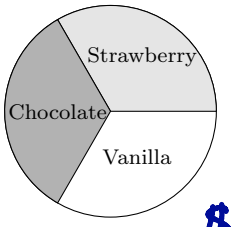
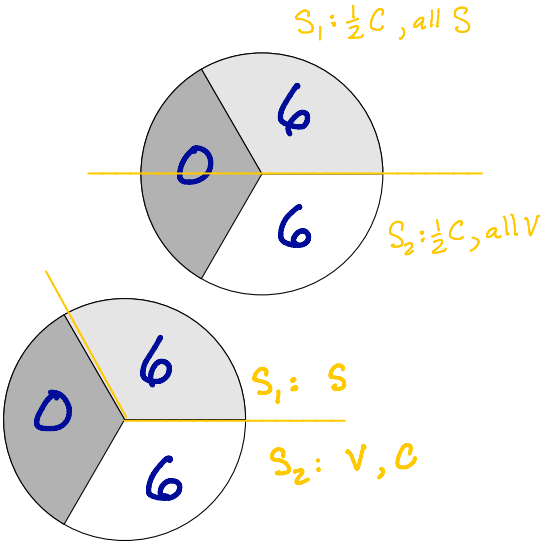
Worksheet 6: Fair Shares and Divider-Chooser

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



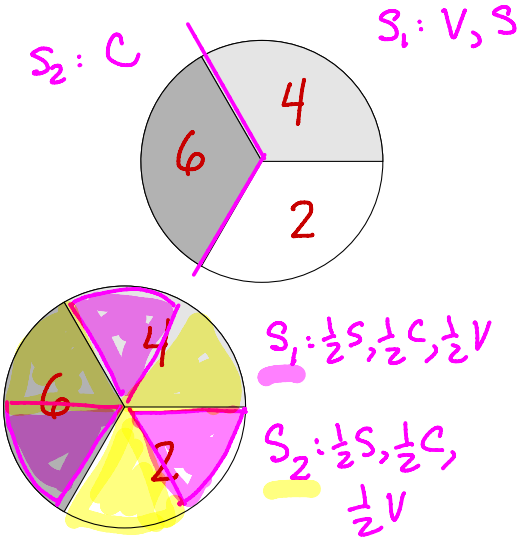
1. How much value is a fair share of the cake? $12/2 = $6

2. Tom likes vanilla and strawberry equally, and doesn't like chocolate at all. Label the cake parts as you answer the following:



   - How much does Tom value the vanilla section of the cake? $6
   - How much does Tom value the chocolate section of the cake? $0
   - How much does Tom value the strawberry section of the cake? $6
   - Find (and draw) two *different* ways Tom could split the cake into two pieces of equal value.

3. Fred will eat vanilla, but he likes strawberry twice as much as vanilla and he likes chocolate *three* times as much as vanilla. Label the cake parts.

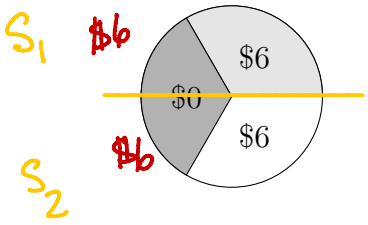


   - How much does Fred value the vanilla section of the cake? 2
   - How much does Fred value the chocolate section of the cake? 6
   - How much does Fred value the strawberry section of the cake? 4
   - Find (and draw) two *different* ways Tom could split the cake into two pieces of equal value.

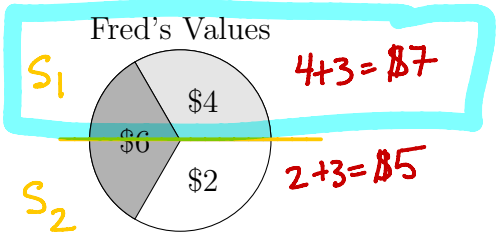
You are going to demonstrate how to divide the cake between Tom and Fred using the Divider-Chooser Method.
Steps:
(1) Divide the cake into two pieces of equal value according to the **Divider's** values. (Label these two pieces in both pictures).
(2) Determine which piece the **Chooser** will select according to their values.
(3) Assign the remaining piece to the **Divider**.
(4) Calculate the value of the final outcome for each person.

4. **Divider:** Tom; **Chooser:** Fred.

Tom's Values



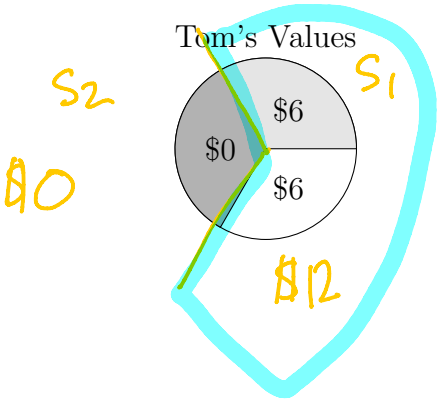
Fred's Values



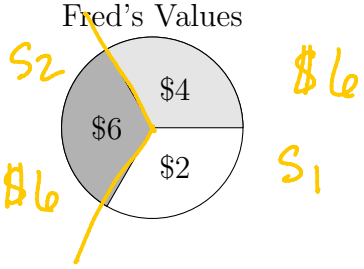
	Tom	Fred
~~Share piece~~	S_2	S_1
value	$6	$7

5. **Chooser:** Tom **Divider:** Fred;

Tom's Values



Fred's Values



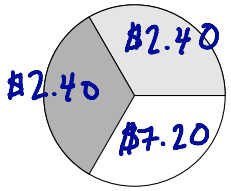
	Tom	Fred
~~Share piece~~	S_1	S_2
value	$12	$6

6. Is it better to be the divider or chooser in this case? Why?

Better to be the chooser! You a guaranteed at least $\frac{1}{2}$, but maybe more. The divider always gets $\frac{1}{2}$ exactly.

7. 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?

Janet's Values



Strawberry $2.40 Vanilla $7.20 Chocolate $2.40

x = value of S or C
$3x$ = value of V

$3x+2x=12$ So $x=\frac{12}{5}=\$2.40$