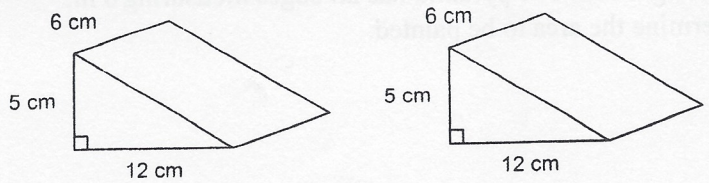
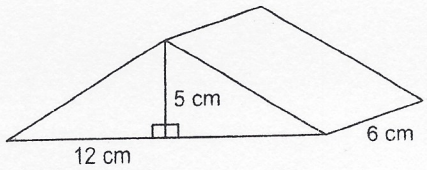
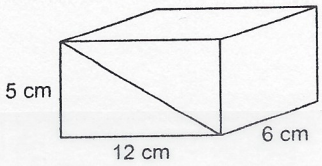
3. These two identical triangular prisms are joined in 3 different ways as shown. Determine the surface area of each object formed.



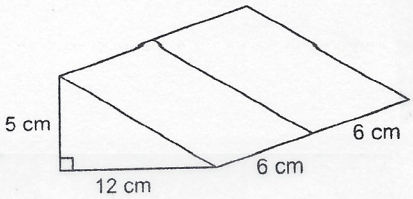

a)



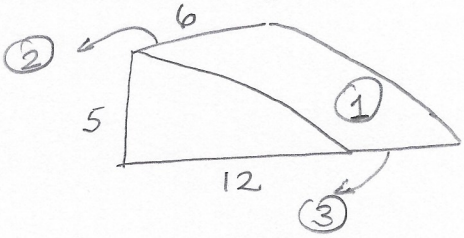

b)




c)




First, Let's get the area of the Ramp itself:

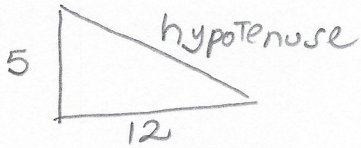



$$\text{Area of Triangles} = 2 \times \frac{(b \times h)}{2}$$

$$= 2 \times \frac{(12\text{ cm} \times 5\text{ cm})}{2}$$

$$\text{Area of Triangles} = 60\text{ cm}^2$$

Use the Pythagoream theorem to find the missing length

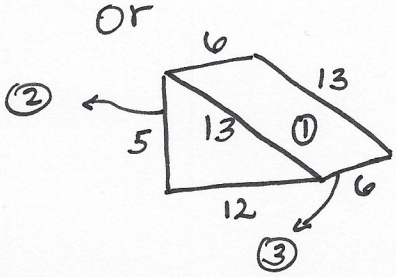



$$\text{hypotenuse}^2 = (5)^2 + (12)^2$$

$$h = \sqrt{25 + 144}$$

$$h = \sqrt{169}, \text{ so } h = 13$$

or




$$\text{Area of Rectangle 1} = 6\text{ cm} \times 13\text{ cm} = 78\text{ cm}^2$$

$$\text{Area of Rectangle 2} = 6\text{ cm} \times 5\text{ cm} = 30\text{ cm}^2$$

$$\text{Area of Rectangle 3} = 12\text{ cm} \times 6\text{ cm} = 72\text{ cm}^2$$

$$\text{Total area of Rectangles} = (78 + 30 + 72)\text{ cm}^2 = 180\text{ cm}^2$$

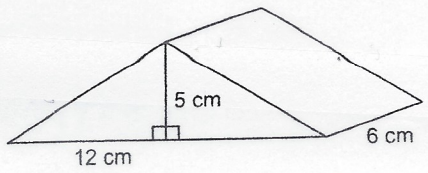
So,

TOTAL AREA = AREA OF TRIANGLES + AREA OF RECTANGLES

$= 60\ cm^2 + 180\ cm^2$

$= 240\ cm^2$

a)




the overlap here is Rectangle # 2

$S_A$ Rectangle # 2 = (5 cm x 6 cm) = 30 $cm^2$

SO: Total overlap = (30 $cm^2$ x 2) = 60 $cm^2$

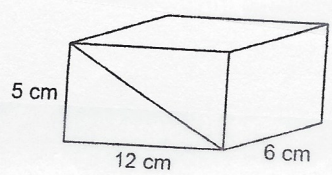
Because the Ramps are identical:

$S_A$ = $S_A$ Ramp 1 + $S_A$ Ramp 2 − overlap

$S_A = 240\ cm^2 + 240\ cm^2 - 60\ cm^2$

$S_A = 480\ cm^2 - 60\ cm^2 = 420\ cm^2$

b)




the overlap here is Rectangle # 1

$S_A$ Rectangle # 1 = 6 cm x 13 cm = 78 $cm^2$

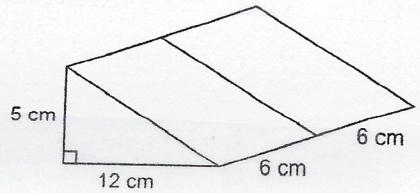
total overlap = 78 $cm^2$ x 2 = 156 $cm^2$

$S_A$ = $S_A$ Ramp 1 + $S_A$ Ramp 2 − overlap

$= 240\ cm^2 + 240\ cm^2 - 156\ cm^2$

$S_A = 480\ cm^2 - 156\ cm^2 = 324\ cm^2$

c)




The overlap here is: one of the triangles

Total overlap: $2 \times \frac{(b \times h)}{2} = 60\ cm^2$

$S_A = 480\ cm^2 - 60\ cm^2 = 420\ cm^2$