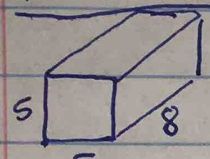
HM3 - Surface Area Day 1 : 1-8

① 

$SA = LA + 2 \cdot \text{Area of Base}$

$SA = P \cdot h + 2 \cdot l \cdot w$

$SA = (5+5+5+5)(8) + 2(5 \cdot 5)$

$SA = 20 \cdot 8 + 2 \cdot 25$

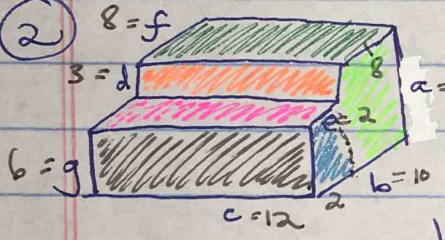
$SA = 160 + 50$

$SA = 210\ cm^2$

2 squares, 4 rectangles

- 2 squares: $2(l \cdot w)$ → $2(5 \cdot 5)$ → 50
- 4 rectangles: $4(l \cdot w)$ → $4(5 \cdot 8)$ → 160

$50 + 160 = 210\ cm^2$

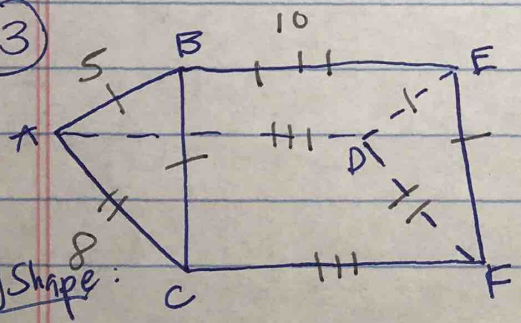
② 

★ you don't need a formula for this one.... just find the area of each piece (don't forget to do the bottom & the other sides that we can't see!)

$(6 \cdot 12) + (12 \cdot 2) + (3 \cdot 12) + (8 \cdot 12) + (2 \cdot 6) + (8 \cdot 9) + (12 \cdot 10) + (9 \cdot 12) + (2 \cdot 6) + (8 \cdot 9)$

(12·10): bottom; (9·12): back; (2·6): other side (light blue); (8·9): other side (light green)

$= 624\ units^2$

③ 

Formulas:

$SA = LA + 2 \cdot \text{Area of Base}$

$SA = P \cdot h + 2(\frac{1}{2} \cdot b \cdot h)$

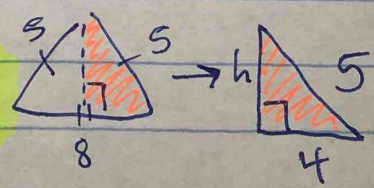
$SA = (5+5+8)(10) + 2(\frac{1}{2} \cdot 8 \cdot h)$

Shape by Shape:

2 triangles, 3 rectangles:

- 2 △s: $2 \cdot \frac{1}{2} \cdot b \cdot h$ → $2 \cdot \frac{1}{2} \cdot 8 \cdot 3 = 24$
- 3 rectangles: $2(5 \cdot 10) + (8 \cdot 10)$ → $100 + 80 = 180$

★ find height:



$h^2 + 4^2 = 5^2$

$h^2 = 9$

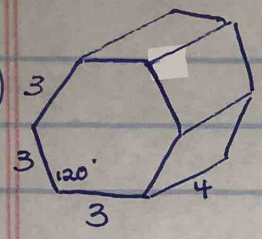
$h = 3$

$SA = (18)(10) + 2 \cdot (\frac{1}{2} \cdot 8 \cdot 3)$

$SA = 180 + 24$

$SA = 204\ units^2$

(4)



Shape by Shape: two hexagons
6 rectangles

• two hexagons:

$2 \cdot 6 \cdot \frac{1}{2} \cdot 3 \cdot \frac{3\sqrt{3}}{2}$

$18 \cdot \frac{3\sqrt{3}}{2}$

$\frac{54\sqrt{3}}{2}$

$27\sqrt{3}$

• 6 rectangles:

$6 \cdot 3 \cdot 4$

72

$SA = 27\sqrt{3} + 72$ units^2

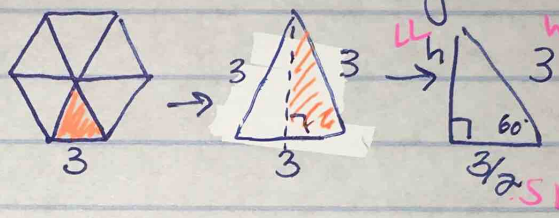
Formulas

$SA = LA + 2 \cdot$ Area of Base

$SA =$ Perimeter $\cdot$ Height $+ 2 \cdot$ Area of Base

$SA = (3 \cdot 6)(4) + 2$ (★need area of hexagon★)

→ area of hexagon: look at the triangles within the hexagon



$h = \frac{3}{2} \cdot \sqrt{3}$

$h = \frac{3\sqrt{3}}{2}$

★note that there are 6 triangles within the hexagon★

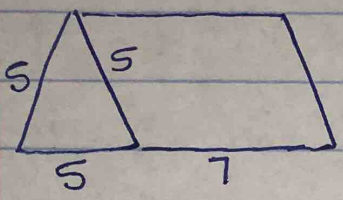
Formulas continued:

$SA = 72 + 2 \cdot 6 \cdot \frac{1}{2} \cdot 3 \cdot \frac{3\sqrt{3}}{2}$

$SA = 72 + 27\sqrt{3}$ units^2

Triangular prism

(5)



Shape by Shape: 2 △s, 3 □s

- 2 △s: $2 \cdot \frac{1}{2} \cdot 5 \cdot h$ → $2 \cdot \frac{1}{2} \cdot 5 \cdot \frac{5\sqrt{3}}{2}$

$\frac{25\sqrt{3}}{2}$

- 3 □s: $3 \cdot 5 \cdot 7$

105

$SA = 105 + \frac{25\sqrt{3}}{2}$ units^2

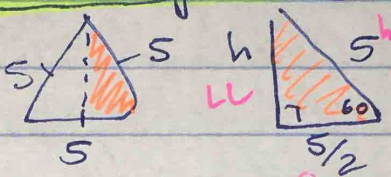
Formulas

$SA = LA + 2 \cdot$ Area of Base

$SA =$ Perimeter $\cdot$ Height $+ 2(\frac{1}{2} \cdot b \cdot h)$

$SA = (5+5+5)(7) + 2(\frac{1}{2} \cdot 5 \cdot h)$

find height of △:



$h = \frac{5}{2} \cdot \sqrt{3}$

$h = \frac{5\sqrt{3}}{2}$

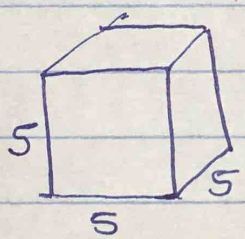
Formulas continued:

$SA = (15)(7) + 2(\frac{1}{2} \cdot 5 \cdot \frac{5\sqrt{3}}{2})$

$SA = 105 + \frac{25\sqrt{3}}{2}$ units^2

→ ~126.65 units^2

Cube:



Shape by Shape:

6 squares

$6(5 \cdot 5)$

$SA = 150$ units^2

Formulas: $SA = LA + 2 \cdot$ Area of Base

$SA = P \cdot h + 2 \cdot$ Area of Base

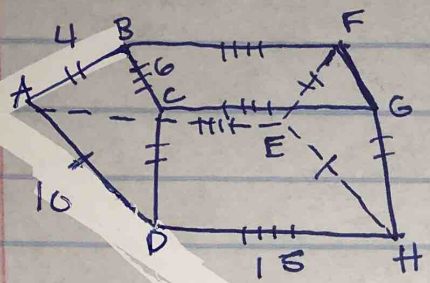
$SA = (5+5+5+5)5 + 2(5 \cdot 5)$

$SA = 150$ units^2

(a) the CUBE has more surface area!

(b) $150 - 126.65 \approx 23.35$ units^2

(6)



*only asks for LATERAL AREA so you don't need the area of the trapezoid bases!

Shape by shape

4 □s *not all the same size!

- $2(15 \cdot 4) = 120$
- $6 \cdot 15 = 90$
- $10 \cdot 15 = 150$

$120 + 90 + 150 = 360 \text{ units}^2$

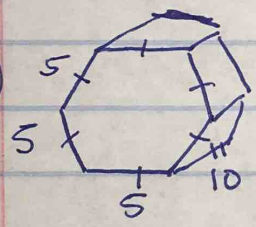
Formulas

LA = Perimeter of Base · Height

$LA = (4+6+4+10) \cdot 15$

$LA = 360 \text{ units}^2$

(7)



*only asks for LATERAL AREA so you don't need the area of the hexagon bases!

Shape by shape

6 rectangles

$6(10 \cdot 5)$

300 units^2

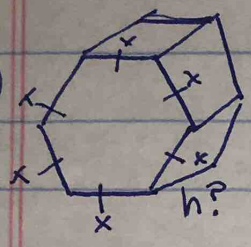
Formulas

LA = Perimeter of Base · Height

$LA = (5 \cdot 6) \cdot 10$

$LA = 300 \text{ units}^2$

(8)

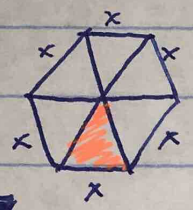


BASE AREA = $24\sqrt{3}$ cm^2

LATERAL AREA = 120 cm^2

* find h *

we can use the area of the hexagon to find the side lengths of the hexagon



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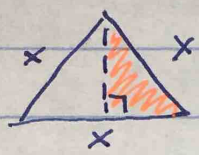

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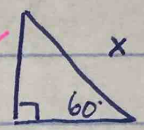

$LL = SL \cdot \sqrt{3}$

height of $\triangle$: $\frac{x\sqrt{3}}{2}$

the area of the hexagon is based on the area of 6 triangles within it!

$$24\sqrt{3} = 6 \cdot \frac{1}{2} \cdot \text{base} \cdot \text{height}$$

$$24\sqrt{3} = 6 \cdot \frac{1}{2} \cdot x \cdot \frac{x\sqrt{3}}{2}$$

$$24\sqrt{3} = 3 \cdot x \cdot \frac{x\sqrt{3}}{2}$$

$$8\sqrt{3} = \frac{x^2\sqrt{3}}{2}$$

$$16\sqrt{3} = x^2\sqrt{3}$$

$$16 = x^2$$

$$4 = x$$ ← length of each side of the hexagon!

Lateral Area = Perimeter of Base · Height

$$120 = (6 \cdot 4) \cdot h$$

$$120 = 24h$$

$$5 = h$$

height = 5 units