

Appendix 6.1

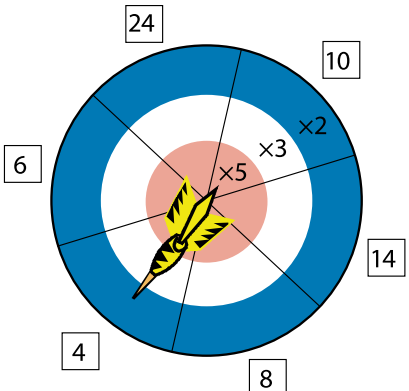
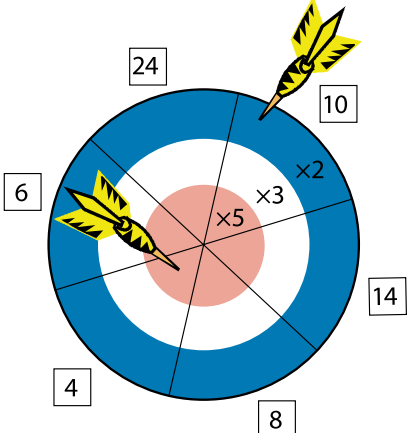
Description of the Dart Game

Dartboard Description

The dartboard is made of:

- 6 areas (4, 6, 8, 10, 14 and 24), each corresponding to a specific number of points;
- 3 coloured rings, each of them multiplying ($\times 2$, $\times 3$ ou $\times 5$) the points.

Points are calculated as follows:

Example 1 : One dart	Example 2 : Two darts
 <p>The diagram shows a circular dartboard divided into six sectors labeled 4, 6, 8, 10, 14, and 24. Three concentric rings are labeled $\times 2$, $\times 3$, and $\times 5$ from the outermost to the innermost. A yellow dart is positioned in the 4-point sector of the $\times 2$ ring.</p>	 <p>The diagram shows the same dartboard as in Example 1. Two yellow darts are shown: one is in the 4-point sector of the $\times 5$ ring, and the other is in the 10-point sector of the $\times 2$ ring.</p>
<p>The dart is on the 4th area of the ring ($\times 2$).</p> <p>The result is therefore:</p> $4 \text{ points} \times 2 = 8 \text{ points.}$	<p>One of the dart is on the 4th area of the ring ($\times 5$), and the other, in the 10th area of the ring ($\times 2$).</p> <p>The result is therefore:</p> $(4 \text{ points} \times 5) + (10 \text{ points} \times 2) = 40 \text{ points}$

The goal of the game is to determine combinations of darts on the dartboard that generate the same number of points. Here are two versions of this game.

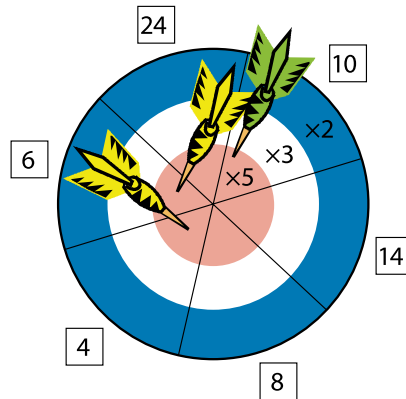
Version 1:

Two darts (F1 and F2) are placed on the dartboard.

Rules

The area where a third dart should be placed must be determined so that the points of this third dart equal the sum of the points of the two first darts.

Example



$$\begin{aligned} \text{Points F1} + \text{Points F2} &= \text{Total} \\ (6 \text{ points} \times 5) + (4 \text{ points} \times 5) &= 50 \text{ points} \end{aligned}$$

To obtain the same number of points, that is 50 points, the third dart must be placed in the 10th area of the ring ($\times 5$).

$$\begin{aligned} \text{Points F3} &= \text{Total} \\ (10 \text{ points} \times 5) &= 50 \text{ points} \end{aligned}$$

The number sentence corresponding to this example is:

$$(6 \text{ points} \times 5) + (4 \text{ points} \times 5) = (10 \text{ points} \times 5).$$

The first number sentence below represents the composition of a number, whereas the second number sentence represents the distributive property of multiplication over addition.

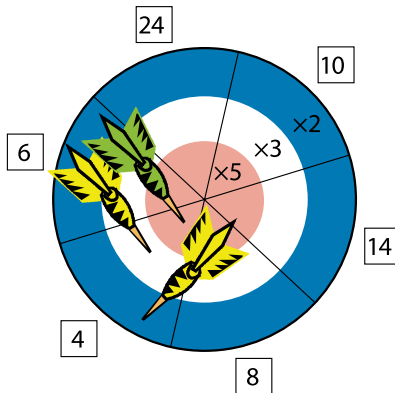
$$\begin{aligned} \underbrace{(6 \text{ points} + 4 \text{ points}) \times 5} &= \underbrace{(10 \text{ points} \times 5)} \\ \swarrow \quad \searrow & \\ (6 \text{ points} \times 5) + (4 \text{ points} \times 5) &= (6 \text{ points} + 4 \text{ points}) \times 5 \end{aligned}$$

Version 2: One dart (F1) is placed on the dartboard.

Rules

The area where two more darts should be placed must be determined so that the sum of the points equal the points obtained with the first dart.

Example



$$\begin{aligned} \text{Points F1} &= \text{Total} \\ (4 \text{ points} \times 5) &= 20 \text{ points} \end{aligned}$$

To obtain the same number of points, that is 20 points, both darts must be placed in the 4th area, one of them being in the ring ($\times 3$) and the other, in the ring ($\times 2$).

$$\begin{aligned} \text{Points F2} + \text{Points F3} &= \text{Total} \\ (4 \text{ points} \times 3) + (4 \text{ points} \times 2) &= 20 \text{ points} \end{aligned}$$

The number sentence corresponding to this example is:

$$(4 \text{ points} \times 5) = (4 \text{ points} \times 3) + (4 \text{ points} \times 2).$$

The first number sentence below represents the composition of a number, whereas the second number sentence represents the distributive property of multiplication over addition.

$$\begin{aligned} (4 \text{ points} \times 5) &= 4 \text{ points} \times (3 + 2) \\ \underbrace{\hspace{10em}} & \\ 4 \text{ points} \times (3 + 2) &= (4 \text{ points} \times 3) + (4 \text{ points} \times 2) \end{aligned}$$