Begin Round One
Sarah learned in social studies class that five of the 50 U.S. states border the Pacific Ocean. What percent of the U.S. states border the Pacific Ocean?

A. 1%
B. 5%
C. 10%
D. 15%
Sarah learned in social studies class that five of the 50 U.S. states border the Pacific Ocean. What percent of the U.S. states border the Pacific Ocean?

C. 10%

5 of 50 is 1/10 or 10%
Bedford, Indiana Daily Temperatures
Sunday 100°F  Thursday 115°F
Monday 110°F  Friday 120°F
Tuesday 98°F  Saturday 109°F
Wednesday 104°F

What was the average daily temperature for the week?

A. 100°F  C. 106°F
B. 102°F  D. 108°F
Bedford, Indiana Daily Temperatures

Sunday  100°F    Thursday  115°F
Monday  110°F    Friday  120°F
Tuesday  98°F    Saturday  109°F
Wednesday  104°F

What was the average daily temperature for the week?

D.  108°F

\[
\frac{(100 + 110 + 98 + 104 + 115 + 120 + 109)}{7} = 108
\]
Grant goes into a convenience store to buy some ice cream to eat. The store has a choice of vanilla, chocolate, strawberry, or chocolate chip in either a sugar cone, waffle cone, or a dish. If he chooses randomly, what is the probability that Grant will choose chocolate or strawberry in a dish?

A. 1/3  
B. 1/5  
C. 1/6  
D. 1/9
Grant goes into a convenience store to buy some ice cream to eat. The store has a choice of vanilla, chocolate, strawberry, or chocolate chip in either a sugar cone, waffle cone, or a dish. If he chooses randomly, what is the probability that Grant will choose chocolate or strawberry in a dish?

\[
\begin{align*}
\text{Prob(chocolate or strawberry)} &= \frac{2}{4} \\
\text{Prob(dish)} &= \frac{1}{3} \\
\text{Prob(both independent events)} &= \left(\frac{2}{4}\right)\left(\frac{1}{3}\right) = \frac{2}{12} \text{ or } \frac{1}{6}
\end{align*}
\]

C. \(\frac{1}{6}\)
Greg was creating simple license plates for a game. He decided each plate must have ONLY one capital letter of the alphabet (A-Z) and ONLY one digit (0-9). How many different license plates can he make? Note: B5 and 5B are different plates.

A. 260
B. 320
C. 460
D. 520
Greg was creating simple license plates for a game. He decided each plate must have ONLY one capital letter of the alphabet (A-Z) and ONLY one digit (0-9). How many different license plates can he make?

D. 520

26 x 10 = 260 with a letter first
10 x 26 = 260 with a number first
Total 520
Ralph opens a bank account and deposits $1000. If he never puts any more money into the account and that amount doubles every 5 years, how much money will be in Ralph’s account in 25 years?

A. $10,000
B. $16,000
C. $25,000
D. $32,000
Ralph opens a bank account and deposits $1000. If he never puts any more money into the account and that amount doubles every 5 years, how much money will be in Ralph’s account in 25 years?

D. $32,000
How many combinations of 4 months can you choose from the year, ignoring the order they are chosen?

A. 136
B. 495
C. 925
D. 1,036
How many combinations of 4 months can you choose from the year, ignoring the order they are chosen?

$\binom{12}{4} = \frac{12!}{4!(12-4)!} = 495$

$\binom{12}{4} = \frac{12!}{4!(12-4)!} = 495$

B. 495
Given these numbers:
44, 16, 11, 22, 18, 8, 29, 14, 18

Find the mean, median, mode, and range (in that order):

A. 20, 18, 18, 36
B. 18, 18, 36, 20
C. 20, 36, 18, 18
D. 18, 36, 18, 20
M.A.T.H. Invitational 2014 Round 1 Number 7

Find the mean, median, mode, and range of the following numbers:
44, 16, 11, 22, 18, 8, 29, 14, 18

A. 20, 18, 18, 36

The mode is 18 which eliminates answer B.
The range is 44-8 = 36 which eliminates the last three answer choices.
Checking the mean and median confirms answer choice A.
Matt restocks the sporting goods store. If he purchases 5 pieces of each item, how much profit can the store expect?

<table>
<thead>
<tr>
<th>Item</th>
<th>Wholesale</th>
<th>Markup</th>
</tr>
</thead>
<tbody>
<tr>
<td>shoes</td>
<td>$39.99</td>
<td>20%</td>
</tr>
<tr>
<td>tennis ball</td>
<td>$1.99</td>
<td>12%</td>
</tr>
<tr>
<td>basketball</td>
<td>$5.99</td>
<td>15%</td>
</tr>
<tr>
<td>jersey</td>
<td>$19.99</td>
<td>17%</td>
</tr>
</tbody>
</table>

A. $62.70  
B. $339.50  
C. $402.50  
D. $407.25
Matt restocks the sporting goods store. If he purchases 5 pieces of each item, how much profit can the store expect?

<table>
<thead>
<tr>
<th>Item</th>
<th>Wholesale</th>
<th>Markup</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>shoes</td>
<td>$39.99</td>
<td>20%</td>
<td>8.00</td>
</tr>
<tr>
<td>tennis ball</td>
<td>$1.99</td>
<td>12%</td>
<td>0.24</td>
</tr>
<tr>
<td>basketball</td>
<td>$5.99</td>
<td>15%</td>
<td>0.90</td>
</tr>
<tr>
<td>jersey</td>
<td>$19.99</td>
<td>17%</td>
<td>3.40</td>
</tr>
</tbody>
</table>

A. $62.70

\[5(\$12.54) = \$62.70\]
End Round One
Begin Round Two
Farmer Farley has $\frac{3}{4}$ of an acre to plant his garden. He wants to plant corn and beans. What fraction of an acre will he have for each crop if he divides the farm equally?

A. $\frac{3}{4}$ acre  
B. $\frac{1}{2}$ acre  
C. $\frac{1}{4}$ acre  
D. $\frac{3}{8}$ acre
Farmer Farley has \( \frac{3}{4} \) of an acre to plant his garden. He wants to plant corn and beans. What fraction of an acre will he have for each crop if he divides the farm equally?

D. \( \frac{3}{8} \) acre

\[
\frac{3}{4} = 6/8 \\
6/8 \div 2 = 3/8
\]
Trista has a ball of yarn that is 5 1/10 meters long. She needs lengths that are 4/40 meters long. How many 4/40 meter lengths can be cut from the ball?

A. 48
B. 49
C. 50
D. 51
Trista has a ball of yarn that is 5 1/10 meters long. She needs lengths that are 4/40 meters long. How many 4/40 meter lengths can be cut from the ball?

D. 51 strips
The stem and leaf plot shows the scores on Mr. Riley’s math class test. 50 points were possible. What was the median score for the math test?

<table>
<thead>
<tr>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
</tr>
<tr>
<td>41, 4, 5, 6, 8, 8, 9</td>
</tr>
<tr>
<td>50, 0, 0, 0</td>
</tr>
</tbody>
</table>

A. 45  
B. 46  
C. 47  
D. 50
The stem and leaf plot shows the scores on Mr. Riley’s math class test out of a possible 50 points. What was the median score for the math test?

The scores are 35, 37, 38, 41, 44, 45, 46, 48, 48, 49, 50, 50, 50.

The median is the middle number when put in order.

3|5 means 35

B. 46
Fruit juice is only sold in gallons. You are hosting a party for 100 people. Each person is expected to drink a half cup. How many gallons will need to be purchased?

A. 1  B. 2  C. 3  D. 4
Fruit juice is only sold in gallons. You are hosting a party for 100 people. Each person is expected to drink a half cup. How many gallons will need to be purchased?

D. 4

The graphic shows 16 cups per gallon. Servings are ½ cup so there are 32 servings per gallon. 100 / 32 = 3.125 gallons but we must purchase full gallons.
During the month of December, the high temperature dropped an average of 2.5°F each day. The high temperature was 40°F on December 10. Use this to predict the high temperature on December 21.

A. 20°F
B. 13°F
C. 12.5°F
D. 10°F
During the month of December, the high temperature dropped an average of 2.5°F each day. The high temperature was 40°F on December 10. Use this to predict the high temperature on December 21.

C. 12.5°F

The temperature dropped 11 days.
2.5(11) = 27.5 total drop
40 − 27.5 = 12.5
A person who works a job in Indiana is entitled to be paid minimum wage at $7.25 an hour. If the wage increased to $10 per hour, how much more would a person earn if the person worked a 40 hour work week?

A. $80  
B. $90  
C. $100  
D. $110
A person who works a job in Indiana is entitled to be paid minimum wage at $7.25 an hour. If the wage increased to $10 per hour, how much more would a person earn if the person worked a 40 hour work week?

D. $110

$10 - $7.25 = $2.75 per hour raise
$2.75 (40) = $110.00 per week raise
If Joe has 16 pool balls, how many different ways could his friend Moe choose just 3 of them, ignoring the order that he selects them?

A. 16
B. 120
C. 560
D. 1,820
If Joe has 16 pool balls, how many different ways could his friend Moe choose just 3 of them, ignoring the order that he selects them?

C. 560

\[
16 \times 15 \times 14 = \text{ways to choose 3 w/o replacement} \\
3 \times 2 \times 1 = \text{ways to order 3 objects}
\]
The inputs and outputs follow a pattern. Which pair of numbers follows the same pattern?

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>10</td>
<td>46</td>
</tr>
<tr>
<td>-3</td>
<td>-19</td>
</tr>
<tr>
<td>-5</td>
<td>-29</td>
</tr>
<tr>
<td>-10</td>
<td>-54</td>
</tr>
</tbody>
</table>

A. 6, 26  
B. 1,3   
C. -1,1  
D. 10,54
The inputs and outputs follow a pattern. Which pair of numbers follows the same pattern?

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>10</td>
<td>46</td>
</tr>
<tr>
<td>-3</td>
<td>-19</td>
</tr>
<tr>
<td>-5</td>
<td>-29</td>
</tr>
<tr>
<td>-10</td>
<td>-54</td>
</tr>
</tbody>
</table>

Each output is 4 less than 5 times the input. $5(6)-4 = 26$

A. 6, 26
End
Round
Two
Begin
Round
Three
Given the five numbers plotted on the number line, which number best represents the median?

A. 50  
B. 60  
C. 80  
D. 170
Given the five numbers plotted on the number line, which number best represents the median?

The middle dot represents the median.

C. 80

The middle dot represents the median.
The probability of rolling a number less than 3 on a number cube is 1/3. What is the probability of rolling a 3 or greater?

A. 1/3  
B. 2/3  
C. 5/6  
D. 1/2
The probability of rolling a number less than 3 on a number cube is 1/3. What is the probability of rolling a 3 or greater?

B. 2/3

Favorable events are rolling a 3, 4, 5, or 6 out of 6 possible outcomes.
Prob(3 or greater) = 4/6 or 2/3
What is the number?
- The sum of the number’s digits is not 8.
- The number is not a prime number.
- The number is not divisible by 2, 3, or 7.
- The number is not greater than 40.
- The number is not less than 20.

A. 35
B. 19
C. 25
D. 42
What is the number?
- The sum of the number’s digits is not 8.
- The number is not a prime number.
- The number is not divisible by 2, 3, or 7.
- The number is not greater than 40.
- The number is not less than 20.

C. 25

2 + 5 ≠ 8
25 = 5x5 so it is not prime
25 is not divisible by 2, 3, or 7.
20<25<40
A set of 15 cards is numbered 1 to 15. Suppose you pick a card at random. What is the probability of picking a prime number?

A. 7/15
B. 8/15
C. 3/5
D. 2/5
A set of 15 cards is numbered 1 to 15. Suppose you pick a card at random. What is the probability of picking a prime number?

D. \( \frac{2}{5} \)

The prime numbers are 2, 3, 5, 7, 11, and 13.

\[ \text{Prob(prime)} = \frac{6}{15} \text{ or } \frac{2}{5} \]
Karl buys a new jacket that sold for $78. There is a 20% discount and Karl had a special in-store coupon for an additional $10 off the sale price of any one item. What is Karl’s final price for the jacket?

A. $15.60
B. $48.50
C. $52.40
D. $53.60
Karl buys a new jacket that sold for $78. There is a 20% discount and Karl had a special in-store coupon for an additional $10 off the sale price of any one item. What is Karl’s final price for the jacket?

C. $52.40

$78.00(0.20) = $15.60 discount
$78.00 - $15.60 - $10.00 = $52.40
Continue the sequence
0, 1, 4, 9, 16, 25,...

A. 30, 36, 49, 64
B. 35, 50, 64, 81
C. 40, 49, 65, 82
D. 36, 49, 64, 81
Continue the sequence
0, 1, 4, 9, 16, 25, ...

These are square numbers.

D. 36, 49, 64, 81
When Stacey is 50, he will be twice as old as his son Taylor. If Taylor is 22 now, how old is Stacey now?

A. 42
B. 45
C. 47
D. 50
When Stacey is 50, he will be twice as old as his son Taylor. If Taylor is 22 now, how old is Stacey now?

C. 47

<table>
<thead>
<tr>
<th></th>
<th><strong>Now</strong></th>
<th><strong>Given</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Stacey</td>
<td>UNKNOWN</td>
<td>50</td>
</tr>
<tr>
<td>Taylor</td>
<td>22</td>
<td>50/2=25</td>
</tr>
</tbody>
</table>

Taylor’s ages tell us “now” is 3 years before “when Stacey is 50”.

M.A.T.H. Invitational 2014 Round 3 Number 7
Andrea did some comparison shopping for shoes and socks. If she can buy one pair of shoes and one pair of socks at either store, which store offers the best cost for her purchase? How much would she spend?

Store A
Socks- 3 pairs @ $9.30
Shoes- 2 pairs @ $48.24

A. Store A, $27.22
B. Store B, $27.22
C. Store A, $31.47
D. Store B, $31.47
Andrea did some comparison shopping for shoes and socks. If she can buy one pair of shoes and one pair of socks at either store, which store offers the best cost for her purchase? How much would she spend?

Store A
Socks - 3 pairs @ $9.30
Shoes - 2 pairs @ $48.24

Store B
Socks - 2 pairs @ $6.84
Shoes - 3 pairs @ $84.15

A. Store A, $27.22

Store A
Socks 9.30/3 = $3.10
Shoes 48.24/2 = $24.12
Total $27.22

Store B
Socks 6.84/2 = $3.42
Shoes 84.15/3 = $28.05
Total $31.47
End
Round
Three
Begin Round Four
Kim rolls a number cube twice. What is the probability she rolls a 2 each time?

A. 1/6  
B. 5/36  
C. 1/30  
D. 1/36
Kim rolls a number cube twice. What is the probability she rolls a 2 each time?

D. 1/36

\[
\text{Prob(2)} = \frac{1}{6} \\
\text{Prob(2 then 2)} = \left(\frac{1}{6}\right)\left(\frac{1}{6}\right)
\]
How many 1/4 pound hamburger patties can be made with 10 pounds of ground beef?

A. 20  
B. 30  
C. 40  
D. 50
How many 1/4 pound hamburger patties can be made with 10 pounds of ground beef?

C. 40 patties

\[ 10 \div \frac{1}{4} = 10 \times 4 = 40 \]
Mr. Smith assigned Civil War projects to be presented at the History Festival. Of 35 students, 1/5 made posters, 2/5 created slideshows, and the rest wrote skits. How many students wrote skits?

A. 6
B. 8
C. 12
D. 14
Mr. Smith assigned Civil War projects to be presented at the History Festival. Of 35 students, 1/5 made posters, 2/5 created slideshows, and the rest wrote skits. How many students wrote skits?

D. 14

\[
\frac{1}{5} + \frac{2}{5} = \frac{3}{5} \text{ did not write skits}
\]
\[
\text{So } \frac{2}{5} \text{ did write skits.}
\]
\[
35 \left(\frac{2}{5}\right) = 14
\]
If Krista saves 25% of the $200 tuition to attend horse camp, her parents will pay the balance. She has saved $30. How much more does she need save?

A. $10  
B. $20  
C. $30  
D. $40
If Krista saves 25% of the $200 tuition to attend horse camp, her parents will pay the balance. She has saved $30. How much more does she need save?

B. $20

25% of 200 is $50
$50 - $30 = $20
## What percent of the students received an A?

A. 4%  
B. 12%  
C. 20%  
D. 28%

### Stem and Leaf Plot

<table>
<thead>
<tr>
<th>Stem</th>
<th>Leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>7 6 6 4 3 3 2</td>
</tr>
<tr>
<td>8</td>
<td>9 9 8 8 5 4 2 0</td>
</tr>
<tr>
<td>7</td>
<td>8 6 4 4 2 1</td>
</tr>
<tr>
<td>6</td>
<td>8 4 3</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

### Scale

- **A** 92-100
- **B** 84-91
- **C** 76-83
- **D** 67-75
- **F** 0-66
What percent of the students received an A?

D. 28%

7 scores are 92-100 out of 25 scores.
7/25 = 28/100
What is the probability of randomly picking a face card (J, Q, or K) from a standard deck of 52 cards? A standard deck of cards consists of 52 cards in each of the 4 suits of Spades, Hearts, Diamonds, and Clubs. Each suit contains 13 cards: Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King. Round the answer to the nearest percent.

A. 2%
B. 23%
C. 40%
D. 50%
What is the probability of randomly picking a face card (J, Q, or K) from a standard deck of 52 cards? A standard deck of cards consists of 52 cards in each of the 4 suits of Spades, Hearts, Diamonds, and Clubs. Each suit contains 13 cards: Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Round the answer to the nearest percent.

B. 23%

\[
\frac{3 \text{ face cards} \times 4 \text{ suits}}{52 \text{ cards in a deck}} = \frac{12}{52} \text{ or } \frac{3}{13} \text{ or } 23\%
\]
What is the sum of all the whole numbers from 1 to 2014?
A. 2,029,105
B. 4,058,210
C. 2,028,098
D. 2,027,091
What is the sum of all the whole numbers from 1 to 2014?

A. 2,029,105

\[
\begin{align*}
1 & \quad 2 & \quad 3 & \quad \ldots & \quad 2014 \\
+ & \quad 2014 & \quad 2013 & \quad 2012 & \quad \ldots & \quad 1 \\
2015 & \quad 2015 & \quad 2015 & \quad \ldots & \quad 2015
\end{align*}
\]

There are 2014 sums of 2015 or a total of 4,058,210. Each number has been added twice though so we must divide by 2 to get 2,029,105.
The table shows the enrollment figures for two schools. Which is the correct comparison of the data?

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4,918</td>
<td>4,939</td>
<td>4,686</td>
<td>4,640</td>
<td>4,530</td>
</tr>
<tr>
<td>B</td>
<td>1,475</td>
<td>1,426</td>
<td>1,525</td>
<td>1,413</td>
<td>1,371</td>
</tr>
</tbody>
</table>

A. The median enrollment in A is twice the median enrollment in B.
B. The difference between the mean and median enrollment in A is less than B.
C. The data for B has a greater range.
D. The difference between the mean and median enrollment in B is less than A.
The table shows the enrollment figures for two schools. Which is the correct comparison of the data?

Enrollment for School Systems

<table>
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<td>1,413</td>
<td>1,371</td>
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</tbody>
</table>

D. The difference between the mean and median enrollment in B is less than A.

Mean of B is 1442  Median of B is 1426  Difference is 16
Mean of A is 4742.6  Median of A is 4686.0  Difference is 56.6
End Round Four
Begin
Alternate
Round
A fly is flying above the figure shown. If the fly lands on a square at random, what is the probability that the fly will land on a shaded square? Convert your answer to percent form.

A. 33%
B. 38%
C. 62%
D. 63%
A fly is flying above the figure shown. If the fly lands on a square at random, what is the probability that the fly will land on a shaded square? Convert your answer to percent form.

A. 33%

8 red / 24 total or 1/3 are red
Which expression means seven more than five times a number?

A. $5x + 7$
B. $7x + 5$
C. $7(5x)$
D. $5x(7)$
Which expression means seven more than five times a number?

A. $5x + 7$

When stuck, try some numbers.

7 more than 20 is 27
7 more than five times 4 is $7 + 20$ or 27
7 more than 5 times 11 is $7 + 5(11)$ or 62

Remember, we multiply before adding unless grouping symbols change the order of operations.
Susan bought a pair of shorts and 5 CD’s at a mall in Indianapolis for $102. If the shorts cost $12 and the CD’s were all the same price, what was the cost of each CD?

A. $20  
B. $18  
C. $16  
D. $14
Susan bought a pair of shorts and 5 CD’s at a mall in Indianapolis for $102. If the shorts cost $12 and the CD’s were all the same price, what was the cost of each CD?

B. $18

$102 - $12 = $90
$90 ÷ 5 = $18
Jeff places tiles with the following letters into a bag.

M A T H B O W L

He draws two tiles randomly without replacing them. What are the chances both letters he pulls out are consonants?

A. 15/28
B. 1/8
C. 1/2
D. 3/8
Jeff places tiles with the following letters into a bag.

M A T H B O W L

He draws two tiles randomly without replacing them. What are the chances both letters he pulls out are consonants?

A. 15/28

Prob(first consonant) = 6/8
Prob(second consonant given first was consonant) = 5/7
Prob(2 consonants) = (6/8)(5/7) or 30/56
The number 18 can be made by multiplying together three prime numbers: 2, 3, and 3. How many prime numbers must be multiplied to make 1,800?

A. 5
B. 6
C. 7
D. 8
The number 18 can be made by multiplying together three prime numbers: 2, 3, and 3. How many prime numbers must be multiplied to make 1,800?

C. 7

\[ 1,800 = 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 \]
A wagon wheel has 12 spaces between spokes. How many spokes does the wheel have?

A. 10 spokes  
B. 12 spokes  
C. 13 spokes  
D. 14 spokes
A wagon wheel has 12 spaces between spokes. How many spokes does the wheel have?

B. 12 spokes

Sketch some wheels:
- 2 spokes, 2 spaces
- 4 spokes, 4 spaces
You spin the three spinners below. What is the probability of landing on the blue, the number 4, and the letter B?

A. $\frac{1}{3}$  
B. $\frac{1}{12}$  
C. $\frac{1}{32}$  
D. $\frac{1}{64}$
You spin the three spinners below. What is the probability of landing on the blue, the number 4, and the letter B?

C. $\frac{1}{32}$
If 4 birds can eat 4 worms in 4 minutes, how long will it take 32 birds to eat 32 worms?

A. 4 minutes  
B. 32 minutes  
C. \(\frac{1}{2}\) an hour  
D. 8 minutes  

M.A.T.H. Invitational 2014 Round Alternate Number 8  
60 seconds
If 4 birds can eat 4 worms in 4 minutes, how long will it take 32 birds to eat 32 worms?

A. 4 minutes

Each of the 4 birds eat one worm each in the given 4 minutes. Thus, 32 birds can each eat one worm in
End Alternate Round