Name: _____

Partner: _____

Directions: Count the number of beads in your bag. Count and record the number of beads of each color.

Answer the following questions:

1. Based on the laws of probability, if the beads of 5 different colors are placed randomly into bags, how many of each color bead would you *expect* to find in a bag containing 30 beads? _____

2. (a) State the **null hypothesis**.

_____
_____

(b) State the **alternate hypothesis**.

_____
_____

3. Complete chart below as you collect your data. (How many beads are in your bag? _____)

Colors	Observed (o)	Expected (e)	o − e	$(o - e)^2$	$(o - e)^2/e$
Pink					
Yellow					
Orange					
Green					
Blue					

χ^2 **(Chi Square) = Σ [$(o - e)^2/e$] = _____**

4. What is your calculated χ^2 value? _____

5. For Chi Square, the **degrees of freedom (df)** are the number of possible outcomes minus 1. How many df are there for this experiment? _____

6. What is the *p* **value** for *your* χ^2 statistic? _____

7. Based on your data, would you *reject* or *fail to reject* the null hypothesis? Why?

_____
_____
_____

8. Indicate one possible explanation the null hypothesis could be rejected in this experiment.

_____
_____

Degrees of freedom (df)	χ^2 value [12]										
1	0.004	0.02	0.06	0.15	0.46	1.07	1.64	2.71	3.84	6.64	10.83
2	0.10	0.21	0.45	0.71	1.39	2.41	3.22	4.60	5.99	9.21	13.82
3	0.35	0.58	1.01	1.42	2.37	3.66	4.64	6.25	7.82	11.34	16.27
4	0.71	1.06	1.65	2.20	3.36	4.88	5.99	7.78	9.49	13.28	18.47
5	1.14	1.61	2.34	3.00	4.35	6.06	7.29	9.24	11.07	15.09	20.52
6	1.63	2.20	3.07	3.83	5.35	7.23	8.56	10.64	12.59	16.81	22.46
7	2.17	2.83	3.82	4.67	6.35	8.38	9.80	12.02	14.07	18.48	24.32
8	2.73	3.49	4.59	5.53	7.34	9.52	11.03	13.36	15.51	20.09	26.12
9	3.32	4.17	5.38	6.39	8.34	10.66	12.24	14.68	16.92	21.67	27.88
10	3.94	4.86	6.18	7.27	9.34	11.78	13.44	15.99	18.31	23.21	29.59
P value (Probability)	0.95	0.90	0.80	0.70	0.50	0.30	0.20	0.10	0.05	0.01	0.001

Circle 4 degrees of freedom.
Circle p = 0.05.
Place a box around the critical value that corresponds to 4 df and p = 0.05.

1. What is a null hypothesis?

_____
_____
_____

2. Describe how to determine whether or not you can reject the null hypothesis.

_____
_____
_____

3. Explain what it means to reject the null hypothesis.

_____
_____
_____

4. Explain what $p < 0.05$ means.

_____
_____
_____

5. Use your knowledge of statistics and the probability table above to complete the table below.

Degrees of freedom	P value	Critical Value	χ^2	p < ____	Reject H$_o$?	Are the data significant?
4	0.05		8.02			
4		13.28	10.33			
	0.05	5.99	7.18			
3	0.05		3.14			
3	0.01		12.01			