Indiana Academic M.A.T.H. Bowl

INVITATIONAL January 23 – February 2, 2017

Begin Practice Round
6(5) = ?

A. 10
B. 20
C. 30
D. 40

C. 30
End Practice Round

Begin Round One
I had 3 dozen eggs but dropped and broke 3. How many eggs are unbroken?

A. 12
B. 24
C. 33
D. 36

3 dozen = 36 eggs
36 – 3 = 33

C. 33
In a half-hour cartoon, commercials are shown for five minutes. What percentage of the half hour cartoon are commercials shown?

A. 17%
B. 18%
C. 19%
D. 20%

Half-hour = 30 minutes
5/30 = 0.166666666667
Or about 17%
Wind speeds were tracked during the week of the big race. Daily average wind speeds for the week were: 12 mph, 10 mph, 2 mph, 6 mph, 11 mph, 9 mph, and 20 mph. What is the mean wind speed for the entire week?

A. 8 mph  
B. 9 mph  
C. 10 mph  
D. 11 mph

\[
\frac{12+10+2+6+11+9+20}{7} = \frac{70}{7}
\]

Or 10 mph
Jace borrowed $2,250 for 45 months to buy a used car. His simple interest (I=PRT) rate on the loan was 4% simple interest per year. How much interest will Jace pay by the end of the 45 month loan?

A. $310.50  
B. $312.00  
C. $337.50  
D. $340.50

I = PRT with t=45/12  
= (2250)(0.04)(45/12)  
= $337.50
There were 3 students sitting per table in a classroom and one other student was absent. The next day, all of the students were sitting at tables but this time there were 4 students at each table and one of the tables was empty. How many students were there and how many tables does the classroom have?

A. 4 tables with 17 students  
B. 5 tables with 16 students  
C. 6 tables with 17 students  
D. 7 tables with 15 students

The number of students is divisible by 4. When dividing by 3, there is a remainder of one. 16 students is the only answer that fits those conditions.

5 tables x 3 students = 15 present and one absent  
4 tables x 4 students = 16 with an empty table
Kathy tosses 3 different colors of number cubes, a penny and a nickel. How many possible outcomes could she get? One possible outcome is: green 2, blue 3, red 4, a head on the penny and a head on the nickel.

A. 216  
B. 432  
C. 628  
D. 864

Each dice can land one of 6 ways. Each coin can land heads or tails, 2 outcomes. That gives $6 \times 6 \times 6 \times 2 \times 2 = 864$ possible outcomes.
In Sum School there are different numbers of students in each grade from 1 through 12. If the grade is equivalent to the number of students in attendance in that grade, how many students are in the school all together?

A. 144  
B. 78  
C. 58  
D. 12

2017 MATH Invitational Round 1 Number 7

In Sum School there are different numbers of students in each grade from 1 through 12. If the grade is equivalent to the number of students in attendance in that grade, how many students are in the school all together?

B. 78

\[1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12 = 78\]

Or use \(\frac{n(n + 1)}{2}\) where \(n=12\)
Mr. Carter purchased a new riding mower. The cost of the mower was $2,779. The dealer said he would take an extra 2% off when he agreed to pay by cash or check. Mr. Carter also traded in his used mower so the dealer gave him $50 off the discounted price. How much did Mr. Carter pay for his new lawn mower?

A. $2,772.42
B. $2,727.00
C. $2,673.42
D. $2,674.42

2017 MATH Invitational Round 1 Number 8

2779 x 0.02 = $55.58
2779 – 55.58 = $2723.42
2723.42 – 50 = $2,673.42

C. $2,673.42
Order these numbers in order from least to greatest.

0.75, 0.5, 0, 1, 0.25, 0.8, 0.19

A. 0.75, 0.5, 0, 1, 0.25, 0.8, 0.19
B. 0.19, 0.8, 0.75, 0.5, 0, 1, 0.25
C. 0.8, 0.75, 0.5, 0.25, 0.19, 0, 1
D. 0, 0.19, 0.25, 0.5, 0.75, 0.8, 1

Think about money:
$0 < $0.19 < $0.25 < $0.50 < $0.75 < $0.80 < 1
People were asked which of the 4 side dishes were their favorite. Based on this survey, what is the probability that macaroni salad is the favorite dish?

<table>
<thead>
<tr>
<th>Side Dish</th>
<th># of people</th>
</tr>
</thead>
<tbody>
<tr>
<td>potato salad</td>
<td>55</td>
</tr>
<tr>
<td>baked beans</td>
<td>25</td>
</tr>
<tr>
<td>macaroni salad</td>
<td>12</td>
</tr>
<tr>
<td>coleslaw</td>
<td>8</td>
</tr>
</tbody>
</table>

A. 55/100
B. 1/4
C. 3/25
D. 2/25

100 people were surveyed. 12 prefer macaroni salad. 12/100 simplifies to 3/25.
A bowling team has 5 members on its Tuesday night league. How many different line-ups can the team arrange their roster to bowl?

A. 25
B. 50
C. 75
D. 120

D. 120

Line-ups are ordered arrangements. There are 5 ways to choose who goes first then 4 ways to choose the second, 3 for the third, 2 for the fourth, and one person left to be last. There are $5(4)(3)(2)(1) = 120$ line-ups.
Jerry collects comic books. He gave 4 books to each of his 4 friends. Then he gave 3 to his sister. If Jerry has 15 comic books left in his collection, how many comic books did he originally have?

- A. 15
- B. 16
- C. 24
- D. 34

4 books to each of 4 friends is 16 books.
Friends’ + sister’s + his = 16 + 3 + 15

D. 34 comic books
If students are required to attend school for 420 minutes per school day and they begin at 8:00 a.m., what is the earliest they can be released?

A. 2:00 p.m.
B. 2:15 p.m.
C. 2:30 p.m.
D. 3:00 p.m.

60 minutes = 1 hour
420 minutes = 7 hours
7 hours after 8 will be 3:00 p.m.
In the local park, the ratio of ducks to geese is 2:3. If there are 30 total fowl, how many geese are there?

A. 12
B. 14
C. 16
D. 18

Guess and Check works:
12 ducks + 18 geese = 30 fowl
12/18 simplifies to 2:3
There are six people in a business meeting. How many handshakes occur between the six people if everyone shakes hands with all the others?

A. 15
B. 18
C. 24
D. 36

2 people = 1 handshake
3 people = 3 handshakes
4 people = 6 handshakes
5 people = 10 handshakes
6 people = 15 handshakes
What are the next 2 terms?

\[
\frac{7}{10}, \frac{9}{10}, \frac{3}{10}, \frac{9}{10}, \frac{7}{10}, \frac{7}{10}, ...
\]

A. \(\frac{11}{10}, \frac{7}{10}, \frac{9}{10}\)

B. \(\frac{10}{10}, \frac{7}{10}, \frac{9}{10}\)

C. \(\frac{12}{10}, \frac{1}{10}, \frac{3}{10}\)

D. \(\frac{13}{10}, \frac{2}{10}, \frac{1}{10}\)

Writing as decimals is often easier, as hinted at in the picture.

\[3.7, 4.9, 6.3, 7.9, 9.7, ...
\]

Numbers are increasing by 1.2, then 1.4, 1.6, and 1.8.
The next number will increase by 2 so only A can be right.
To check, the next number increases by 2.2.
\[11.7 + 2.2 = 13.9\]
End
Round Two

Begin
Round Three
I am a regular pentagon.
One side is 3 cm long.
What is my perimeter?

A. 3 cm
B. 6 cm
C. 9 cm
D. 15 cm

The blue shape is a reminder that pentagons have 5 sides.
Perimeter is the sum of the side lengths.
5 \times 3 = 15
Clayton, Dalton, and Taylor are each holding a card of a different color. Clayton has a green card. Dalton does NOT have a red card. Taylor’s card is not green or yellow. Which statement is true?

A. Dalton’s card is yellow.
B. Taylor’s card is yellow.
C. Clayton’s card is red.
D. Dalton’s card is green.

Clayton has the green card.
Dalton’s card is not red and not green. So it must be yellow.
Taylor would have the red card.
A shopping mall has 550,000 square feet of space for stores. If the 2 big stores each had 35,000 square feet and all the smaller stores had 12,000 square feet, how many stores are located in the mall?

A. 44
B. 42
C. 40
D. 38

550,000 – 2(35,000) = 480,000 for the smaller stores.
480,000 ÷ 12,000 = 40 smaller stores
2 large and 40 small stores = 42 total stores

B. 42
3-Ingredient Shortbread Cookies
Makes 36 cookies
2 cups salted butter, cold and cut into pieces
1 cup packed light brown sugar
4½ cups all purpose flour
Optional: Your favorite sprinkles
How much sugar and flour are needed to make 6 dozen cookies?

A. 9 cups sugar and 4 cups flour
B. 6 cups sugar and 27 cups flour
C. 4 cups butter and 9 cups flour
D. 2 cups sugar and 9 cups flour

36 cookies is 3 dozen. We need to double the recipe to get 6 dozen.

2 x 1 cup sugar = 2 cups sugar
2 x 4 ½ cups flour = 9 cups of flour

D. 2 cups sugar and 9 cups flour
Kylie put 4 small blocks on the left side of the scale. She put a large block on the right with a 12 pound weight. The sides are now equal. How much did the large block weigh?

A. 4 pounds
B. 8 pounds
C. 3 pounds
D. 16 pounds
Five students take a test. The mean of their test scores was 90, the median score was 90, and the mode score was 95. What were the 5 scores of the students’ tests?

A. 85, 85, 90, 95, 95
B. 85, 85, 90, 90, 90
C. 87, 88, 90, 95, 95
D. 83, 87, 90, 95, 95
The table shows the number of hours the average American worked in 2000 compared to 2010. What was the percent of increase during that 10 year span? Round your answer to the nearest tenth.

<table>
<thead>
<tr>
<th>Year</th>
<th>Time (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1,943</td>
</tr>
<tr>
<td>2010</td>
<td>1,979</td>
</tr>
</tbody>
</table>

A. 1.0%
B. 1.8%
C. 1.9%
D. 2.0%

C. 1.9%

Amount of increase \((1979 - 1943)\)
Original amount 1943

% of increase ≈ 1.8528...% or 1.9% more hours/year
Amy began making friendship bracelets for her friends as gifts. She worked in October, November, and December. By the end of November, she had four times as many bracelets as the end of October. She had made 56 total bracelets by the end of December. She made ten times the number of bracelets in December as she did in October. How many bracelets did Amy make in October?

A. 2  
B. 4  
C. 6  
D. 10

Amy began making friendship bracelets for her friends as gifts. She worked in October, November, and December. By the end of November, she had four times as many bracelets as the end of October. She had made 56 total bracelets by the end of December. She made ten times the number of bracelets in December as she did in October. How many bracelets did Amy make in October?

B. 4

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made in Oct</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>Check given answers</td>
</tr>
<tr>
<td>4 X Oct</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>40</td>
<td>Total made in Oct &amp; Nov</td>
</tr>
<tr>
<td>10 X Oct</td>
<td>20</td>
<td>40</td>
<td>60</td>
<td>100</td>
<td>Made in Dec</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>56</td>
<td>84</td>
<td>140</td>
<td>Total for the 3 months</td>
</tr>
</tbody>
</table>
End
Round Three

Begin
Round Four
Which of the following answers could NOT be the probability of an event?

A. 0
B. 0.55
C. 2/40
D. 13.5

Probability is a number between zero and one that shows how likely a certain event is. Thus, 13.5 cannot be used to express a probability.
Which equation is false?

A. \((15 \times 14) \div 5 = 42\)
B. \(81 \div (9^2 + 7) = 8\)
C. \(15 \times (14 \div 5) = 42\)
D. \((81 \div 9^2) + 7 = 8\)
Acme is having a “Back to School” sale on shoes. Buy 3 pair of shoes at regular price and receive the fourth pair for $5. If the total for 4 pair of shoes was $50, and the first three pair were the same price, what was the price of each of the first three pair of shoes?

A. $12  
B. $13  
C. $14  
D. $15

$50 - $5 = $45 total for the first three pair  
$45 ÷ 3 = $15 each for the first three pair
Farmer Fred needs to fence in this strangely shaped pasture for his sheep. How many YARDS of fence does he need to purchase for this field?

Adding we get 33 feet.
Divide by 3 feet /yard to get 11 YARDS
Jeff created his salad by choosing three different items from a salad bar with 10 different items. How many 3-ingredient salads could he create if he doesn’t care what order they are placed on his plate?

A. 1,000  
B. 720  
C. 30  
D. 120

10 first choices x 9 second choices x 8 third choices = 720 ways to order his three choices
However, the order doesn’t matter and there are 3x2x1 = 6 ways to order 3 items
720 ÷ 6 = 120 different salads Jeff can make where order does not matter
If the input numbers (x) are 3, 9, 4, and 8, and the output numbers (y) are respectively 13, 19, 14, and 18, which equation reflects the function?

A. $y = 10(x)$  
B. $y = x + 10$  
C. $y = x \div 10$  
D. $y = x - 10$

The first value of 3 becomes 13.  
The second value of 9 becomes 19.  
The third value of 4 becomes 14.  
The last value of 8 becomes 18.  
Each time, the number is increased by 10.
There are 99 students at Somewhere Elementary School, who all own a cat or dog or both. If 60 of them own a dog, and 67 of them own a cat, how many students own both a cat and a dog?

A. 7  
B. 20  
C. 28  
D. 30

Adding the numbers of cat and dog owners gives us 127 pet owners. That is 28 more than the number of students. So 28 own both a cat and a dog.
Stan, Dan, Ann, and Fran counted their savings. Stan has 7 nickels, 40 dimes, and 37 quarters. Dan has 8 nickels, 30 dimes, and 23 quarters. Ann has 9 nickels, 35 dimes, and 20 quarters. Fran has 10 nickels, 40 dimes, and 21 quarters. Order the children from most to least in savings.

A. Stan, Dan, Ann, Fran
B. Stan, Fran, Dan, Ann
C. Ann, Dan, Fran, Stan
D. Dan, Fran, Stan, Ann
What is the mode in this stem & leaf plot?

<table>
<thead>
<tr>
<th>Stem</th>
<th>Leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>4 7</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>2 3</td>
</tr>
<tr>
<td>9</td>
<td>0 2 3 9</td>
</tr>
<tr>
<td>10</td>
<td>0 0 5</td>
</tr>
</tbody>
</table>

Key 8|3 = 83

A. 64  
B. 105  
C. 91  
D. 100  

The mode occurs most often. There are two 100's.
Victoria has a dozen pair of footwear. A third of them are boots. If she puts the boots away for the summer, half of what is left are sandals. How many pairs of sandals does she have?

A. 6
B. 4
C. 3
D. 2

1 dozen = 12 pair of shoes
1/3 of 12 = 4 pair of boots
12 – 4 = 8 pair of others
½ of 8 = 4 pair of sandals
The table shows how much money Tara earns when she babysits. If she makes the same amount per hour no matter how many hours she works, how much would she make if she worked 12 hours?

<table>
<thead>
<tr>
<th>Number of hours</th>
<th>3</th>
<th>7</th>
<th>9</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money earned</td>
<td>$13.50</td>
<td>$31.50</td>
<td>$40.50</td>
<td>?</td>
</tr>
</tbody>
</table>

A. $54.50  
B. $54.00  
C. $53.50  
D. $53.00

Easy solutions:
1. Multiply the 3-hour rate by 4. $13.50(4) = $54.00  
2. Add the 3- and 9-hour rates. $13.50 + $40.50 = $54.00
Five children divided some candy evenly. If two of the children received 40 pieces to share, how many pieces were left for the other children to share?

A. 20  
B. 40  
C. 60  
D. 80

40 pieces for 2 children means each gets 20 pieces. There are 3 other children. They each get 20 pieces as well. That means there are 60 pieces left for them.
A set of 15 cards is numbered 1 to 15. One card is chosen without looking. What is the probability that the card is a prime number?

A. 1/5  
B. 1/6  
C. 2/5  
D. 1/3

The prime numbered cards are 2, 3, 5, 7, 11, and 13. So 6/15 cards or 2/5 are prime numbers.
About half of the children at Ginger Elementary School said they don’t like vegetables and about a fourth of them love vegetables. Which would be a reasonable conclusion from this information?

A. About 6 of 200 students don’t like vegetables.
B. About 12 of 200 students don’t like vegetables.
C. About 8 of 2000 students love vegetables.
D. About 50 of 200 students love vegetables.

D. About 50 of 200 students love vegetables.

50 is ¼ of 200
And another 50 neither love nor dislike their veggies.
How many seconds are in a calendar year?

A. 21,900  
B. 1,314,000  
C. 9,198,000  
D. 31,536,000

Units of Time

1 minute = 60 seconds
1 hour = 60 minutes
1 day = 24 hours
1 week = 7 days
1 year = 365 days

60 seconds \times 60 \text{ minutes} \times 24 \text{ hours} \times 365 \text{ days} = 31,536,000 \text{ seconds/year}

7 \text{ days in a week is unneeded data}
A department store is having a sale on shirts and pants. They are allowing 30% off shirts and 40% off pants. If you use the store’s credit card, you get an additional 10% off your purchase. Joe buys 2 shirts at $24.99 each and 3 pairs of pants at $35.99 each. Joe decides to pay using the store’s credit card. How much will Joe pay before sales tax?

A. $89.79  
B. $83.97  
C. $35.18  
D. $99.77

Joe pays 70% of price for shirts, 60% of price for pants
2 shirts @$24.99 x 70% = $49.98(0.70) or $34.99  
3 pants @$35.99 x 60% = $107.97(0.60) or $64.78  
Total is $34.99 + $64.78 = $99.77 before the additional 10% discount  
$99.77 x 90% = $99.77(.90) or $89.79 before sales tax
End
Round
Alternate

Congratulations to all teams.
See you again at the Area contest on February 23, 2017.