

Scatter Plots and Two-Way Tables: practice solutions, Grade 8 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Plot and describe



- a. Temperature, because it is the variable that may influence sales (independent variable). Cups sold go on the vertical axis.
- b. $(60, 12)$ and $(85, 38)$.
- c. As temperature rises, the number of cups sold rises, so the association is **positive**.

2 Name that association



- a. Negative: older cars are usually worth less.
- b. No association: shoe size has no connection with quiz results.
- c. Positive: more practice tends to mean more baskets.
- d. Positive: a longer distance takes more time.
- e. Negative: more absences tend to go with lower grades.

3 Reading a scatter plot



- a. Negative association: older bikes tend to cost less.
- b. The point at $x = 4$ is $(4, 6)$, so the bike costs **600 dollars**.
- c. Points with $y > 5$ are $(1, 9)$, $(2, 8)$, $(3, 8)$, $(4, 6)$: **4 bikes**.

4 Complete the totals



Row totals: $14 + 9 = 23$ and $6 + 11 = 17$. Column totals: $14 + 6 = 20$ and $9 + 11 = 20$.
Grand total: $23 + 17 = 40$, which matches $20 + 20 = 40$.

	Walk	Bus	Total
Plays soccer	14	9	23
Does not play soccer	6	11	17
Total	20	20	40

5 Spot the outlier



The pages increase by about 12 each day: 12, 25, 36, 48, then 73, 85. The pair $(5, 11)$ is far below the expected value of about 60 for day 5, so it is the **outlier**. It could be a recording mistake.

6 Slope of a trend line



a. $m = \frac{35 - 15}{5 - 1} = \frac{20}{4} = 5.$

b. $15 = 5(1) + b$, so $b = 10.$

c. $y = 5x + 10$. Check with $(5, 35)$: $5(5) + 10 = 35$. Correct.

7 Use the equation



a. $y = 3(10) + 8 = 38$ songs.

b. $3x + 8 = 50$, so $3x = 42$ and $x = 14$. After **14 weeks**.

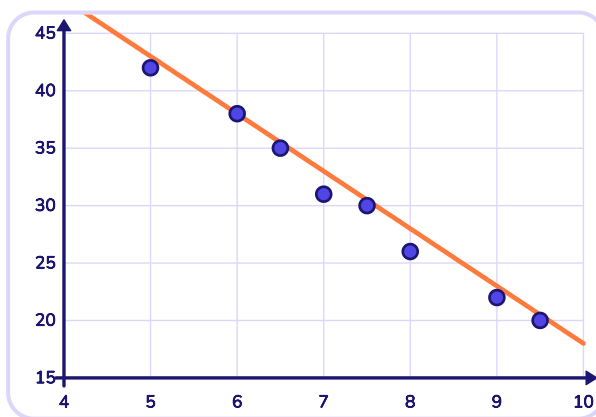
8 Build the scatter plot



a. The points fall from left to right: **negative, linear association** (see the graph).

b. $m = \frac{23 - 38}{9 - 6} = -5$. Then $38 = -5(6) + b$, so $b = 68$. The line is $y = -5x + 68$.

c. $y = -5(8.5) + 68 = 25.5$. About **25.5 minutes**.



9 Which line fits best?



- a. Line A, $y = 1.7x + 0.5$. It follows the direction of the points, with points on both sides.
- b. Line B, $y = x + 4$, is too flat and lies above every point except the last, so it overestimates. Line C, $y = 2x - 3$, lies below every point, so it underestimates.

10 Interpolate or extrapolate?



- a. $4(7) + 12 = 40$ cm.
- b. $4(30) + 12 = 132$ cm.
- c. The week 7 prediction (interpolation), because 7 lies inside the measured weeks 0 to 10. Week 30 is extrapolation: the seedling will not keep growing at the same pace forever.

11 Scooter rentals



- a. Each extra minute adds about 0.40 dollars (40 cents) to the cost.
- b. When $x = 0$, the cost is 3 dollars: a starting fee for unlocking the scooter.
- c. $0.40x + 3 = 10$ gives $0.40x = 7$, so $x = 17.5$. You can ride up to **17.5 minutes**.

12 Honor roll and band



- a. Row totals: 30 and 50. Column totals: 40 and 40.
- b. $\frac{18}{30} = 60\%$.
- c. $\frac{22}{50} = 44\%$.
- d. 60% and 44% are noticeably different, so there is an **association**: band students are more likely to be on the honor roll in this sample.

13 Fill in from clues



Bus and pet: 14. Bus and no pet: $35 - 14 = 21$. Walk and pet: $24 - 14 = 10$. Walk and no pet: $25 - 10 = 15$. No pet total: $21 + 15 = 36 = 60 - 24$.

	Pet	No pet	Total
Bus	14	21	35
Walk	10	15	25
Total	24	36	60

14 Cats or dogs?



Grade 7: $\frac{24}{60} = 40\%$ like cats. Grade 8: $\frac{20}{50} = 40\%$ like cats. The percents are equal (and 60% for dogs in both), so there is **no association** between grade and favorite pet.

15 The outlier effect



- $(7, 5)$.
- $4(7) + 8 = 36$ passes.
- $36 - 5 = 31$ passes below the prediction.
- For example, the pool was closed that week because of a storm. An outlier often has a special cause.

16 Two clusters



- a. Cluster 1: 5 players practicing 1 to 3 hours, scoring 40% to 52%. Cluster 2: 5 players practicing 7 to 9 hours, scoring 70% to 85%. There is a gap between 3 and 7 hours with no data.
- b. It would be unreliable: no player practices around 5 hours, so the prediction would not be based on data there. The data probably come from two groups (casual players and team players).

17 Resale value



- a. $m = \frac{400 - 640}{4 - 1} = -80$. Then $640 = -80(1) + b$, so $b = 720$. $y = -80x + 720$.
- b. The phone loses about 80 dollars of value each year. The intercept 720 dollars is the predicted value at purchase (when $x = 0$).
- c. $-80x + 720 = 0$ gives $x = 9$. Nine years is far beyond the data (extrapolation), and real phones often become obsolete sooner, so it is only a rough estimate.

18 Fit your own line



- a. Positive and linear.
- b. Sample answer: use $(10, 100)$ and $(60, 600)$. $m = \frac{500}{50} = 10$ and $b = 100 - 10(10) = 0$, so $y = 10x$. (Nearby lines are also acceptable.)
- c. $y = 10(45) = 450$ calories.
- d. About 10 more calories are burned for each extra minute of jogging.

19 Association in a table



a. $\frac{66}{100} = 66\%$ and $\frac{48}{100} = 48\%$.

b. The difference is 18 percentage points, so there is an **association**.

c. $\frac{66}{114} \approx 57.9\%$.

20 Relative frequency table



a. $0.18 \times 500 = 90$, $0.42 \times 500 = 210$, $0.12 \times 500 = 60$, $0.28 \times 500 = 140$.

b. Bus riders: $\frac{90}{300} = 30\%$. Walkers: $\frac{60}{200} = 30\%$.

c. The percents are equal, so there is **no association**.

21 Cause or coincidence?



a. $1.5x - 60 = 0$ gives $x = 40$. At 40 °F.

b. Each degree of warming is associated with about 1.5 dollars more in sales.

c. Association is not causation. Warm weather leads to both more ice cream sales and a warmer town; ice cream does not cause the heat.



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