



Math Worksheet for 8th Grade

Interpreting scatter plots

Name: _____

Due Date: _____

Teacher: _____

Parent Sign: _____

1. A scatter plot shows students' minutes of homework per week (x) and their test scores (y). As x increases, y tends to increase. What is the direction of the association?
2. A scatter plot of hours spent watching TV per day (x) versus hours of sleep per night (y) slopes downward. Describe the direction of the relationship.
3. A scatter plot of shoe size (x) and math grade (y) shows points scattered with no pattern. What is the direction of association?
4. Explain in one sentence what a positive association in a scatter plot means.
5. Explain in one sentence what a negative association in a scatter plot means.
6. Consider these points: (1, 5), (2, 7), (3, 9), (4, 11). Describe the direction and strength (weak/moderate/strong) of the association.
7. Consider these points: (1, 10), (2, 9), (3, 2), (4, 11), (5, 8). Would you say the scatter plot shows a clear association? Explain briefly.
8. A scatter plot comparing amount of fertilizer used (x) to plant height (y) shows most points forming a tight upward line. Is the association positive or negative? Strong, moderate, or weak?
9. A scatter plot of daily temperature (x) versus number of people at an outdoor pool (y) shows most points close to a curve that goes up then down (nonlinear). How would you describe the direction of association?
10. What is an outlier on a scatter plot? Give a short example.
11. Given the points below, which point is an outlier relative to the others: (2, 5), (3, 6), (4, 5), (10, 20), (5, 6)? Explain.
12. Two scatter plots show the same negative direction. Plot A points are tightly clustered near a straight line; Plot B points are widely scattered along the same downward trend. Which plot shows stronger association?
13. A scatter plot shows x = number of years a person has driven, y = number of car accidents. The plot shows no clear pattern (points scattered). What does this say about association between years driving and accidents?
14. A teacher plots time spent studying (x) vs number of mistakes on a test (y). The scatter plot shows a downward trend. Which is the independent variable, and what does the direction suggest about studying and mistakes?
15. If a scatter plot has many points forming a downward-sloping line but one point far below that line, how does that point affect the strength of the association?
16. Explain why "correlation does not imply causation" using an example with a scatter plot.
17. You are given a scatter plot of shoe size (x) and reading level (y) that shows a positive association. Suggest a plausible explanation for this association that does not imply shoe size causes reading level to improve.
18. The correlation appears stronger for males than for females in a scatter plot comparing hours worked per week and monthly earnings. What might this suggest about analyzing data separately by gender?
19. Given these paired data for students (hours studied, score): (0, 50), (2, 60), (4, 70), (6, 80), (8, 90). If the trend continues, estimate the score for someone who studies 5 hours.
20. A scatter plot of class size (x) vs average grade (y) shows a weak negative association. Describe what "weak negative association" means in plain language.



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21. A scatter plot comparing number of cigarettes smoked per day (x) to lung capacity in liters (y) for several people has the following points: (0, 6.0), (5, 5.7), (10, 5.3), (15, 5.0), (20, 4.6), (25, 4.3). Describe the direction and strength of the association.
22. Using the data in question 21, estimate the lung capacity for someone who smokes 12 cigarettes per day by interpolating from the trend.
23. From the same data (question 21), estimate the decrease in lung capacity (in liters) per additional 5 cigarettes per day (approximate rate).
24. Another scatter plot shows years smoking (x) and percent of maximum lung function (y): (0, 100), (5, 94), (10, 88), (15, 82), (20, 76). Is the association positive, negative, or none? Estimate the average decrease in percent lung function per 5 years of smoking.
25. A scatter plot of age (x) and number of cigarettes smoked per day (y) shows points all over with no clear pattern. What conclusion can you draw about age and cigarettes/day from that plot?
26. Given this small dataset of smokers (cigarettes/day, daily breath-hold time in seconds): (0, 60), (5, 55), (10, 48), (15, 44), (20, 40). Predict the breath-hold time for 8 cigarettes/day by linear interpolation.
27. A scatter plot comparing number of cigarettes per day (x) and hours of exercise per week (y) shows a weak negative correlation. Give two possible explanations for this pattern besides "smoking causes less exercise."
28. In a scatter plot of cigarettes/day (x) vs number of coughs per day (y), most people who smoke more cough more. One point at (30, 2) is far below the trend. What is this point called, and what could it represent?
29. Two researchers create scatter plots of cigarettes/day vs lung capacity. Researcher A's plot shows a stronger negative association than Researcher B's plot. List two reasons why the strength might differ.
30. A dataset of 6 people shows (years smoking, lung capacity liters): (0, 6.2), (2, 6.0), (5, 5.5), (10, 5.0), (12, 4.8), (20, 4.4). Find the approximate slope between 0 and 20 years and interpret it (change in liters per year).
31. If a scatter plot's best-fit line has slope -0.07 when x is cigarettes/day and y is lung capacity in liters, what does that slope mean in words?
32. A scatter plot of cigarettes/day vs lung capacity shows a negative association. A student says, "If you reduce smoking by 10 cigarettes a day, your lung capacity will increase by 0.7 liters." Is this necessarily true for every person? Explain briefly.
33. You have two scatter plots: Plot 1 shows a positive moderate association; Plot 2 shows a negative strong association. Without numbers, which plot would be better to use to predict y from x ? Why?
34. A scatter plot shows amount of fast food eaten per week (x) and number of dentist visits per year (y). The plot shows a positive association. Give an example of a lurking variable that might explain this association.
35. A teacher gives students two scatter plots: (A) study time vs grade (positive moderate), (B) coffee cups per day vs grade (weak positive). Which variable (study time or coffee) would you say is more likely to be useful for predicting grade? Why?
36. The scatter plot of cigarettes/day vs lung capacity has one extreme high point at (40, 3.9) while most points are between 0-25 cigarettes and 4.3-6.0 liters. Would including that extreme point likely make the correlation appear stronger or weaker? Explain.
37. For a set of points that lie exactly on the line $y = 100 - 2x$ (x from 0 to 20), describe the direction and strength of the association. If x is cigarettes/day and y is a health-index, what happens to the index as cigarettes increase?



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38. A scatter plot shows a nonlinear (curved) positive pattern. Is it correct to describe the plot's direction as positive, negative, or none? Explain.
39. Given these points about smokers (years, percent predicted lung capacity): (1, 97), (3, 94), (7, 87), (10, 82), (14, 76), estimate percent predicted lung capacity at 5 years by linear interpolation between appropriate points.
40. A scatter plot comparing pack-years (packs per day \times years smoking) to risk score shows a strong positive correlation. What does a strong positive correlation imply about pack-years and the risk score?
41. A survey records age (x) and whether each person smokes (0 = no, 1 = yes). When age is plotted vs the smoking indicator, what kind of scatter plot pattern would you expect? Would correlation measures be useful here?
42. A scatter plot comparing number of cigarettes/day (x) and blood oxygen levels (y) displays a strong negative linear trend. A student asks whether reducing cigarettes will immediately raise blood oxygen to the predicted level. How would you respond?
43. Given this dataset (cigarettes/day, lung capacity liters): (0,6.1), (2,6.0), (4,5.8), (6,5.6), (8,5.4). Find the average rate of change in lung capacity per 2 cigarettes/day between $x=0$ and $x=8$.
44. A scatter plot shows two clusters: non-smokers cluster at low x and high y ; heavy smokers cluster at high x and lower y . How would you describe the overall direction and what additional information might you seek?
45. In a scatter plot where points slope down but with much scatter, would you describe the relationship as deterministic or probabilistic? Explain in one sentence.
46. A public health class plots months since quitting smoking (x) vs lung function improvement percent (y). The scatter plot shows a positive association. Interpret this finding in plain language.
47. A scatter plot of cigarettes/day (x) vs number of sick days per year (y) shows a moderate positive association. If a person asks "How many more sick days will I have if I smoke 10 more cigarettes per day?", how should you answer?
48. Which of these scatter-plot descriptions best matches a strong negative linear association: (A) points tightly clustered around a downward line, (B) points clustered around an upward curve, (C) no clear pattern? Choose and explain.
49. A teacher shows a scatter plot of cigarettes/day vs lung capacity and draws a straight line that seems to go through the middle of the points. What is this line usually called, and what is its purpose?
50. A scatter plot shows cigarettes/day (x) vs hours of TV watched per week (y) and has correlation near zero. If you had to recommend a variable to investigate for a relationship with cigarettes/day, name one plausible choice and why.