

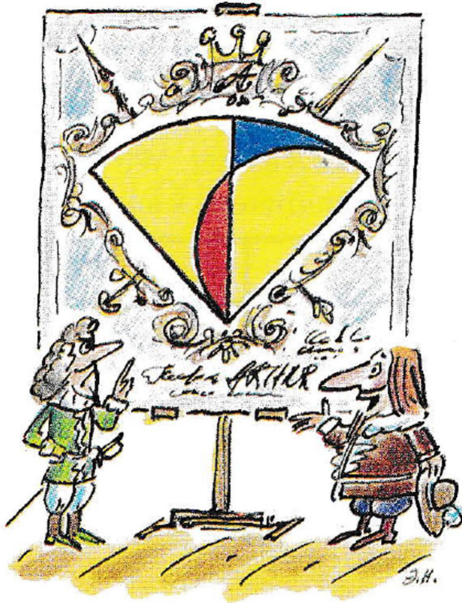
Wisdom of Old

9 April 2020

Jim Stevenson

Here is another Brainteaser from the *Quantum* magazine ([1]).

King Arthur ordered a pattern for his quarter-circle shield. He wanted it to be painted in three colors: yellow, the color of kindness; red, the color of courage; and blue the color of wisdom. When the artist brought in his work, the king's armor-bearer said there was more courage than wisdom on the shield. But the artist managed to prove that the proportions of both virtues were equal. Can you tell how? (A. Savin)



Art by Edward Nazarov

This is another relatively simple problem, though it may look a bit daunting at first.

Solution

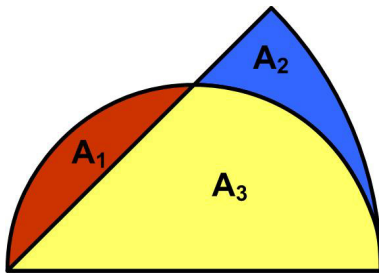
Figure 1 shows the setup where we have labeled the three relevant areas A_1 , A_2 , and A_3 and have assumed the diameter of the semicircle is 2. We wish to show $A_1 = A_2$.

Figure 2 shows the area within the red semicircle is

$$A_1 + A_3 = \frac{1}{2} \pi r^2 = \frac{1}{2} \pi 1^2 = \pi/2.$$

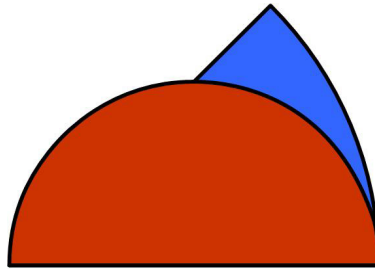
Figure 3 shows the area within the sector is

$$A_2 + A_3 = \frac{1}{2} r^2 \pi/4 = \frac{1}{2} 2^2 \pi/4 = \pi/2$$



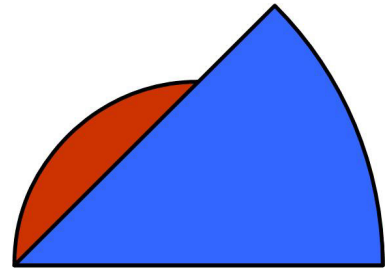
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Figure 1



$$A_1 + A_3 = \frac{1}{2} \pi 1^2 = \pi/2$$

Figure 2



$$A_2 + A_3 = \frac{1}{2} 2^2 \pi/4 = \pi/2$$

Figure 3

These two areas are equal, therefore

$$0 = (A_1 + A_3) - (A_2 + A_3) = A_1 - A_2$$

which is what we wanted to show.

This solution is also the same as that provided by *Quantum*.

References

- [1] “Brainteasers” *Quantum Magazine*, Vol.1 No.4, National Science Teachers Assoc., Springer-Verlag, Mar-Apr 1991 p.46 B30

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