Begin
Practice
Round
20 + 0 = ?

A. 0
B. 2
C. 20
D. 200

20 + 0 = ?

C. 20
End Practice Round

Begin Round One
Write 12 and 35 hundredths in standard form.

A. 12.35
B. 12.035
C. 1235
D. 1.235

The word “and” is used to denote a decimal point. The places to the right of the decimal point are tenths and hundredths.
Trista was getting ready for a surprise party from 8:00 a.m. until 10:29 a.m. How many minutes did she spend preparing?

A. 120  
B. 149  
C. 169  
D. 189  

B. 149  

8:00 to 10:29 is 2 hours 29 minutes  
1 hour is 60 minutes.  

60 + 60 + 29 = 149 minutes
The value of a baseball card was $6 when it was sold. The value of this card is now $15. What is the percent increase in the value of the card?

A. 125%
B. 1.5%
C. 90%
D. 150%

D. 150%

Change in value is increase of $9. Original value was $6.

\[ \frac{9}{6} = 1.5 \text{ or } 150\% \]
Change 35°C from Celsius to Fahrenheit by multiplying the Celsius reading by 1.8 then adding 32 to the product.

A. 90°
B. 91°
C. 92°
D. 95°

35(1.8) + 32
63 + 32
95

D. 95°
Travis started a rock collection in June. In July, his total was four times as many rocks as collected in June. He had 46 rocks in August, which was ten more than in July. How many rocks did Travis collect in June?

A. 9  
B. 10  
C. 11  
D. 12

Working backward:

46 in August
36 in July
36 is 4 times number in June
So Travis had 9 rocks in June
Jamie needs to make 36 cookies. If her recipe makes 12 cookies using 1 2/3 cups of sugar, how much sugar does she need?

A. 3 cups  
B. 3 6/9 cups  
C. 4 2/3 cups  
D. 5 cups

\[ \frac{36 \div 12}{1} = 3 \text{ batches} \]

\[ 3(1 \frac{2}{3}) = \]

\[ \frac{3 \cdot 5}{1 \cdot 3} = 5 \text{ cups} \]

D. 5 cups
Nolan bought a new lawnmower this past summer for $330. He knows that the price included a 20% mark up in value. What was the original cost of the lawn mower before it was marked up 20%?

A. $396
B. $66
C. $270
D. $275

120% of original = marked up price

\[ 1.20x = 330 \]

\[ x = \frac{330}{1.2} \]

\[ x = 275 \]
In a class of 32 students, 18 students have dogs, 9 students have cats but 4 of these same students have both cats and dogs. The rest of the students have neither cats nor dogs. How many students have neither?

A. 1  
B. 4  
C. 5  
D. 9
End Round One

Begin Round Two
Simplify $2^7$

A. 14
B. 114
C. 128
D. 135

Or use the exponent key on the calculator

$2^7 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 128$
Abby makes 25 out of 30 free throw shots when practicing on Saturday. If she keeps up this rate, how many free throw shots should she make in 42 attempts?

A. 35  
B. 36  
C. 37  
D. 38

25/30 is 5/6 are successful.  
5/6 of 42 is 35
Which group of numbers includes only prime numbers?

A. 7, 23, 57, 71, 91  
B. 1, 13, 17, 19, 51  
C. 19, 23, 59, 61, 73  
D. 2, 11, 13, 31, 91

C. 19, 23, 59, 61, 73

57 is divisible by 3 in A
1 is neither prime nor composite in B
91 is divisible by 7 in both A and D
Archie has 4 pennies, 2 nickels, and 4 dimes in a shaker. If he shakes coins out one at a time, what is the probability that the first coin has a value greater than 4 cents?

A. 6/9  
B. 4/10  
C. 3/5  
D. 2/5

C. 3/5

The nickels and dimes both have values greater than 4 cents. There are 6 of the ten coins that are favorable events. 6/10 simplifies to 3/5.
Which event is least likely to occur?

A. Toss a head on one toss of a fair coin.
B. Roll an even number using a pair of fair 6-sided dice.
C. Randomly choose a vowel from the letters in the word MATH.
D. Randomly choose a cube from a bin full of basketballs.

D. Randomly choose a cube from a bin full of basketballs. D. Has a zero chance of happening. It is least likely.
Find the next mixed number in this pattern:
9, 8 ⅓, 10 ⅙, 9 ½, 11 ⅓ ...

A. 10 ⅓
B. 10 ⅔
c. 11
d. 13 ⅙

2020 MATH Invitational Round 2 Number 6

Find the next mixed number in this pattern:
9, 8 ⅓, 10 ⅙, 9 ½, 11 ⅓ ...

B. 10 ⅔
You have tossed all of your socks in the drawer, unmatched. 5 pair are brown, 3 pair are white, 4 pair are black. What is the maximum number of times you must reach into the drawer without looking to guarantee at least two of the same color?

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

In the worst case, every sock is different from those already drawn out. There are 3 colors so on the fourth pick, it must match at least one of the first three.

Matches might occur on the first three picks but the most you will need to pick is 4.
Jerald’s math teacher asked the class to find the sum of the numbers 22 through 48. Jerald knew an efficient and fast way to add consecutive numbers. What is the sum of all the numbers 22 through 48?

A. 910  
B. 945  
C. 1,820  
D. 1,240

We need to add (48-21) or 27 consecutive integers. Using Gauss Formula: \( \frac{n}{2}(\text{first} + \text{last}) \)

\[
\frac{27}{2}(22 + 48) = \frac{27}{2}(70) = 945
\]
End Round Two

Begin Round Three
Cam has 7 Dalmatian puppies. The stem and leaf plot shows the number of spots on each. What is the mode?

A. 19  
B. 27  
C. 7  
D. 38

The mode occurs most frequently. The numbers are 9, 12, 20, 24, 27, 27, and 38 spots.

Key $1\,|\,2 = 12$

<table>
<thead>
<tr>
<th>STEM</th>
<th>LEAF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>0, 4, 7, 7</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>
What is the prime factorization of 147?

A. $3 \times 7^2$
B. $2 \times 7^3$
C. $3 \times 2^3$
D. $3 \times 7^3$

Upside down division

\[
\begin{array}{c|c}
3 & 147 \\
7 & 49 \\
\end{array}
\]

\[
\begin{array}{c|c}
\text{Or factor tree} & 147 \\
/ \ & / \\
3 \times 49 & 7 \times 7 \\
/ \ & / \\
7 & \\
\end{array}
\]
What is the probability of spinning a red with this spinner?

A. 1/5
B. 1/6
C. 1/7
D. 2/6

Only one of the seven equal sized spaces is red as indicated by the arrow.
Luke is collecting eggs from the henhouse. If he collects 147 eggs, how many single-dozen cartons will he be able to completely fill?

A. 10  
B. 11  
C. 12  
D. 13

\[147 \div 12 = 12 \text{ R } 3\]

He can completely fill 12 cartons with 3 left over.
Symone is saving money to buy a phone. She saved $24 dollars the first week. She had $54 dollars by the end of the second week. What percent of the first week’s savings was the second week’s savings?

A. 1.25%
B. 12.5%
C. 110%
D. 125%

1st week saved $24
2nd week saved $30
Question is thus $30 is what percent of $24?
First 2 answers are eliminated as they are less than 100%.

\[
\begin{align*}
\frac{x}{100} &= \frac{30}{24} \\
x &= \frac{30(100)}{24} \\
x &= \frac{3000}{24} \\
x &= 125
\end{align*}
\]

D. 125%
Jaylen is analyzing the data from the line plot. How many students ate at least three candy bars?

A. 9
B. 10
C. 12
D. 3

3 students ate 3
0 students ate 4
4 students ate 5
2 students ate 6
1 student ate 7
2 students ate 8
12 students ate 3 or more candy bars
Find the probability of spinning a prime number on a yellow or blue space.

A. 3/4  
B. 1/2  
C. 3/8  
D. 1/4

Both yellow spaces are prime numbers. Only the 5 is prime in the blue area. There are 8 equal spaces.
Find the quartiles for these test scores:

69, 75, 99, 98, 75, 88, 95, 87, 79

A. 87, 75, 91  
B. 75, 87, 97  
C. 69, 75, 99  
D. 75, 87, 96.5

Place data in order from least to greatest.

69, 75, 75, 79, 87, 88, 95, 98, 99

Median is 87, the middle number, the 2nd quartile.

1st quartile is median of lower half = 75

3rd quartile is median of upper half = (95+98)/2 = 96.5
End
Round Three

Begin
Round Four
What is the absolute value of -158?

A. 158
B. 0
C. -158
D. 316

Absolute value is the positive distance from zero.
Written as $|-158| = 158$
What is the median and mean for this data: 25, 22, 26, 23, 27, 24?

A. 25.5, 24.5
B. 24.5, none
C. none, 24.5
D. both are 24.5

Arranging in order to find median: 22, 23, 24, 25, 26, 27. So median is \((24 + 25)/2 = 24.5\)
Mean is the average, found by adding all six and then dividing by six. This mean is also 24.5
How many more students prefer soccer than prefer softball?

A. 9  
B. 4  
C. 5  
D. 3

9 students prefer soccer  
4 students prefer softball  
The difference is 5
Aaron is painting his room. He painted 1/3 of it on Monday, then 1/6 of it on Tuesday, and another 1/9 of it on Friday. What part of the room does he still have left to paint?

A. 2/3
B. 15/36
C. 5/12
D. 7/18

So far, Aaron has painted 1/3 + 1/6 + 1/9 of the room. That sum is 11/18 of the room. He has 7/18 of the room left.
If a glove and a ball together cost $50 and the glove cost $45 more than the ball, what is the price of the ball?

A. $47.50  
B. $5  
C. $2.50  
D. Not possible to calculate

**Solution:**

Let the price of the ball be $\circ$.

Glove + $\circ = $50

Glove = $45 + $\circ$

$(45 + $\circ$) + $\circ = $50$

$45 + 2 \circ = $50$

$2 \circ = $5$

$\circ = $2.50
There are 3 orange, 4 blue and 5 green marbles in a bag. What is the probability of drawing a blue marble and then a green marble without replacing the first marble?

A. 5/33
B. 5/36
C. 2/3
D. 7/12

These events are dependent. That is what happens first impacts the second event by changing what is left in the bag.

\[
\text{Prob(blue; then green)} = \frac{4}{12} \times \frac{5}{11} = \frac{20}{132} = \frac{5}{33}
\]
The ages of grandparents are listed in the Stem and Leaf Plot. Find the median and the mode from this data set.

A. 72.5 and 78
B. 78 and 78
C. 75 and 78
D. 70 and 80

The mode is 78.
The median (middle) is half the sum of the two middle numbers.

\[ \frac{1}{2}(70 + 75) = 72.5 \]
The numbers 1 through 50 are placed in a bag and one number is then chosen randomly. Find the probability of choosing a prime number with the digit 2 or 3 in it.

A. 4 out of 25  
B. 8 out of 50  
C. 7 out of 50  
D. 8 out of 15

The prime numbers are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47

Graying out the ones without a 2 or 3 in it gives us
2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47
End Round Four

Begin Alternate Round
Which fraction represents the fraction of mint green heart(s) in the picture?

A. 1/6  
B. 1/3  
C. 1/4  
D. 6/1
Which number has a different value?

A. 9.085
B. 9 85/1000
C. 9.85
D. 9 17/200
Find the median and range for these test scores.

70 93 93 95 93 78 83 68 92

A. 85 and 27
B. 92 and 27
C. 92 and 22
D. 93 and 22

The median is the middle number when data is placed in numerical order. The range is the difference in largest and smallest data item.

68 70 78 83 92 93 93 95

The median is 92.

95 – 68 = 27 for the range.
The average railroad track is 4 feet, 8.5 inches wide. We know one foot is 12 inches. Convert the total width to inches.

A. 48
B. 56
C. 48.5
D. 56.5

\[
12 \text{ inches per foot} \\
12(4) + 8.5 \\
48 + 8.5 \\
56.5
\]
Marcia and her classmates conducted a “Favorite Pizza Toppings” survey where 800 students replied. 35% liked pepperoni, 25% liked sausage, 15% liked cheese, 10% liked ham. The remaining students chose the “other” category. How many students chose “other”?

A. 120
B. 240
C. 160
D. 150

35 + 25 + 15 + 10 = 85% listed
100% - 85% = 15% liked other
15% of 800 =
0.15(800) =
120
Drew went for a rectangular walk. First he walked south $2\frac{1}{4}$ miles. Then he turned west and walked $1\frac{1}{3}$ miles. He then turned north and walked $1\frac{1}{8}$ miles. How many miles does he have left to return home?

A. $1\frac{1}{8}$  
B. $2\frac{1}{4}$  
C. $2 \frac{11}{24}$  
D. 6

\[
\begin{align*}
1\frac{1}{6} + 1\frac{1}{8} &= 1 \frac{1}{6} + \frac{8}{24} + 1 \frac{3}{24} + 1 \frac{8}{24} \\
&= 2 \frac{11}{24}
\end{align*}
\]

Or $2 \frac{11}{24}$ miles.
Nathan is 5 years older than Darci. If the total of their ages is 19, how old is Darci?

A. 14
B. 9
C. 8
D. 7

Checking each answer avoids need for algebra.
A. 14 If Darci is 14, Nathan is 19, sum is 33
B. 9 If Darci is 9, Nathan is 14, sum is 23
C. 8 If Darci is 8, Nathan is 13, sum is 21
D. 7 If Darci is 7, Nathan is 12, sum is 19
If the first four Fibonacci numbers are 0, 1, 1 and 2, what is the tenth number in the series?

A. 10  
B. 34  
C. 55  
D. 89

The numbers are in red along the diagram, except for the first number, zero.
0, 1, 1, 2, 3, 5, 8, 13, 21, 34