Name: …………………… **(   )**

Class: ………………

Date: …… **/** …… **/** ……

Sc!ence

The Scientific Method – Analysing Experimental Results using Graphs to Interpret Data

Anne was looking for a project for the school science fair. She had read an article in a science magazine about feeding antibiotics to chickens. The chickens that were fed antibiotics grew at a faster rate than those that were fed none. Anne thought about the chicken experiment for a long time. After more reading in the library, she decided to design an experiment using red crayfish. Crayfish grow to a maximum size of about 10 cm and mature in 6 to 8 weeks. Female crayfish produce between 100 and 400 eggs that hatch in 2 to 3 weeks. Anne's teacher helped her order 144 crayfish from a science supply store. Anne obtained *Aureomycin**, an antibiotic, from her doctor.
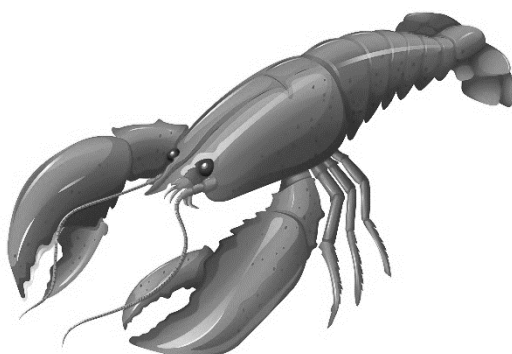
• Crayfish

When the crayfish arrived, Anne divided them into 6 groups. Each group contained 12 males and 12 females. She placed each group in an identical glass container, fed them the same food, and changed the water in each container every seven days. All six groups were treated the same way except that *Aureomycin* was added to five of the containers after each water change according to the following schedule:

Group Number	Mass of Aureomycin Added After Each Change of Water / mg
1	0
2	25
3	50
4	100
5	200
6	300

* Aureomycin is the trademarked name of the drug chlortetracycline, an antibiotic used to treat many bacterial infections and some viral infections. Aureomycin has the formula $C_{22}H_{23}ClN_2O_8$, and is obtained from the bacterium *Streptomyces aureofaciens*.

Each week, before the water was changed, the length of each crayfish was measured and the average length was calculated for each group. The following data was obtained:

Group Number	Average Length of Red Crayfish after Number of Weeks Indicated / cm					
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
1	1.5	3.1	4.0	4.6	6.0	6.8
2	4.0	6.1	7.2	7.3	7.4	7.5
3	2.8	5.0	6.6	7.5	7.6	7.7
4	4.4	6.5	8.0	9.0	9.5	10.0
5	1.6	3.1	4.2	4.5	4.7	4.8
6	1.5	1.9	2.6	2.8	2.9	3.0

Questions

1. What was Anne's hypothesis?

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2. Describe the control that Anne used in her experiment.

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3. Explain why Anne used so many crayfish in her experiment.

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4. What did Anne do to ensure the accuracy of her experiment?

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5. Scientists use many different types of graphs to present and communicate the results to their experiments, for example, bar graphs, histograms, line graphs, pie charts and scatter plots. The data from Anne's experiment is best presented as a series of line graphs, but for this introductory activity, you will present her results as a series of histograms. Complete the table below to calculate the average length by which the crayfish in each group have grown:

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Average length by which the crayfish have grown / cm (length week 6 – length week 1)						

Present the results to Anne's experiment as a histogram on the graph paper provided below. You may use a different colour for each group.
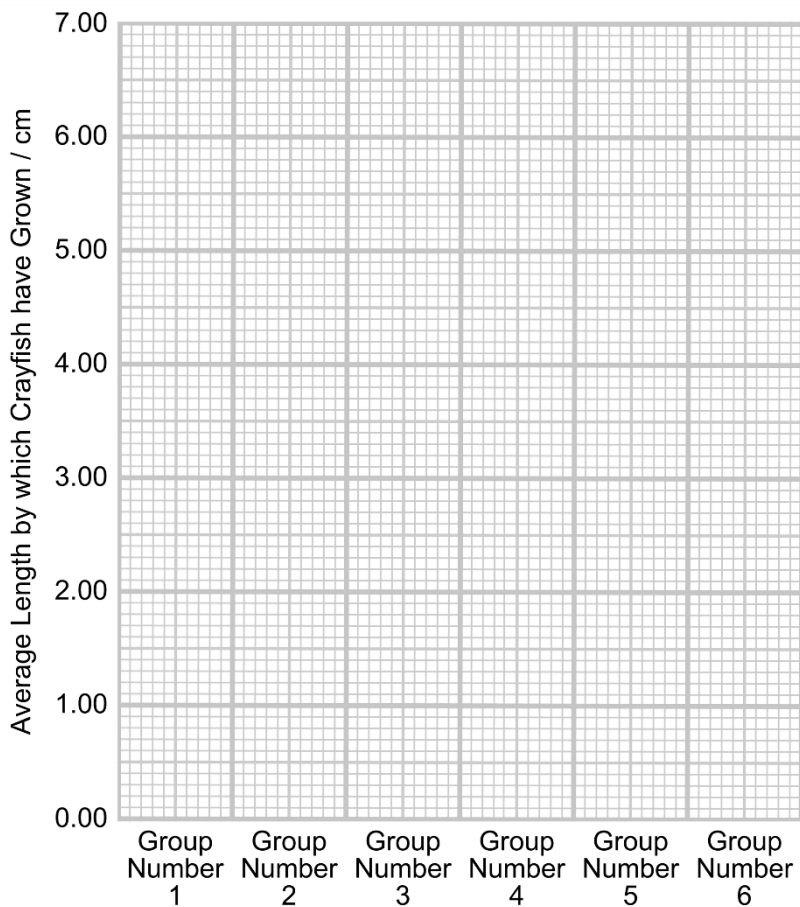
6. What conclusions can be drawn from Anne's experiment?

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7. If you were to repeat Anne's experiment, what would you do to improve it further?

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- Scan the QR code given below to view the answers to this assignment.

http://www.nygh.sg/nature_of_science/worksheets/13_crayfish_ans.pdf