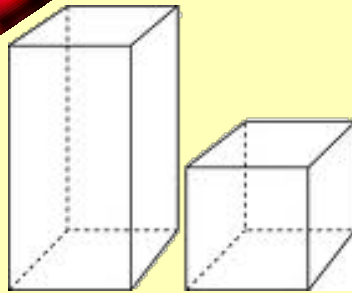
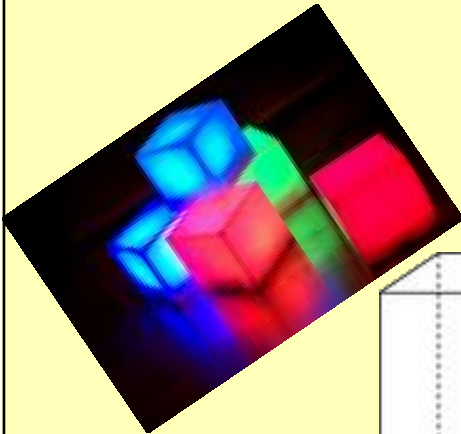


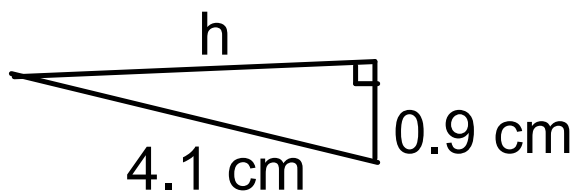
Intro to High School Math

Section 1.3:
Surface Area of Objects Made from Right Rectangular
Prisms



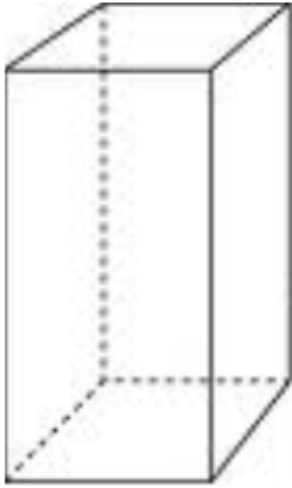
Quiz

Determine the unknown length.



$$\begin{aligned}a^2 &= c^2 - b^2 \\h &= \sqrt{4.1^2 - 0.9^2} \\&= \sqrt{16.81 - 0.81} \\&= \sqrt{16.00} \\h &= 4.0 \text{ cm}\end{aligned}$$

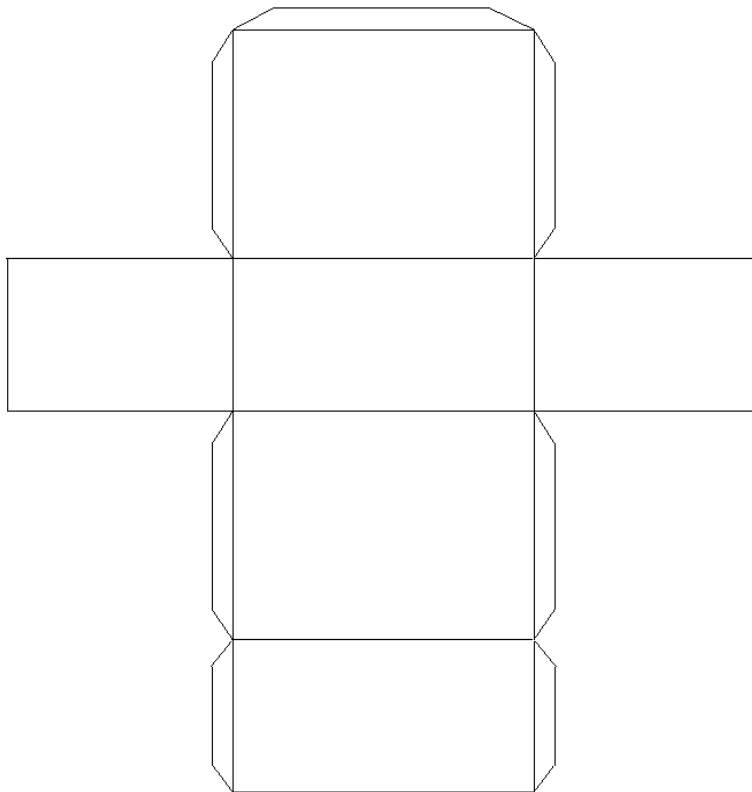
Rectangular Prism



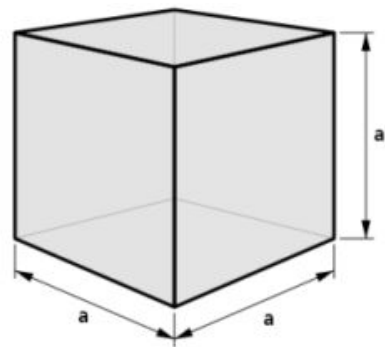
Number of Faces: 6

bottom/top
front/back
side/side

Rectangular Prism



Cubes



Number of Faces: 6

6 x area of 1 face

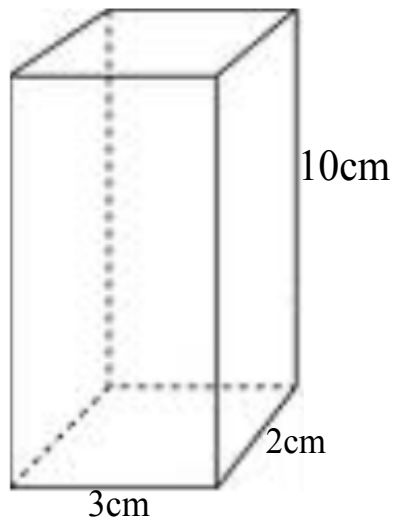
Surface Area

The surface area is the sum of all the areas of all the "shapes that cover the surface" of the object.

Faces

Find the Surface Area of The Rectangular Prism

a)



Think in Pairs

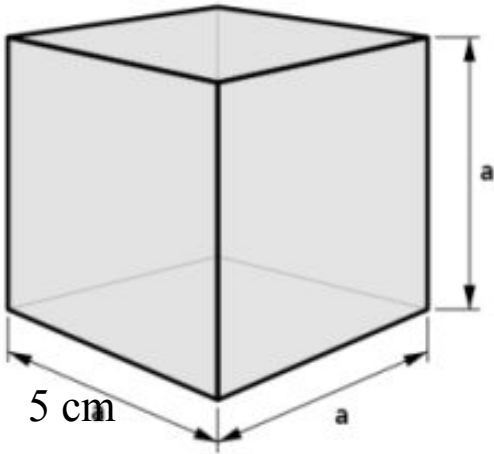
Front = Back

Top = Bottom

Side = Side

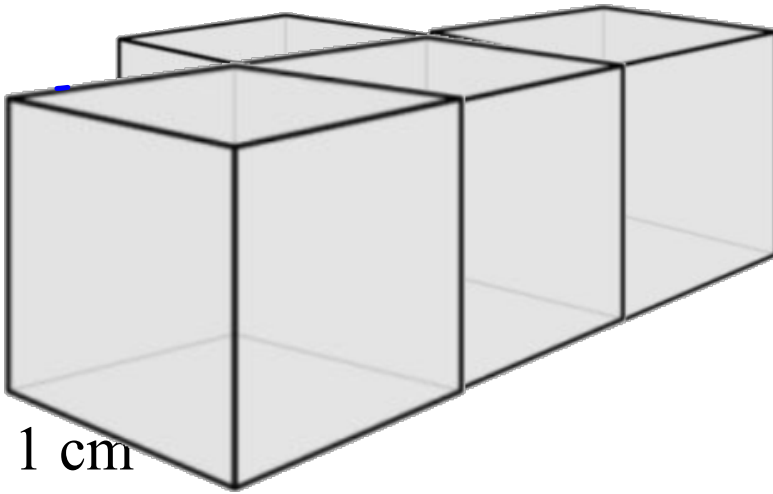
$$\begin{aligned} S.A. &= 2(lw) + 2(lh) + 2(wh) \\ &= 2(3)(2) + 2(10)(2) + 2(3)(10) \\ &= 12 + 40 + 60 \\ &= 112 \text{ cm}^2 \end{aligned}$$

Find the Surface Area of the Following Cube:



$$6 \times (\text{Area of one side})$$
$$A = 6(5 \times 5)$$
$$= 150 \text{ cm}^2$$

Find the Surface Area of the Connected Cubes

Method 1 (Think Individually about each shape)

4 cubes connected

* each have 6 faces **FIND THE AREA OF EACH FACE**

$$4 \times 6 \text{ faces} = 24 \text{ faces}$$

$$\text{Area} = 24 (1\text{cm}^2) = 24\text{cm}^2$$

But have overlap

BUT

WHAT HAPPENS WHEN YOU JOIN FACES? *overlaps*Do you have to count where they join in "surface area"? NO

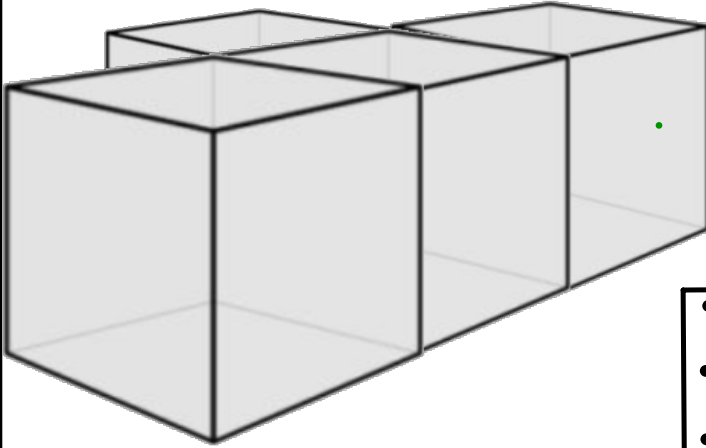
With every connected cube 2 faces disappear

3 (2)

$$\begin{aligned} \text{Total surface Area} &= 24\text{cm}^2 - 6\text{cm}^2 \\ &= 18\text{cm}^2 \end{aligned}$$

3 overlaps so 6 faces disappear

Method 2: (Visualize the top/bottom, front/back, side/side)



How many faces do we see on the top?

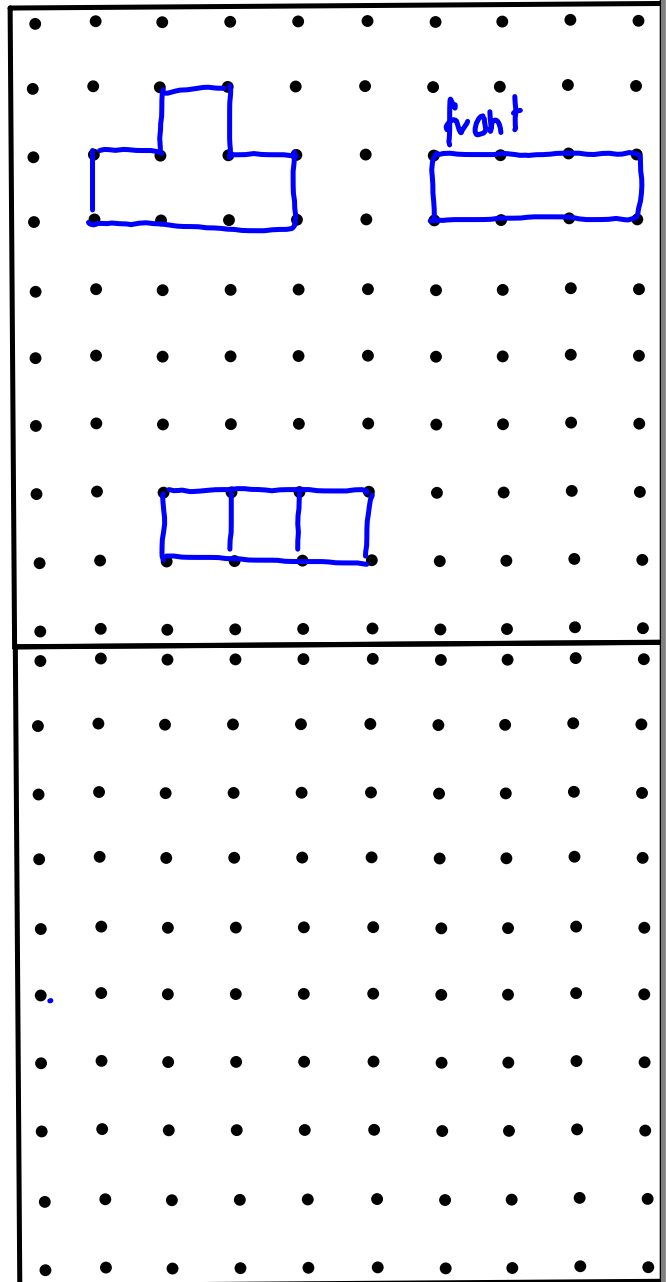
How many faces do we see on the bottom?

How many faces do we see on the front?

How many faces do we see on the back?

How many faces do we see on the left side?

How many faces do we see on the right side?





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questions

4 to 7

$$4.a) 3(6)(1) - 2(2)(1)$$

$$= 18 - 4$$

$$= 14 \text{ units}^2$$

$$4.b) A = 4(6)(1) - (3)(2)(1)$$

$$= 24 - 6$$

$$= 18 \text{ units}^2$$

$$4.c) A = 5(6)(1) - 4(2)(1)$$

$$= 30 - 8$$

$$= 22 \text{ units}^2$$

Homework Solutions

Page 30

4a) Area of a single face = 1 unit²

Of cubes = 3

Total number of faces = 6 x 3 = 18 faces

$$\begin{aligned} \text{Total Area of all cubes} &= 18 \text{ faces} \times (1 \text{ unit}^2) \\ &= 18 \text{ units}^2 \end{aligned}$$

of overlaps = 2

of faces that disappear = 2(2) = 4

$$\begin{aligned} \text{area of disappearing faces} &= 4 \times 1 \text{ units}^2 \\ &= 4 \text{ units}^2 \end{aligned}$$

$$\begin{aligned} \text{Total SA} &= 18 \text{ units}^2 - 4 \text{ units}^2 \\ &= 14 \text{ units}^2 \end{aligned}$$
4b) Area of a single face = 1 unit²

Of cubes = 4

Total number of faces = 6 x 4 = 24 faces

$$\begin{aligned} \text{Total Area of all cubes} &= 24 \text{ faces} \times (1 \text{ unit}^2) \\ &= 24 \text{ units}^2 \end{aligned}$$

of overlaps = 3

of faces that disappear = 2(3) = 6

$$\begin{aligned} \text{area of disappearing faces} &= 6 \times 1 \text{ units}^2 \\ &= 6 \text{ units}^2 \end{aligned}$$

$$\begin{aligned} \text{Total SA} &= 24 \text{ units}^2 - 6 \text{ units}^2 \\ &= 18 \text{ units}^2 \end{aligned}$$
4c) Area of a single face = 1 unit²

Of cubes = 5

Total number of faces = 6 x 5 = 30 faces

$$\begin{aligned} \text{Total Area of all cubes} &= 30 \text{ faces} \times (1 \text{ unit}^2) \\ &= 30 \text{ units}^2 \end{aligned}$$

of overlaps = 4

of faces that disappear = 2(4) = 8

$$\begin{aligned} \text{area of disappearing faces} &= 8 \times 1 \text{ units}^2 \\ &= 8 \text{ units}^2 \end{aligned}$$

$$\begin{aligned} \text{Total SA} &= 30 \text{ units}^2 - 8 \text{ units}^2 \\ &= 22 \text{ units}^2 \end{aligned}$$
4d) Area of a single face = 1 unit²

Of cubes = 5

Total number of faces = 6 x 5 = 30 faces

$$\begin{aligned} \text{Total Area of all cubes} &= 30 \text{ faces} \times (1 \text{ unit}^2) \\ &= 30 \text{ units}^2 \end{aligned}$$

of overlaps = 5

of faces that disappear = 2(5) = 10

$$\begin{aligned} \text{area of disappearing faces} &= 10 \times 1 \text{ units}^2 \\ &= 10 \text{ units}^2 \end{aligned}$$

$$\begin{aligned} \text{Total SA} &= 30 \text{ units}^2 - 10 \text{ units}^2 \\ &= 20 \text{ units}^2 \end{aligned}$$

Homework Solutions
Page 30 continued...

4e) Area of a single face = 1 unit^2

Of cubes = 5

Total number of faces = $6 \times 5 = 30$ faces

Total Area of all cubes = $30 \text{ faces} \times (1 \text{ unit}^2)$
= 30 units^2

of overlaps = 4

of faces that disappear = $2(4) = 8$

area of disappearing faces = $8 \times 1 \text{ units}^2$
= 8 units^2

Total SA = $30 \text{ units}^2 - 8 \text{ units}^2$
= 22 units^2

4f) Area of a single face = 1 unit^2

Of cubes = 6

Total number of faces = $6 \times 6 = 36$ faces

Total Area of all cubes = $36 \text{ faces} \times (1 \text{ unit}^2)$
= 36 units^2

of overlaps = 5

of faces that disappear = $2(5) = 10$

area of disappearing faces = $10 \times 1 \text{ units}^2$
= 10 units^2

Total SA = $36 \text{ units}^2 - 10 \text{ units}^2$
= 26 units^2

5i) Area of a single face = 1 unit^2

Of cubes = 5

Total number of faces = $6 \times 5 = 30$ faces

Total Area of all cubes = $30 \text{ faces} \times (1 \text{ unit}^2)$
= 30 units^2

of overlaps = 5

of faces that disappear = $2(5) = 10$

area of disappearing faces = $10 \times 1 \text{ units}^2$
= 10 units^2

Total SA = $30 \text{ units}^2 - 10 \text{ units}^2$
= 20 units^2

5ii) Area of a single face = 1 unit^2

Of cubes = 5

Total number of faces = $6 \times 5 = 30$ faces

Total Area of all cubes = $30 \text{ faces} \times (1 \text{ unit}^2)$
= 30 units^2

of overlaps = 5

of faces that disappear = $2(5) = 10$

area of disappearing faces = $10 \times 1 \text{ units}^2$
= 10 units^2

Total SA = $30 \text{ units}^2 - 10 \text{ units}^2$
= 20 units^2

Homework solutions cont...

5iii) Area of a single face = 1 unit^2

Of cubes = 5

Total number of faces = $6 \times 5 = 30$ faces

Total Area of all cubes = $30 \text{ faces} \times (1 \text{ unit}^2)$
 $= 30 \text{ units}^2$

of overlaps = 4

of faces that disappear = $2(4) = 8$

area of disappearing faces = $8 \times 1 \text{ units}^2$
 $= 8 \text{ units}^2$

Total SA = $30 \text{ units}^2 - 8 \text{ units}^2$
 $= 22 \text{ units}^2$