

# **A nontransitive talk**

**James Grime**



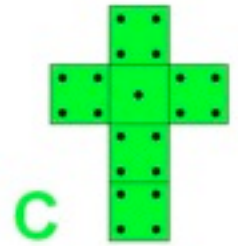
**Hi Jim,**

**Hi Jim,**

**I was wondering if you can  
design a set of five non-  
transitive dice**

# Non-transitive Dice

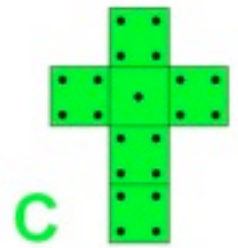
# Non-transitive Dice



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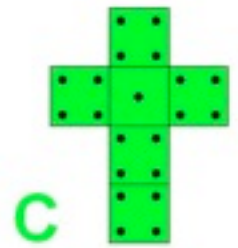
# Non-transitive Dice



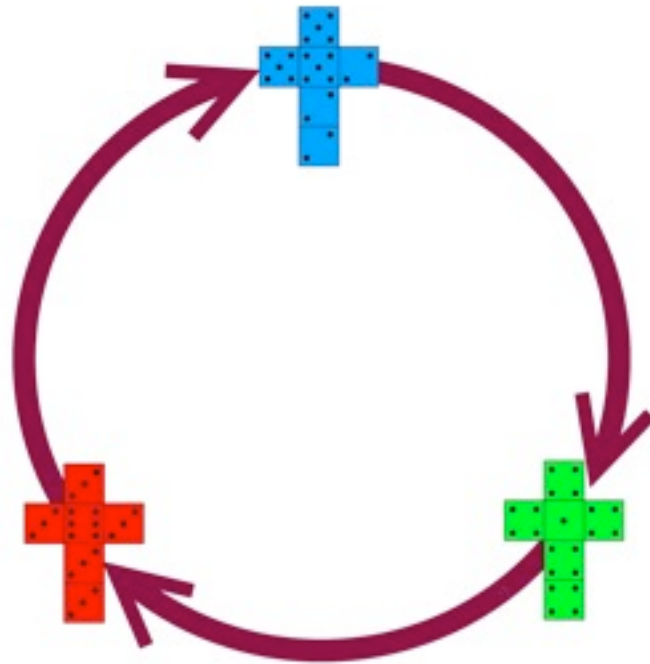
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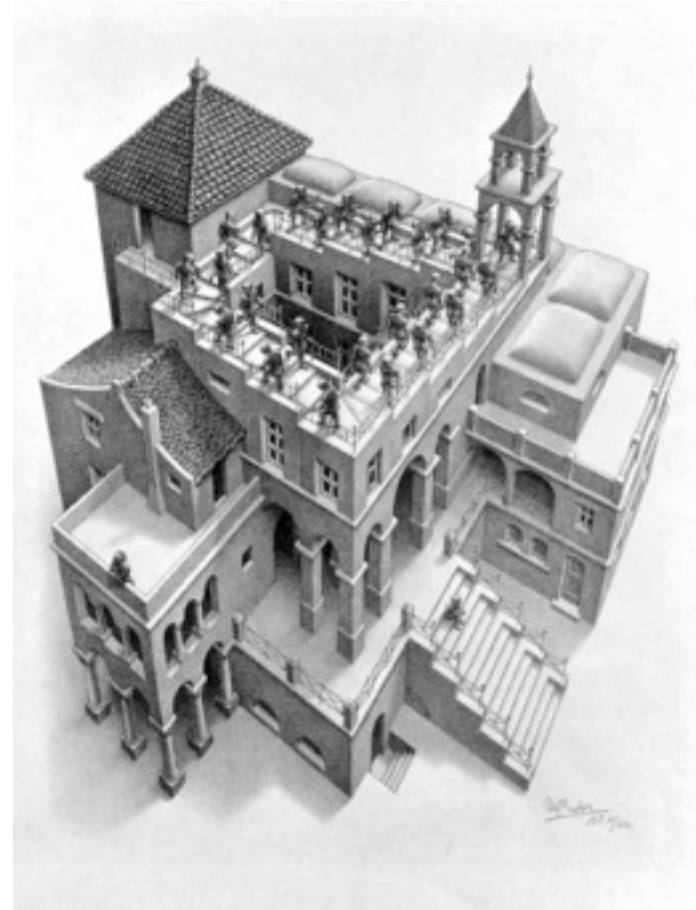
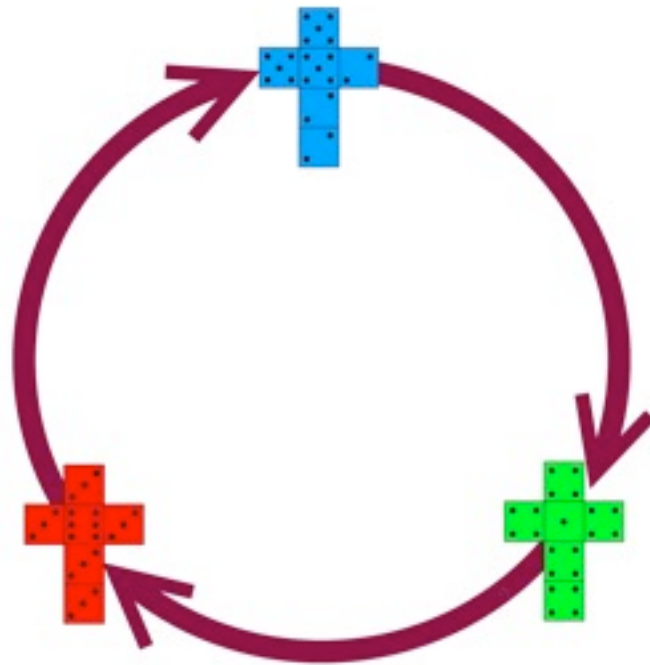
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# Non-transitive Dice



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**Hi Jim,**

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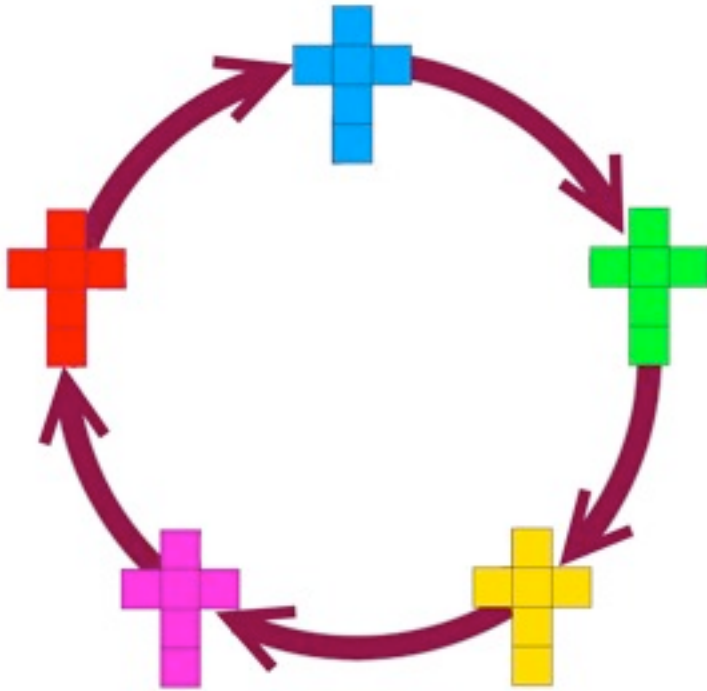
**such that,**

Hi Jim,

I was wondering if you can  
design a set of five non-  
transitive dice

such that,

**A > B > C > D > E > A**



Hi Jim,

I was wondering if you can  
design a set of five non-  
transitive dice

such that,

$A > B > C > D > E > A$

and,

$A > D > B > E > C > A$



Hi Jim,

I was wondering if you can  
design a set of five non-  
transitive dice

such that,

$A > B > C > D > E > A$

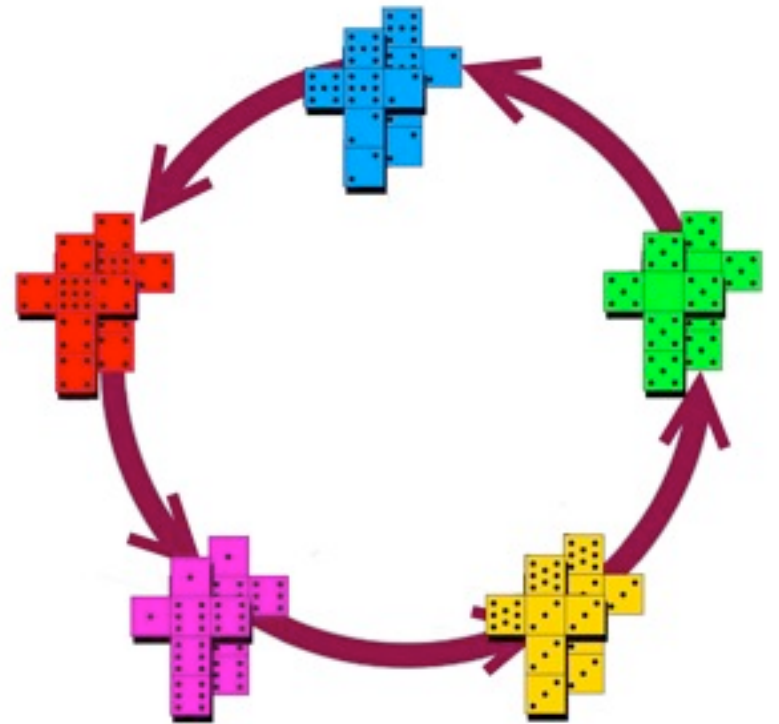
and,

$A > D > B > E > C > A$





ONE DIE



TWO DICE



ONE DIE



TWO DICE



ONE DIE



TWO DICE

# A Gambler's Game



# A Gambler's Game

Two versus one



# A Gambler's Game

Two versus one

Play 100 rolls



# A Gambler's Game

**Two versus one**

**Play 100 rolls**

**Win = Win £1**

**Lose = Lose £1**



# A Gambler's Game

**Two versus one**

**Play 100 rolls**

**Win = Win £1**

**Lose = Lose £1**

**Beat both opponents 43.8%**



# A Gambler's Game

**Two versus one**

**Play 100 rolls**

**Win = Win £1**

**Lose = Lose £1**

**Beat both opponents 43.8%**

**Lose to both opponents 22.7%**



# A Gambler's Game

**Two versus one**

**Play 100 rolls**

**Win = Win £1**

**Lose = Lose £1**

**Beat both opponents 43.8%**

**Lose to both opponents 22.7%**

**Net Profit: £42**

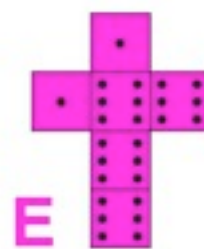
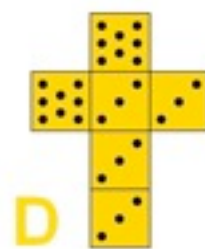
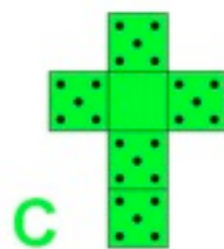
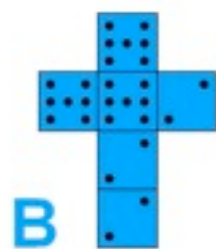
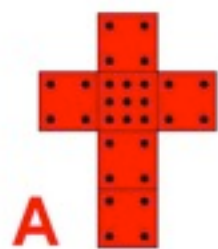




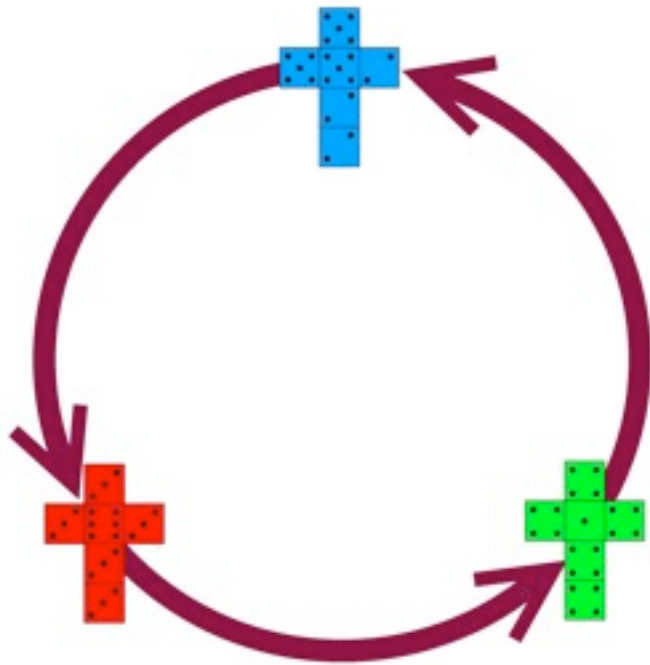




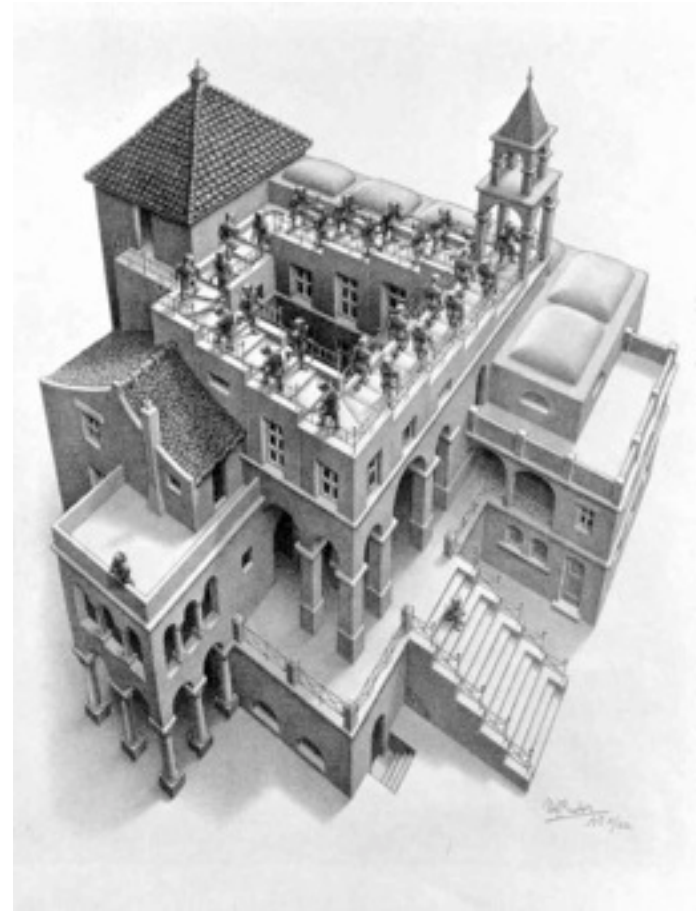


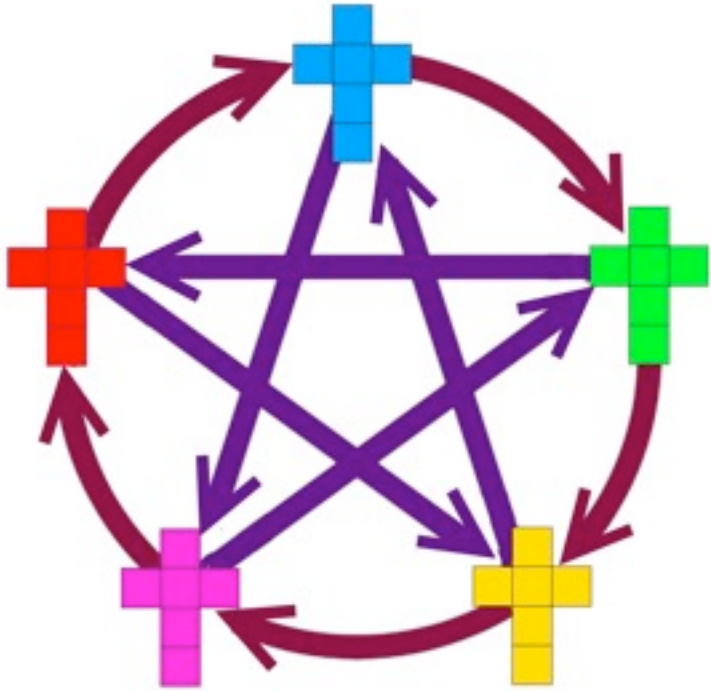


# Non-transitive Dice



TWO DICE







ONE DIE



TWO DICE



ONE DIE



TWO DICE