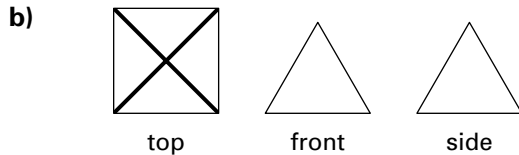going from the tip to each vertex of the base. Draw what you see using thick black lines to show changes in depth.
(4) Imagine you are looking at the pyramid from the front. You would see only the face of a triangle. Draw what you see.
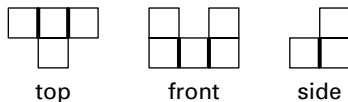(5) Imagine you are looking at the pyramid from one side. You would see only the face of a triangle. Draw what you see.
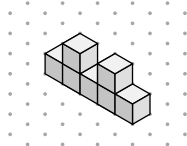
b)

| top | front | side |

2. Follow these steps to build a structure using the top, front, and side views. (1) Start with the side view, because there are no changes in depth. Use six cubes to build the side. (2) Look at the top view of the structure you have built. It matches the top view in the drawing. (3) Look at the front view of the structure you have built. It matches the front view in the drawing. (4) Your structure is finished, because it matches all three views.
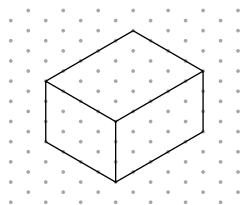
Test Yourself

1. C
2. A and B
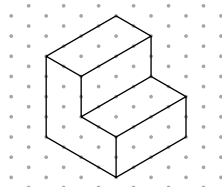**3.**

| top | front | side |

4.

5. a)

b)

6. Follow these steps to draw top, front, and side views of the structure. (1) Imagine you are looking at the structure from above. You will see six cubes arranged in a rectangle with a width of two cubes and a length of three cubes. The top left cube is raised above the rest. (2) Imagine you are looking at the structure from the front. There are two cubes side by side. Directly above the cube on the left is another cube at a different depth. (3) Imagine you are looking at the structure from the right. There are three cubes in a row. Directly above the cube on the far right is another cube at a different depth.

Chapter 11

11.1 Surface Area of a Rectangular Prism

1. a) 4 cm by 6 cm; 24 cm^2
   b) 4 cm by 2 cm; 8 cm^2
   c) 2 cm by 6 cm; 12 cm^2
   d) Surface Area $= 2 \times (24$ cm$^2 + 8$ cm^2
   $+ 12$ cm$^2) = 88$ cm^2
2. a) 28 cm^2 **b)** 32 cm^2 **c)** 78 cm^2
3. a) 46 cm^2 **b)** 280 cm^2 **c)** 138.2 cm^2

11.2 Volume of a Rectangular Prism

1. a) 12 cubes   **b)** 32 cubes
   c) 120 cubes
2. a) 64 cm^3 **b)** 1176 cm^3
3. a) 12 cm^3 **b)** 450 cm^3
   c) 64 cm^3 **d)** 196 cm^3
   e) 100 000 cm^3 **f)** 1237.5 cm^3
4. She should buy (c), the Super Clean filter.
5. a) 4 cm   **b)** 4 cm   **c)** 9 cm   **d)** 260 cm^3
   e) 8 cm   **f)** 12 cm
6. Two possible sets of dimensions are 10 m by 3 m by 2 m; and 6 m by 5 m by 2 m.
7. Brand 3 is the best buy, because it has the lowest price per cm^3. (Find the volume, then divide the price by the volume to find the price per cm^3.)
8. 128 units^3
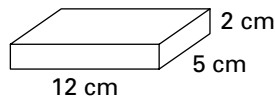**9.** Yes, Miguel should accept. Jody's box has a larger volume than his box.

11.3 Solve Problems by Guessing and Testing

1. b) $2 \times 6 \times 10$ **c)** $12 \times 5 \times 2$
   d) $6 \times 5 \times 4$ **e)** $4 \times 15 \times 2$
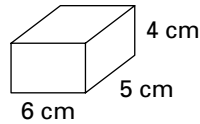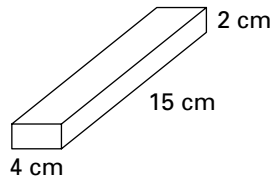
2. b)

c)

d)

e)

3. The three prisms can have dimensions 2 cm $\times$ 9 cm $\times$ 10 cm; 3 cm $\times$ 6 cm $\times$ 10 cm; 6 cm $\times$ 6 cm $\times$ 5 cm; or any other combination of three numbers that multiply to give 180 cm^3.

4.

Length (cm)	Width (cm)	Height (cm)	Surface Area (cm^2)
100.0	40.0	50.0	22 000
90.0	44.4	50.0	21 432
80.0	50.0	50.0	21 000
70.0	57.1	50.0	20 704
60.0	66.7	50.0	20 674
50.0	80.0	50.0	21 000

According to the chart above, a base with length = 60.0 cm and width = 66.7 cm results in the smallest surface area. This is a good answer. However, you can keep going to find a better answer. Notice that these dimensions are almost equal. From this, you can guess that a length and width that are equal will result in the smallest possible surface area:

Length (cm)	Width (cm)	Height (cm)	Surface Area (cm^2)
63.2	63.2	50	20 628.5

5. 25 cm, 30 cm, and 10 cm

11.4 Relating the Dimensions of a Rectangular Prism to Its Volume

1. a) i) 4 cm $\times$ 6 cm $\times$ 10 cm
  ii) 4 cm $\times$ 5 cm $\times$ 12 cm

b) If you doubled the height of the dimensions in part (i), the new volume would be 480 cm^3, or double the original volume.

c) Yes, the new volume would be equal. Doubling any one dimension results in a volume that is doubled.

d) i) 480 cm^3 **ii)** 480 cm^3

2. a) 720 cm^3 **b)** 180 cm^3 **c)** 1080 cm^3
  d) 5 cm   **e)** 100 cm   **f)** 1 cm

11.5 Exploring the Surface Area and Volume of Prisms

1. a) 96 cm^2 and 64 cm^3
  b) 136 cm^2 and 64 cm^3
  c) 160 cm^2 and 64 cm^3

2. a) 64.0 cm^2 and 28.0 cm^3
  b) 64.0 cm^2 and 32.0 cm^3
  c) 64.0 cm^2 and 34.848 cm^3

3. The prism on the right side has the greatest surface area. If two prisms have the same volume, the prism that is closest in shape to a cube will have the smallest surface area.

4. The prism on the left side has the greatest volume. If two prisms have the same surface area, the prism that is closest in shape to a cube will have the greatest volume.

Test Yourself

1. a) 78 units^2 **b)** 32 units^2
  c) 142 cm^2

2. a) 24 units^3 **b)** 48 units^3
  c) 360 cm^3

3. a) 248 cm^2 **b)** 240 cm^3
  c) 120 cm^3 **d)** 480 cm^3

4. a) 30 cm^3 **b)** 1 cm
  c) 3 cm   **d)** 125 cm^3
  e) 21 cm^3

5. Sandra's tower should be 3 blocks high.

Chapter 12

12.1 Exploring Probability

1. a) probably $\frac{1}{2}$ to 1, depending on your habits

  b) $\frac{1}{2}$ **c)** 0   **d)** probably about $\frac{1}{8}$

  e) $\frac{1}{2}$

2. a) This is not a fair game.
  b) Omar is most likely to win.