

Section 4.2

Building Linear Models from Data

OBJECTIVE 1

- ✓ **1 Draw and Interpret Scatter Diagrams**

EXAMPLE

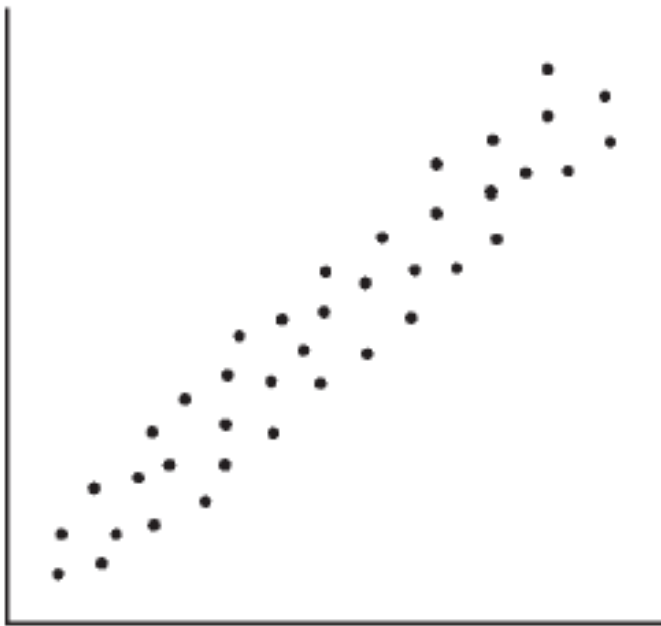
Drawing and Interpreting a Scatter Diagram

| Team | On-Base Percentage, x | Runs Scored, y | (x, y) |
|---------------|-------------------------|------------------|-------------|
| Atlanta | 33.7 | 849 | (33.7, 849) |
| St. Louis | 33.7 | 781 | (33.7, 781) |
| Colorado | 34.1 | 813 | (34.1, 813) |
| Houston | 33.2 | 735 | (33.2, 735) |
| Philadelphia | 34.7 | 865 | (34.7, 865) |
| San Francisco | 32.4 | 746 | (32.4, 746) |
| Pittsburgh | 32.7 | 691 | (32.7, 691) |
| Florida | 33.1 | 758 | (33.1, 758) |
| Chicago Cubs | 31.9 | 716 | (31.9, 716) |
| Arizona | 33.1 | 773 | (33.1, 773) |
| Milwaukee | 32.7 | 730 | (32.7, 730) |
| Washington | 33.8 | 746 | (33.8, 746) |
| Cincinnati | 33.6 | 749 | (33.6, 749) |
| San Diego | 33.2 | 731 | (33.2, 731) |
| NY Mets | 33.4 | 834 | (33.4, 834) |
| Los Angeles | 34.8 | 820 | (34.8, 820) |

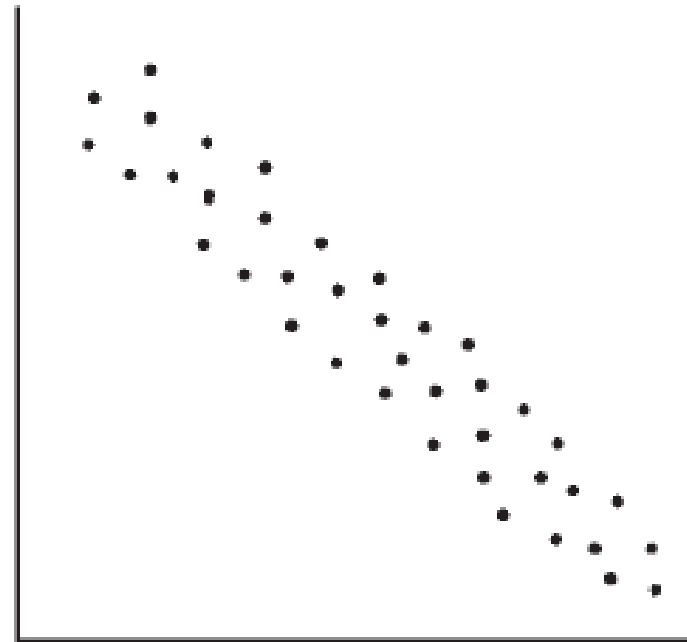
- Draw a scatter diagram of the data, treating on-base percentage as the independent variable.
- Use a graphing utility to draw a scatter diagram.
- Describe what happens to runs scored as the on-base percentage increases.

OBJECTIVE 2

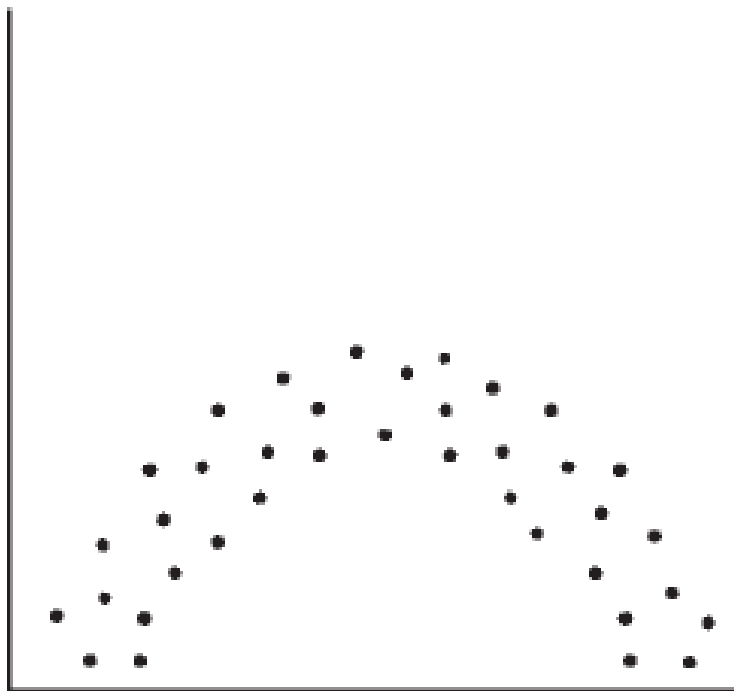
- ✓ **Distinguish between Linear and Nonlinear Relations**



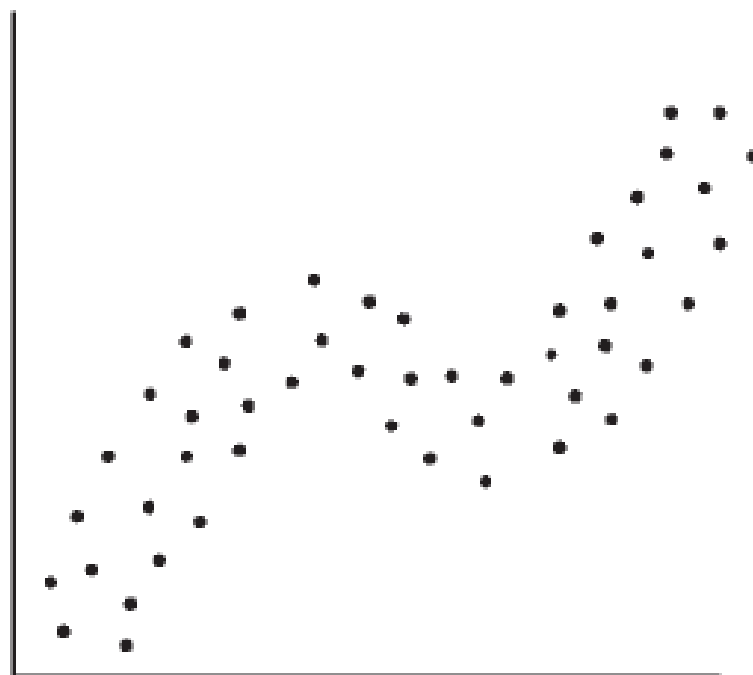
(a) Linear
 $y = mx + b, m > 0$



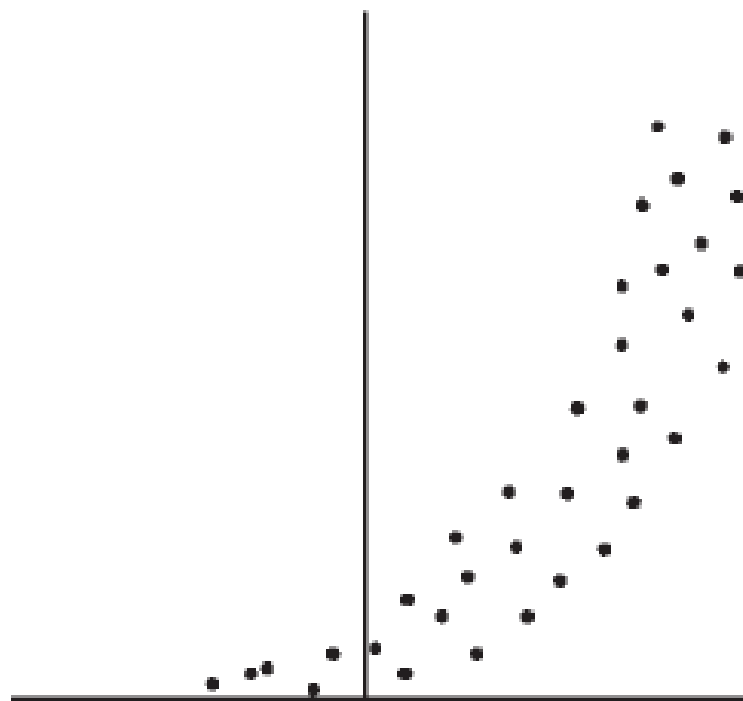
(b) Linear
 $y = mx + b, m < 0$



(c) Nonlinear



(d) Nonlinear

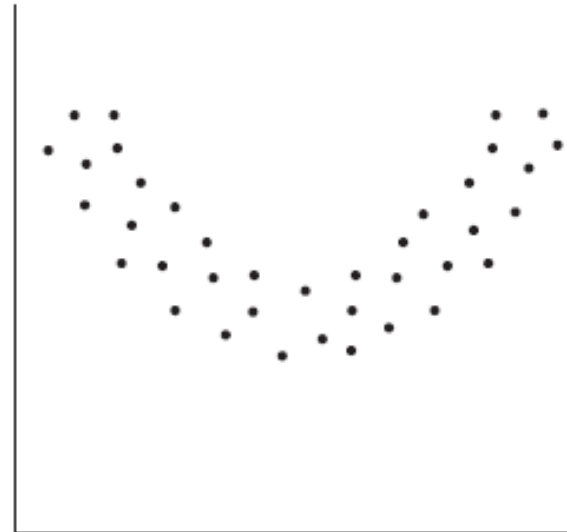


(e) Nonlinear

EXAMPLE

Distinguishing between Linear and Nonlinear Relations

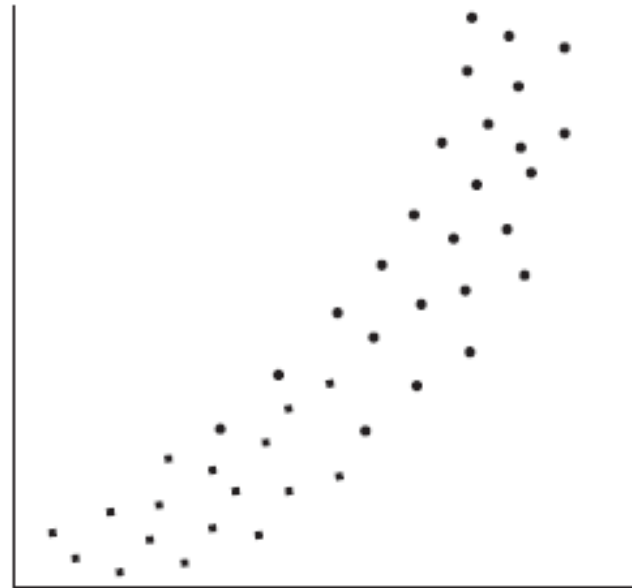
Determine whether the relationship between the two variables is linear or nonlinear.



EXAMPLE

Distinguishing between Linear and Nonlinear Relations

Determine whether the relationship between the two variables is linear or nonlinear.



EXAMPLE**Finding a Model for Linearly Related Data**

| Team | On-Base Percentage, x | Runs Scored, y | (x, y) |
|---------------|-------------------------|------------------|-------------|
| Atlanta | 33.7 | 849 | (33.7, 849) |
| St. Louis | 33.7 | 781 | (33.7, 781) |
| Colorado | 34.1 | 813 | (34.1, 813) |
| Houston | 33.2 | 735 | (33.2, 735) |
| Philadelphia | 34.7 | 865 | (34.7, 865) |
| San Francisco | 32.4 | 746 | (32.4, 746) |
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| Arizona | 33.1 | 773 | (33.1, 773) |
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| Washington | 33.8 | 746 | (33.8, 746) |
| Cincinnati | 33.6 | 749 | (33.6, 749) |
| San Diego | 33.2 | 731 | (33.2, 731) |
| NY Mets | 33.4 | 834 | (33.4, 834) |
| Los Angeles | 34.8 | 820 | (34.8, 820) |

- (a) Select two points and find an equation of the line containing the points.
- (b) Graph the line on the scatter diagram obtained in the previous example.

OBJECTIVE 3

- 3 Use a Graphing Utility to Find the Line of Best Fit

EXAMPLE

Finding a Model for Linearly Related Data

| Team | On-Base Percentage, x | Runs Scored, y | (x, y) |
|---------------|-------------------------|------------------|-------------|
| Atlanta | 33.7 | 849 | (33.7, 849) |
| St. Louis | 33.7 | 781 | (33.7, 781) |
| Colorado | 34.1 | 813 | (34.1, 813) |
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| Cincinnati | 33.6 | 749 | (33.6, 749) |
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| NY Mets | 33.4 | 834 | (33.4, 834) |
| Los Angeles | 34.8 | 820 | (34.8, 820) |

- Use a graphing utility to find the line of best fit that models the relation between on-base percentage and runs scored.
- Graph the line of best fit on the scatter diagram obtained in the previous example.
- Interpret the slope.
- Use the line of best fit to predict the number of runs a team will score if their on-base percentage is 33.5.