Use the given data to answer the questions and construct the scatter plots.

Pathfinder Character Level vs. Total Experience Points

<table>
<thead>
<tr>
<th>Level</th>
<th>2</th>
<th>3</th>
<th>6</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>14</th>
<th>15</th>
<th>17</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>XP</td>
<td>15</td>
<td>35</td>
<td>150</td>
<td>500</td>
<td>710</td>
<td>1050</td>
<td>2950</td>
<td>4250</td>
<td>8500</td>
<td>24000</td>
</tr>
</tbody>
</table>

1. Which variable should be the independent variable (x-axis) and which should be the dependent variable (y-axis)?
   Level should be x, XP should be y
2. Should you use a broken axis? Why or why not?
   No broken axis, uses all space in range
3. What scale and interval should you use for the x-axis?
   0 to 20 by ones
4. What scale and interval should you use for the y-axis?
   0 to 24,000 by 1,200
5. Construct the scatter plot.

Age vs. Weekly Allowance

<table>
<thead>
<tr>
<th>Age</th>
<th>12</th>
<th>12</th>
<th>13</th>
<th>13</th>
<th>14</th>
<th>14</th>
<th>15</th>
<th>15</th>
<th>16</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowance</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

6. Which variable should be the independent variable (x-axis) and which should be the dependent variable (y-axis)?
   Age should be x, Allowance should be y
7. Should you use a broken axis? Why or why not?
   Broken axis for x since 0 to 11 not used
8. What scale and interval should you use for the x-axis?
   12 to 16 by 0.25
9. What scale and interval should you use for the y-axis?
   0 to 30 by 1.5 or 0 to 40 by twos
10. Construct the scatter plot.
11. Which variable should be the independent variable (x-axis) and which should be the dependent variable (y-axis)?
   Age should be x, Baby Teeth should be y
   12. Should you use a broken axis? Why or why not?
   No broken axis, range greater than gap beforehand
   13. What scale and interval should you use for the x-axis?
   0 to 20 by ones
   14. What scale and interval should you use for the y-axis?
   0 to 20 by ones
   15. Construct the scatter plot.

---

16. Which variable should be the independent variable (x-axis) and which should be the dependent variable (y-axis)?
   Speed should be x, Mileage should be y
   17. Should you use a broken axis? Why or why not?
   Broken axis for y since 0 to 22 not used
   18. What scale and interval should you use for the x-axis?
   0 to 100 by fives
   19. What scale and interval should you use for the y-axis?
   22 to 32 by ones (or by halves)
   20. Construct the scatter plot.
Use the given scatter plots to answer the questions.

1. Does this scatter plot show a positive association, negative association, or no association? Explain why.
   Positive, going up from left to right

2. Is there an outlier in this data set? If so, approximately how old is the outlier and how about many minutes does he or she study per day?
   12 years old and 75 minutes

3. Is this association linear or non-linear? Explain why.
   Linear, increases by about the same amount each year

4. What can you say about the relationship between your age and the amount that you study?
   The older you are, the more you study

5. Does this scatter plot show a positive association, negative association, or no association? Explain why.
   Negative, going down from left to right

6. Is there an outlier in this data set? If so, approximately how old is the outlier and about how many minutes does he or she spend with family per day?
   No outlier in this data set

7. Is this association linear or non-linear? Explain why.
   Non-linear, it curves down

8. What can you say about the relationship between your age and the amount of time that you spend with family?
   As you get older, you spend much less time with family each day
9. Does this scatter plot show a positive association, negative association, or no association? Explain why.
Negative, going down from left to right

10. Is there an outlier in this data set? If so, approximately how much does that person watch TV daily and what is his or her approximate math grade?
About 5.5 hours of TV and 95% math grade

11. Is this association linear or non-linear? Explain why.
Linear, grade goes down by the same amount for each hour of TV

12. What can you say about the relationship between the amount of time you watch TV and your math grade?
Watching more TV correlates with lower math grades

13. Does this scatter plot show a positive association, negative association, or no association? Explain why.
Positive, math grade goes up from left to right

14. Is there an outlier(s) in this data set? If so, approximately how much time does that person(s) spend with his or her family daily and what is his or her approximate math grade?
40 minutes with 92% and 100 minutes with 96%

15. Is this association linear or non-linear? Explain why.
Questionable, could go either way

16. What can you say about the relationship between the amount of time that you spend with your family and your math grade?
More time with family correlates with higher math grades

17. Are there any other patterns that you notice in this data?
Clumping around 280 minutes and also around 140 minutes
18. Does this scatter plot show a positive association, negative association, or no association? Explain why.
   **Negative, going down from left to right**

19. Is there an outlier(s) in this data set? If so, approximately how many pets does that person(s) have?
   **No outlier**

20. Is this association linear or non-linear? Explain why.
   **Linear, going down the same amount each time**

21. What can you say about the relationship between your last name and the number of pets you have?
   **Earlier in the alphabet has more pets**

22. Are there other patterns that you notice about people’s last names and how many pets they have?
   **Clumping, early alphabet between 8 and 13 pets, middle alphabet between 4 and 6, later alphabet between 0 and 2 pets**

23. Does this scatter plot show a positive association, negative association, or no association? Explain why.
   **No association, no clear pattern**

24. Is there an outlier(s) in this data set? If so, approximately how old is that person?
   **No outlier**

25. Is this association linear or non-linear? Explain why.
   **Neither since there is no association**

26. What can you say about the relationship between your last name and your age?
   **There is no relationship**
27. Does this scatter plot show a positive association, negative association, or no association? Explain why.
Positive, going up from left to right

28. Is there an outlier(s) in this data set? If so, approximately how tall is that person and how much does he or she make in allowance each week?
72 inches with $0 allowance

29. Is this association linear or non-linear? Explain why.
Non-linear, it curves up

30. What can you say about the relationship between your height and your allowance?
As height increases, allowance increases

31. Do you think that being taller means that you will get more allowance? In other words, do you think this relationship is a causation or a correlation?
This is a correlation, not a causation because being tall doesn’t cause more allowance

32. Does this scatter plot show a positive association, negative association, or no association? Explain why.
Positive, going up from left to right

33. Is there an outlier(s) in this data set? If so, approximately how old is that person and how much does he or she make in allowance each week?
16 years old with $0 allowance

34. Is this association linear or non-linear? Explain why.
Non-linear, it curves up

35. What can you say about the relationship between your age and your allowance?
As age increases, allowance increases

36. Do you think that being older means that you will get more allowance? In other words, do you think this relationship is a causation or a correlation?
This is probably a causation since being older means you generally spend more money and therefore need more allowance
Lesson 9.3

Draw an informal line of best fit on the given scatter plot and explain why you drew the line where you did. The real line of best fit is the thick line in red.

1. Daily Study Time

2. Math Grade

3. Math Grade

4. Number of Pets
Determine whether the drawn line of best fit is accurate or not. Explain why you think your position is true. The real line of best fit is the thick line in red.
Use the given line of best fit or equation of the line of best fit to answer the following questions.

17. Using the graph only, about how much would you expect an 18 year old to weigh?
   185 – 190 lbs

18. Using the graph only, about how much would you expect a 4 year old to weigh?
   40 lbs

19. Using the graph only, if a person weighed 80 pounds, how old would you expect them to be?
   8 years old

20. Using the graph only, if a person weighed 120 pounds, how old would you expect them to be?
   12 years old

The line of best fit for the scatter plot showing age (x-value) compared to weight (y-value) is approximately:

\[ y = \frac{21}{2}x - \frac{7}{2} \]

21. Using the line of best fit equation (show your work), about how much would you expect an 18 year old to weigh? How does this answer compare to the answer you gave to problem number 17?
   185.5 lbs

22. Using the line of best fit equation (show your work), about how much would you expect a 4 year old to weigh? How does this answer compare to the answer you gave to problem number 18?
   38.5 lbs

23. Using the line of best fit equation (show your work), about how old would you expect a person to be if they weighed 80 pounds? How does this answer compare to the answer you gave to problem number 19?
   \approx 8 \text{ years old}

24. Using the line of best fit equation (show your work), about how old would you expect a person to be if they weighed 120 pounds? How does this answer compare to the answer you gave to problem number 20?
   \approx 11.8 \text{ years old}

25. What is the rate of change (slope) of the line of best fit? What does the slope represent in this context and does that make sense?
   \frac{21}{2} \text{ represents how many lbs per year you gain}

26. What is the initial value (y-intercept) of the line of best fit? What does it represent in this context and does that make sense?
   -\frac{7}{2} \text{ represents weight at birth, doesn't make sense to have negative weight}
27. Using the graph only, about how much would you expect a 22 year old to sleep?
   4 hours

28. Using the graph only, about how much would you expect a 4 year old to sleep?
   12 hours

29. Using the graph only, if a person slept 6 hours, how old would you expect them to be?
   17 years old

30. Using the graph only, if a person slept 13 hours, how old would you expect them to be?
   2 years old

The line of best fit for the scatter plot showing age (x-value) compared to daily hours of sleep (y-value) is approximately:

\[ y = -\frac{1}{2}x + 14 \]

31. Using the line of best fit equation (show your work), about how much would you expect a 22 year old to sleep? How does this answer compare to the answer you gave to problem number 27?
   3 hours

32. Using the line of best fit equation (show your work), about how much would you expect a 4 year old to sleep? How does this answer compare to the answer you gave to problem number 28?
   12 hours

33. Using the line of best fit equation (show your work), about how old would you expect a person to be if they slept 6 hours? How does this answer compare to the answer you gave to problem number 29?
   16 years old

34. Using the line of best fit equation (show your work), about how old would you expect a person to be if they slept 13 hours? How does this answer compare to the answer you gave to problem number 30?
   2 years old

35. What is the rate of change (slope) of the line of best fit? What does the slope represent in this context and does that make sense?
   \( -\frac{1}{2} \) represents sleeping a half hour less per year

36. What is the initial value (y-intercept) of the line of best fit? What does it represent in this context and does that make sense?
   14 represents hours of sleep at birth
Lesson 9.4

*Use the data set to answer the following questions. For this data set a class of middle school students was asked what they thought was most important in school: good grades or popularity.*

<table>
<thead>
<tr>
<th>Boy or Girl</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades or Popularity</td>
<td>P</td>
<td>G</td>
<td>G</td>
<td>P</td>
<td>G</td>
<td>P</td>
<td>G</td>
<td>G</td>
<td>P</td>
<td>G</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>G</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boy or Girl</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades or Popularity</td>
<td>P</td>
<td>G</td>
<td>P</td>
<td>G</td>
<td>P</td>
<td>G</td>
<td>P</td>
<td>G</td>
<td>P</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>G</td>
</tr>
</tbody>
</table>

1. Construct a two-way table of the data.

<table>
<thead>
<tr>
<th></th>
<th>Grades</th>
<th>Popularity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Girls</td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

2. What is the frequency of students who believe grades are more important?  
   \[22\]

3. What is the relative frequency of students who believe grades are more important?  
   \[\frac{22}{40} = 55\%\]

4. What is the frequency of students who believe popularity is more important?  
   \[18\]

5. What is the relative frequency of students who believe popularity is more important?  
   \[\frac{18}{40} = 45\%\]

6. What is the frequency of girls who believe grades are more important?  
   \[15\]

7. What is the relative frequency of girls who believe grades are more important?  
   \[\frac{15}{20} = 75\%\]

8. What is the frequency of boys who believe popularity is more important?  
   \[13\]

9. What is the relative frequency of boys who believe popularity is more important?  
   \[\frac{13}{20} = 65\%\]

10. Based on this data, do you feel there is relationship between a student’s gender and what they think is most important in school? What is that relationship and what evidence do you have that it exists?  
    Based on the relative frequencies, girls typically believe that grades are more important, while boys believe popularity is more important.
Use the data set to answer the following questions. For this data set a class of middle school students was asked what hand was their dominant hand.

| Boy or Girl | B | B | G | G | G | B | B | G | G | B | G | B | G | B | G | G | B |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Right or Left | L | R | R | L | R | L | R | R | R | L | R | R | R | L | R | L | R |

11. Construct a two-way table of the data.

<table>
<thead>
<tr>
<th></th>
<th>Right-handed</th>
<th>Left-handed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Girls</td>
<td>13</td>
<td>7</td>
</tr>
</tbody>
</table>

12. What is the frequency of students who are right-handed? 27

13. What is the relative frequency of students who are right-handed? \( \frac{27}{40} = 67.5\% \)

14. What is the frequency of students who are left-handed? 13

15. What is the relative frequency of students who are left-handed? \( \frac{13}{40} = 32.5\% \)

16. What is the frequency of girls who are right-handed? 13

17. What is the relative frequency of girls who are right-handed? \( \frac{13}{20} = 65\% \)

18. What is the frequency of boys who are right-handed? 14

19. What is the relative frequency of boys who are right-handed? \( \frac{14}{20} = 70\% \)

20. Based on this data, do you feel there is relationship between a student’s gender and whether or not they are right-handed? What is that relationship and what evidence do you have that it exists?

Based on the relative frequencies it appears that boys and girls have the same chances of being left- or right-handed and that being right-handed is much more likely than being left-handed.
Use the two-way tables representing surveys middle school students took to answer the following questions.

<table>
<thead>
<tr>
<th>Survey 1:</th>
<th>Prefer Spicy Salsa</th>
<th>Prefer Mild Salsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>255</td>
<td>45</td>
</tr>
<tr>
<td>Girls</td>
<td>68</td>
<td>132</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Survey 2:</th>
<th>Prefer Spicy Salsa</th>
<th>Prefer Mild Salsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right-handed</td>
<td>280</td>
<td>170</td>
</tr>
<tr>
<td>Left-handed</td>
<td>43</td>
<td>7</td>
</tr>
</tbody>
</table>

21. How many students were surveyed? 500

22. What is the relative frequency of students who prefer spicy salsa? Is it the same on both two-way tables?

\[
\frac{323}{500} = 64.6\% 
\]

23. How many boys were surveyed? 300

24. How many girls were surveyed? 200

25. What is the relative frequency of boys who prefer spicy salsa?

\[
\frac{255}{300} = 85\% 
\]

26. What is the relative frequency of girls who prefer spicy salsa?

\[
\frac{68}{200} = 34\% 
\]

27. Do you think there is a relationship between gender and salsa preference? What is that relationship and what evidence do you have that it exists?

Based on the relative frequencies, it appears that boys prefer spicy salsa more than girls.

28. How many right-handed students were surveyed? 450

29. How many left-handed students were surveyed? 50

30. What is the relative frequency of right-handed students who prefer mild salsa?

\[
\frac{170}{450} = 37.7\% 
\]

31. What is the relative frequency of left-handed students who prefer mild salsa?

\[
\frac{7}{50} = 14\% 
\]

32. Do you think there is a relationship between a student’s dominant hand and salsa preference? What is that relationship and what evidence do you have that it exits?

Based on the relative frequencies, it appears that right-handed students are between two and three times as likely to prefer mild salsa.