

# Challenge 1

<p>Solution 1</p> <ul style="list-style-type: none"> <li>3 left red</li> <li>1 left black</li> <li>4 Right yellow</li> </ul> <p>Total = 8</p>	<p>Solution 3</p> <ul style="list-style-type: none"> <li>2 Left blue</li> <li>3 Left red</li> <li>3 right red</li> </ul> <p>Total = 8</p>
<p>Solution 2</p> <ul style="list-style-type: none"> <li>4 left yellow</li> <li>2 left blue</li> <li>2 right blue</li> </ul> <p>Total = 8</p>	<p>Solution 4</p> <ul style="list-style-type: none"> <li>2 right blue</li> <li>5 right orange</li> <li>1 left black</li> </ul> <p>Total = 8</p>

We chose 8 because it is a big number so it has more solutions, we also chose 1 because it is even and odd + odd = even, even + odd = odd, if we had odd there are more odd to do odd + odd = odd, but less even to do even + even + odd = odd.

# Challenge 2

Game 1	8
Game 2	9
Game 3	10

We chose 8, 9, 10 because we already had many solutions for 8 to give us a good start.

### Challenge 3

1+1+2=5	1+2+2=7
1+1+1+3=6	1+2+2+3=8
1+1+1+1+4=7	1+2+2+4=9
1+1+1+1+5=8	1+2+2+5=10
1+1+2+2=6	1+2+3+3=9
1+1+2+3=6	1+2+3+4=10
1+1+2+4=8	1+2+3+5=11
1+1+2+5=9	1+2+4+4=11
1+1+3+3=8	1+2+4+5=12
1+1+3+4=9	1+3+3+3=10
1+1+3+5=10	1+3+3+4=11
1+1+4+4=10	1+3+3+5=11
1+1+4+5=11	1+3+4+4=11
1+1+5+5=11	1+3+4+5=12

# Challenge 5

1+3+8+4=16	2+2+3+3+3=11
1+3+4+5=13	2+3+3+4=12
1+4+4+4=13	2+3+3+5=13
1+4+4+5=14	2+3+4+4=13
2+2+2+3=9	2+4+4+4=14
2+2+2+4=10	2+4+4+5=14
2+2+2+5=11	2+4+5+4=14
2+2+3+3=10	2+4+5+5=15
2+2+3+4=11	3+1+4+4+5=16
2+2+3+5=12	
2+2+4+4=12	
2+2+4+5=13	
2+3+3+3=11	
2+3+3+4=12	
2+3+3+5=13	
2+3+4+4=13	
2+3+4+5=14	
2+4+4+4=14	
2+4+4+5=15	
3+3+3+4=13	
3+3+3+5=14	
3+3+4+4=14	
3+3+4+5=15	
3+4+4+5=16	

Today this first part we worked systematically by starting with the smallest numbers

BP: Totals

# Dart Challenge

1, 2, 3, 4, 5  
1, 2, 3, 4, 5

## Challenge 1

$$\begin{aligned} 5+1+1 &= 7 \\ 1+2+4 &= 7 \\ 3+2+2 &= 7 \\ 3+3+1 &= 7 \end{aligned}$$

## Challenge 2

$$\begin{aligned} 1+2+3 &= 6 \times \\ 3+3+1 &= 7 \\ 3 & \end{aligned}$$

$$\begin{aligned} 1+5+1 &= 7 \\ 2+4+2 &= 8 \times \\ 3+3+3 &= 9 \end{aligned}$$

$$\begin{aligned} 5+4+2 &= 11 \\ 4+2+3 &= 9 \times \\ 4+1+5 &= 10 \end{aligned}$$

$$\begin{aligned} 3+2+1 &= 6 \\ 3+3+1 &= 7 \times \\ 4+2+2 &= 8 \end{aligned}$$

$$\begin{aligned} 4+1+2 &= 7 \\ 5+2+2 &= 9 \\ 5+1+4 &= 10 \end{aligned}$$

$$\begin{aligned} 3+1+3 &= 7 \\ 4+2+2 &= 8 \times \\ 5+3+1 &= 9 \end{aligned}$$

## Challenge 3

$$\begin{aligned} 1+2+3+5 &= 11 \\ 1+3+3+5 &= 12 \\ 2+2+4+5 &= 13 \end{aligned}$$

$$\begin{aligned} 1+1+1+4 &= 7 \\ 1+1+1+5 &= 8 \\ 3+2+2+2 &= 9 \\ 5+1+1+3 &= 10 \\ 5+1+2+3 &= 11 \\ 5+4+2+1 &= 12 \\ 5+4+3+1 &= 13 \\ 5+4+4+1 &= 14 \\ 5+4+4+2 &= 15 \\ 5+4+4+3 &= 16 \end{aligned}$$

To do challenge 1, we knew that number 1, 2, and 3 would not be possible because you have to use all 3 darts so even if you got ones every time it would be too high. We tried a higher number because it would have more combinations. Then we wrote the addition ways to get seven and split the even number into 2 so there was three numbers. After that, we checked the numbers didn't appear more than twice on each sum.

To do challenge 2, we started of working systematically before we realized that there was hundreds of different combinations. We knew that we couldn't have the number 1, 2 or 3 because they would be too low. Then we started using trial and error with numbers 6-12 and changed some of the numbers so we didn't use the same numbers more than twice. For example 5+1+1 could be changed into 4+2+1 and not use the same number twice in number sentence so we could use a certain number again to make it easier to make the consecutive numbers without using the same number 3 times or even more.

On this challenge you can only go up to 16 because 5+4+4+3 = 16 and there all of the highest numbers on the targets. The other way that me and Rajavel worked this out is we worked out all of the possibilities for all of the numbers.

## Challenge 1

- 1-0
- 2-0
- 3-0
- 4-1,1,2
- 5-3,1,1 2,2,1
- 6-4,1,1 3,1,2
- 7-5,1,1 4,2,1 3,2,2
- 8-3,3,2 5,2,1 4,3,1 3,2,4

## Challenge 2

- Game 1: 4,2,2=8
- Game 2: 5,3,1=9
- Game 3: 5,4,1=10

## Challenge 3

- 1-0
- 2-0
- 3-0
- 4-0
- 5-1,1,2
- 6-1,1,1,3 1,1,2,2
- 7-1,1,1,4 1,1,2,3 1,2,2,2
- 8-2,2,2,2 1,1,1,5 1,1,2,4 1,1,3,3 1,2,2,3

We went through all the possible numbers until we got four possible values.

We decided to use the numbers 8,9,10 because 8 was the number that had the most possibilities so we did the numbers above that. Many resubmits later we did it.

## Part Target

- 9. 1,2,1,5 1,2,3,3 1,1,3,4 2,2,2,8 5,1,1,2
- 10. 3,3,3,1 4,2,2,2 1,2,3,4 2,2,3,3 5,1,1,3 5,2,2,1
- 11. 1,1,2,3,5
- 12. 1,2,4,5
- 13. 2,2,4,5
- 14. 2,3,4,5
- 15. 2,4,4,5
- 16. 3,4,4,5

- Game 1: 1+2+3+5=11
- Game 2: 1+2+4+5=12
- Game 3: 1+3+4+5=13

For challenge 3 we needed to make the biggest possible number. We had three targets 1: 1,2,3 2: 1,2,3,4 3: 1,2,3,4,5. We had four darts. We did five to sixteen but realised we can't make seventeen without using the same numbers.

Part 1. For challenge 3 we needed to make the biggest possible number. We had three targets 1: 1,2,3 2: 1,2,3,4 3: 1,2,3,4,5. We had four darts and started systematically with 1. It turns out you can't make the numbers 1-4 but we only had 4 darts. We did five to sixteen but realised we can't make seventeen without using the same numbers.

Part 2. The easiest way to do part two was to check some of the numbers around on the sheet. The one on the sheet was wrong to prevent cheating.



### Challenge 1

- $1+2+3=6$  X
- $2+3+4=9$  and  $1+3+5=9$
- $3+4+5=12$  and X
- $1+2+4=7$  and X
- $1+3+4=8$  and  $1+2+5=8$
- $1+4+5=10$  and X
- $2+4+5=11$  X

We did it wrong X

### Challenge 1

- $1+2+3=6$
- $1+2+4=7$
- $1+3+4=8$
- $2+3+4=9$
- $1+2+5=8$
- $2+3+5=10$
- $3+4+5=12$

### Challenge 1 - Journaling

Firstly, we found all the possibilities for the first target then we did the same for the second target. Then we looked at all our answers and tried to see if we could make any more answers that is the same as the answer we got for doing one target by itself. So we looked at 6

### Dart target

Can't start with 5 or 6

### Challenge 2

- Game 1:  $1+2+3=6$
- Game 2:  $1+2+4=7$  X
- Game 1:  $1+2+3=6$  X
- Game 2: X
- Game 1:  $4+1+1=6$
- Game 2:  $2+2+3=7$  X

- Game 1:  $3+1+1=5$  X
- Game 2: X
- Game 1:  $2+2+1=5$
- Game 2: X
- Game 1:  $1+2+4=7$
- Game 2:  $1+2+5=8$
- Game 3: X

- Game 1:  $1+2+4=7$
- Game 2:  $1+3+4=8$
- Game 3: X
- Game 1:  $1+2+4=7$
- Game 2:  $2+3+3=8$
- Game 1:  $1+1+5=7$
- Game 2:  $2+2+4=8$
- Game 3: X
- Game 1:  $1+3+4=8$
- Game 2:  $5+3+1=9$
- Game 3: X

- Game 1:  $2+2+4=8$
- Game 2:  $5+1+3=9$
- Game 3:  $5+1+4=10$

Journaling  
We started by using the smallest possible answer which at first we thought was 6 but then we thought it was five. So we found solutions for 5, 6, 7 but we got worked out that 5 as game 1 would not work, so we moved onto 6. We carried on like this until we found the right solution.

### Challenge 3

- Game 1:  $1+2+3+5=11$
- Game 2:  $1+2+4+5=12$
- Game 3:  $1+3+4+5=13$

- Game 1:  $1+2+3+5=11$
- Game 2:  $1+2+3+5=12$
- Game 3: X

- Game 1:  $1+2+3+5=11$
- Game 2:  $1+2+4+5=12$
- Game 3:  $1+3+4+5=13$

- Game 1:  $1+2+3+5=11$
- Game 2:  $1+3+3+5=12$
- Game 3:  $2+2+4+5=13$

- Game 1:  $1+2+3+5=11$
- Game 2:  $2+2+3+5=12$
- Game 3:  $1+3+4+4=13$

- Game 1:  $1+2+3+5=11$
- Game 2:  $1+1+5+5=12$
- Game 3:  $2+3+4+4=13$

- Game 1:  $1+2+3+5=11$
- Game 2:  $2+2+3+5=12$
- Game 3:  $1+3+4+5=13$

- Game 1:  $1+1+4+5=11$
- Game 2:  $2+2+3+5=12$
- Game 3:  $1+3+4+5=13$

- Game 1:  $1+1+4+5=11$
- Game 2:  $1+2+4+5=12$
- Game 3:  $2+2+4+5=13$

Evie  
and  
Oliver

- $1+2+3+5=11$
- $5+4+2=11$  X
- $5+3+2+1$
- $1+2+3+4=10$
- $1+2+3+5=11$
- $1+2+4+5=12$
- $1+3+4+5=13$
- $2+3+4+5=14$

We found the first solution when we accidentally found it trying to find all of the solutions. We found all of the others with trial and error. We think that there will be more possible solutions as well.

- We used:
- Visualising
  - Imagining
  - Expressing
  - Organising
  - Conjecturing
  - Convincing