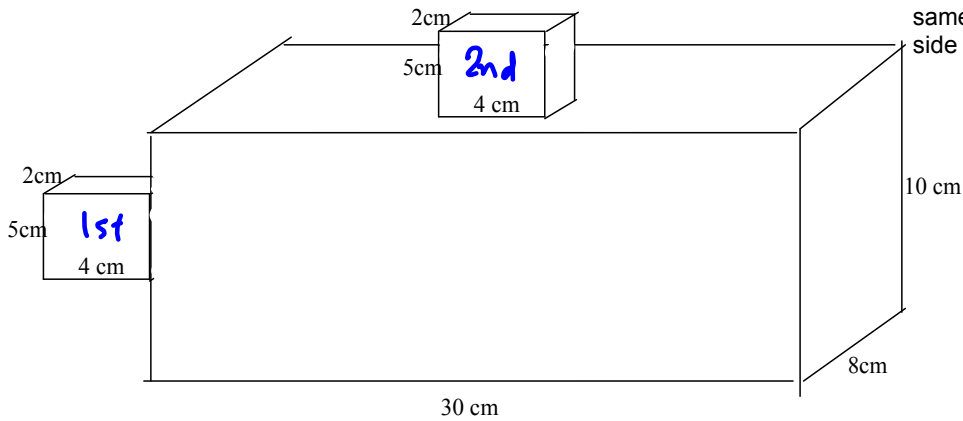




Oct 30, 2011
Warm Up Grade 9



Find the Surface Area of Composite Objects.



hint the side shape is the same dimension as the side prism

First overlapped area $(5)(2)(2) = 20\text{cm}^2$

second overlapped area $(4)(2)(2) = 16\text{cm}^2$

Small Prism

$$5 \times 4 \times 2$$

$$\begin{array}{l} 5 \times 4 \\ 5 \times 2 \\ 4 \times 2 \end{array}$$

$$\begin{aligned} \text{S.A.} &= (5)(4)(2) + (5)(2)(2) + 4(2)(2) \\ &= 40 + 20 + 16 \\ &= 76\text{cm}^2 \end{aligned}$$

$$\begin{aligned} \text{S.A.} \times 2 &= 76 \times 2 \\ &= 152\text{cm}^2 \end{aligned}$$

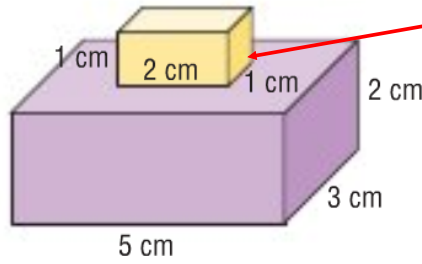
Large Prism

$$\begin{aligned} \text{S.A.} &= (30)(8)(2) + (30)(10)(2) + (8)(10)(2) \\ 30 \times 8 \times 10 & \\ &= 480 + 600 + 160 \\ &= 1240\text{cm}^2 \end{aligned}$$

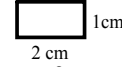
$$\begin{aligned} \text{S.A. total} &= 1240 + 152 - 20 - 16 \\ &= 1356\text{cm}^2 \end{aligned}$$

Homework Solutions
Page 31

8 a)



Overlapped Faces
2 face involved

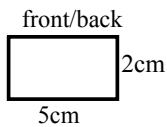


$$\begin{aligned} \text{Area of one face} &= 2\text{cm} \times 1\text{cm} \\ &= 2\text{cm}^2 \end{aligned}$$

BUT 2 faces involved for each overlap
THUS must multiply by 2 to get total overlapped area

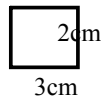
$$\begin{aligned} \text{Area of overlap} &= 2(2\text{cm}^2) \\ &= 4\text{cm}^2 \end{aligned}$$

BIG Prism (if alone)



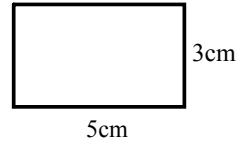
$$\begin{aligned} A &= l \times w \\ &= 5\text{cm} \times 2\text{cm} \\ &= 10\text{cm}^2 \end{aligned}$$

side/side



$$\begin{aligned} A &= l \times w \\ &= 3\text{cm} \times 2\text{cm} \\ &= 6\text{cm}^2 \end{aligned}$$

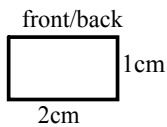
top/bottom



$$\begin{aligned} A &= l \times w \\ &= 3\text{cm} \times 5\text{cm} \\ &= 15\text{cm}^2 \end{aligned}$$

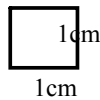
$$\begin{aligned} \text{Total SA of BIG} &= 2(10\text{cm}^2) + 2(6\text{cm}^2) + 2(15\text{cm}^2) \\ &= 20\text{cm}^2 + 12\text{cm}^2 + 30\text{cm}^2 \\ &= 62\text{cm}^2 \end{aligned}$$

Small Prism (if alone)



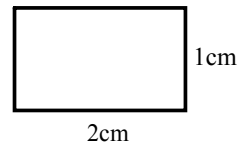
$$\begin{aligned} A &= l \times w \\ &= 2\text{cm} \times 1\text{cm} \\ &= 2\text{cm}^2 \end{aligned}$$

side/side



$$\begin{aligned} A &= l \times w \\ &= 1\text{cm} \times 1\text{cm} \\ &= 1\text{cm}^2 \end{aligned}$$

top/bottom



$$\begin{aligned} A &= l \times w \\ &= 2\text{cm} \times 1\text{cm} \\ &= 2\text{cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Total SA of Small} &= 2(2\text{cm}^2) + 2(1\text{cm}^2) + 2(2\text{cm}^2) \\ &= 4\text{cm}^2 + 2\text{cm}^2 + 4\text{cm}^2 \\ &= 10\text{cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Surface area of object} &= \text{Big area} + \text{Small area} - \text{overlap area} \\ &= 62\text{cm}^2 + 10\text{cm}^2 - 4\text{cm}^2 \\ &= 68\text{cm}^2 \end{aligned}$$

Homework Solutions
Page 31

8b)

Overlapped Faces
2 face involved

Area of one face = $2\text{ cm} \times 2\text{ cm}$
 $= 4\text{ cm}^2$

BUT 2 faces involved for each overlap
THUS must multiply by 2 to get total overlapped area

Area of overlap = $2(4\text{ cm}^2)$
 $= 8\text{ cm}^2$

Overlapped Faces
2 face involved

Area of one face = $4\text{ cm} \times 3\text{ cm}$
 $= 12\text{ cm}^2$

2 faces involved for each overlap
THUS must multiply by 2 to get total overlap

Area of overlap = $2(12\text{ cm}^2)$
 $= 24\text{ cm}^2$

Overlapped Faces
2 face involved

Area of one face = $2\text{ cm} \times 2\text{ cm}$
 $= 4\text{ cm}^2$

BUT 2 faces involved for each overlap
THUS must multiply by 2 to get total overlapped area

Area of overlap = $2(4\text{ cm}^2)$
 $= 8\text{ cm}^2$

THEN
sum of overlap area = $24\text{ cm}^2 + 8\text{ cm}^2$
 $= 32\text{ cm}^2$

BIG Prism (if alone) BLUE

<p>front/back</p> <p>6cm</p> <p>$A = l \times w$ $= 6\text{ cm} \times 3\text{ cm}$ $= 18\text{ cm}^2$</p>	<p>side/side</p> <p>3cm</p> <p>4cm</p> <p>$A = l \times w$ $= 3\text{ cm} \times 4\text{ cm}$ $= 12\text{ cm}^2$</p>	<p>top/bottom</p> <p>6cm</p> <p>4cm</p> <p>$A = l \times w$ $= 6\text{ cm} \times 4\text{ cm}$ $= 24\text{ cm}^2$</p>
---	---	--

Total SA of BIG = $2(18\text{ cm}^2) + 2(12\text{ cm}^2) + 2(24\text{ cm}^2)$
 $= 36\text{ cm}^2 + 24\text{ cm}^2 + 48\text{ cm}^2$
 $= 108\text{ cm}^2$

Middle Prism (if alone) Purple

<p>front/back</p> <p>4cm</p> <p>2cm</p> <p>$A = l \times w$ $= 4\text{ cm} \times 2\text{ cm}$ $= 8\text{ cm}^2$</p>	<p>side/side</p> <p>2cm</p> <p>3cm</p> <p>$A = l \times w$ $= 3\text{ cm} \times 2\text{ cm}$ $= 6\text{ cm}^2$</p>	<p>top/bottom</p> <p>4cm</p> <p>3cm</p> <p>$A = l \times w$ $= 3\text{ cm} \times 4\text{ cm}$ $= 12\text{ cm}^2$</p>
---	--	--

Total SA of Middle = $2(8\text{ cm}^2) + 2(6\text{ cm}^2) + 2(12\text{ cm}^2)$
 $= 16\text{ cm}^2 + 12\text{ cm}^2 + 24\text{ cm}^2$
 $= 52\text{ cm}^2$

Green

Small Prism (if alone)

<p>front/back</p> <p>2cm</p> <p>1cm</p> <p>$A = l \times w$ $= 2\text{ cm} \times 1\text{ cm}$ $= 2\text{ cm}^2$</p>	<p>side/side</p> <p>1cm</p> <p>2cm</p> <p>$A = l \times w$ $= 1\text{ cm} \times 2\text{ cm}$ $= 2\text{ cm}^2$</p>	<p>top/bottom</p> <p>2cm</p> <p>2cm</p> <p>$A = l \times w$ $= 2\text{ cm} \times 2\text{ cm}$ $= 4\text{ cm}^2$</p>
---	--	---

Total SA of small = $2(2\text{ cm}^2) + 2(2\text{ cm}^2) + 2(4\text{ cm}^2)$
 $= 4\text{ cm}^2 + 4\text{ cm}^2 + 8\text{ cm}^2$
 $= 16\text{ cm}^2$

Surface area of object = Big area + Middle area + Small area - overlap area
 $= 108\text{ cm}^2 + 52\text{ cm}^2 + 16\text{ cm}^2 - 32\text{ cm}^2$
 $= 144\text{ cm}^2$

Homework Solutions
Page 31

8)

Overlapped Faces
2 face involved

Area of one face = $3.5\text{cm} \times 1.5\text{cm}$
 $= 5.25\text{cm}^2$

BUT 2 faces involved for each overlap
THUS must multiply by 2 to get total overlapped area

Area of overlap = $2(5.25\text{cm}^2)$
 $= 10.5\text{cm}^2$

Overlapped Faces
2 face involved

Area of one face = $3.5\text{cm} \times 1.5\text{cm}$
 $= 5.25\text{cm}^2$

2 faces involved for each overlap
THUS must multiply by 2 to get total overlap

Area of overlap = $2(5.25\text{cm}^2)$
 $= 10.5\text{cm}^2$

THEN
sum of overlap area = $10.5\text{cm}^2 + 10.5\text{cm}^2$
 $= 21\text{cm}^2$

Brown Prism (if alone) brown

<p>front/back</p> <p>$A = l \times w$ $= 2.5\text{cm} \times 5.5\text{cm}$ $= 13.75\text{cm}^2$</p>	<p>side/side</p> <p>$A = l \times w$ $= 5.5\text{cm} \times 4.5\text{cm}$ $= 24.75\text{cm}^2$</p>	<p>top/bottom</p> <p>$A = l \times w$ $= 2.5\text{cm} \times 4.5\text{cm}$ $= 11.25\text{cm}^2$</p>
--	---	--

Total SA of Brown = $2(13.75\text{cm}^2) + 2(24.75\text{cm}^2) + 2(11.25\text{cm}^2)$
 $= 27.5\text{cm}^2 + 49.5\text{cm}^2 + 22.5\text{cm}^2$
 $= 99.5\text{cm}^2$

Middle Prism (if alone) green

<p>front/back</p> <p>$A = l \times w$ $= 3.5\text{cm} \times 1.5\text{cm}$ $= 5.25\text{cm}^2$</p>	<p>side/side</p> <p>$A = l \times w$ $= 3.5\text{cm} \times 1.5\text{cm}$ $= 5.25\text{cm}^2$</p>	<p>top/bottom</p> <p>$A = l \times w$ $= 3.5\text{cm} \times 3.5\text{cm}$ $= 12.25\text{cm}^2$</p>
---	--	--

Total SA of Middle = $2(5.25\text{cm}^2) + 2(5.25\text{cm}^2) + 2(12.25\text{cm}^2)$
 $= 10.5\text{cm}^2 + 10.5\text{cm}^2 + 24.5\text{cm}^2$
 $= 45.5\text{cm}^2$

Purple Prism (if alone)

<p>front/back</p> <p>$A = l \times w$ $= 2.5\text{cm} \times 6.5\text{cm}$ $= 16.25\text{cm}^2$</p>	<p>side/side</p> <p>$A = l \times w$ $= 5.5\text{cm} \times 6.5\text{cm}$ $= 35.75\text{cm}^2$</p>	<p>top/bottom</p> <p>$A = l \times w$ $= 2.5\text{cm} \times 5.5\text{cm}$ $= 13.75\text{cm}^2$</p>
--	---	--

Total SA of purple = $2(16.25\text{cm}^2) + 2(35.75\text{cm}^2) + 2(13.75\text{cm}^2)$
 $= 32.5\text{cm}^2 + 71.5\text{cm}^2 + 27.5\text{cm}^2$
 $= 131.5\text{cm}^2$

Surface area of object = Brown area + green area + purple area - overlap area
 $= 99.5\text{cm}^2 + 45.5\text{cm}^2 + 131.5\text{cm}^2 - 21\text{cm}^2$
 $= 255.5\text{cm}^2$



Practice page 31

Questions: 10 & 11

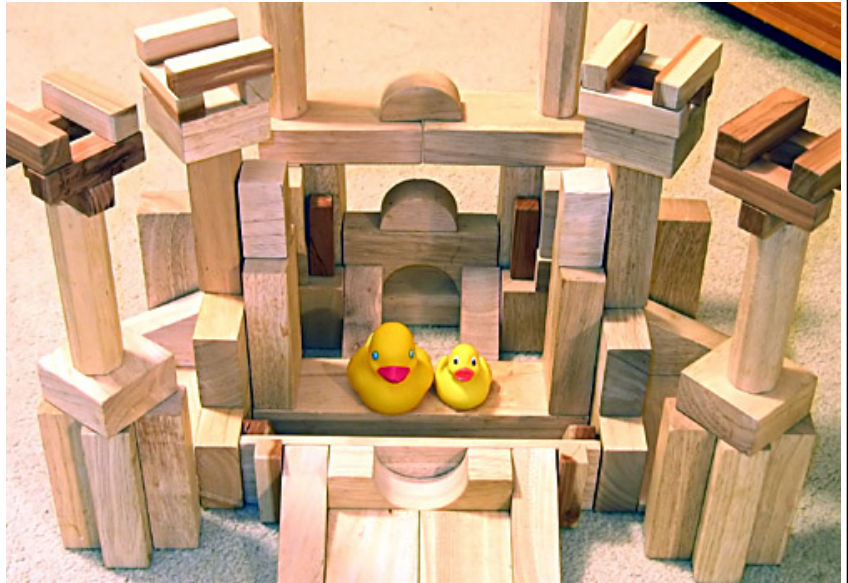
Move onto section 1.4



**Surface Area
Of Other
Composite Objects**



Surface area????



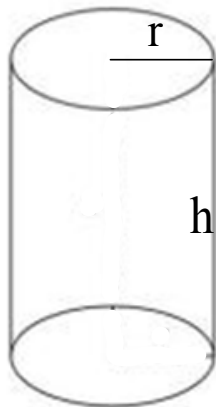
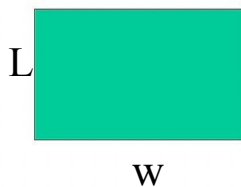
Other Composite Shapes

3-D shapes sitting on other 3-D shapes (This will cause an overlap meaning that the entire two or more shapes are not exposed to the surface)

Area of Shapes

Area of a Rectangle

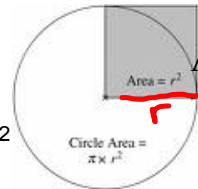
A = length x width



Area of a Circle

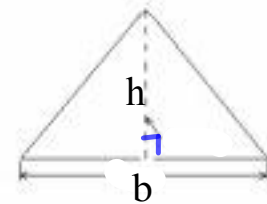
$$A = \pi r^2$$

$$= (3.14) (r)^2$$



Area of Triangle

$$A = \frac{(\text{base} \times \text{height})}{2}$$



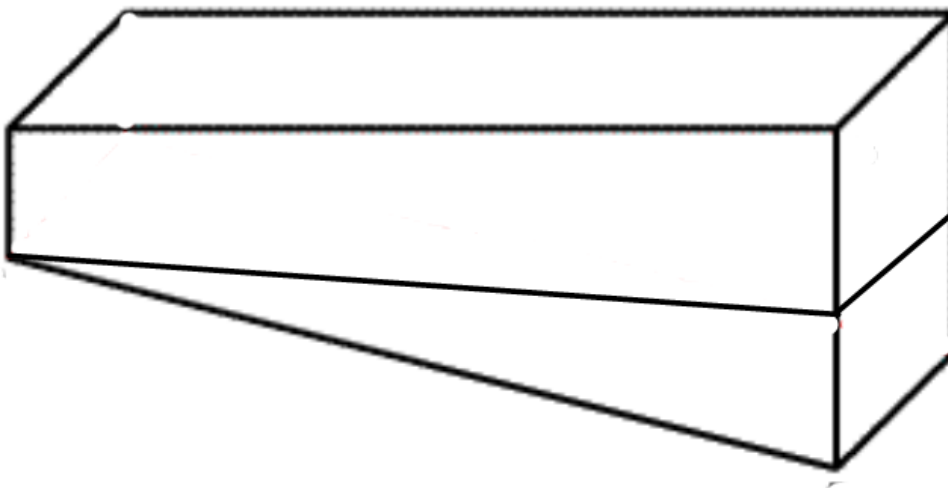
2 circles + rectangle

$$\text{Area of Cylinder} = 2\pi r^2 + 2\pi rh$$

$$= 2(3.14) (\text{---})^2 + 2(3.14) (\text{---}) (\text{---})$$

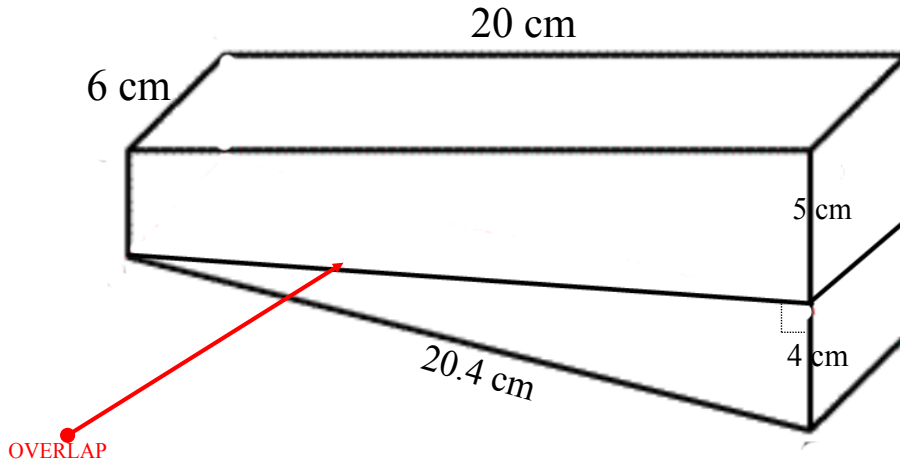
What is this "Composite Shape" made up of ?

Is there an overlap?



Calculate the surface area

Method 1)



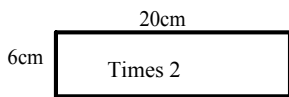
Step 1) Calculate the overlap area BUT remember 2 faces are involved

$$\begin{aligned}
 A &= 6 \text{ cm} \times 20 \text{ cm} \\
 &= 120 \text{ cm}^2 \\
 &\quad \underline{\quad \times 2 \quad} \\
 &= 240 \text{ cm}^2
 \end{aligned}$$

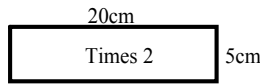
total overlap

Step 2) Calculate the Surface area of each Prism INDIVIDUALLY

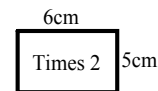
Rectangular prism (Surface)



$$\begin{aligned}
 A &= 6 \text{ cm} \times 20 \text{ cm} \\
 &= 120 \text{ cm}^2
 \end{aligned}$$



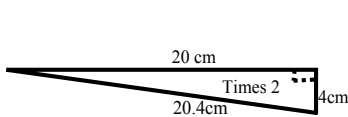
$$\begin{aligned}
 A &= 5 \text{ cm} \times 20 \text{ cm} \\
 &= 100 \text{ cm}^2
 \end{aligned}$$



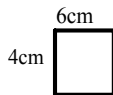
$$\begin{aligned}
 A &= 5 \text{ cm} \times 6 \text{ cm} \\
 &= 30 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of rectangular prims} &= 2(120) \text{ cm}^2 + 2(100 \text{ cm}^2) + 2(30 \text{ cm}^2) \\
 &= 240 \text{ cm}^2 + 200 \text{ cm}^2 + 60 \text{ cm}^2 \\
 &= 500 \text{ cm}^2
 \end{aligned}$$

Triangular Prism



$$\begin{aligned}
 A &= (20 \text{ cm} \times 4 \text{ cm}) / 2 \\
 &= (80 \text{ cm}^2) / 2 \\
 &= 40 \text{ cm}^2
 \end{aligned}$$



$$\begin{aligned}
 A &= 4 \text{ cm} \times 6 \text{ cm} \\
 &= 24 \text{ cm}^2
 \end{aligned}$$

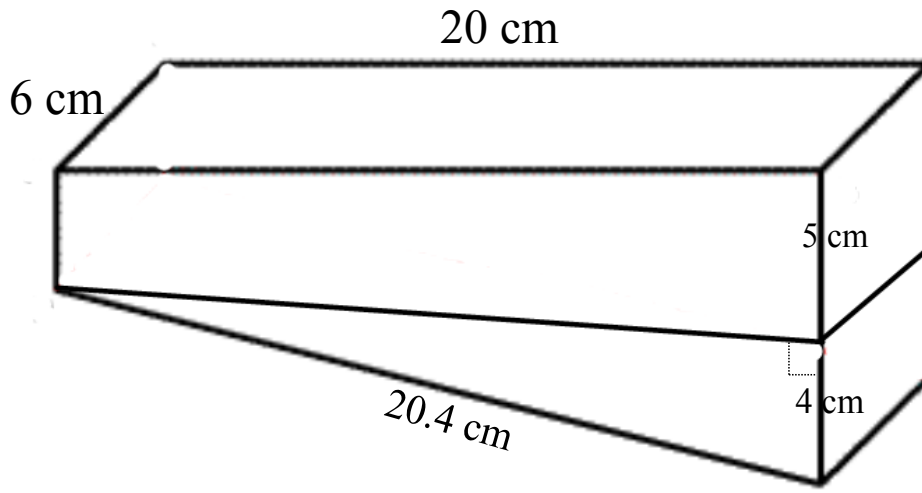


$$\begin{aligned}
 A &= 20.4 \text{ cm} \times 6 \text{ cm} \\
 &= 122.4 \text{ cm}^2
 \end{aligned}$$

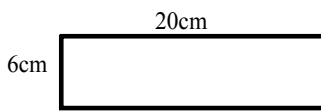
$$\begin{aligned}
 A &= 6 \text{ cm} \times 20 \text{ cm} \\
 &= 120 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of triangular prism} &= 2(40 \text{ cm}^2) + 24 \text{ cm}^2 + 122.4 \text{ cm}^2 + 120 \text{ cm}^2 \\
 &= 80 \text{ cm}^2 + 24 \text{ cm}^2 + 122.4 \text{ cm}^2 + 120 \text{ cm}^2 \\
 &= 346.4 \text{ cm}^2
 \end{aligned}$$

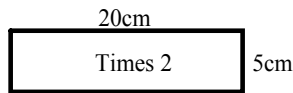
Calculate the surface area



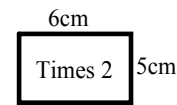
Rectangular prism (Surface exposed)



$$A = 6\text{cm} \times 20\text{cm} = 120\text{cm}^2$$



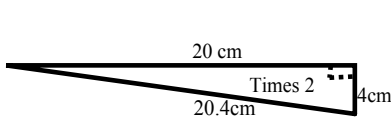
$$A = 5\text{cm} \times 20\text{cm} = 100\text{cm}^2$$



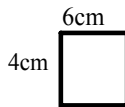
$$A = 5\text{cm} \times 6\text{cm} = 30\text{cm}^2$$

$$\begin{aligned} \text{Area of rectangular prims exposed} &= 120\text{cm}^2 + 2(100\text{cm}^2) + 2(30\text{cm}^2) \\ &= 120\text{cm}^2 + 200\text{cm}^2 + 60\text{cm}^2 \\ &= 380\text{cm}^2 \end{aligned}$$

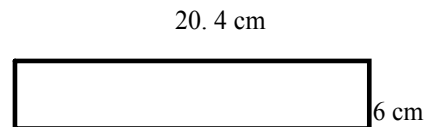
Triangular Prism (Surface Exposed)



$$\begin{aligned} A &= (20\text{cm} \times 4\text{cm}) / 2 \\ &= (80\text{cm}^2) / 2 \\ &= 40\text{cm}^2 \end{aligned}$$



$$A = 4\text{cm} \times 6\text{cm} = 24\text{cm}^2$$

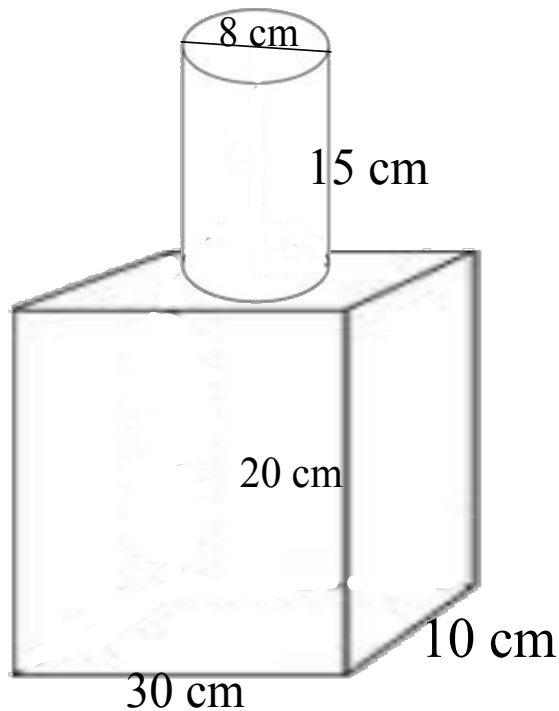


$$A = 20.4\text{cm} \times 6\text{cm} = 122.4\text{cm}^2$$

$$\begin{aligned} \text{Area of triangular prism exposed} &= 2(40\text{cm}^2) + 24\text{cm}^2 + 122.4\text{cm}^2 \\ &= 80\text{cm}^2 + 24\text{cm}^2 + 122.4\text{cm}^2 \\ &= 226.4\text{cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Total Surface Area} &= \text{Rectangular prism exposed} + \text{Triangular Prism Exposed} \\ &= (380\text{cm}^2) + 226.4\text{cm}^2 \\ &= 606.4\text{cm}^2 \end{aligned}$$

How much paint is needed to cover the following shape?



You try!!!

$$\begin{aligned}
 \text{Overlap} &= \pi r^2 \times 2 \\
 &= \pi (4)^2 \times 2 \\
 &= 32\pi \\
 &= 100.53 \text{ cm}^2
 \end{aligned}$$

Cylinder

$$\begin{aligned}
 S.A. &= 2\pi r^2 + 2\pi rh \\
 &= 2\pi (4)^2 + 2\pi (4)(15) \\
 &= 32\pi + 120\pi \\
 &= 152\pi \\
 &= 477.52 \text{ cm}^2
 \end{aligned}$$

Rectangular Prism

$$\begin{aligned}
 30 \times 20 \times 10 \\
 S.A. &= (30)(20)(2) + (20)(10)(2) + (30)(10) \\
 &= 1200 + 400 + 600 \\
 &= 2200 \text{ cm}^2
 \end{aligned}$$

Total Surface Area = $2200 + 152\pi - 32\pi$ ← overlap

$$= 2200 + 120\pi$$

$$= 2576.99$$

Class / Homework

Practice Page 40 - 43

Questions :

page 40

3a

3b

