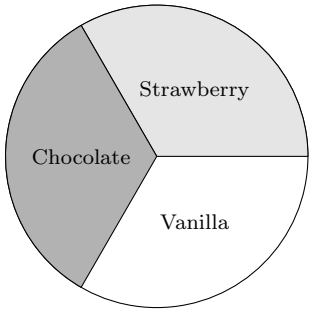
Worksheet 6: Fair Shares and Divider-Chooser

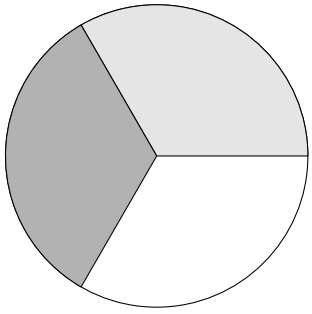
Group Names: Solutions

Tom and Fred were given a cake worth $12 that is equal parts strawberry, vanilla and chocolate.



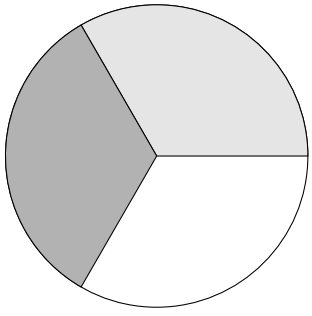
1. How much value is a fair share of the cake? 12/2 = $6 (2 people)

2. Tom likes vanilla and strawberry equally, and doesn't like chocolate at all.
   (a) How much does Tom value the vanilla section of the cake? $6
   (b) How much does Tom value the chocolate section of the cake? 0
   (c) How much does Tom value the strawberry section of the cake? $6



3. Fred will eat vanilla, but he likes strawberry twice as much as vanilla and he likes chocolate *three* times as much as vanilla.
   (a) How much does Fred value the vanilla section of the cake? $2
   (b) How much does Fred value the chocolate section of the cake? $6
   (c) How much does Fred value the strawberry section of the cake? $4

guess: Vanilla = $1, Straw = $2, choc = $3 } 1+2+3=6 No good!
But 2+4+6=12 ✓ (V S C)

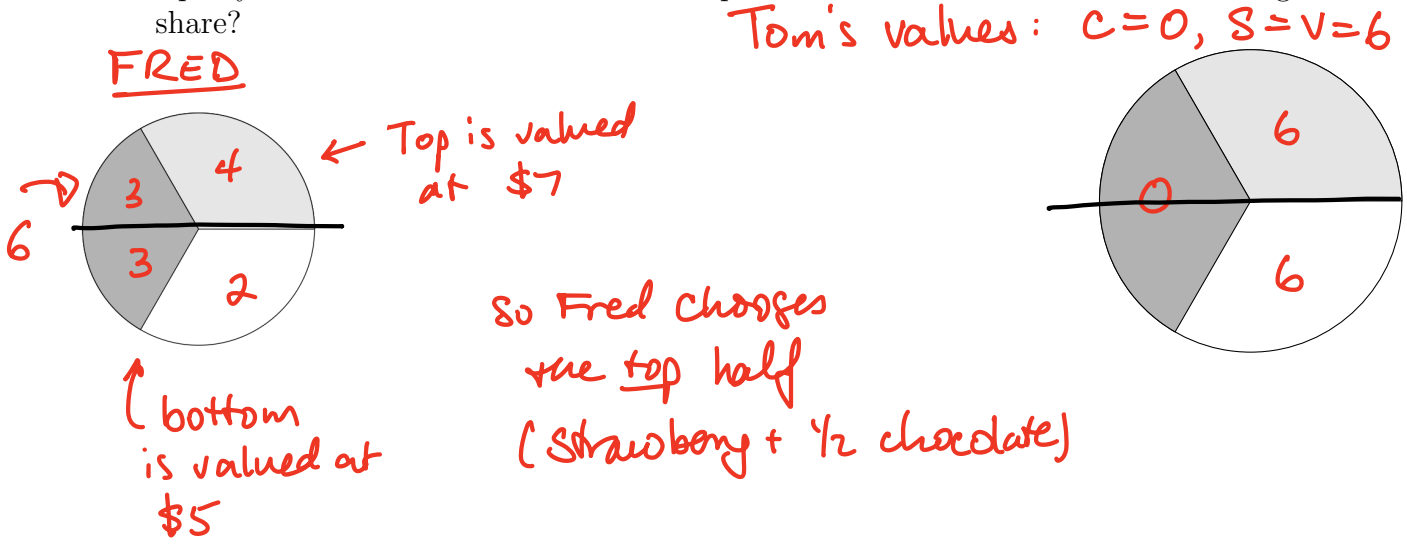


by Algebra: let V = value of vanilla
C = choc = 3V
S = straw = 2V

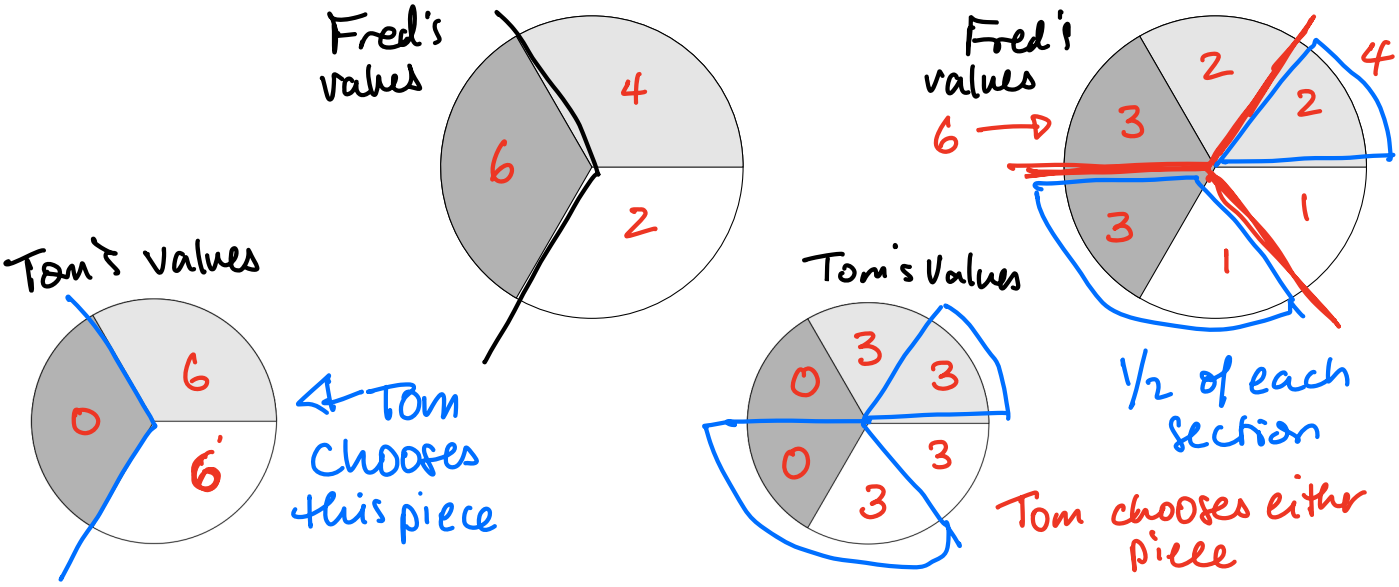
then V+C+S=12 ⇒ V+3V+2V=12 ⇒ 6V=12
⇒ V = 12/6 = 2, C = 3(2) = 6, S = 2(2) = 4

For each of the following, assume you can subdivide the cake pieces as you like.

4. Find a way for Tom to divide the cake into two equal pieces so that he values each piece equally. How does Fred value those two pieces? Which one should he choose to get a fair share?



5. Find two different ways for Fred to divide the cake into two shares that he values equally. In each case, which share should Tom choose to make sure he gets his fair share??

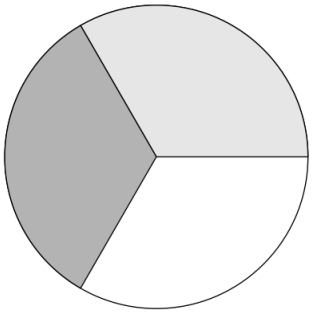


6. Challenge: Suppose that another friend, Janet, likes vanilla 3 times as much as she likes strawberry and chocolate, which she likes equally. How much does she value each of the three pieces?

let S = strawberry. S = C (she likes equally)

V = 3S. So 3S + S + S = 12 ⇒ 5S = 12 ⇒ S = 12/5

$2.40



Strawberry $2.40 Vanilla $7.20 Chocolate $2.40