Use the given data to answer the questions and construct the scatter plots.
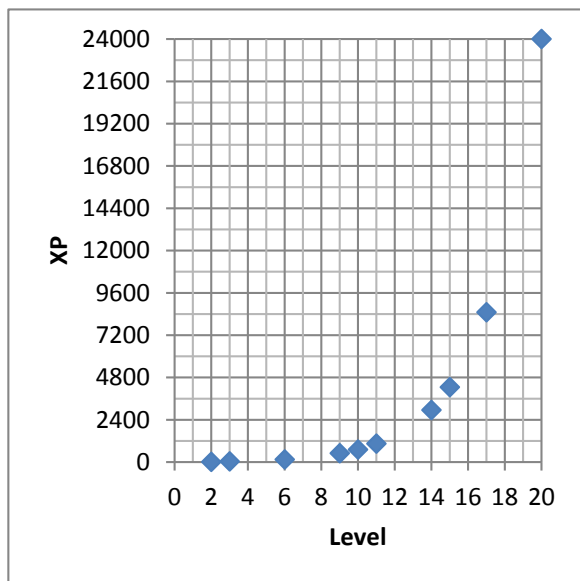
Pathfinder Character Level vs. Total Experience Points

Level	2	3	6	9	10	11	14	15	17	20
XP	15	35	150	500	710	1050	2950	4250	8500	24000

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
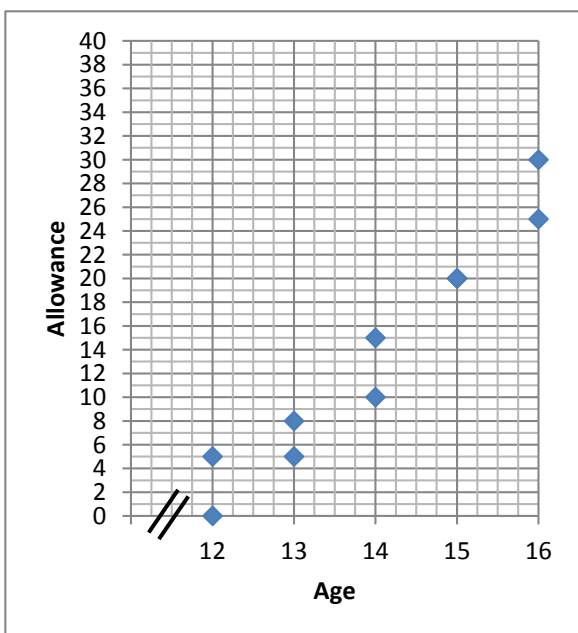3. What scale and interval should you use for the x-axis?
0 to 20 by ones
4. What scale and interval should you use for the y-axis?
0 to 24,000 by 1,200
5. Construct the scatter plot.

Age vs. Weekly Allowance

Age	12	12	13	13	14	14	15	15	16	16
Allowance	0	5	5	8	10	15	20	20	25	30

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
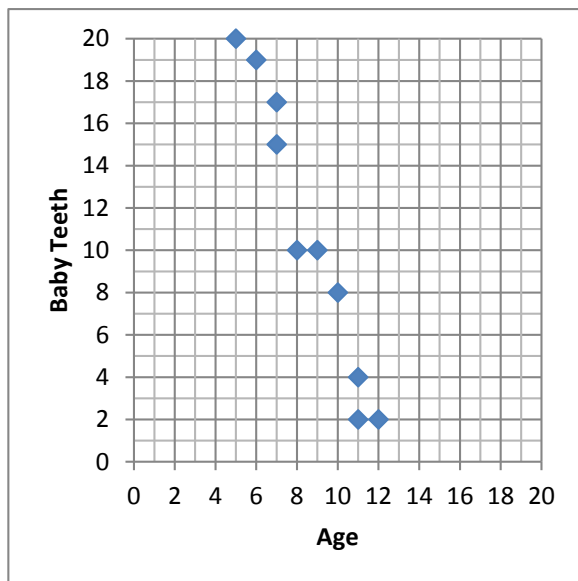9. What scale and interval should you use for the y-axis?
0 to 30 by 1.5 or 0 to 40 by twos
10. Construct the scatter plot.

Age vs. Number of Baby Teeth

Age	5	6	7	7	8	9	10	11	11	12
Baby Teeth	20	19	17	15	10	10	8	4	2	2

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

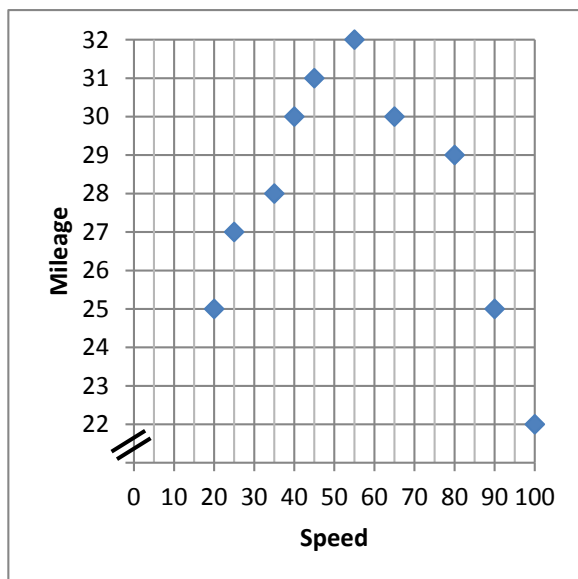13. What scale and interval should you use for the x-axis?
0 to 20 by ones

14. What scale and interval should you use for the y-axis?
0 to 20 by ones

15. Construct the scatter plot.

Car Speed (in mph) vs. Gas Mileage (in mpg)

Speed	20	25	35	40	45	55	65	80	90	100
Mileage	25	27	28	30	31	32	30	29	25	22

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

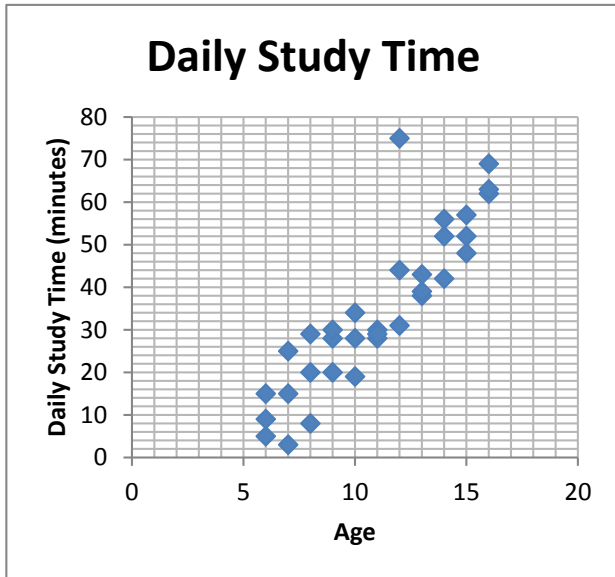18. What scale and interval should you use for the x-axis?
0 to 100 by fives

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.

Daily Study Time

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?
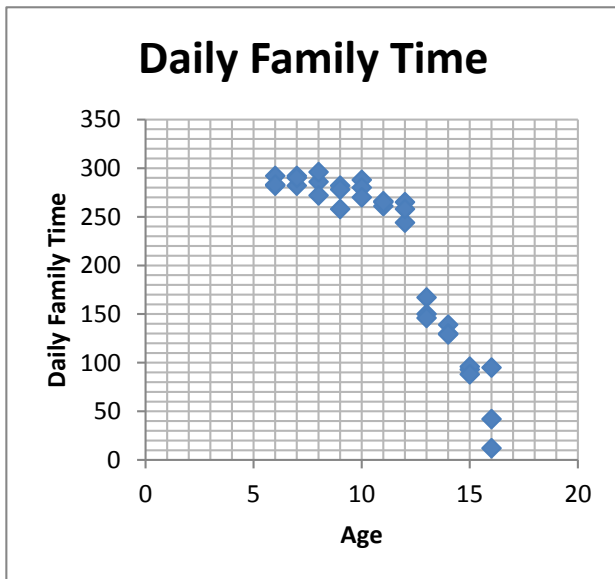12 years old and 75 minutes

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

Daily Family Time

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?
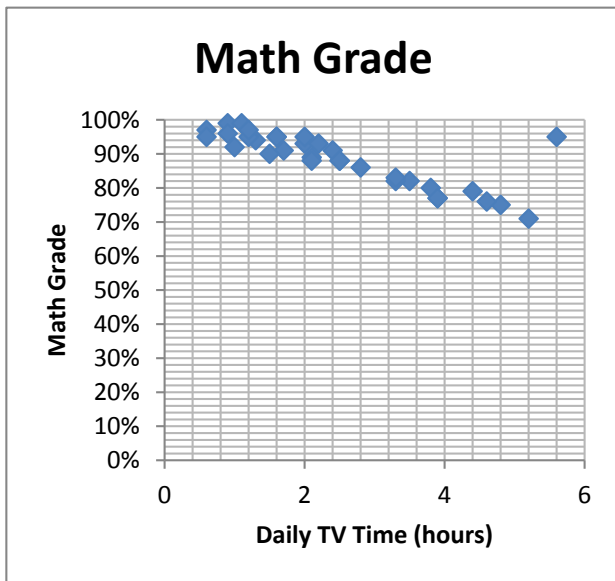No outlier in this data set

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

Math Grade

Math Grade (y-axis): 0% – 100%
Daily TV Time (hours) (x-axis): 0 – 6

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

Math Grade

Math Grade (y-axis): 0% – 100%
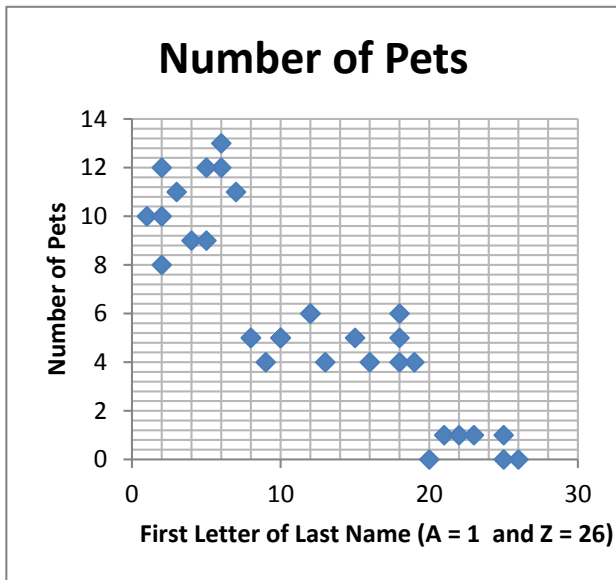**Daily Family Time (minutes)** (x-axis): 0 – 400
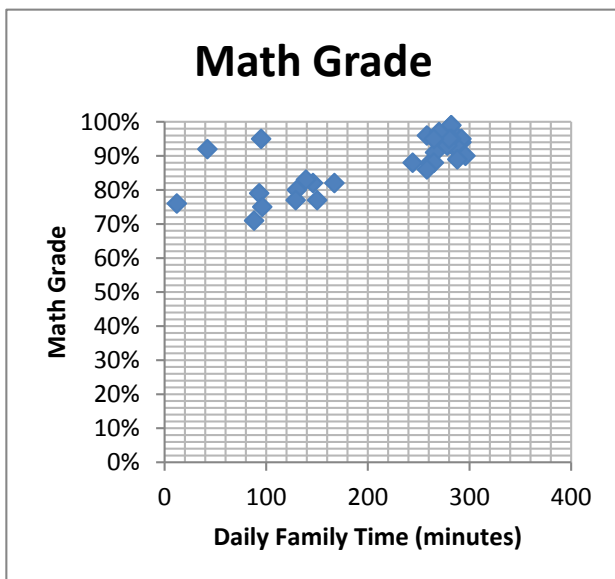
13. Does this scatter plot show a positive association, negative association, or no association? Explain why.
Positive, math grade goes up from left to right

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
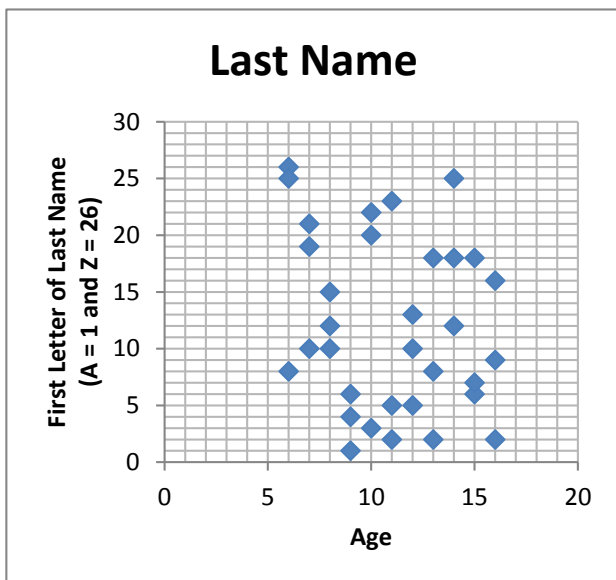
Number of Pets

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

Last Name

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

Weekly Allowance ($)
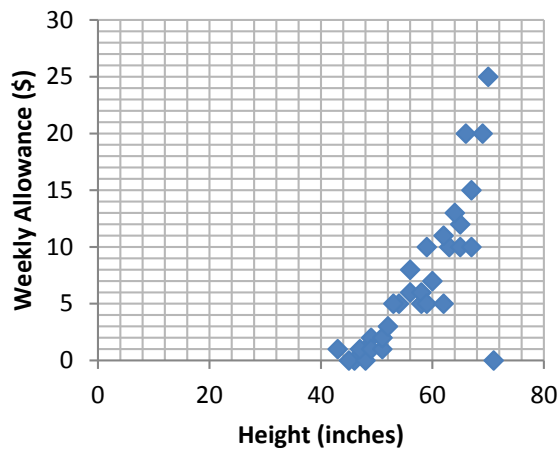
27. Does this scatter plot show a positive association, negative association, or no association? Explain why.
Positive, going up from left to right

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.
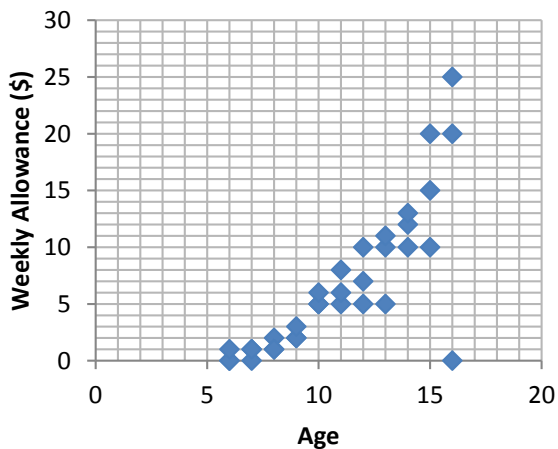Non-linear, it curves up

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

Weekly 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?
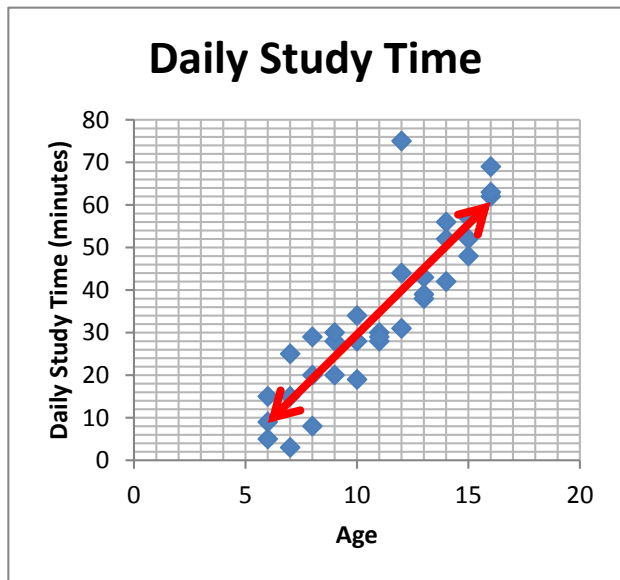As age increases, allowance increases

36. Do you think that being older means that you will get more allowance? In other words, do 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
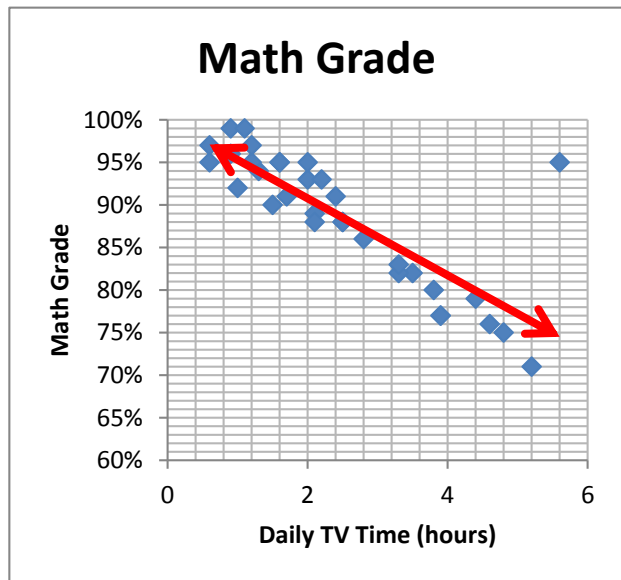
Draw an informal line of best fit on the given scatter plot and explain why you drew the line where you did. **The real line of best fit is the thick line in red.**

1.

Daily Study Time
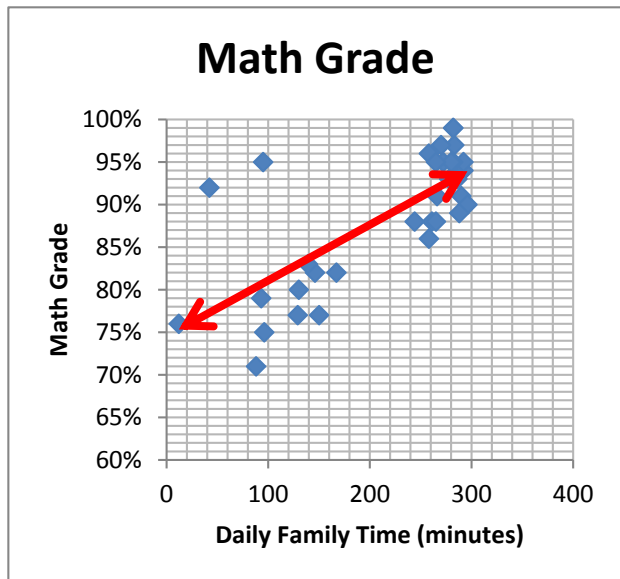
Daily Study Time (minutes) vs. Age

2.

Math Grade

Math Grade vs. Daily TV Time (hours)

3.

Math Grade

Math Grade vs. Daily Family Time (minutes)

4.

Number of Pets

Number of Pets vs. First Letter of Last Name (A = 1 and Z = 26)

5.

Age vs. Height

6.

Age vs. Sleep

7.

Age vs. Weight

8.

Age vs. Languages Known
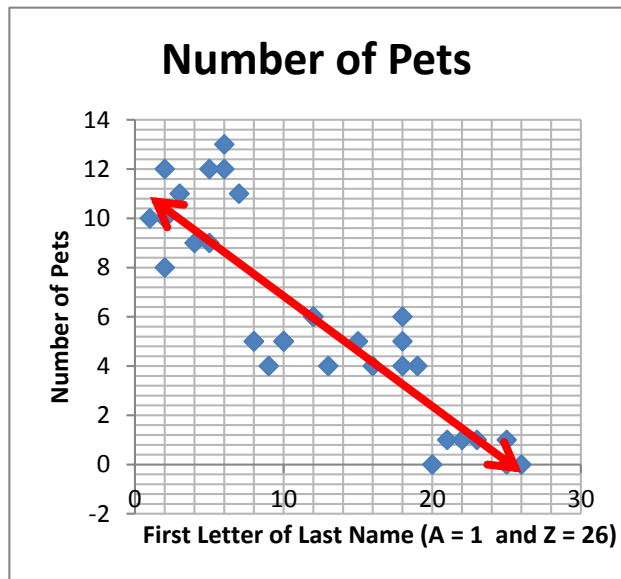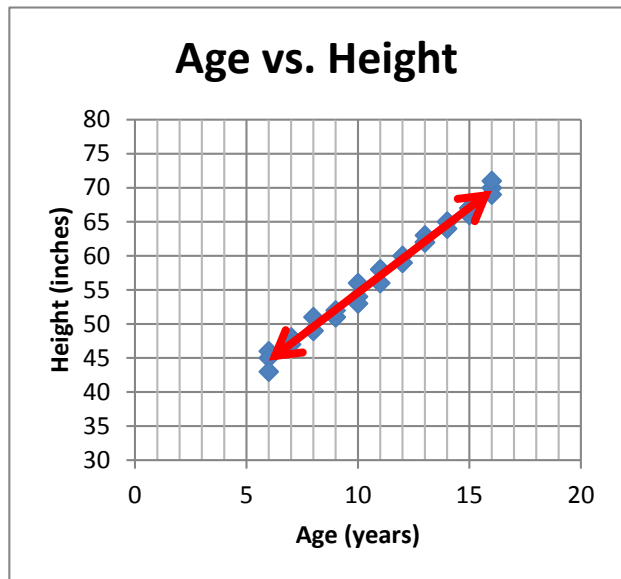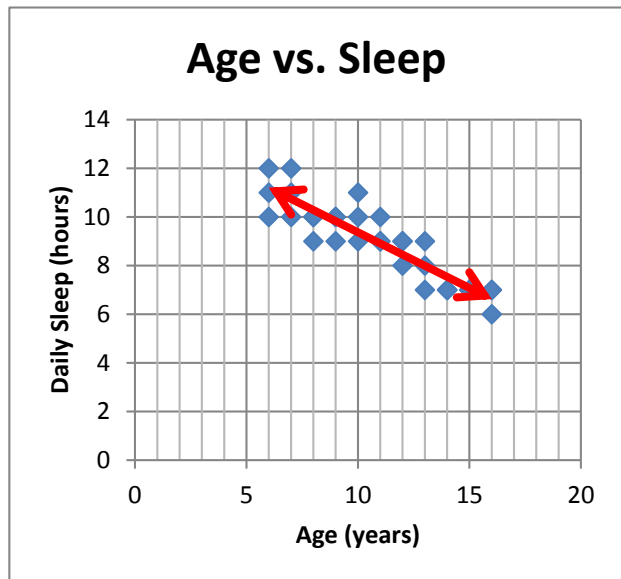
Determine whether the drawn line of best fit is accurate or not. Explain why you think your position is true. *The real line of best fit is the thick line in red.*

9.

10.

11.
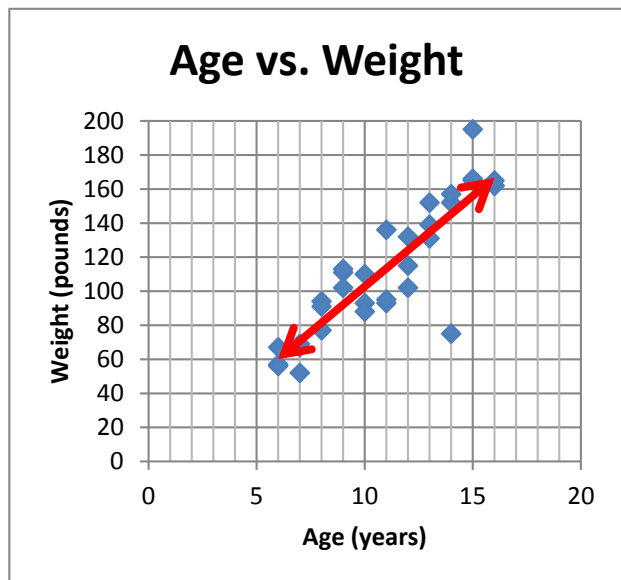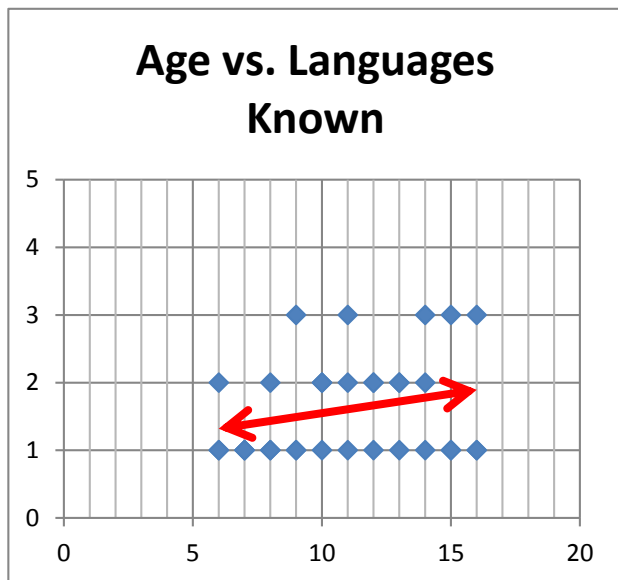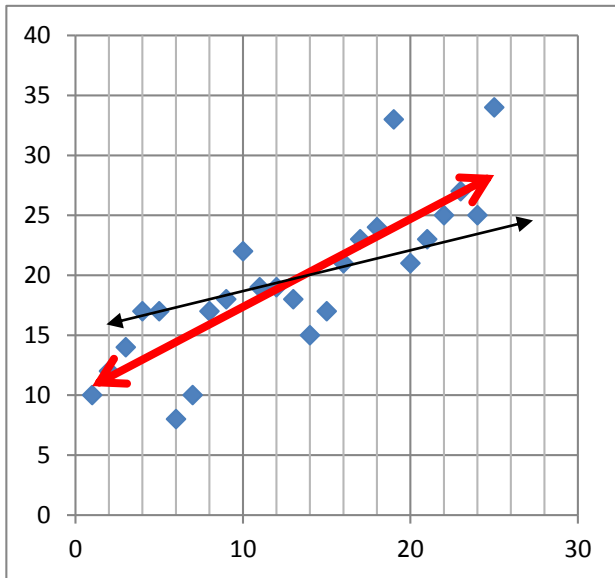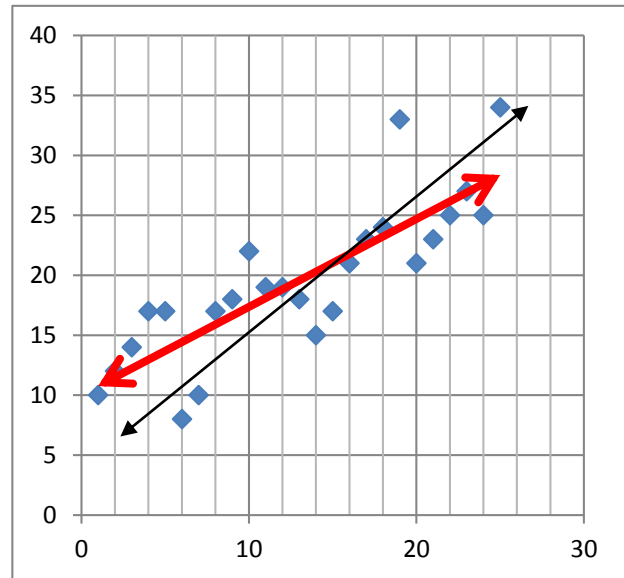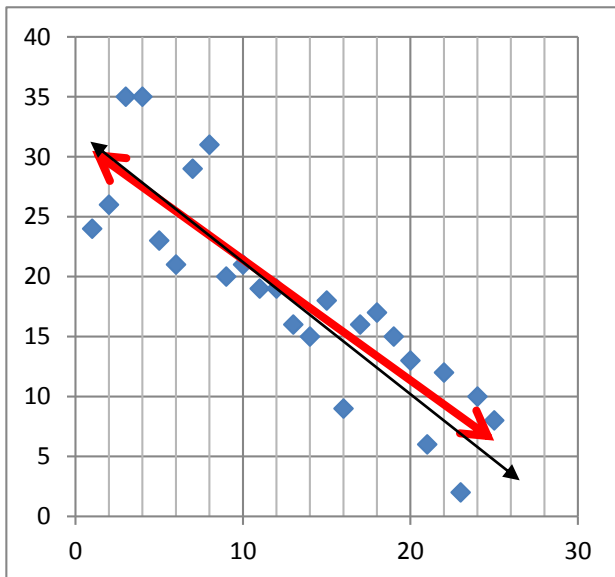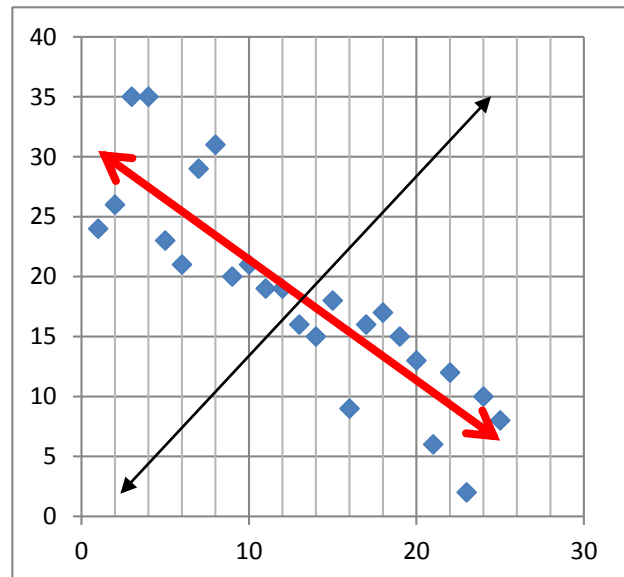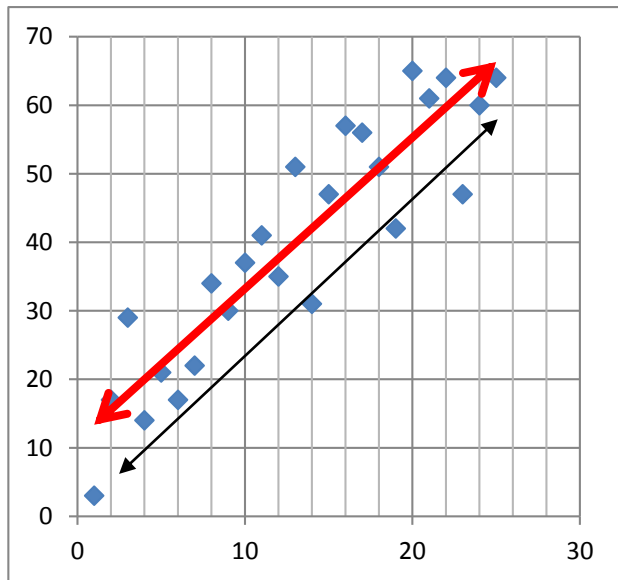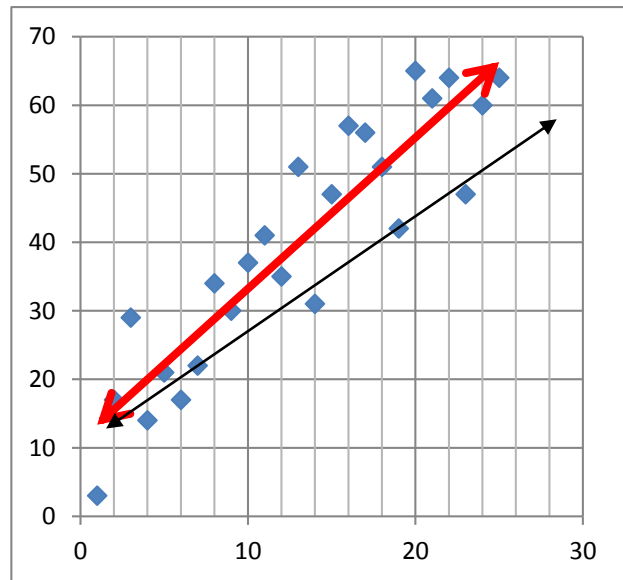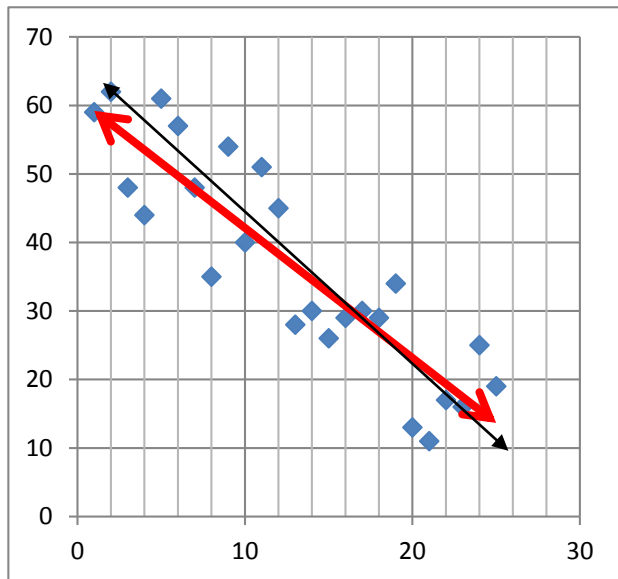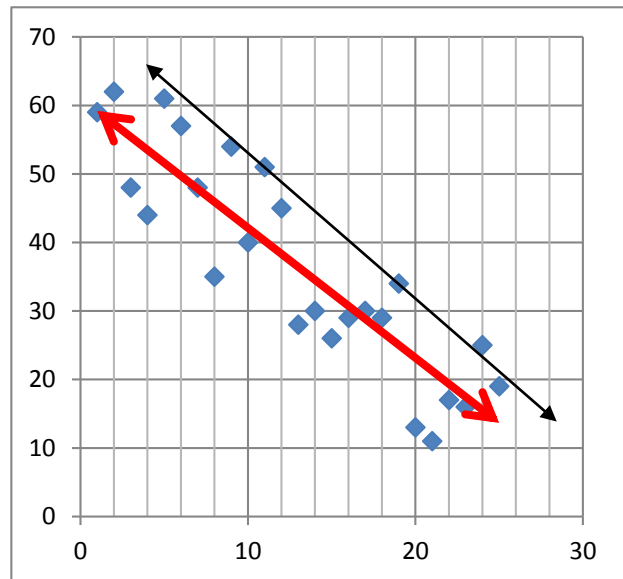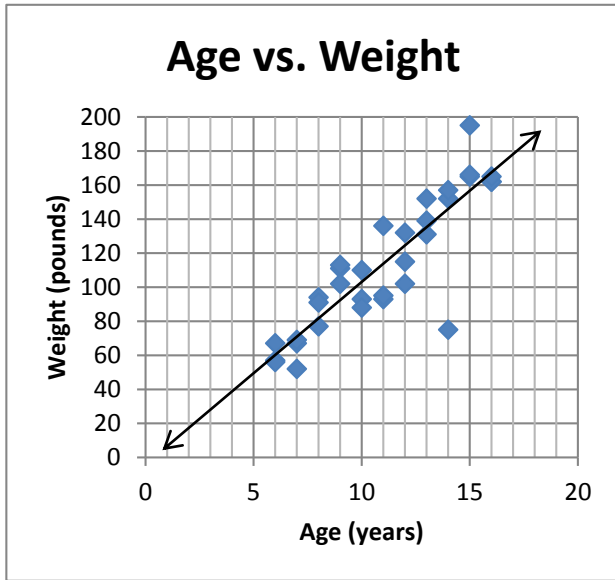

12.

13.

14.

15.

16.

Use the given line of best fit or equation of the line of best fit to answer the following questions.

Age vs. Weight

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?
$\approx 8\ years\ old$

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?
$\approx 11.8\ years\ old$

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? $\frac{21}{2}\ represents\ how\ many\ lbs\ per\ year\ you\ gain$

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? $-\frac{7}{2}\ represents\ weight\ at\ birth, doesn't make\ sense\ to\ have\ negative\ weight$

Age vs. Sleep
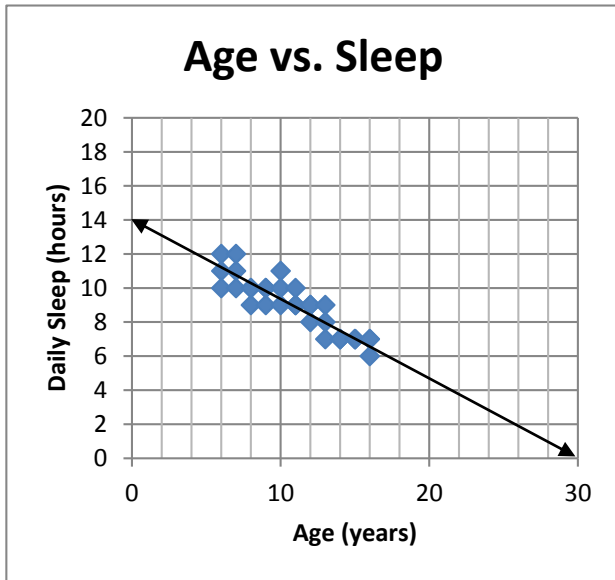
27. Using the graph only, about how much would you expect a 22 year old to sleep?
4 hours

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.

Boy or Girl	B	B	G	G	G	B	G	B	B	G	G	B	G	B	G	B	B	G	G	B
Grades or Popularity	P	G	G	P	G	P	G	G	P	G	G	P	G	P	P	P	G	G	G	P

Boy or Girl	B	B	G	G	G	B	G	B	B	G	G	B	G	B	G	B	B	G	G	B
Grades or Popularity	P	G	P	G	G	P	G	P	P	G	G	G	G	P	P	P	G	P	G	G

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

	Grades	Popularity
Boys	7	13
Girls	15	5

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	G	B	B	G	G	B	G	B	G	B	B	G	G	B
Right or Left	L	R	R	L	R	L	R	R	R	R	L	R	R	R	R	R	L	R	L	R

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

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

	Right-handed	Left-handed
Boys	14	6
Girls	13	7

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.

Survey 1:	Prefer Spicy Salsa	Prefer Mild Salsa
Boys	255	45
Girls	68	132

Survey 2:	Prefer Spicy Salsa	Prefer Mild Salsa
Right-handed	280	170
Left-handed	43	7

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?

$$\frac{170}{450} = 37.\overline{7}\%$$

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 that right-handed students are between two and three times as likely to prefer mild salsa.