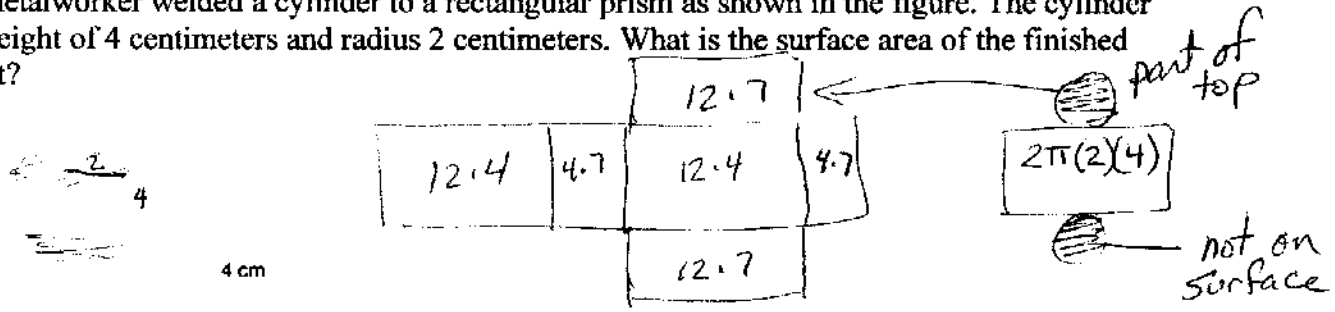
Welding
Surface Area Worksheet

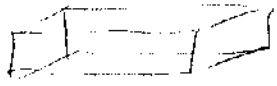
Name Key

1. A metalworker welded a cylinder to a rectangular prism as shown in the figure. The cylinder has a height of 4 centimeters and radius 2 centimeters. What is the surface area of the finished product?



$12.4 = 48 \times 2 = 96$
$12.7 = 84 \times 2 = 168$
$4.7 = 28 \times 2 = 56$
$2\pi(2)(4) = 50.3$
$SA = 96 + 168 + 56 + 50.3 = 370.3$

2. A tank has dimensions 48" long, 26" wide, and 32" tall. How many square feet of material are needed for 10 of these tanks? If a stock piece of 16-gauge sheet metal is 4 feet wide by 8 feet long, how many pieces are needed to complete the 10 tanks?



$48 \times 26 = 1248 \times 2 = 2496$
$48 \times 32 = 1536 \times 2 = 3072$
$32 \times 26 = 832 \times 2 = 1664$
$SA\ 1\ tank = 2496 + 3072 + 1664 = 7232\ in^2$
$SA\ 10\ tanks = 7232 \times 10 = 72320\ in^2$
$72320\ in^2 \cdot \frac{1\ ft^2}{144\ in^2} = 502.2\ ft^2$

Stock $= 4' \times 8' = 32\ ft^2$
$502.2\ ft^2 \div 32\ ft^2$
15.7
16 sheets

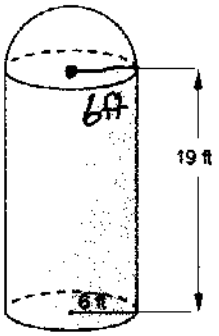
3. There are eight 48" x 96" sheet of metal in supply. How many square feet of sheet metal is available?

$48" \cdot \frac{1\ ft}{12\ in} = 4\ ft$
$96" \cdot \frac{1\ ft}{12\ in} = 8\ ft$
$4\ ft \times 8\ ft = 32\ ft^2$
32×8 sheets
$256\ ft^2$

OR

$48 \times 96 = 4608\ in^2$
$4608 \times 8 = 36864\ in^2$
$36864\ in^2 \cdot \frac{1\ ft^2}{144\ in^2}$
$256\ ft^2$

4. A farmer stores grain in the silo shown below. The shape of the silo is a cylinder with a radius of 6 feet and a height of 19 feet. On top of the cylinder is a hemisphere (half of a sphere) that also has a radius of 6 feet. If one gallon of paint covers 250 square feet, how many gallons of paint will the farmer need to completely cover the outside of the silo (excluding the base)?



not on outside surface

$2\pi rh$

$2\pi(6)(19)$

no base

$\frac{1}{2}$ sphere

$SA = 4\pi r^2 \times \frac{1}{2}$

$SA = 4\pi(6)^2 \times \frac{1}{2}$

$2\pi(6)(19) = 716.3$

$4\pi 6^2 \times \frac{1}{2} = 226.2$

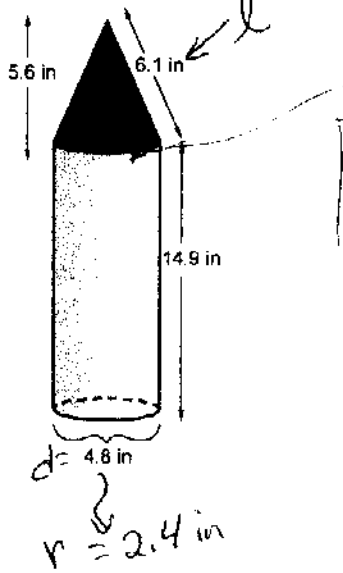
$SA = 716.3 + 226.2$

$SA = 942.5\ ft^2$

$942.5 \div 250 = 3.77$

4 gallons

5. Students in Mrs. Spain's physics class are building a rocket for a national competition. The main fuselage of the rocket is a cylinder with a diameter of 4.8 inches and a height of 14.9 inches. The nosecone of the rocket is a cone with a diameter of 4.8 inches, a height of 5.6 inches, and a slant height of approximately 6.1 inches as shown below. What is the surface area, in square inches, of the rocket including the base of the fuselage? Round your answer to the nearest tenth. Show your work.



not part of surface

$2\pi rh$

πr^2

not part of surface

cone

πrl

$2\pi(2.4)(14.9) = 224.7\ in^2$

$\pi(2.4)^2 = 18.1\ in^2$

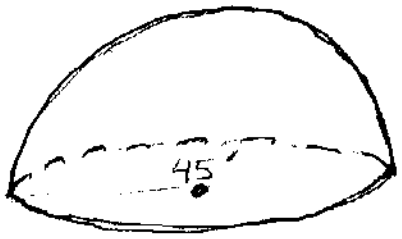
$\pi(2.4)(6.1) = 46.0\ in^2$

$SA = 224.7 + 18.1 + 46.0$

$SA = 288.8\ in^2$

6. An architect is designing a half-spherical dome above a circular fountain and path. The architect wants the dome to be only over the fountain and path. The total diameter of the fountain with surrounding path is 45 feet.

a. What is the height of the cover? Explain.
b. What is the surface area of the cover? Show your work.

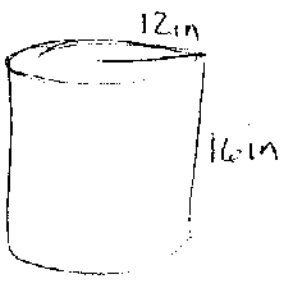


(A) Diameter of sphere is 45 ft.
$45 \div 2$ = Radius (which is h)
22.5 ft

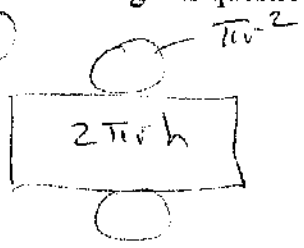
(B) $SA = 4\pi r^2 \times \frac{1}{2}$
$SA = 4\pi(22.5)^2 \times \frac{1}{2}$
$SA = 3180.9\ ft^2$

7. Jessica is designing a cylindrical storage container for lawn chemicals. She first designed a cylinder with radius 12 inches and height 16 inches.

a. What is the surface area of this container? Explain how you find the surface area.
b. Jessica is considering changing the container by doubling either the radius or the height of the container. Will doubling the radius of the original container or doubling the height of the original container cause the greater percent of increase in surface area from the original? Explain your method for answering this question.



(A)



$\pi(12)^2 = 452.4 \times 2$ ⊙'s $= 904.8$
$2\pi(12)(16) = 1206.4$
$SA = 904.8 + 1206.4$
$SA = 2111.2\ in^2$

(B) Double Radius ($r = 24$ in)
$\pi(24)^2 = 1809.6 \times 2 = 3619.1$
$2\pi(24)(16) = 2412.7$
$SA = 3619.1 + 2412.7 = 6031.8\ in^2$

Double Height ($h = 32$)
$\pi(12)^2 = 452.4 \times 2 = 904.8$
$2\pi(12)(32) = 2412.7$
$SA = 904.8 + 2412.7 = 3317.5\ in^2$

Doubling radius will cause greater increase b/c radius is squared when finding area of ⊙'s.

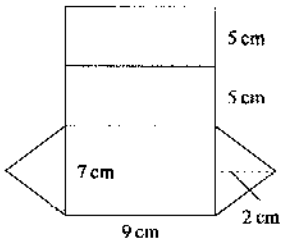
8. A rectangular prism has a surface area of 40 in.^{2}. If all of the dimensions of the prism are tripled, what is the surface area of the larger prism?

$SA = 40 in^2$

$40 \times 9 = \boxed{360 in^2}$

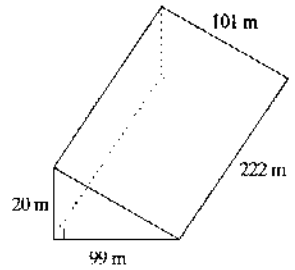
$3 \times 3 = 9$
dimension tripled — area multiplied by 9

9. Find the surface area of the space figure represented by the net.

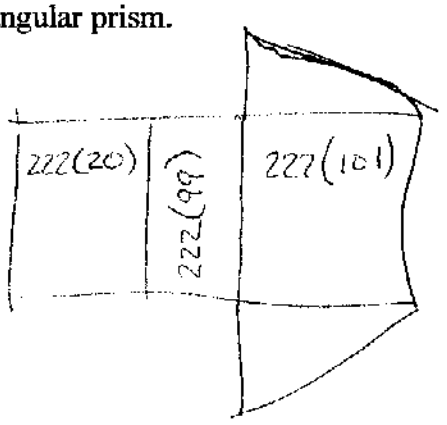


$5 \cdot 9 = 45$
$5 \cdot 9 = 45$
$7 \cdot 9 = 63$
$\frac{1}{2}(7)2 = 7 \times 2\Delta = 14$
$SA = 45 + 45 + 63 + 14 = \boxed{167 cm^2}$

10. Calculate the surface area of the right triangular prism.



Not drawn to scale



$222(20) = 4440$
$222(99) = 21978$
$222(101) = 22422$
$\frac{1}{2}(99)(20) = 990 \times 2\Delta = 1980$
$SA = 4440 + 21978 + 22422 + 1980 = \boxed{50820 m^2}$