > 11 & 11 < 0	F	10 > 11 11 < 0	F	!(10 > 11 & 11 > 0)	T	!(10 >= 11 & 11 > 0)	T	10 < 11 & 11 !> 0	F	10 < 11 11 !> 0	T				
10 > 11 & 11 > 0	F																				
10 > 11 11 > 0	T																				
10 > 11 & 11 < 0	F																				
10 > 11 11 < 0	F																				
!(10 > 11 & 11 > 0)	T																				
!(10 >= 11 & 11 > 0)	T																				
10 < 11 & 11 !> 0	F																				
10 < 11 11 !> 0	T																				

4	<p>Alien from planet Num A=90, B=91...Z=115. Its neighbor planet Quo speaks number only too, but with different set, e.g. A=60 B=61... Z=85. Create a simple formula using '+' and/or '-' to convert ROBOTS from Alien Num language to Alien Quo language without even referencing the numbers</p> $R_{\text{quo}} = R_{\text{num}} - (A_{\text{num}} - A_{\text{quo}})$
5	<p>If NEW YORK can be encrypted as PGYAQTM, how can you code the word HAIWAI? answer: JCKYCK Explanation: Each letter in the original word is forwarded two places (+2) in the alphabetical order, to get the encrypted word.</p>
6	<p>Distance from the car to the cliff is 100 meters. A blind man is driving a car towards the cliff, but must stop right before it drops off to his demise. His car's wheel measures 2 meters wide, and makes a sharp clunk sound after each full rotation. He has to count the number of 'clunk' sound. So, what is the maximum number of 'clunk' sound should be allowed?</p>  <p>$2 * \text{PI} * \text{rotation} < 100$ $\text{Rotation} = 50 / 3.14159... = 15$ (only whole number)</p>
7	<p>If $a \blacktriangle b$ means $a + a - b$ and the value of $(5 \blacktriangle 3) \blacktriangle Z$ is 12, find Z .</p> $(5 \blacktriangle 3) \blacktriangle Z = 12$ $(5 + 5 - 3) \blacktriangle Z = 12$ $7 \blacktriangle Z = 12$ $7 + 7 - Z = 12$ $Z = 14 - 12 = 2$
8	<p>If $3a = 4b = 5c$ and $a * b * c = 450$, what are a,b, and c?</p> $a * \frac{3}{4} a * \frac{3}{5} a = 450$ $\frac{9}{20} a^3 = 450 * 20$ $9 a^3 = 9000$ $a = 10$
9	<p>The product of 3 whole numbers is 60. The numbers are all different and greater than 1. The sum of the 3 numbers is 13. What are the numbers?</p> $x * y * z = 60$ $x + y + z = 13$ <p>The possible numbers must be factors of 60: 2, 3, 5, 6, 10, 12, 20, 30. Since there are 3 numbers and > 1, the only possible ones are: 2, 3, 5, 6, 10 . Sum = 13, it leaves 2, 5, 6</p>

BONUS													
10	<p>You are in a roomful of 20 people. Everyone is asked to shake hands with everyone. How many handshakes will there be? How can you figure this out? What strategies will you use?</p> <p>Suppose there are 5 people in a room. Each of those 5 would shake hands with 4 others. Thus, we have $5 * 4$. However, this would count the handshakes between each pair twice. Consequently, we must divide by two, giving us the formula:</p> <p>$2 \rightarrow 1$ shake $3 \rightarrow 3$ shakes $4 \rightarrow 6$ shakes $5 \rightarrow 10$ shakes</p> <p>$5*4/2$ or, normalized to $n(n-1)/2$</p>												
11	<p>Judy's clock loses 15 minutes very hour. The clock is set at the correct time at 9 am. What is the correct time when Judy's clock first shows 11am. ?</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">Judy's clock</td> <td style="text-align: center;">Correct time</td> </tr> <tr> <td></td> <td style="text-align: center;">Every 45</td> <td style="text-align: center;">Every 60</td> </tr> <tr> <td style="text-align: center;">ratio</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">From 9 to 11</td> <td style="text-align: center;">120 min</td> <td style="text-align: center;">160 min</td> </tr> </table> <p>9am + 160 minutes = 11:40 am</p>		Judy's clock	Correct time		Every 45	Every 60	ratio	3	4	From 9 to 11	120 min	160 min
	Judy's clock	Correct time											
	Every 45	Every 60											
ratio	3	4											
From 9 to 11	120 min	160 min											