LESSON 9.6

Midpoints

You will need:

graph paper 

MEETING HALFWAY

1. Linda works at the corner of Galbrae Avenue and 15th Street. Micaelia works at the corner of Galbrae Avenue and 38th Street. The streets between 15th and 38th are all consecutively numbered streets. Linda and Micaelia agree to meet after work. If they both want to walk the same distance, where should they meet?

2. Change Micaelia's workplace in problem 1. Make her meeting place with Linda at a street corner, not the middle of a block.

3. For what values of n is the halfway point between 15th Street and n^{th} Street in the middle of the block, and for what values is it at a street corner?

4. Find the point on the number line halfway between:
   a. 1.5 and 6.8; b. 1/3 and 1/2.

5. Describe how to find the point on the number line halfway between a and b. Use a sketch and explain.

6. Explain how to find the point on the number line
   a. 1/3 of the way from 4 to 6;
   b. 1/4 of the way from 4 to 7.

FINDING A FORMULA

Sue and Ruth were trying to find the number halfway between 5 and 11.4. Ruth used this method: First she found the distance between 11.4 and 5, which is 6.4. Next she took half of that, which is 3.2. Last she added 3.2 to 5.

7. Use a sketch of the number line to explain Ruth's method.

8. If $B > A$, what is the distance between A and B on the number line? What is half that distance?

9. The formula for Ruth's method is
   $$\text{midpoint} = \frac{B - A}{2} + A.$$
   Explain.

10. Ruth's formula can be rewritten as two fractions with a common denominator.
    $$\text{midpoint} = \frac{B - A}{2} + \frac{2A}{2}$$
    Write it as one fraction in lowest terms.

11. Explain the formula you found in problem 10 in words.

12. Sue's method for finding the midpoint between two points on the number line is to take the average of the two points. Does that method work? Test it on some examples, and explain what you find out.

13. **Summary** Compare Ruth's method with Sue's method. Use examples, sketches, and algebra. Does either method work all the time? Which one do you prefer? Do they work when A and/or B are negative?

THE MIDPOINT OF LINEAR GROWTH

Between ages 10 and 12, Sue's growth in height was approximately linear as a function of age. This means that the rate of change of height per year was approximately constant.

Sue's Growth (Height)

Age (years)	Height (cm)
10	146
11	—
12	161

14. Estimate Sue's height at age 11.

15. Based on the data, do you think her weight increased linearly as a function of age? If so, estimate her weight at ages 10½ and 11½.

Sue's Growth (Weight)

Age (years)	Weight (lbs)
10	90
11	101
12	112

16. Joel kept a record of his height and weight. When he was 5′5″ tall, he weighed 130 pounds. When he was 5′7″ tall, he weighed 142 pounds. If his weight increased as a linear function of his height, how much did he weigh when he was 5′6″ tall?

MIDPOINT OF A LINE SEGMENT

17. On a graph, plot and label the midpoint of the segment joining each pair of points.

a. (5, 3) and (8, 7)

b. (-5, -3) and (8, -7)

c. (-5.5, 3.5) and (8, 7)

d. (1/4, 3) and (3/4, -7)

18. Using a sketch, explain how to find the coordinates of the midpoint of the segment joining the points (a, b) and (c, d). Check your method for positive and negative numbers. Try to write a formula.

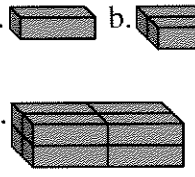
PREVIEW *SURFACE AREA SEQUENCES*

For each sequence of buildings, find the volume and surface area of the first four buildings. Then, describe and sketch the fifth building, and find its volume and surface area.

19. a. b. c. d.

20. a. b. c.

d.



21. a. b. c.

d.