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Learn through sports

PRINTABLE · GRADES 6-8 · AGES 11–14

Hot Hand Scatter Plots

Do players who stay on the court longer score more? Use the Herons' scatter plot and table to describe the pattern, find the outlier and use the line of best fit to make predictions.

Name _____

Date _____

SCATTER PLOT TOOLKIT

Scatter plot — pairs of data shown as dots

Positive — both values tend to go up together

Negative — one goes up while the other goes down

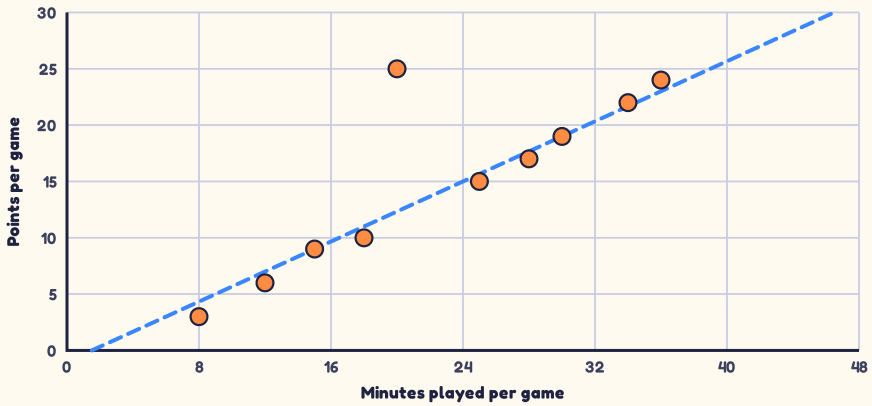
Outlier — a dot far away from the pattern

Best-fit line — a straight line that follows the trend



SPOT THE TREND

HARBOR CITY HERONS · 10 PLAYERS



PLAYER	MIN	PTS
#4	34	22
#7	30	19
#12	12	6
#15	25	15
#21	18	10
#23	8	3
#30	28	17
#33	36	24
#41	15	9
#44	20	25

Season averages. An NBA-length game is 48 minutes.

ROOKIE

1 How many Herons average **more than 15** points per game?

WORK SPACE

_____ **players**

ROOKIE

2 Describe the association between minutes and points: positive, negative or none?

WORK SPACE

_____

STARTER

3 Which player is an **outlier**? Explain how you can tell from the graph.

_____

_____

_____

STARTER

4 What is the **range** of minutes played by the Herons?

WORK SPACE

_____ **minutes**

PRO

5 The dashed line of best fit passes through **(12, 7)** and **(36, 23)**. What is its slope?

WORK SPACE

slope = _____

PRO

6 The line's equation is $y = \frac{2}{3}x - 1$. Predict the points per game for a player who plays **42** minutes.

WORK SPACE

_____ **points**

ALL-STAR

7 What does the slope of ⅔ mean about **minutes** and **points** for the Herons?

_____

_____

CHALLENGE ★

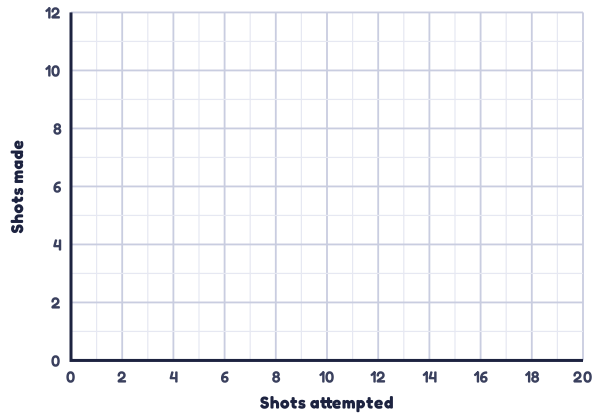
8 Challenge: What does the line predict for a player who plays **0** minutes? Does that make sense? Explain.

_____

_____

A Plot It Yourself

Bayview Comets, one game: field goals **attempted** and **made** by each player.



PLAYER	TRIED	MADE
#2	4	3
#8	6	3
#10	8	5
#13	10	4
#19	12	7
#24	14	6
#31	16	9
#35	18	10

1. Plot all 8 players on the grid. Describe the association.

   _____

2. Which player has the **highest** shooting percentage? What is it?

   # _____ _____ %

3. Which player has the **lowest** shooting percentage?

   # _____

4. If all of #31's makes were 2-pointers, how many points did #31 score from these shots?

   _____ **pts**

B Points From the Line

For the Comets' season, the line of best fit is **y = 3x + 75**, where x = made 3-pointers and y = team points.

MADE THREES (x)	PREDICTED POINTS (y)
10	
14	
18	

1. Use the line to find how many made threes go with **108** points.

   _____ **threes**

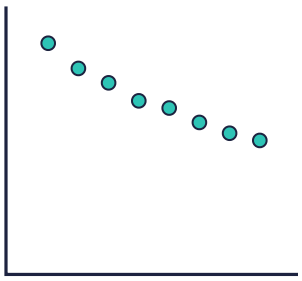
2. The slope is 3. Why does that number make sense in basketball?

   Because _____

C Name That Association

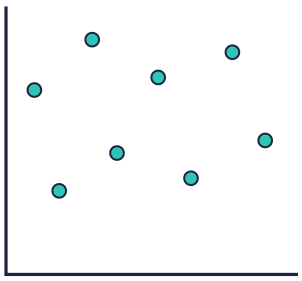
Each mini plot shows made-up data. Write **positive**, **negative** or **none**.

1. **Shot distance (ft) vs. shooting %**



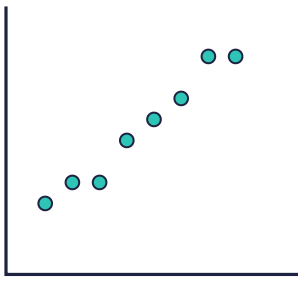
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2. **Jersey number vs. points per game**



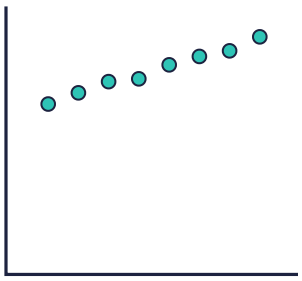
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3. **Player height (in) vs. rebounds per game**



_____

4. **Free-throw practice (min/day) vs. FT %**



_____

BONUS · NOT SCORED

Think of two basketball stats that you predict have a **negative** association. Name them and explain why.

_____

_____

Answer Key (for teachers & parents)

Answers for **Hot Hand Scatter Plots**, with the work shown. Print pages 1 and 2 for students and keep this page for checking. Accept any clear explanation for the written answers. Point values and the 48-minute game are real NBA rules; teams, players and stats are made up.

Page 1 Problems

1. Answer: **5 players**
   #4 (22), #7 (19), #30 (17), #33 (24), #44 (25). #15 has exactly 15, which is not more than 15.
2. Answer: **Positive**
   Players who play more minutes tend to score more points.
3. Answer: **#44**
   20 minutes and 25 points sits far above the line and the other dots (the line predicts about 12).
4. Answer: **28 minutes**
   36 − 8 = 28
5. Answer: ⅔
   (23 − 7) ÷ (36 − 12) = 16 ÷ 24 = ⅔
6. Answer: **27 points**
   ⅔ × 42 − 1 = 28 − 1 = 27
7. Answer: **About ⅔ of a point more per extra minute**
   Same as about 2 more points for every 3 more minutes played.
8. Answer: **−1 points; no**
   A player cannot score negative points. The line only works near the data (8 to 36 minutes).

C · Name That Association

1. Answer: **Negative**
2. Answer: **None**
3. Answer: **Positive**
4. Answer: **Positive**

Quick score

Page 1 problems	_____ / 8
A · Plot It Yourself	_____ / 4
B · Line (3 boxes + 2)	_____ / 5
C · Associations	_____ / 4
Total	_____ **/ 21**

Skills practiced

Scatter plots · Association · Outliers · Line of best fit · Slope · Y-intercept · Predictions · Percents

Teaching tip: Have students cover the outlier (#44) with a finger and check how well the line fits everyone else. In Section B, connect the slope to the 3-point shot and the 75 to points from everything else.

A · Plot It Yourself

1. Answer: **Positive (plot shows 8 dots)**
   More attempts tend to go with more makes.
2. Answer: **#2, 75%**
   3 ÷ 4 = 0.75
3. Answer: **#13 (40%)**
   4 ÷ 10 = 0.40
4. Answer: **18 points**
   9 makes × 2 = 18

B · Points From the Line

Table: Answer: **105, 117, 129**
3(10) + 75, 3(14) + 75, 3(18) + 75

1. Answer: **11 threes**
   108 − 75 = 33, 33 ÷ 3 = 11
2. Answer: **Each made 3-pointer is worth 3 points**
   So each extra three adds about 3 team points.

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