

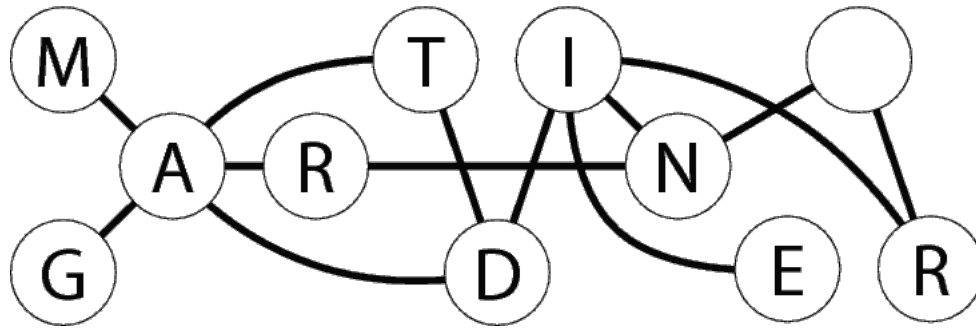


Photo Martin Gardner by Alex Bellos in 2008 in Norman

Born in Tulsa in 1914 and passed away in Norman in 2010.

Stage 1

1. A rectangular prism has edge lengths 6, 8, and 24. What is the length of the interior diagonal?

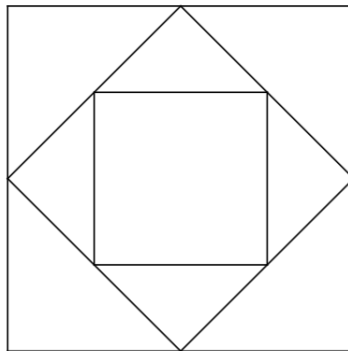
2. Which of the statements below is true?
- A. The number of false statements given here is one.
 - B. The number of false statements given here is two.
 - C. The number of false statements given here is three.
 - D. The number of false statements given here is four.

Stage 1, Round 2 (Blitz Round, 3 Minutes)

- a. President Boren turned 75 this year (Happy Birthday!). For which n is $n!$ the closest possible to 75?
- b. If $\sin(\theta) = 3/5$, then what is $\cos(\theta)$?
- c. If you have a spherical birthday cake and make three distinct straight cuts through the cake, what is the fewest number of pieces you can make?
- d. Let $x = 201^6$. Which of the following numbers is closest to x ?
 - (a) 64,000,000
 - (b) 64,000,000,000
 - (c) 64,000,000,000,000
 - (d) 64,000,000,000,000,000
- e. Which is more likely: rolling two sixes with a fair die or getting five heads by tossing a fair coin?

Stage 1, Round 3 (3 Questions, 5 Minutes)

1. In the figure below the corners of each square touch the midpoint of the sides of the next larger square. If the center square has area 1 square inch, what is the area of the largest square?



2. The polynomial

$$p(x) = x^5 - 14x^4 + 74x^3 - 184x^2 + 213x - 90$$

has roots $x = 1, 2, 3, 5$. Since $p(x)$ is degree 5 it must have one more root. What is it?

3. How many distinct rearrangements are there of the letters SCHETTLER?

Lunch!

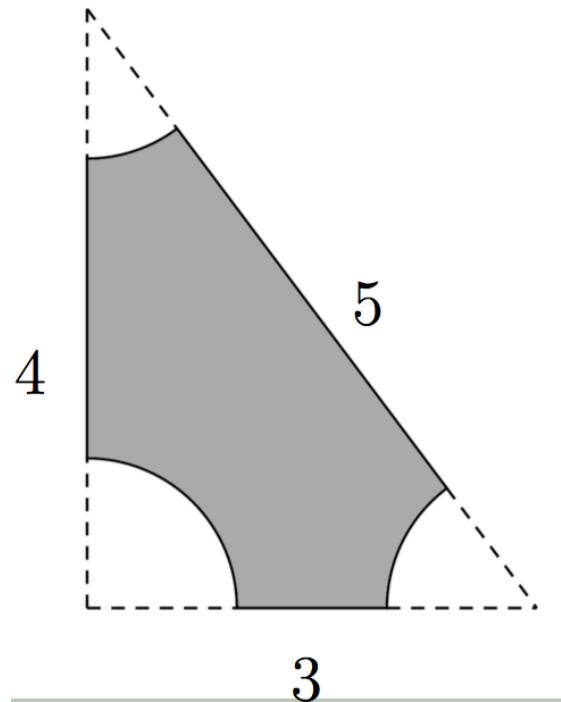
Stage 2

Stage 2, Round 1 (Blitz Round, 3 Minutes)

- a. What is the sum of the first five prime numbers?
- b. If you have square with side length 2, what is the area of the largest circle contained within the square?
- c. Which is larger: 20^{16} or 11^{20} ?
- d. Consider the sequence $a_1 = 1, a_2 = 5, a_3 = 5, a_4 = 9, a_5 = 9, a_6 = 13, \dots$.
If you continue this sequence, what is a_{10} ?
- e. Which is larger, the volume of a sphere of radius 3 or the area a circle of radius 3?

Stage 2, Round 2 (3 Questions, 5 Minutes)

1. If $a_1 = 1$, $a_2 = 1$, and $a_n = a_{n-1} + a_{n-2}$ for $n \geq 3$, then is a_{2016} even or odd?
2. In the figure below the white areas are cut out by circles of radius one centered at the vertices of the triangle. What is the total area of the regions cut out?



3. Consider the polynomial

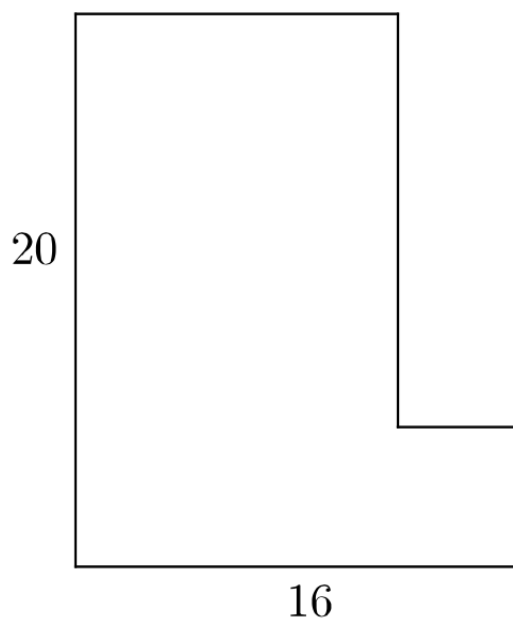
$$p(x) = (1 - x)^{2016} + 2016.$$

If you were to expand out the product and write $p(x)$ in standard form as a combination of powers of x , what would be the constant term?

Stage 3

Stage 3, Round 1 (3 Questions, 5 Minutes)

1. A test has five multiple choice questions with four possible answers for each. What is the probability you will get them all right by guessing at random?
2. Let x be a real number which is closer to 20 than to 16 and closer to 5 than to 33. How long is the interval of possible values for x ?
3. What is the perimeter of the following shape?



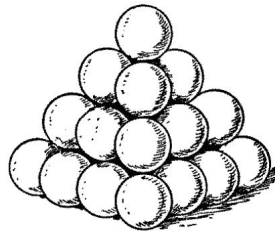
Stage 3, Round 2 (2 Questions, 5 Minutes)

1. We call a polynomial with integer coefficients,

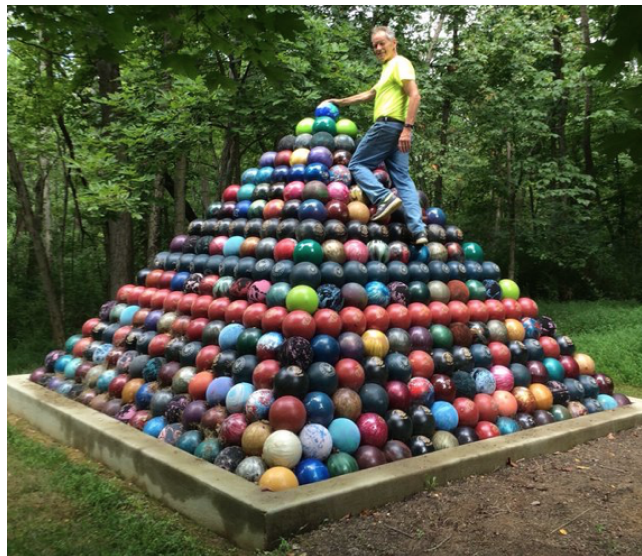
$$p(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_2 x^2 + a_1 x + a_0,$$

an *ambi polynomial* if $a_0 = a_n$, $a_1 = a_{n-1}$, $a_2 = a_{n-2}$, etc.

- (a) If $p(x)$ is an ambi polynomial, degree two, and $p(1)$ is even, is a_1 even or odd?
- (b) If $p(x)$ is an ambi polynomial, degree $2k$, and $p(1)$ is even, is a_k even or odd?
2. (a) How many balls are there in the following pyramid?



- (b) How many bowling balls are in the stack? Hint: The pyramid has 17 levels.



The End!

Spot Prize I (Word Search!)

Name: _____

School: _____

P H Y O V Q Q E T Q Y C H N B B Y A Z D N C O H U L G K D F F B U X R J C J K C
 E F I R I R R E O W A W O L N W F Q Q Q W A U T D M A S G A Y G A Y W S J E Z A
 R W Q Z B A X T C N Q S N L B V M G O U S L O B E J A I P H B I M B Q I N Q N R
 M K P C U K K Z T M N D Z T E W C Q N V T H U K A O Z R M D Z P N T W N V K T D
 U A W Q E R E O A H L J J L Q W V I Z Z B Y K E L G O K Q O Y G V M A M N T W S
 T B S Y G F R G O P H Y A C R Q I I D V O L E W M B B S L H N A S R C Q K M F G
 A V V L Q W I J U R A E H S M B V S Q P I P T B A V S T H Q B Y D S T S U Y V B
 T W M F U C G V L B U Z X U Z J P L W P P L A B U I P T H R B B L P J M M I N I
 I J S N F T J E C U A H P A T W K A T H E R I N E X R B M L Z O C O S I O E D O
 O A B I G J V E T U O D L K F V F S Z S N L C I N O M R A H N E X O P Y N L O B
 N C W Q I R E M D E U J I K R L G A E N I O T H Q F G V H P H I A Z M S U F V D
 P D B A X V I O F C T E J E I F E N B T T Z E J N Q R R M I Z T Z M I Y F F R A
 S T O E D A L R U O Z E A A O U F X Y Q M C N L H E K O K I R P E J G I H U O E
 D K X I I Z W D O M D R N S I M B N A Y V W W X Z I K L X Q A E I K Q G U H N A
 Q L I R N J G N B C W F Z Z G C L T Y G M A T S W Z B M J R R T N M Y J K S N A
 R N I T R A M I F G P A B C Z D G H C P O H E O S D U G W P C P A D P O B M T T
 Y W S Q L U E L O S Q D J Q G L H M X O C N A R M B C P V F A Q F E R I Y P I F
 Q U A R A N G A Q F A W W S I X B D B C N U H H M F J J M Q R W N F B A D Q S Q
 N E V A F U O P T S K H T G N K S J W J O W R L E J J R Z P R T I Q C L G D A R
 O K I N I I C N P C H P L J A G Y H O V U D A C E A J D C L O W O I H V N C J T
 J K V R X G R V R H T K D D M B C Q L D K M E Y R E D R A P L S T O N K W W P U
 W M L B N J F E N L Y P L X R H W C U C D F M A T H Z K V N L U U I F S K R Y L
 Q Y P A F K L O J O R D A N O A F T X F J I E N K C I R C L E O Q E G E P W Q Y
 Z Q Q K H T J L O P G A M B N I M C O B A U S A W A B I J U G J J S P S Q X K H
 D A C F T O R E H T E O N M Q A X N P T J N S G I L T T G R I R X O T E C C D P
 K S V E E E M F I T F B E A N D N D R W Z D X P X I M U V F J V U J G U L S O V
 Q O H A K W A A O P L F L T V D W I X D Q B R A Q D J K I A D H O A N F U I P G
 Z C E E L B M C J E M D F R B X V R O B Q N K N N F J T Q S P F E R C O R X S G
 S J V B E B O W W V Y R O I M A P V X M I H Q W O T C K O G N P X U O U Q Y Z Z
 S Z P F F C K Q Q X D L Q X E X N K Z F T M U C J F D O N D H K H F H B R H G T

- | | | | |
|----------------|---------------|---------------|--------------|
| • JORDAN | • CANTOR | • PROBABILITY | • PALINDROME |
| • SCHETTLER | • EMMY | • KNOTS | |
| • SANJOSE | • NOETHER | • MATH | • SQUARE |
| • LEWIS | • MARTIN | • PUZZLE | • CIRCLE |
| • CARROLL | • GARDNER | • TULSA | |
| • CONWAY | • SHUFFLE | • NORMAN | • CODE |
| • GRIGO | • CARDS | • OKLAHOMA | • KATHERINE |
| • HEXAFLEXAGON | • PERMUTATION | • POLYNOMIAL | |
| • DR MATRIX | • MAGIC | • XENHARMONIC | • JOHNSON |

Spot Prize I (Word Search!)

Name: _____

School: _____

P H Y O V Q Q E T Q Y C H N B B Y A Z D N C O H U L G K D F F B U X R J C J K C
 E F I R I R R E O W A W O L N W F Q Q Q W A U T D M A S G A Y G A Y W S J E Z A
 R W Q Z B A X T C N Q S N L B V M G O U S L O B E J A I P H B I M B Q I N Q N R
 M K P C U K K Z T M N D Z T E W C Q N V T H U K A O Z R M D Z P N T W N V K T D
 U A W Q E R E O A H L J J L Q W V I Z Z B Y K E L G O K Q O Y G V M A M N T W S
 T B S Y G F R G O P H Y A C R Q I I D V O L E W M B B S L H N A S R C Q K M F G
 A V V L Q W I J U R A E H S M B V S Q P I P T B A V S T H Q B Y D S T S U Y V B
 T W M F U C G V L B U Z X U Z J P L W P P L A B U I P T H R B B L P J M M I N I
 I J S N F T J E C U A H P A T W K A T H E R I N E X R B M L Z O C O S I O E D O
 O A B I G J V E T U O D L K F V F S Z S N L C I N O M R A H N E X O P Y N L O B
 N C W Q I R E M D E U J I K R L G A E N I O T H Q F G V H P H I A Z M S U F V D
 P D B A X V I O F C T E J E I F E N B T T Z E J N Q R R M I Z T Z M I Y F F R A
 S T O E D A L R U O Z E A A O U F X Y Q M C N L H E K O K I R P E J G I H U O E
 D K X I I Z W D O M D R N S I M B N A Y V W W X Z I K L X Q A E I K Q G U H N A
 Q L I R N J G N B C W F Z Z G C L T Y G M A T S W Z B M J R R T N M Y J K S N A
 R N I T R A M I F G P A B C Z D G H C P O H E O S D U G W P C P A D P O B M T T
 Y W S Q L U E L O S Q D J Q G L H M X O C N A R M B C P V F A Q F E R I Y P I F
 Q U A R A N G A Q F A W W S I X B D B C N U H H M F J J M Q R W N F B A D Q S Q
 N E V A F U O P T S K H T G N K S J W J O W R L E J J R Z P R T I Q C L G D A R
 O K I N I I C N P C H P L J A G Y H O V U D A C E A J D C L O W O I H V N C J T
 J K V R X G R V R H T K D D M B C Q L D K M E Y R E D R A P L S T O N K W W P U
 W M L B N J F E N L Y P L X R H W C U C D F M A T H Z K V N L U U I F S K R Y L
 Q Y P A F K L O J O R D A N O A F T X F J I E N K C I R C L E O Q E G E P W Q Y
 Z Q Q K H T J L O P G A M B N I M C O B A U S A W A B I J U G J J S P S Q X K H
 D A C F T O R E H T E O N M Q A X N P T J N S G I L T T G R I R X O T E C C D P
 K S V E E E M F I T F B E A N D N D R W Z D X P X I M U V F J V U J G U L S O V
 Q O H A K W A A O P L F L T V D W I X D Q B R A Q D J K I A D H O A N F U I P G
 Z C E E L B M C J E M D F R B X V R O B Q N K N N F J T Q S P F E R C O R X S G
 S J V B E B O W W V Y R O I M A P V X M I H Q W O T C K O G N P X U O U Q Y Z Z
 S Z P F F C K Q Q X D L Q X E X N K Z F T M U C J F D O N D H K H F H B R H G T

- | | | | |
|----------------|---------------|---------------|--------------|
| • JORDAN | • CANTOR | • PROBABILITY | • PALINDROME |
| • SCHETTLER | • EMMY | • KNOTS | |
| • SANJOSE | • NOETHER | • MATH | • SQUARE |
| • LEWIS | • MARTIN | • PUZZLE | • CIRCLE |
| • CARROLL | • GARDNER | • TULSA | |
| • CONWAY | • SHUFFLE | • NORMAN | • CODE |
| • GRIGO | • CARDS | • OKLAHOMA | • KATHERINE |
| • HEXAFLEXAGON | • PERMUTATION | • POLYNOMIAL | |
| • DR MATRIX | • MAGIC | • XENHARMONIC | • JOHNSON |

Spot Prize II (Add it up!)

Name: _____ School: _____

In each of the following equations you can replace the letters with the digits $0, 1, 2, \dots, 9$ to make the equations arithmetically true. For each equation, please determine which substitution works. Hint: Zero is never the leftmost digit of a number and if, for example, you decide $E = 2$, then all E 's should be replaced with 2 and no other letter should be replaced by a 2. Also, note that each equation has a different solution!

Equation A:

$$OOOH + FOOD = FIGHT$$

Equation B:

$$SIX + SEVEN + SEVEN = TWENTY$$

Equation C:

$$TEN + TEN + FORTY = SIXTY$$

Spot Prize II (Add it up!)**Name:** _____ **School:** _____

In each of the following equations you can replace the letters with the digits $0, 1, 2, \dots, 9$ to make the equations arithmetically true. For each equation, please determine which substitution works. Hint: Zero is never the leftmost digit of a number and if, for example, you decide $E = 2$, then all E 's should be replaced with 2 and no other letter should be replaced by a 2. Also, note that each equation has a different solution!

Equation A:

$$OOOH + FOOD = FIGHT$$

Equation B:

$$SIX + SEVEN + SEVEN = TWENTY$$

Equation C:

$$TEN + TEN + FORTY = SIXTY$$

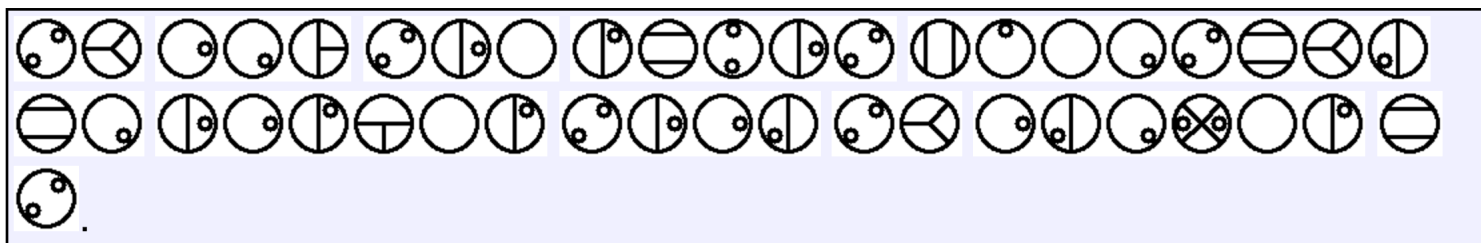
Lunch Problem (Crack The Code!)

Name: _____ School: _____

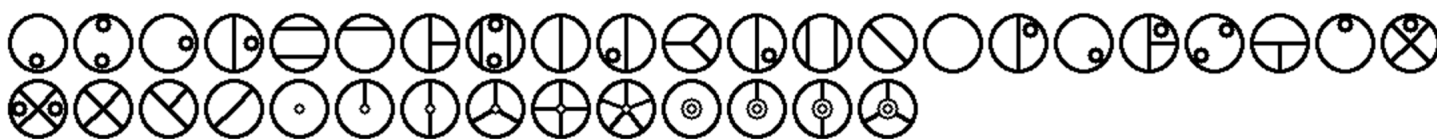
Due after lunch at the door to the Math Bowl.

Write your solution on the back.

You are Oklahoma Jones, the less famous sibling of Indiana Jones. While investigating the invention of zero by Brahmagupta in India (circa 650 AD) you stumble across an ancient inscription:



Here is the full set of 26 ancient symbols. Can you crack the code?



Hint: When you text him, your brother tells you that all he knows is that the symbols for E, N, and R are (in that order):

