

Solution to #1

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We need to find three numbers. Let's name them for now.

Back side of 6, call it ?

Back side of 7, call it *

Back side of 8, call it ♥

We need to find the #'s, ?, * and ♥ the sum of three ~~three~~ disks add to 15, 16, 17, 18, 19, 20, 21, 22.

For example guess the back side of 6 is zero (so $? = 0$). And say $* = 9$ and $♥ = 9$. We would have a problem since if ?, * and ♥ land face up, the total would be $0 + 9 + 9$ or 18 which is not one of the possible sums.

Let's try some more guessing. Let's try $? = 1$, $* = 6$ and $♥ = 9$. Notice now if ?, *, and ♥ land face up, the total is $1 + 6 + 9 = 16$ which is one of the allowable sums. This looks good?

We keep going and see that we need to make sure all possible sums listed can be made with our choice of ?, *, and ♥.

So we check:

$6 + 7 + 8 = 21$	$? + * + ♥ = 16$
$? + 7 + 8 = 16$	$6 + * + 8 = 20$
$? + * + 8 = 15$	$6 + * + ♥ = 21$
$? + 7 + ♥ = 17$	$6 + 7 + ♥ = 22$

We are missing 18 and 19 as sums. Notice we also can make 21 and 16 in two different ways.

Let's guess some values that are distinct from the given 6, 7, 8. For example guess $? = 2$, $* = 5$ and $♥ = 9$.

We run the same check:

$6 + 7 + 8 = 21$	$? + * + ♥ = 16$
$? + 7 + 8 = 17$	$6 + * + 8 = 19$
$? + * + 8 = 15$	$6 + * + ♥ = 20$
$? + 7 + ♥ = 18$	$6 + 7 + ♥ = 22$

Which worked?

Setting Up the Problem

We need to find three numbers. Let's name them for now.

Back side of 6, call it ?

Back side of 7, call it *

Back side of 8, call it ♡

We need to find the #'s, ?, *, and ♡ the sum of three of these discs add to 15, 16, 17, 18, 19, 20, 21, 22.

First Guess

For example, guess the back side of 6 is zero (so ? = 0). And say * = 9 and ♡ = 9. We would have a problem since if ?, *, and ♡ land face up, the total would be $6 + 9 + 9$ or 24 which is not one of the possible sums.

Second Guess

Let's try some more guessing. Let's try ? = 1, * = 6 and ♡ = 9. Notice now if ?, *, and ♡ land face up, the total is $1 + 6 + 9 = 16$ which is one of the allowable sums. This looks good!

Checking All Combinations

We keep going and see that we need to make sure all possible sums listed can be made with our choice of ?, *, and ♡.

So we check:

$6 + 7 + 8 = 21$	$? + * + \heartsuit = 16$
$? + 7 + 8 = 16$	$6 + * + 8 = 20$
$? + * + 8 = 15$	$6 + * + \heartsuit = 21$
$? + 7 + \heartsuit = 17$	$6 + 7 + \heartsuit = 22$

We are missing 18 and 19 as sums. Notice we also can made 21 and 16 in two different ways.

Third Guess

Let's guess some values that are distinct from the given 6, 7 & 8. For example guess ? = 2, * = 5 and ♡ = 9.

We run the same check:

$6 + 7 + 8 = 21$	$? + * + \heartsuit = 16$
$? + 7 + 8 = 17$	$6 + * + 8 = 19$

$$? + * + 8 = 15$$

$$6 + * + \heartsuit = 20$$

$$? + 7 + \heartsuit = 18$$

$$6 + 7 + \heartsuit = 22$$

Which worked!