MiSP Human Physiology Worksheet #2, L2

Name _____ Date _____

CHILDREN'S HEART AND BREATHING RATES

Key Question: How do children's heart and respiratory rates change as they grow older?

Introduction:

Earlier in this unit you measured your resting heart rate and breathing. You found that people had different heart and breathing rates, and you discussed the possible reasons for those differences. Was your resting heart rate and breathing rate always the same number? Will it increase or decrease in the future? This activity addresses these questions.

Procedure:

1. Review the data on the charts below:

Children's Heart Rates

Age Range	Heart Rate Range (beats per minute)	Median Age (years)	Median Heart Rate Range (beats per minute)
Infant: Birth to 1 yr.	100–160	0.5	130
Toddler: 1–3 yrs.	90–150	2.0	120
Preschooler: 3–6 yrs.	80–140	4.5	110
School-age: 6–12 yrs.	70–120	9.0	95
Adolescent: 12–18 yrs.	60–100	15.0	80

Children's Breathing Rates

Age Range	Breathing Rate Range (breaths per minute)	Median Age (Years)	Median Breathing Rate (Breaths per Minute)
Infant: Birth to 1 yr.	30–60	0.5	45
Toddler: 1–3 yrs.	24–40	2.0	32
Preschooler: 3–6 yrs.	22–34	4.5	28
School-age: 6–12 yrs.	18–30	9.0	24
Adolescent: 12–18 yrs.	12–18	15.0	14

2. Graph the data to show the relationship between age (years) and heart rate (beats per minute) and between age (years) and breathing rate (breaths per minute). GRAPH THE DATA ON

TWO DIFFERENT GRAPHS. USE THE MEDIAN FOR EACH AGE CATEGORY AND THE MEDIAN RATE FOR EACH RANGE. THIS DATA IS HIGHLIGHTED IN GRAY ON THE CHARTS.

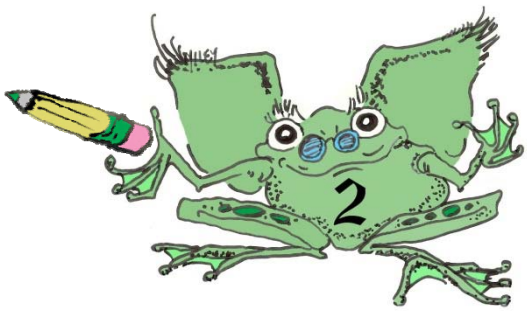
For the heart rate graph:

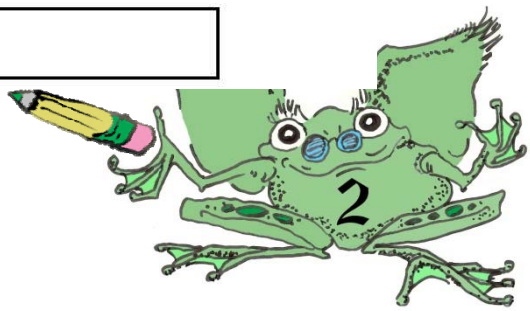
- What is the independent/manipulated variable? Scale and label the *x*-axis for this variable.
- What is the dependent/responding variable? Scale and label the *y*-axis for this variable.
- Connect the data points.

For the breathing rate graph:

- What is the independent/manipulated variable? Scale and label the *x*-axis for this variable.
- What is the dependent/responding variable? Scale and label the *y*-axis for this variable.
- Connect the data points.

Be sure to put a title on each graph!

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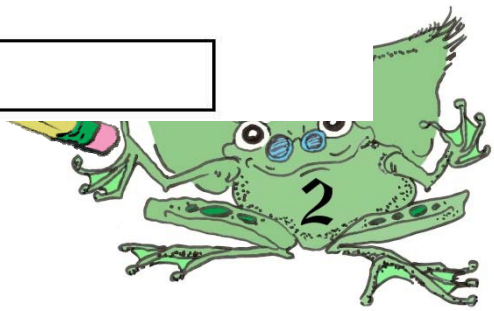
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Discussion Questions:

1a. Describe the age and heart rate graph by completing the sentence, "As a child grows from birth to adolescence, her or his heart rate _____."

1b. Describe the age and breathing rate graph by completing the sentence, "As a child grows from birth to adolescence, her or his breathing rate _____."

2. Use your graphs to estimate the heart and breathing rates at ages 7 and 17.

Age (years)	Heart Rate (beats/min.)	Breathing Rate (breaths/min.)
7		
17		

3. Is the <u>change</u> in heart rate the same between each set of consecutive age ranges? _____ If not, between which two median ages is the change the greatest?

_____

4. Is the <u>change</u> in breathing rate the same between each set of consecutive age ranges? _____ If not, between which two median ages is the change the greatest?

_____

5. Can you tell when the greatest change is greatest, just by looking at the graph? How?

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_____

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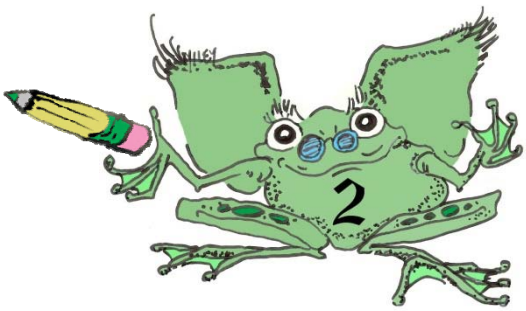


6. Doctors and scientists WOULD NOT use these data and graphs to predict the heart and breathing rates of a person 40 years old. Why not?

_____

_____

_____

7. Look at the .5 to 2 years and 9 to 15 years lines on the age and breathing rate graph. Compare those two sections of the graph by calculating the unit rates of change (slope) of each section.

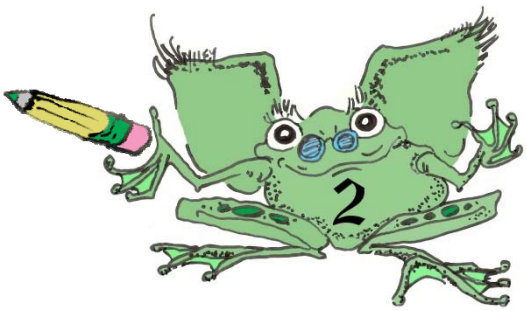
Unit Rate of Change = $\frac{\Delta y}{\Delta x} = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{\Delta \text{ Breathing Rate (breaths per minute)}}{\Delta \text{ Time (minutes)}}$

Section of graph Ordered Pairs (x_1, y_1) (x_2, y_2)	Δ Breathing Rate (breaths per minute Δy	Δ Age (years) Δx	**Unit Rate of Change (slope)** $\Delta y/\Delta x$
.5 to 2 years			
9 to 15 years			

8. Why is the sign of the unit rate of change (slope) of both sections of the graph negative (-)?

_____

_____



9. Which unit rate of change (slope) shows the greatest change per year? How does that difference make that section of the graph look in comparison to the other section of the graph?

_____

_____

_____