Names: _____ .

Fair Division Worksheet

1. A round pizza is half cheese and half pepperoni. It costs $7.20. Walter values pepperoni four times as much as cheese. Jesse values cheese twice as much as pepperoni.

    (a) Find the value of the cheese half of the pizza, according to Walter's value system. *Round to the nearest cent.*

    (b) Find the value of the pepperoni half of the pizza, according to Walter's value system. *Round to the nearest cent.*

    (c) Find the value of a 45° cheese slice of pizza, according to Walter's value system. *Round to the nearest cent.*

    (d) Find the value of a 60° pepperoni slice of pizza, according to Walter's value system. *Round to the nearest cent.*

    (e) Find the value of the cheese half of the pizza, according to Jesse's value system. *Round to the nearest cent.*

    (f) Find the value of the pepperoni half of the pizza, according to Jesse's value system. *Round to the nearest cent.*

    (g) Find the value of a 45° cheese slice of pizza, according to Jesse's value system. *Round to the nearest cent.*

    (h) Find the value of a 60° pepperoni slice of pizza, according to Jesse's value system. *Round to the nearest cent.*

2. Six friends agree to divide a \$18 pizza fairly using the **Lone Divider Method**. The table shows how each player values each of the six slices that have been cut by the divider. Assume that all of the friends play honestly.

	s_1	s_2	s_3	s_4	s_5	s_6
Tuco	\$1	\$2	\$1	\$1	\$1	\$13
Hector	\$3	\$3	\$3	\$3	\$3	\$3
Leonel	\$8	\$2	\$2	\$2	\$2	\$2
Marco	\$5	\$2	\$3	\$2	\$2	\$4
Tortuga	\$2	\$2	\$8	\$1	\$3	\$2
Don Eliado	\$10	\$1	\$0	\$4	\$0	\$3

(a) How much is a fair share worth?

(b) Which player was the Divider?

(c) Give the bid list (declaration) for each player.

player	Tuco	Hector	Leonel	Marco	Tortuga	Don Eliado
bid list						

(d) Give a possible Fair Division of the pizza, if one exists.

player	Tuco	Hector	Leonel	Marco	Tortuga	Don Eliado
slice received						

(e) What would the players do if there were no possible fair division of these slices?

3. Three students, Andrea, Brock, and Combo, divide fairly 20 pieces of candy, of different types, using the **Method of Markers**. The candy is placed in an array and the players bid by placing markers as shown below. (Marker A_1 is Andrea's first marker, A_2 is her second; B_1 and B_2 are Brock's markers, and C_1 and C_2 are Combo's.) It is agreed that candy leftover after the allocation will be put aside for a rainy day *Recall that our convention is to go from left to right.*
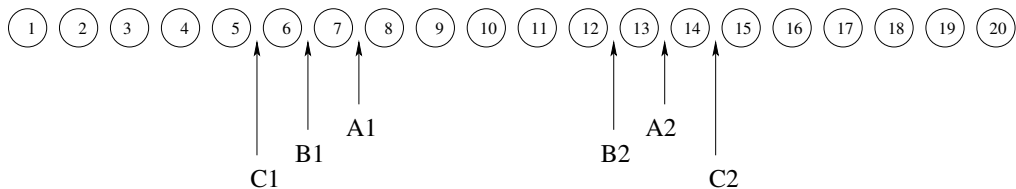
Which pieces does each person get?

player	Andrea	Brock	Combo	Leftovers
pieces received				

4. Four heirs, Skyler, Flynn, Holly, and Marie divide fairly an estate consisting of four items— a car wash, a house, a car, and a watch— using the **Method of Sealed Bids**. The players' bids are given in the table below.

(a) **(The Bids)** Determine each player's opinion of the total value of the estate and the value that each player places on a fair share. Enter these values in rows (1) and (2) of the table.

(b) **(The Allocation)** Determine the allocation of the items in the estate. Fill in the item(s) allocated to each player in row (3) of the table.

(c) **(The Payments)** After the items are allocated, some players will owe the estate money and others will be owed money by the estate. Determine the amount of money each player owes or is owed and enter this in row (4) *OR* (5) of the table.

(d) **(Dividing the Surplus)** After the payments are all made, there might be a surplus left in the estate. Determine each player's share of the surplus and enter it in row (6) of the table.

(e) **(Final Settlement)** Find the net settlement (items and money) for each player and enter it in row (7) of the table.

			Skyler	Flynn	Holly	Marie
Bids		Car Wash	$800,000	$500,000	$750,000	$100,000
		House	$200,000	$120,000	$250,000	$180,000
		Car	$10,000	$9,000	$6,000	$5,000
		Watch	$1,000	$1,500	$1,200	$1100
	(1)	Total Value of Estate				
	(2)	Value of a Fair Share				
Allocation	(3)	Item(s) Allocated				
Payments	(4)	Player Owes Estate				
	(5)	Estate Owes Player				
Surplus	(6)	Share of Surplus				
Final Settlement	(7)	Final Settlement				
		Items:				
		Money (+/-):				

5. Saul and Huell buy a 12-inch half-ham, half-turkey sub sandwich for $4.80. (So there are 6 inches of ham and 6 inches of turkey.) Saul values turkey three times as much as ham. Huell values ham five times as much as turkey.

   (a) Find the value of 1 inch of ham and 1 inch of turkey to Saul.

   (b) Find the value of 1 inch of ham and 1 inch of turkey to Huell.

   (c) If Saul were the divider in a two-person **Divider-Chooser** game, where would he cut the sandwich? (Suppose he must make just one cut, cross-wise.)

   (d) How much would each of the pieces Saul cut be worth to Huell?

   (e) If Huell were the divider in a two-person **Divider-Chooser** game, where would he cut the sandwich? (Suppose he must make just one cut, cross-wise.)

   (f) How much would each of the pieces Huell cut be worth to Saul?