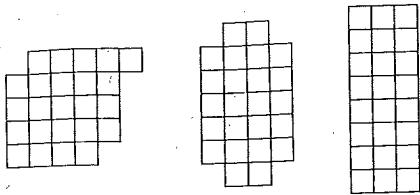


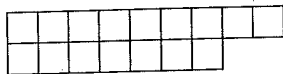
Applications

1. a. Possible answers:

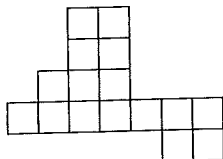


b. The bumper-car ride has an area of 24 m^2 , which is the total number of square meters used to cover the floor plan of the bumper-car ride. The perimeter of 22 m is the total number of rail sections that are needed to surround the bumper-car ride.

2. Answers will vary. Maximum perimeter for whole-number dimensions is 34 units, minimum is 16 units. Possible answers:

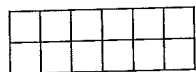


Perimeter: 22 units

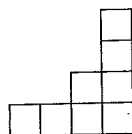


Perimeter: 26 units

3. Answers will vary. Maximum area for whole-number dimensions is 16 square units, minimum is 7 square units. Possible answers:

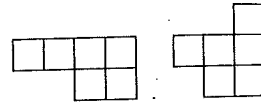


Area: 12 square units

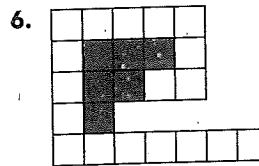


Area: 8 square units

4. Answers will vary. Possible answers:



5. Possible answers: The perimeters are not the same, because I counted the number of units around the edge of each figure and found that their perimeters were different.



Adding these six tiles reduced the perimeter of the figure. Only two of the new tiles have exposed edges, while together they cover ten previously exposed edges in the original figure.

7. $P = 4 \times 12 \text{ ft} = 48 \text{ ft}$, $A = 12 \text{ ft} \times 12 \text{ ft} = 144 \text{ ft}^2$

8. $P = 22 \times 12 \text{ ft} = 264 \text{ ft}$,
 $A = 144 \text{ ft}^2 \times 21 = 3,024 \text{ ft}^2$

9. $P = 30 \times 12 \text{ ft} = 360 \text{ ft}$,
 $A = 144 \text{ ft}^2 \times 26 = 3,744 \text{ ft}^2$

10. $P = 26 \times 12 \text{ ft} = 312 \text{ ft}$,
 $A = 144 \text{ ft}^2 \times 20 = 2,880 \text{ ft}^2$

11. $P = 16 \text{ units}$, $A = 7 \text{ units}^2$

12. $P = 16 \text{ units}$, $A = 16 \text{ units}^2$

13. $P \approx 11 \text{ units}$, $A \approx 5.5 \text{ units}^2$

14. $P = 40 \text{ in.}$, $A = 100 \text{ in.}^2$

15. $P = 40 \text{ m}$, $A = 75 \text{ m}^2$

16. $P = 2\ell + 2w$, $A = \ell \cdot w$

17. Check students' sketches. (See Figure 1.)

18. $A = 65 \text{ cm}^2$, $P = 38 \text{ cm}$

19. $A = 36 \text{ cm}^2$, $P = 36 \text{ cm}$

20. a. The next thing that she did was she stretched out the string and measured it. She was finding the perimeter of the figure.

b. She got the same answer that she got by counting, 18 cm.

c. No, she can't because the string method measures length, not area. Instead, she must count all the squares.

21. a. $6 \text{ ft} \times 8\frac{1}{2} \text{ ft} = 51 \text{ ft}^2$

b. 29 ft of molding

c. Two walls have an area of $6 \text{ ft} \times 6 \text{ ft} = 36 \text{ ft}^2$, and two walls would have an area of $6 \text{ ft} \times 8.5 \text{ ft} = 51 \text{ ft}^2$. The total surface area would be $36 + 36 + 51 + 51 = 174 \text{ ft}^2$. You would need 4 pints of paint because $174 \text{ ft}^2 \div 50 \text{ ft}^2 = 3.48$ and you round up to 4 so that you will have enough paint.

d. Check students' work. Answers will vary, but students should use processes similar to those they used in parts (a)–(c). Students also need to make sure that they round the number of pints of paint up to the nearest whole number to make sure they have enough paint to cover the walls.

22. a. Since $40 \times 120 = 4,800$, the cost of this model is $4,800 \times \$95 = \$456,000$

b. $4,800 \div 100 = 48$ cars

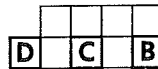
23. Designs will vary and costs are dependent on the number of tiles and rail sections used. Two possible answers:

7 m by 5 m: area = 35 m^2 , perimeter = 24 m, cost = \$1,650.00

6 m by 6 m: area = 36 m^2 , perimeter = 24 m, cost = \$1,680.00

Students will have to make a guess to get started and then alter the guess to increase or decrease three inter-related variables. Look for ways that students proceeded from their first guesses.

24. A



25. A 4 ft-by-4 ft square requires the least amount of material for the sides: 16 ft of board.

Figure 1

Rectangle	Length (in.)	Width (in.)	Area (square in.)	Perimeter (in.)
A	5	6	30	22
B	4	13	52	34
C	$6\frac{1}{2}$	8	52	29

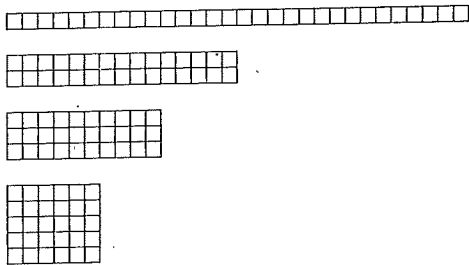
26. a.

Length (ft)	Width (ft)
1	240
2	120
3	80
4	60
5	48
6	40
8	30
10	24
12	20
15	16

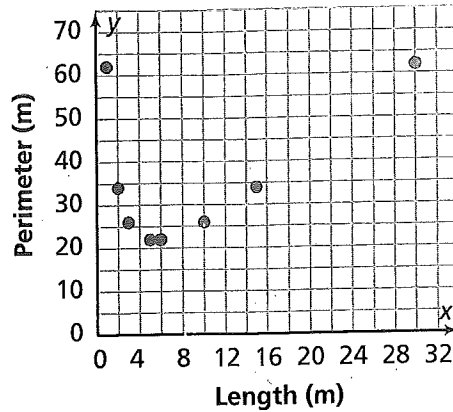
b. Possible answer: A car needs at least 8 ft for the length, so the 8 ft-by-30 ft design would probably be too snug. The 10 ft-by-24 ft, 12 ft-by-20 ft, and 15 ft-by-16 ft designs would all be appropriate as garages.

27. a.

Length (m)	Width (m)	Area (m ²)	Perimeter (m)
1	30	30	62
2	15	30	34
3	10	30	26
5	6	30	22
6	5	30	22
10	3	30	26
15	2	30	34
30	1	30	62



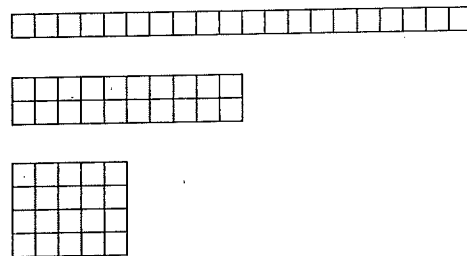
b.

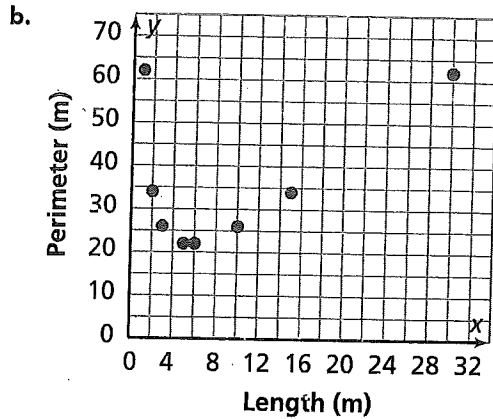


c. On the table, look for the greatest (least) number in the perimeter column. The dimensions will be next to this entry in the length and width columns. On the graph, look for the highest (lowest) point. Then read left to the perimeter axis to get the perimeter. The greatest perimeter is 62 meters (a 1 m × 30 m rectangle). The least perimeter is 22 meters (a 5 m × 6 m rectangle).

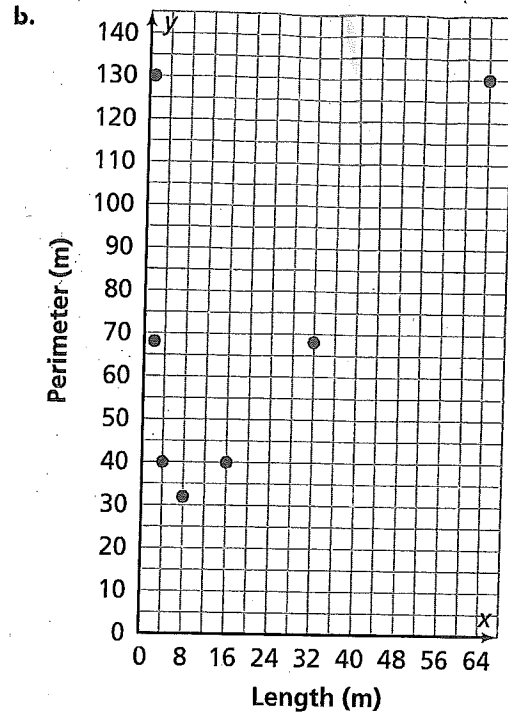
28. a.

Length (m)	Width (m)	Area (m ²)	Perimeter (m)
1	20	20	42
2	10	20	24
4	5	20	18
5	4	20	18
10	2	20	24
20	1	20	42





c. On the table, look for the greatest (least) number in the perimeter column. The dimensions will be next to this entry in the length and width columns. On the graph, look for the highest (lowest) point. Then read left to the perimeter axis to get the perimeter. The greatest perimeter is 42 meters (a 1 m \times 20 m rectangle). The least perimeter is 18 meters (a 4 m \times 5 m rectangle).



c. On the table, look for the greatest (least) number in the perimeter column. The dimensions will be next to this entry in the length and width columns. On the graph, look for the highest (lowest) point. Then read left to the perimeter axis to get the perimeter. The greatest perimeter is 130 meters (a 1 m \times 64 m rectangle). The least perimeter is 32 meters (a 8 m \times 8 m rectangle).

29. a.

Length (m)	Width (m)	Area (m ²)	Perimeter (m)
1	64	64	130
2	32	64	68
4	16	64	40
8	8	64	32
16	4	64	40
32	2	64	68
64	1	64	130

(See Figure 2.)

Figure 2

