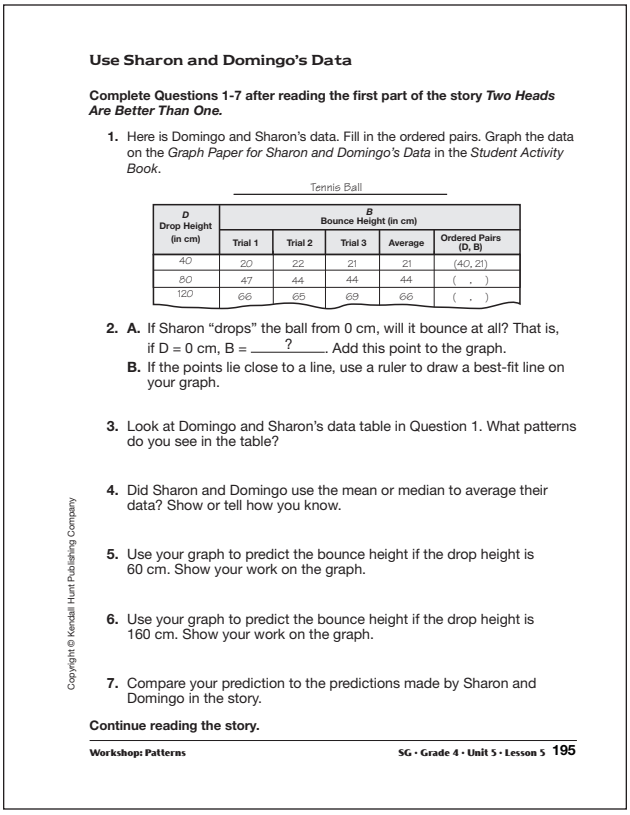

Use Sharon and Domingo's Data

Complete Questions 1-7 after reading the first part of the story *Two Heads Are Better Than One.*

1. Here is Domingo and Sharon's data. Fill in the ordered pairs. Graph the data on the *Graph Paper for Sharon and Domingo's Data* in the *Student Activity Book*.

Tennis Ball

D Drop Height (in cm)	B Bounce Height (in cm)				
	Trial 1	Trial 2	Trial 3	Average	Ordered Pairs (D, B)
40	20	22	21	21	(40, 21)
80	47	44	44	44	(,)
120	66	65	69	66	(,)

2. **A.** If Sharon "drops" the ball from 0 cm, will it bounce at all? That is, if D = 0 cm, B = _____?_____. Add this point to the graph.
   B. If the points lie close to a line, use a ruler to draw a best-fit line on your graph.
3. Look at Domingo and Sharon's data table in Question 1. What patterns do you see in the table?
4. Did Sharon and Domingo use the mean or median to average their data? Show or tell how you know.
5. Use your graph to predict the bounce height if the drop height is 60 cm. Show your work on the graph.
6. Use your graph to predict the bounce height if the drop height is 160 cm. Show your work on the graph.
7. Compare your prediction to the predictions made by Sharon and Domingo in the story.

Continue reading the story.

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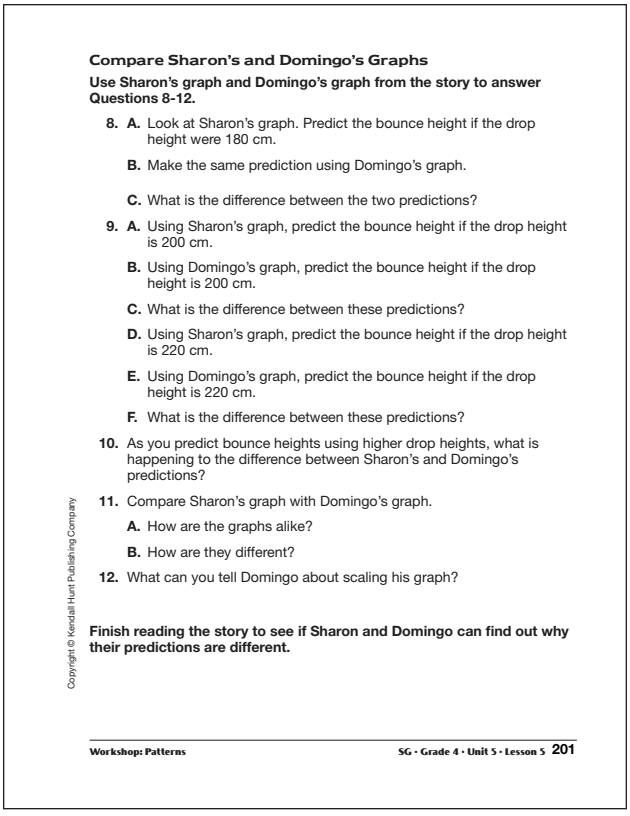

Compare Sharon's and Domingo's Graphs

Use Sharon's graph and Domingo's graph from the story to answer Questions 8-12.

8. **A.** Look at Sharon's graph. Predict the bounce height if the drop height were 180 cm.
   B. Make the same prediction using Domingo's graph.
   C. What is the difference between the two predictions?
9. **A.** Using Sharon's graph, predict the bounce height if the drop height is 200 cm.
   B. Using Domingo's graph, predict the bounce height if the drop height is 200 cm.
   C. What is the difference between these predictions?
   D. Using Sharon's graph, predict the bounce height if the drop height is 220 cm.
   E. Using Domingo's graph, predict the bounce height if the drop height is 220 cm.
   F. What is the difference between these predictions?
10. As you predict bounce heights using higher drop heights, what is happening to the difference between Sharon's and Domingo's predictions?
11. Compare Sharon's graph with Domingo's graph.
    A. How are the graphs alike?
    B. How are they different?
12. What can you tell Domingo about scaling his graph?

Finish reading the story to see if Sharon and Domingo can find out why their predictions are different.

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Student Guide

Workshop: Patterns

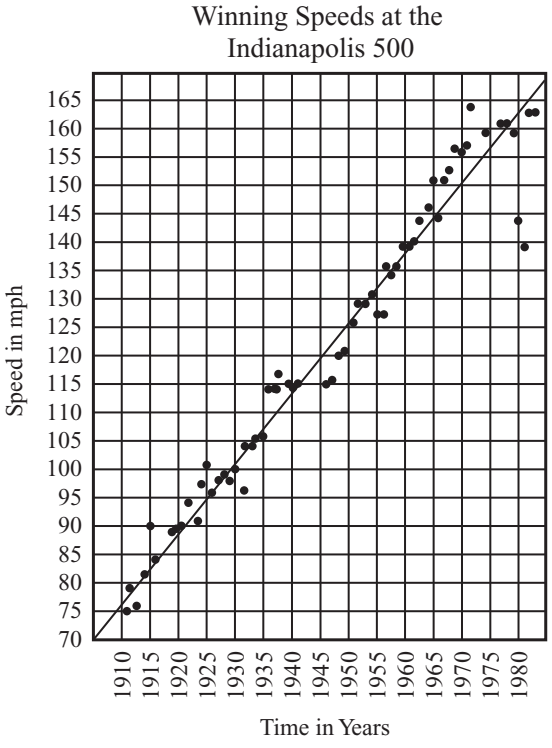
Questions 1–11 (SG pp. 195 and 201)

1. (80, 44), (120, 66)
   For the correct graph, see Sharon's Graph on p. 199
2. **A.** B = 0 cm (0, 0)
3. Possible response: The bounce height is about half of the drop height. The drop height is about 2 times as much as the bounce height.
4. The used the median. I know it is the median because they chose the middle number for each drop height.
5. **A.** 34 cm
   B. Answers will vary.
6. **A.** B = 88 cm
   B–C. Answers will vary.
7. Answers will vary. Students should notice the Domingo's predictions seem different.
8. **A.** 100 cm
   B. 80 cm
   C. 20 cm
9. **A.** Sharon's bounce height 110 cm
   B. Domingo's bounce height 86 cm
   C. The difference is 24 cm
   D. Sharon's bounce height 120 cm
   E. Domingo's bounce height 92 cm
   F. The difference is 28 cm.
10. The difference between their estimates is getting larger.
11. **A.** Possible Response: Both Sharon and Domingo graphed the drop height on the horizontal axis and the bounce height on the vertical axis. They both plotted their points correctly. Both Sharon and Domingo scaled the vertical axis by 10. Both Sharon and Domingo drew in a best-fit line that was close to the data points they had plotted.
    B. Sharon scaled the horizontal axis by 10 but Domingo started scaling the vertical axis by 10 and then when he got to 100 he started scaling by 20.
11. Answers will vary. If a graph is not scaled correctly, it will cause errors.

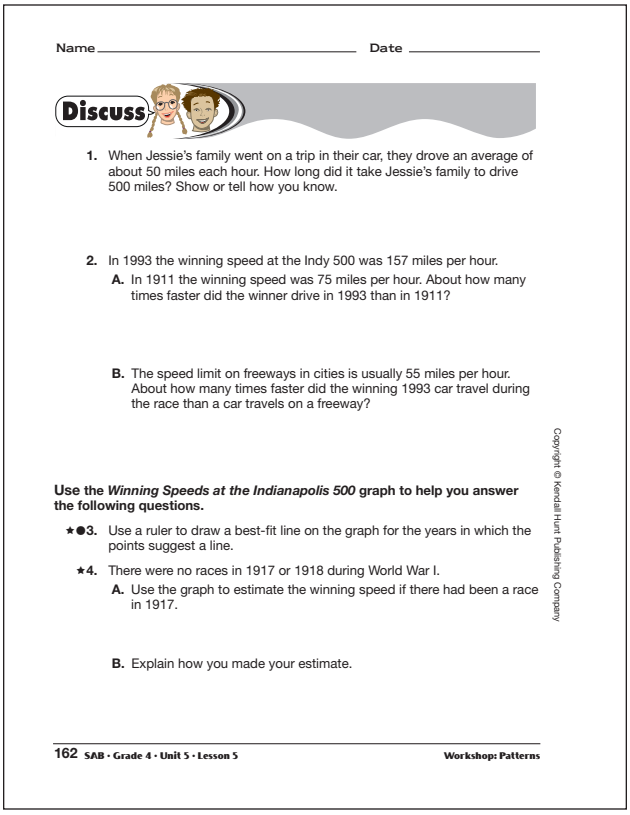
Student Activity Book

Speeds at the Indianapolis 500

Questions 1–15 (SAB pp. 162–168)

1. About 10 hours; 500 = 50 miles × 10 hrs.
2. **A.** About 2 times faster; using friendly numbers: 150 is 2 times 75.
   B. About 3 times faster; 150 is about 3 times 50.
3. 

4. **A.** Estimates will vary. About 87 miles per hour. Accept estimates between 85 and 90 miles per hour.
   B. Possible response: I used the best-fit line. First, I found where 1917 would be on the horizontal axis. I went up to the best fit line and then read across to the vertical axis.
5. **A.** Estimates will vary. About 117 miles per hour. Accept estimates between 115 and 120 miles per hour.
   B. Explanations will vary. (See Question 4B)
   C. Interpolation



Name _____ Date _____

Discuss

1. When Jessie's family went on a trip in their car, they drove an average of about 50 miles each hour. How long did it take Jessie's family to drive 500 miles? Show or tell how you know.

2. In 1993 the winning speed at the Indy 500 was 157 miles per hour.
   A. In 1911 the winning speed was 75 miles per hour. About how many times faster did the winner drive in 1993 than in 1911?

   B. The speed limit on freeways in cities is usually 55 miles per hour. About how many times faster did the winning 1993 car travel during the race than a car travels on a freeway?

Use the *Winning Speeds at the Indianapolis 500* graph to help you answer the following questions.

★●3. Use a ruler to draw a best-fit line on the graph for the years in which the points suggest a line.

★4. There were no races in 1917 or 1918 during World War I.
   A. Use the graph to estimate the winning speed if there had been a race in 1917.

   B. Explain how you made your estimate.

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Name _____ Date _____

★●5. There were no races from 1942–1945 during World War II.

A. Use the graph to estimate the winning speed if there had been a race in 1943.

B. Explain how you made your estimate.

C. Did you use interpolation or extrapolation?

●■6. In 1979, the yellow light rule was changed. Starting in 1979, when a yellow light is on, a pace car leads all the cars at the slower speed. The cars still maintain their positions as before, but they may not pass the pace car. Do you think the rule change made a difference to the average winning speed? Why do you think so?

●■7. Looking at the data, what do you think might have happened in 1990? Does the 1990 data point fit more with the data before 1979 or the data after 1979? Explain your answer.

■8. **A.** Can you use the graph to make an accurate prediction about the winning speed in 2015? Why or why not?

B. If so, what is your prediction?

C. Did you use interpolation or extrapolation?

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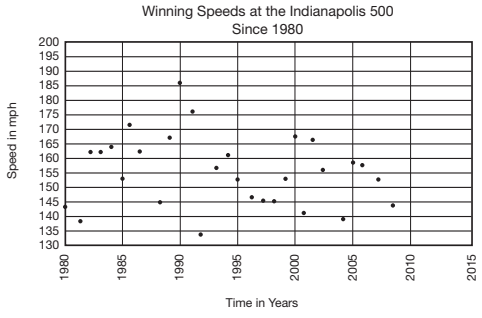
Name _____ Date _____

■9. Write a short paragraph that tells the story of the graph. In your paragraph, describe the graph. What does the graph tell you about the speeds of the winning cars over the years?

●■10. Here is part of the graph. This part shows the winning speeds from 1980 to 2008.



A. Describe this part of the graph.

B. Can you draw a best-fit line for this part of the graph? Why or why not?

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6. Answers will vary. After 1979, the pattern of the data points changes. They no longer fall on an obvious line. The rule change may have made a difference and, depending on the number of accidents and the weather, reduced the average speed of the winners.

7. Answers will vary. Possibly there were good road conditions and fewer accidents so the average speed of the winner was faster. The 1990 data point falls roughly on the same best-fit line as the points before 1979.

8. A–B. Answers and explanations will vary. Students should see that the pattern doesn't hold true after about 1980. They may make a prediction using a range. They can predict that the speed will be between 130 and 180 mph.

C. Extrapolation

9. Answers will vary. Students might say that the graph tends to go uphill at a steady rate until about 1980 when the data becomes scattered. Until 1980 the winning speeds increased over the years, with the exception of the war years. After 1980 the winning speeds varied widely.

10. A. Answers will vary. Students may say that the points are scattered with no visible pattern.

B. No, the points vary and do not suggest a line.

11. A.

L	D
2	5
4	10
6	15
8	20
10	25
20	50
40	100
60	150
80	200
100	250
200	500

B. Answers will vary.

C. Answers will vary. The D column is $2 \times L + \frac{1}{2}L$ or $D = L + L + \frac{1}{2}L$. When L doubles, D also doubles.

12. A.

L	D
1	90
2	180
3	270
4	360
5	450
6	540

B. T goes up by ones, D goes up by 90s. D is 90 times T.

C. Multiply the time by 90.

13. A.

T Time	*D* Distance in miles	*(T, D)* Ordered Pair
1	62 miles	(1, 62)
2	122 miles	(2, 122)
3	176 miles	(3, 176)
4	240 miles	(4, 240)

B–C. Scale of graphs will vary.

14. Yes; using the graph, the line for 6 hours crosses the best-fit line at about 350 miles.

Name _____ Date _____

★●11. **A.** A driver must complete 200 laps to finish the race. Complete the table.

B. Describe any patterns you see in the table.

C. If you know the number of laps, how can you find the number of miles the race car has traveled?

L Number of Laps	*D* Distance in Miles
2	5
4	10
6	15
8	
10	25
20	
40	100
60	
	200
100	
200	500

✓ **Check-In: Questions 12-15**

★●■12. In 1915, the fifth year of the race, the winning speed was about 90 miles per hour.

A. Complete the table.

B. Describe any patterns you see in the table.

T Time in Hours	*D* Distance in Miles
1	90
2	
3	
	360
5	450
6	

C. If you know the time in hours, how can you find the number of miles the race car has traveled?

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Name _____ Date _____

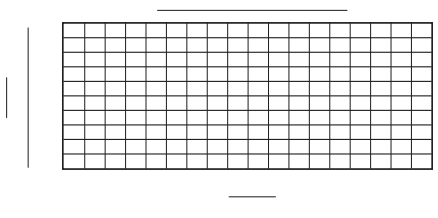
★●■13. Mr. Sabol drove to see the Indianapolis 500. It usually takes him about 6 hours to get there. He kept track of how far he had driven after each hour and put the data for the first four hours in this table.

T Time in Hours	*D* Distance in Miles	*(T, D)* Ordered Pairs
1	62	
2	122	(2, 122)
3	176	
4	240	

A. Write the ordered pairs for each data point.

B. Make a point graph of Mr. Sabol's data. Choose a scale for each axis that will leave room to make predictions.

C. If the points lie close to a line, use a ruler to draw a best-fit line. Extend the line in both directions.



★●■14. If Mr. Sabol lives about 350 miles away, will he get there in six hours? Show how you know using your graph.

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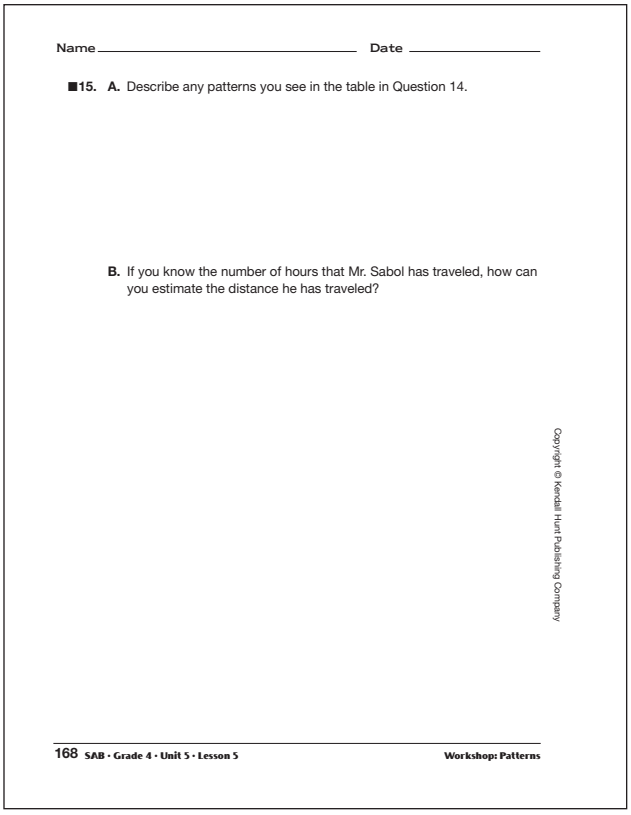

Name _____ Date _____

■15. **A.** Describe any patterns you see in the table in Question 14.

B. If you know the number of hours that Mr. Sabol has traveled, how can you estimate the distance he has traveled?

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15. **A.** There is not an exact pattern, but the general pattern is that the miles are about 60 times the number of hours he is driving, or about 60 miles per hour.

B. Multiply the number of hours by 60.