



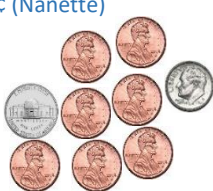
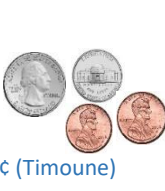
Math Challenge #10

First Name: _____	Last Name: _____	Grade: _____
Teacher: _____	Parent's email: _____	

Coins



Kinder & First Grade: solve at least 3 problems.
Second & Third Grade: solve at least 7 problems.
Fourth Grade and above: solve at least 12 problems.

Answer

1. $5\text{¢} + 5\text{¢} + 1\text{¢} + 1\text{¢} + 1\text{¢} = 13\text{¢}$	13 [cents]
2. $\bigcirc + \bigcirc = 15\text{¢}$ $10\text{¢} + 5\text{¢} = 15\text{¢}$	A dime and a nickel Or a 10-cent coin and a 5-cent coin
3. $\bigcirc + \bigcirc + \bigcirc = 16\text{¢}$ $10\text{¢} + 5\text{¢} + 1\text{¢} = 15\text{¢}$ $\bigcirc + \bigcirc + \bigcirc = 31\text{¢}$ $25\text{¢} + 5\text{¢} + 1\text{¢} = 31\text{¢}$	a. A dime, a nickel, and a penny. Or 10¢, 5¢, 1¢ b. A quarter, a nickel, and a penny Or $25\text{¢} + 5\text{¢} + 1\text{¢} = 31\text{¢}$
4. The two copper-colored coins must be pennies. So, we need to find the value of the three silver coins. $17\text{¢} - 2\text{¢} = 15\text{¢}$. The possible three silver coins that add up to 15 cents must be nickels. Three nickels = 15¢, and one nickel is 5¢.	5 [cents] or 5¢
5. $50\text{¢} + 10\text{¢} + 10\text{¢} + 5\text{¢} = 75\text{¢}$	1 half dollar, 2 dimes, and 1 nickel or $50\text{¢} + 10\text{¢} + 10\text{¢} + 5\text{¢} = 75\text{¢}$
6.  38¢ (Jacob)  33¢ (Arush)  22¢ (Nanette)  32¢ (Timoune)	Arush: 33¢ Jacob: 38¢ Nanette: 22¢ Timoune: 32¢
7. $1+2+3 = 6$ coins. If she has more quarters than pennies and more dimes than quarters, then the number of pennies must be 1, the number of quarters must be 2, and the number of dimes must be 3 since the total number of coins is 6. $25\text{¢} + 25\text{¢} + 10\text{¢} + 10\text{¢} + 10\text{¢} + 1\text{¢} = 81\text{¢}$	81¢ or 81 cents


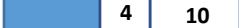
8. Let's use an imaginary third person. If Jack gives 10 nickels to a third person, he then will have 4 fewer nickels than Maya would. In other words, Maya would then have 4 more nickels than Jack. But since Maya receives those 10 nickels, Maya actually has 14 nickels more than Jack does.
 14 nickels = **70 cents**
 Another way: We can draw a model showing Jack has 6 more nickels than Maya (BEFORE).
 14 nickels = $14 \times 5\text{¢} = 70\text{¢}$

BEFORE

Jack		10
Maya		4

6

AFTER

Jack		
Maya		4 10

Another way: to act it out. If Jack will be giving 10 nickels to Maya, he should have at least 10 nickels. Let us say, he has 10 nickels and Maya 6 less, or just 4 nickels. Now Jack gives 10 nickels to Maya, he will end with 0 nickels, Maya will have 14 nickels. Which is 14 nickels more than him. 14 nickels \times 5 cents = **70 cents**



9. We can do guess and check, and making sure that we only count 9 coins. Since nickels are twice as many as dimes, we can try 2 nickels and 1 dime and 2+4 = 6 pennies, total of 9 coins: $5\text{¢} + 5\text{¢} + 6 \times 1\text{¢} + 10\text{¢} = 26\text{¢}$.

10. We can do guess and check.
 Let's order their guesses 63 (Arjun), 71 (Billy) and 81 (Carlos).
 $63 + 6 = 69$, $71 - 4 = 67$, doesn't work as the number of coins must be the same
 $63 + 6 = 69$, $81 - 4 = 77$, doesn't work
 $71 + 6 = 77$, $81 - 4 = 77$, works. The number of coins in a jar is **77**, Arjun was too low on his guess. Billy and Carlos work with the clue.

11. We can make an organized list.

Pennies	Nickels	Dimes	Quarter	
2	0	0	0	2¢
1	1	0	0	6¢
1	0	1	0	11¢
1	0	0	1	26¢
0	2	0	0	10¢
0	1	1	0	15¢
0	1	0	1	30¢
0	0	1	1	35¢
0	0	2	0	20¢
no other combination				

12. Let's do the model drawing. 1 nickel = 5 cents, and 1 quarter is 25 cents. Twice as many nickels and quarters, if we draw the model corresponding to the nickels as a unit.

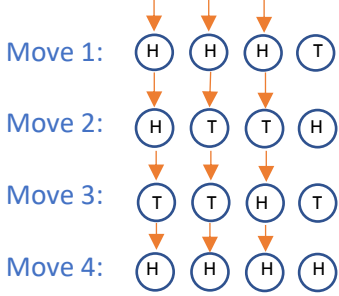
Nickel		} 525 ¢
Quarter		

$525\text{¢} \div 7 = 75\text{¢}$ per 1 unit
 There are two units of nickels, which means $2 \times (75 \div 5) = 30$ coins for nickels. There were 15 quarters.
 $30 + 15 = 45$ coins in total.

13. 83¢ is an odd number, which means she has 3 pennies for sure.
 Now we need to find how to make 80¢ with 9 coins, 5 of which are the same.
 Same 5 coins cannot be dollar, half-dollar, or quarter. Those 5 same coins can't be dimes either as $5 \times 10 = 50\text{¢}$, but there will be 4 coins (30 cents) left, which can't be done with other coins than dimes.
 So, five coins must be nickels $5 \times 5\text{¢} = 25\text{¢}$
 4 coins left = 55¢. $55\text{¢} = 25\text{¢} + 10\text{¢} + 10\text{¢} + 10\text{¢}$
 Or do guess and check.
 12 coins used = 1 quarter, 3 dimes, 5 nickels, 3 pennies.
 $25\text{¢} + 10\text{¢} + 10\text{¢} + 10\text{¢} + 5\text{¢} + 5\text{¢} + 5\text{¢} + 5\text{¢} + 5\text{¢} + 1\text{¢} + 1\text{¢} + 1\text{¢} = 83\text{¢}$

3 [dimes]

14.



Move 1: (H) (H) (H) (T)
 Move 2: (H) (T) (T) (H)
 Move 3: (T) (T) (H) (T)
 Move 4: (H) (H) (H) (H)

4 [moves]

15. $\frac{1}{3} = \frac{2}{6}, \frac{1}{2} = \frac{3}{6}$
 Flipping 2 coins changed $\frac{1}{6}$ of the coins from Head to Tail. Thus, there were $6 \times 2 = 12$ coins in a row.

12 [coins]

16. We can make an organized list.

Nickels	Pennies	
1	0	5¢
2	0	10¢
3	0	15¢
4	0	20¢
5	0	25¢
1	1	6¢
2	1	11¢
3	1	16¢
4	1	21¢
5	1	26¢
1	2	7¢
2	2	12¢
3	2	17¢
4	2	22¢
5	2	27¢

Nickels	Pennies	
1	3	8¢
2	3	13¢
3	3	18¢
4	3	23¢
5	3	28¢
0	1	1¢
0	2	2¢
0	3	3¢

Another way to think: there are 5 different amounts where you can have 0 penny, 1 penny, 2 pennies, or three pennies = $5 \times 4 = 20$.
 There are 3 different amounts when you have 0 nickels or {0 nickel and 1 penny, 0 nickel and 2 pennies, 0 nickel and 3 pennies} = 3
 Total different amounts = $20 + 3 = 23$.

23

17. Make a table to organize the number of coins.

25¢	10¢	5¢
1	2	11
1	4	7
1	6	3
2	2	6
2	4	2
3	2	1

We have 6 ways to make \$1.00 using even number of coins.

6 [ways]

18. We can do guess and check.

Another way would be as follow.

Let's pretend that all 54 coins are nickels, the there would be $54 \times 5¢ = 270¢$

It is $475 - 270 = 205¢$ less than what we need. Now let's trade 1 nickel for 1 dime, the number of coins will be still correct, but we'll change the sum into 5 cents more.

So to find the number of dimes $205 \div (10 - 5) = 41$ dimes.

Let's check $41 \times 10¢ + 13 \times 5¢ = 410 + 65 = 475¢$

41 [dimes]

Solution is available on March 3, 2023

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