Biology 4605 / 7220 Name Key
Worksheet Single Variable Short Assignment A3 Yr 2020 Quiz 6 Year 2015

1. Walking Babies. Cobb (2015 *Design and Analysis of Experiments* p 150) reported the age (in months) at which babies first walked. The goal of the study was to find if special (structured) exercise lowered the age, compared to 3 control groups: (1) 12 minute/day of unstructured exercise; (2) no exercise and a weekly parental report; (3) no exercise and a single parental report at the end of the study. Six baby boys were assigned randomly to each level, only 5 values were obtained for the single parental report babies.

Age	Ex
9	Special
9.5	Special
9.75	Special
10	Special
13	Special
9.5	Special
11	Exercise
10	Exercise
10	Exercise
11.8	Exercise
10.5	Exercise
15	Exercise
11	Weekly Report
12	Weekly Report
9	Weekly Report
11.5	Weekly Report
13.3	Weekly Report
13	Weekly Report
13.3	Single Report
11.5	Single Report
12	Single Report
13.5	Single Report
11.5	Single Report

1a. Complete the table, use A for age and Ex for Exercise group

Name	Symbol	Resp/Explanatory	Type (NOIR)	Rand/Fixed
Age	A	Response	Ratio	
Ex Group	Ex	Explanatory	Nominal	

1b. 2c. Justify your choice of random or fixed factor

Inferring only to 4 named categories arising from experiment goals

Number of groups being compared 4 [1]
Sample size across all groups $6 \times 3 + 5 = 23$ [1]

1a. Write a GLM, using A for age, and Ex for Exercise group. [5]

$$A = \beta_0 + \beta_{Ex} Ex + \varepsilon$$

1b. The SS_{group} for this data was 14.448
Complete the ANOVA table

	Df	Sum of Sq	Mean Sq	F-ratio	Pr(F)
Group	3	14.448	4.816	2.075	0.137
Residuals	19	44.106	2.321		
Total	22	58.554			

[6]

The p-value shown is for 14.448.
What happens to the p-value when SS_{group} increases ? It decreases [1]

1c. Use symbolic notation to state the null hypothesis being tested $H_0: \mu_{str} = \mu_{unstr}$ [1]

$= \mu_{parent\ rep} = \mu_{single\ report}$

H_0: μ_i is equal in all groups

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2. Follow-up study (over).