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UNIT 3: SQUARE ROOTS AND SURFACE AREA

SECTION 1.3: SURFACE AREAS OF OBJECTS MADE FROM RIGHT RECTANGULAR PRISMS

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MATH 9

WHAT'S THE POINT OF TODAY'S LESSON?

We will continue working on the Math 9 Specific Curriculum Outcome (SCO) "Shape and Space 2" OR "SS2" which states:

SS2: "Determine the surface area of composite 3-D objects to solve problems."

What does THAT mean???

SCO SS2 means that we will stack two or more 3-D objects (right rectangular prisms, right triangular prisms, right cylinders) on top of each other. We will find the area of each face (side) of each object then add them all up to find the total surface area of the object. We will also have to subtract any overlapping sides from the total.

You only need to remember 6 formulas in the surface area section of this unit which you already knew before grade 9:

1. **Area of a rectangle/square:**   **bh**

2. **Area of a triangle:** $\dfrac{bh}{2}$

3. **Area of a circle:** πr^2

4. **Circumference of a circle:** $2\pi r$ **OR** πd

5. **The Pythagorean Theorem:** $a^2 + b^2 = c^2$

6. **Surface Area of a Cylinder:** $2\pi r^2 + 2\pi rh$

Page 25: Investigate

Number of Cubes	Surface Area (square units)
1	6
2	10
3	14
4	18
5	22

What happens to the surface area each time you add a cube? +4

Why does the surface area change in this way?

+1 cube,
+1 overlap,
−2 sides

As page 26 states, there are 2 strategies for determining the surface area of the cube-a-links we've been working with:

1. Count the faces of all cubes (in other words, multiply the number of cubes by 6) and subtract 2 faces for every "overlap".

2. "6 views": count the faces visible from the top, bottom, front, back, left, and right of the object.

Page 27: Example 1

Example 1

Determine the surface area of this composite object.
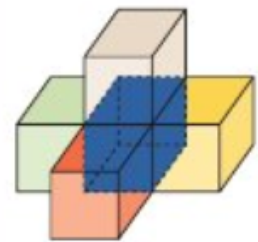Each cube has edge length 2 cm.

$$SA = (5 \text{ cubes} \times 6 \text{ sides each} \times bh)$$
$$- (4 \text{ overlaps} \times 2 \text{ sides each} \times bh)$$
$$= (5 \times 6 \times 2 \times 2) - (4 \times 2 \times 2 \times 2)$$
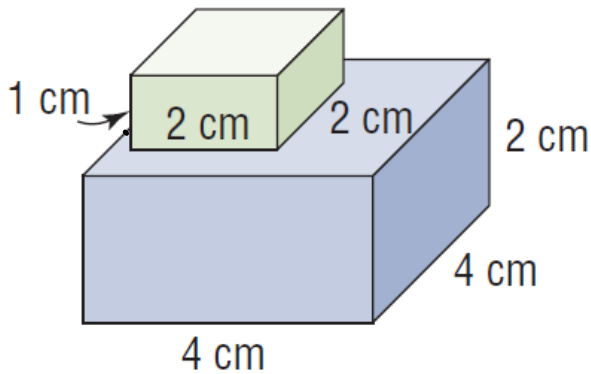$$= 120 - 32$$
$$= 88 \text{ cm}^2$$
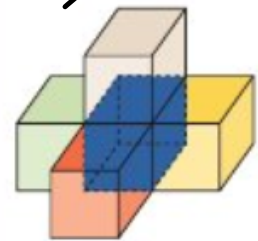
Page 27: Example 1

Example 1

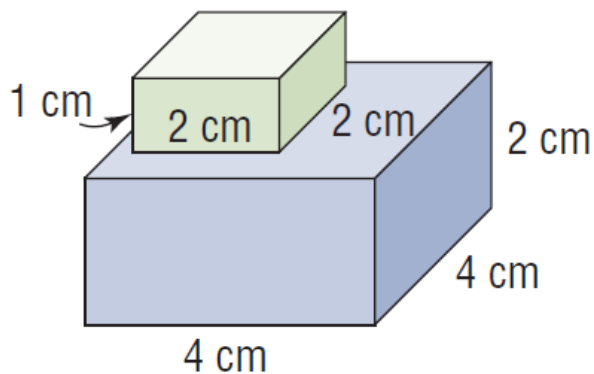Determine the surface area of this composite object.
Each cube has edge length 2 cm.

TOP:　　4
BOTTOM:　　4
FRONT:　　4
BACK:　　4
LEFT:　　3
RIGHT:　$\underline{+3}$
　　　　$\overline{22}$ visible faces

$SA = 22\,bh$
$\quad = 22(2)(2)$
$\quad = 88\,cm^2$

EXAMPLE - 2 Objects:

1 cm   2 cm   2 cm   2 cm
4 cm
4 cm

$$SA = (\text{Green} + \text{Blue}) - \text{Overlap}$$

$$= \left[(T/B + F/B/L/R) + (T/B + F/B/L/R) \right]$$

$$- 2B \text{ of Green}$$

$$= \left[(2bh + 4bh) + (2bh + 4bh) \right] - 2bh$$

$$= \left[2(2)(2) + 4(2)(1) + 2(4)(4) + 4(4)(2) \right]$$

$$- 2(2)(2)$$

$$= \left[(8 + 8) + (32 + 32) \right] - 8$$

$$= (16 + 64) - 8$$

$$= 80 - 8$$

$$= 72 \text{ cm}^2$$

EXAMPLE - 2 Objects:

1 cm
2 cm   2 cm   2 cm
4 cm
4 cm

$$SA = \text{Green} + \text{Blue}$$
$$= (F|B|L|R) + (T|B + F|B|L|R)$$
$$= (4bh) + (2bh + 4bh)$$
$$= [4(2)(1)] + [2(4)(4) + 4(4)(2)]$$
$$= (8) + (32 + 32)$$
$$= 8 + 64$$
$$= 72 \, cm^2$$

EXAMPLE - 3 Objects:

2.5 cm

5.5 cm

4.5 cm

2.5 cm

3.5 cm

6.5 cm

5.5 cm

3.5 cm

1.5 cm
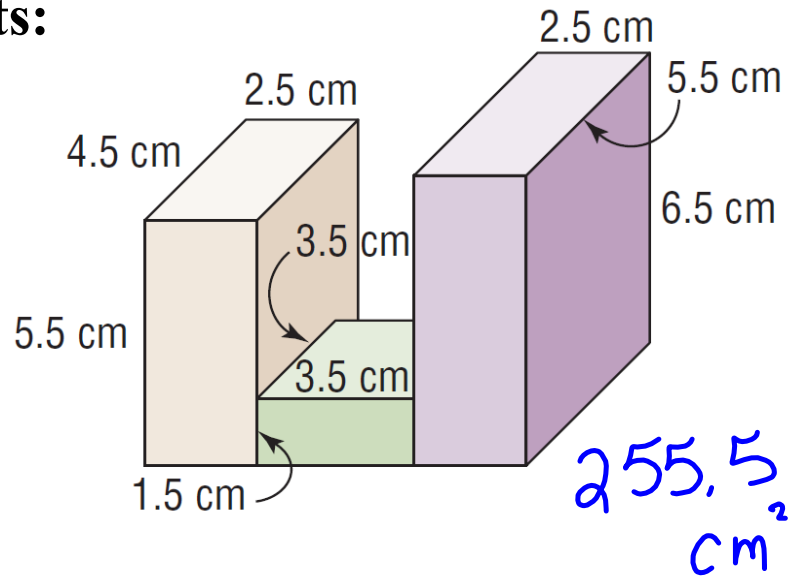
255.5 cm^2

$$SA = Beige + Green + Purple$$

$$= (T|B + F|B + L|R) + (T|B) + (T|B + F|B + L|R)$$

$$= (2bh + 2bh + 2bh) + (2bh) + (2bh + 2bh + 2bh)$$

$$= [2(4.5)(2.5) + 2(2.5)(5.5) + 2(4.5)(5.5)]$$
$$+ [2(3.5)(3.5)] +$$
$$[2(5.5)(2.5) + 2(2.5)(6.5) + 2(5.5)(6.5)]$$

$$= (22.5 + 27.5 + 49.5) + (24.5) + (27.5 + 32.5 + 71.5)$$

$$= 99.5 + 24.5 + 131.5$$

$$= 255.5 \, cm^2$$

CONCEPT REINFORCEMENT:

MMS9
PAGE 30:   #6
PAGE 31:   #8ab

THERE WILL BE A HOMEWORK CHECK TOMORROW (THURS., NOV. 19) FOR PD 3 AND MON., NOV. 23 FOR PDS 4 AND 6!!!