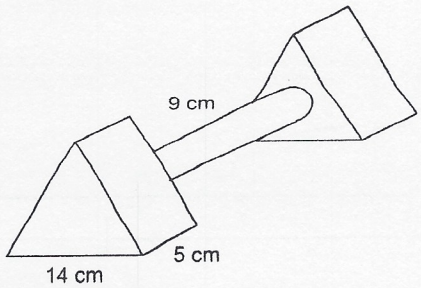
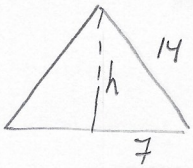
4. Two identical equilateral triangular prisms are joined by a cylinder as shown.
The equilateral triangle has side length 14 cm and the rectangular sides have length 5 cm.
The cylinder has diameter 5 cm and length 9 cm.
Determine the surface area of the composite object, to the nearest square centimetre.
Show your work.



EACH TRIANGULAR PRISM:

2 TRIANGLES + 3 RECTANGLES

AREA OF TRIANGULAR PRISMS:

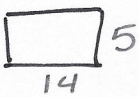


To get the height, use the pythagorean Theorem:

$$\text{height} = \sqrt{(14)^2 - (7)^2} = \sqrt{196-49} = \sqrt{147} = 12.12 \text{ cm}$$

- AREA OF TRIANGLES:

$$S_{A\,2\triangle} = \left(\frac{b \times h}{2}\right) \times 2 = \left(\frac{14 \text{ cm} \times 12.12 \text{ cm}}{2}\right) 2 = 169.74 \text{ cm}^2$$

- AREA OF RECTANGLES
  - EACH RECTANGLE IS  (BECAUSE THE TRIANGLES ARE EQUILATERAL, THE 3 RECTANGLES ARE EQUAL)

$$S_{A\,3\,▭} = (b \times h) \times 3 = (5\text{cm} \times 14 \text{ cm}) \times 3 = (70 \text{ cm}^2) \times 3 = 210 \text{ cm}^2$$

AREA OF 1 TRIANGULAR PRISM = $169.74 \text{ cm}^2 + 210 \text{ cm}^2 = 379.74 \text{ cm}^2$

AREA OF cylinder: ($d = 5$ cm; $r = 2.5$ cm; $h = 9$ cm)

$$S_A = 2\pi r^2 + (2\pi r \times \text{height})$$
$$= 2\pi(2.5)^2 + (2\pi(2.5) \times 9) = 39.27 \text{ cm}^2 + 141.37 \text{ cm}^2$$

$S_{A\,\text{cylinder}} = 180.64 \text{ cm}^2$

AREA OF CIRCLE = $\pi \times r^2$

- THERE ARE 2 OVERLAPS. EACH OVERLAP IS A CIRCLE. SO:

Overlaps = (2 × area of circle) × 2 → there are 2 overlaps

↳ each overlap multiplied by 2

$$= (2 \times \pi r^2) \times 2$$
$$= (2 \times \pi \times 2.5^2) \times 2$$
$$= 78.54 \text{ cm}^2$$

SO:

S_A of Composite figure : AREA OF 2 TRIangular PRISMS + AREA OF Cylinder - Overlaps

$$S_A = 2\times(379.74\ cm^2) + 180.64\ cm^2 - 78\ cm^2$$

$$S_A = 759.48\ cm^2 + 180.64\ cm^2 - 78\ cm^2$$

$$S_A = 940.12\ cm^2 - 78\ cm^2 = \underbrace{862.12\ cm^2}$$