

Surface Area

How to really paint your house...

Surface area is really nothing more than finding the area of figures... except this time the polygons will be on prisms, pyramids, cylinders and cones. There are two kinds, Total Surface Area, (TSA) and Lateral Surface Area.

Total Surface Area is the sum of the areas of the faces of a 3 dimensional figure. So like if you want to paint your house including all the walls, the roof, and under the house (Why you want to do this I don't know what's wrong with you?) you would need to find the total surface area before you went to the paint store... Check out this example...

Step 1. Draw out and label all the faces.

TSA = 24cm^2 L face $6\text{cm} + 24\text{cm}^2$ R Face $6\text{cm} + 48\text{cm}^2$ Front $6\text{cm} + 48\text{cm}^2$ Back $6\text{cm} + 32\text{cm}^2$ Top $4\text{cm} + 32\text{cm}^2$ bottom 8cm

Step 2. Find the area of each face.

Step 3. Add up the areas of the faces.

$$= 24\text{cm}^2 + 24\text{cm}^2 + 48\text{cm}^2 + 48\text{cm}^2 + 32\text{cm}^2 + 32\text{cm}^2 = 208\text{cm}^2 = \text{TSA}$$

Okay, so there are some things that you can assume. First, anything that looks like a rectangle is a rectangle unless it says otherwise. If you don't, the figures will be so overwhelmed with 90° boxes and dimension labels that you couldn't tell what was going on. Also, you can assume that the top and bottom of prisms are congruent unless marked otherwise (rare).

Lateral Surface Area is the total surface area except for the top and bottom. So, if you are more normal and want to paint just the walls outside your house (recommended) you would just need the lateral surface area. By the way, lateral means "side" or "to the side". Like a lateral in football, you throw the ball to the side. Here is an example...

Step 1. Draw out and label all the faces.

Lateral Surface Area = 24cm^2 L. Face $6\text{cm} + 24\text{cm}^2$ R. Face $6\text{cm} + 48\text{cm}^2$ Front $6\text{cm} + 48\text{cm}^2$ Back 6cm

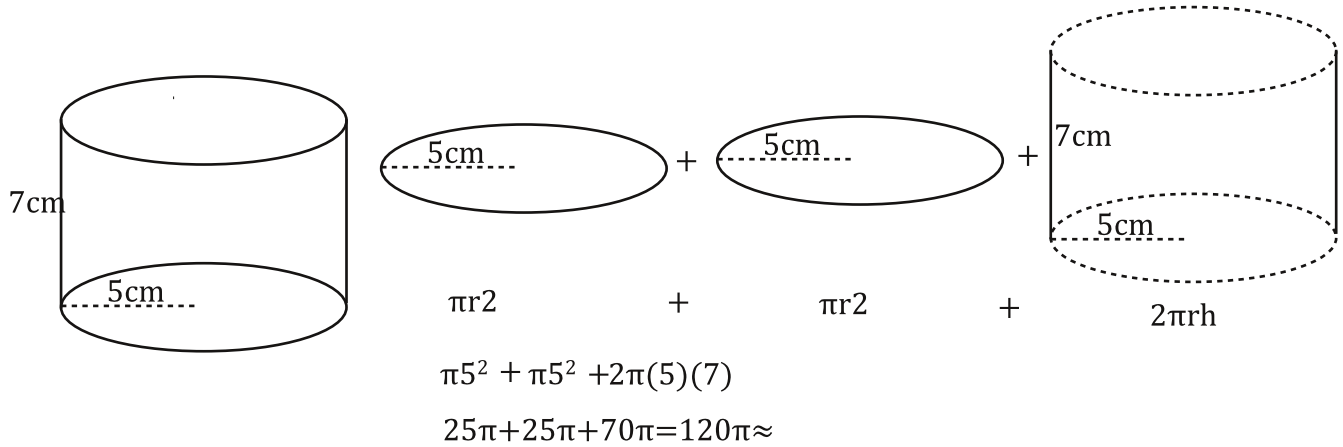
Step 2. Find the area of each face.

Step 3. Add up the areas of the faces.

$$= 24\text{cm}^2 + 24\text{cm}^2 + 48\text{cm}^2 + 48\text{cm}^2 = \text{Lateral Surface Area} = 144\text{cm}^2$$

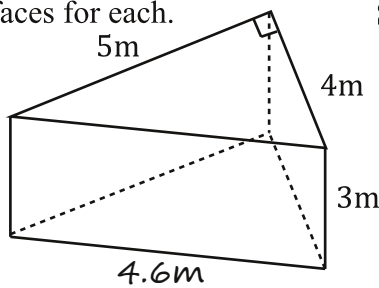
Notice the top and bottom are missing. This is Lateral Surface Area.

Now let's do a Cylinder... to find the "sides" of the cylinder you need to multiply the circumference by the height giving you πdh (or $2\pi rh$).



Despite the need to find and add multiple areas, finding surface areas is actually very easy...however a lot of people have trouble getting these consistently correct. Why? Two reasons... One, they have trouble finding missing dimensions... And two, they will often forget a face or two. So, before we get to actually calculating the TSA and Lateral Surface Area we will practice finding dimensions and drawing out all the faces. Look at these examples of how...

Find the missing dimensions and draw a picture of all the faces for each.



Step 1. Find the missing dimensions.

$$a^2 + b^2 = c^2$$

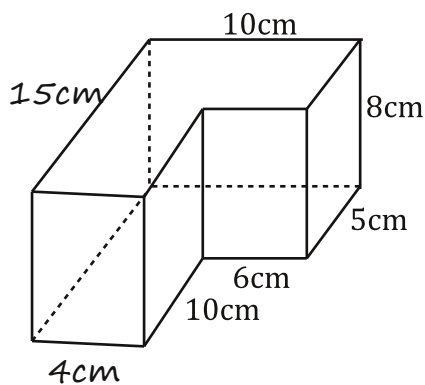
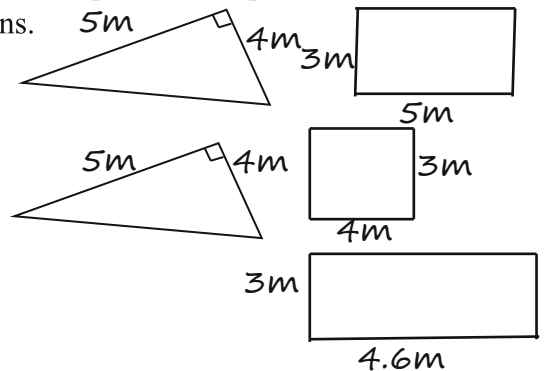
$$5^2 + 4^2 = c^2$$

$$25 + 16 = c^2$$

$$\sqrt{41} = \sqrt{c^2}$$

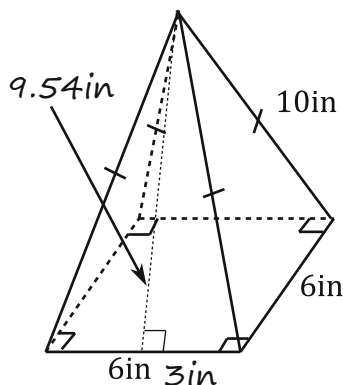
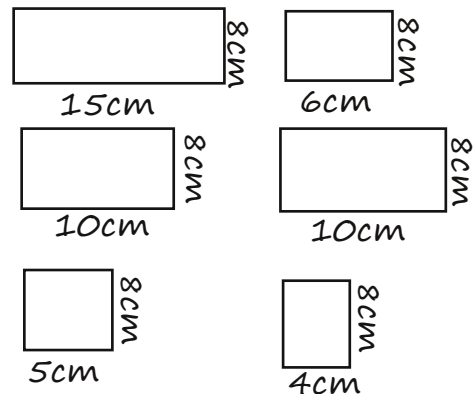
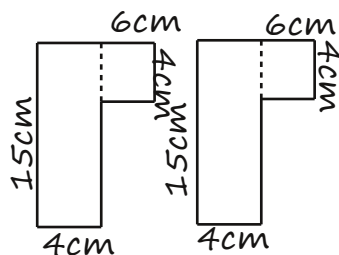
$$6.4 = c$$

Step 2. Draw a picture of each face.



$$10\text{cm} - 6\text{cm} = 4\text{cm}$$

$$10\text{cm} + 5\text{cm} = 15\text{cm}$$



$$a^2 + b^2 = c^2$$

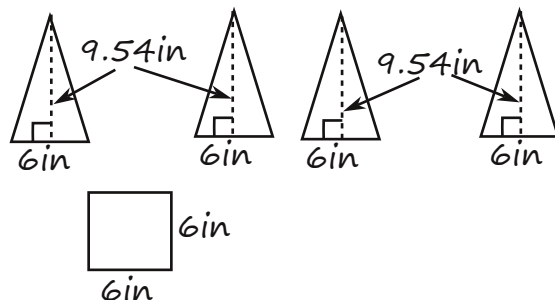
$$h^2 + 3^2 = 10^2$$

$$h^2 + 9 = 100$$

$$-9 \quad -9$$

$$\sqrt{h^2} = \sqrt{91}$$

$$h = 9.54$$

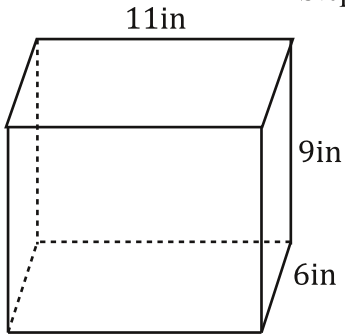


Let's practice just this. Once you get it down these problems will be easy!

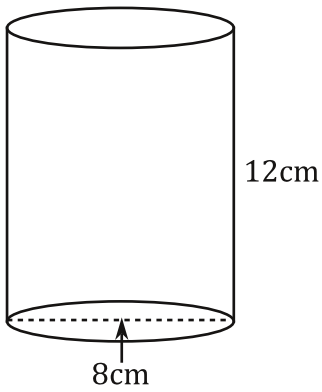
Find the missing dimensions and draw a picture of all the faces for each.

Step 1. Find missing dimensions. Step 2. Draw and label all faces.

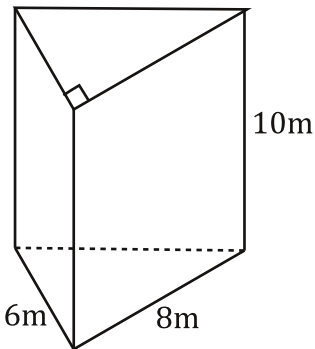
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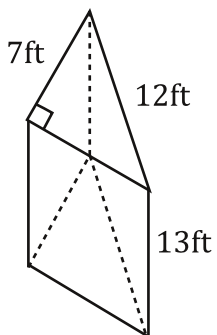
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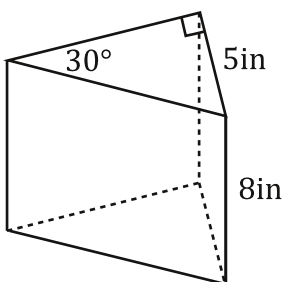
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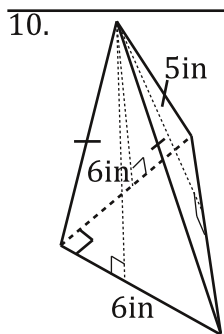
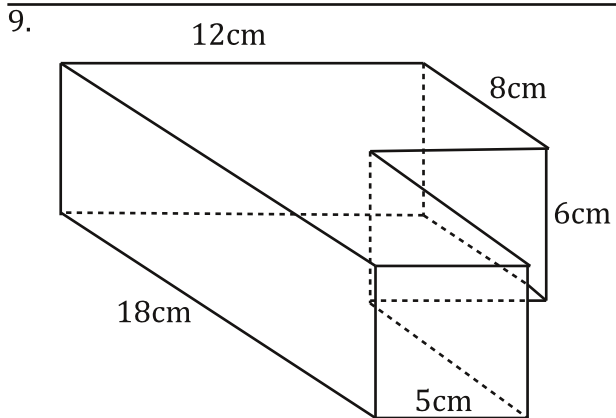
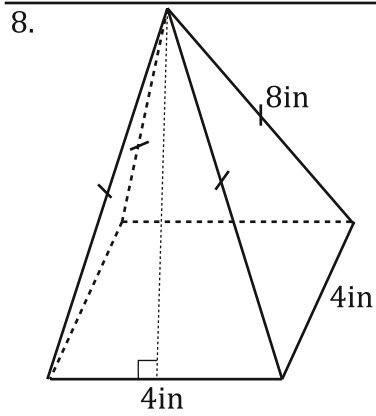
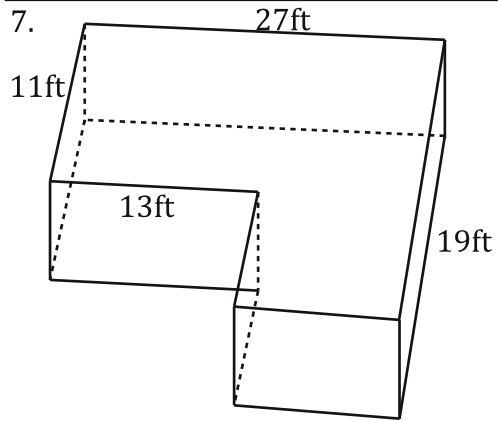
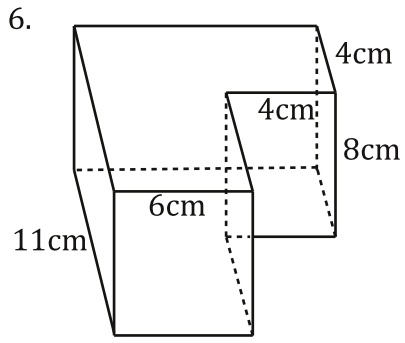


4.



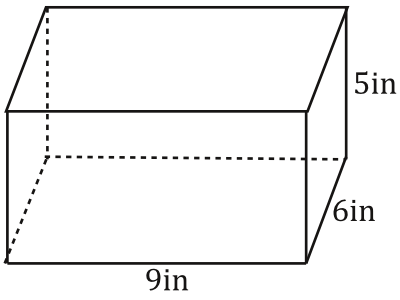
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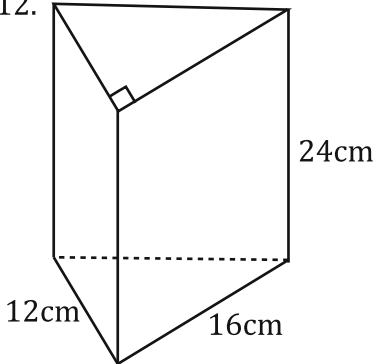


Find the TSA for each...

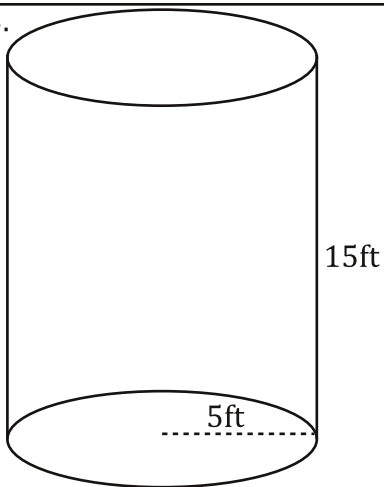
11.



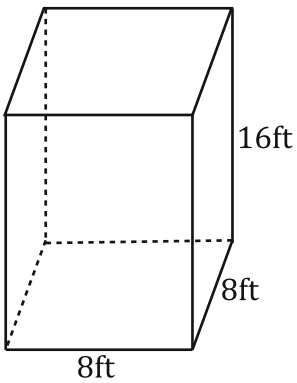
12.



13.

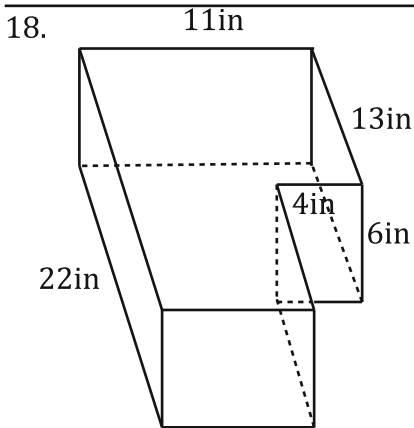
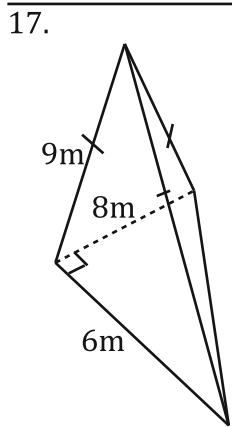
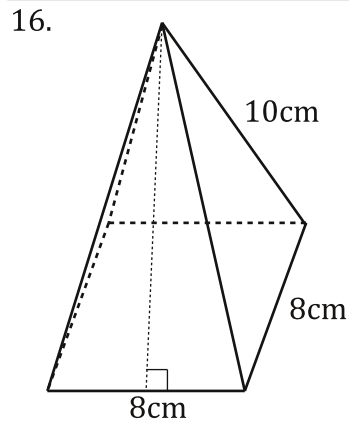
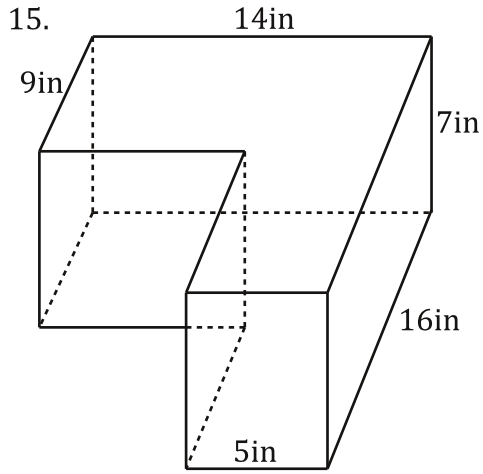


14.



Bubble all the correct answers from above. Don't bubble incorrect answers.

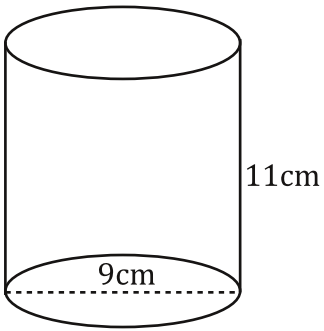
1099.56 1344 628.32 9216 640 285 258 512 1199.18 567



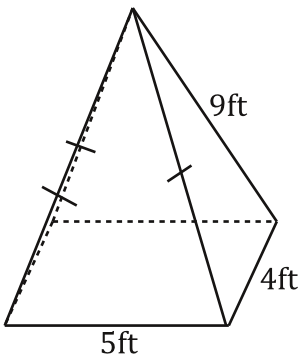
Bubble all the correct answers from above. Don't bubble incorrect answers.

- 707
 49.38
 210.72
 216
 742
 640
 808
 100.68
 123.5
 119.11

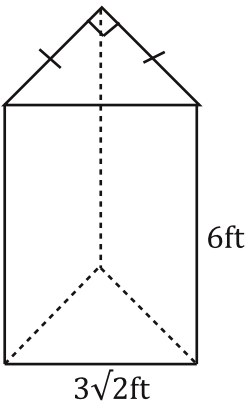
19.



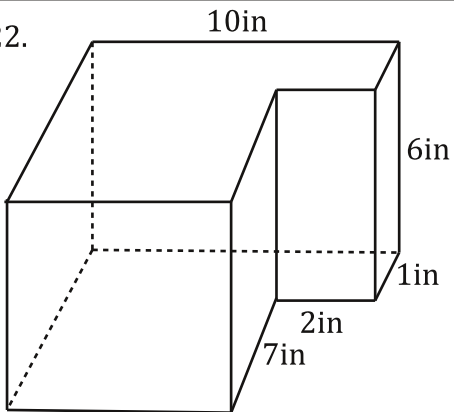
20.



21.



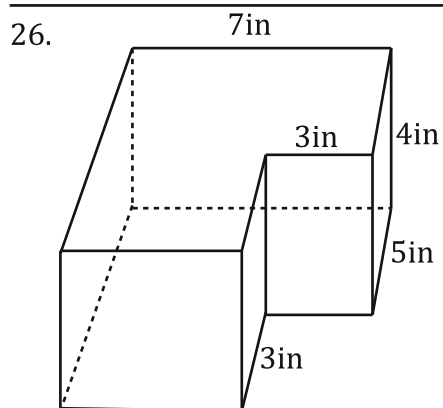
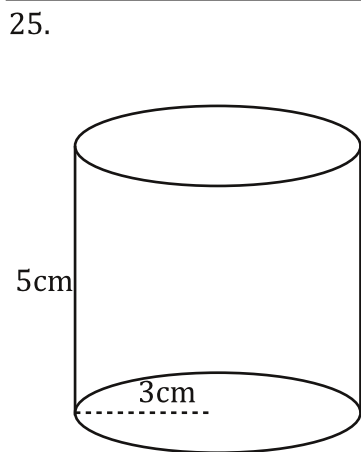
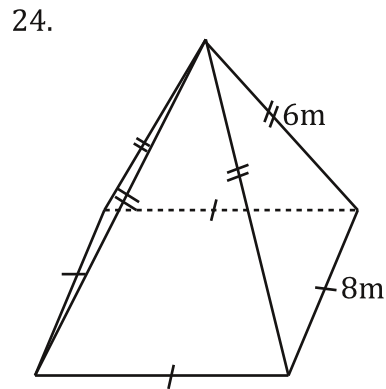
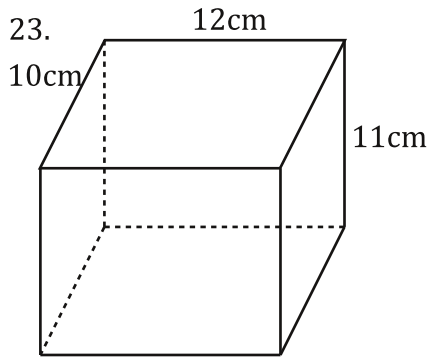
22.



Bubble all the correct answers from above. Don't bubble incorrect answers.

- 438.26 348 79.46 84.48 463 265 70.46 76.59 483.87 98.34

Find the lateral surface area of each.



Bubble all the correct answers from above. Don't bubble incorrect answers.

- 208 150.8 94.25 135.52 71.52 265.64 49.25 802 120 484