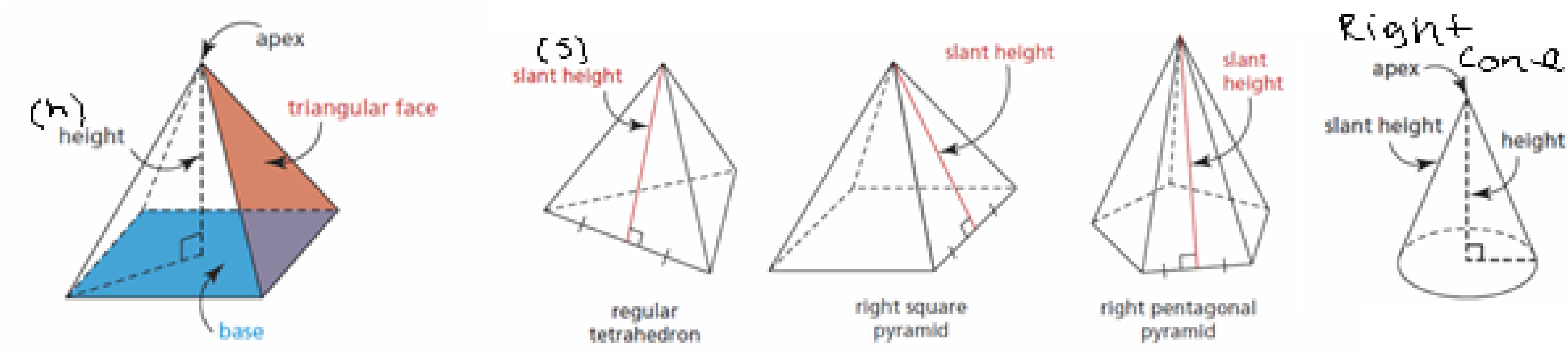
square units m^2, cm^2, in^2, etc......

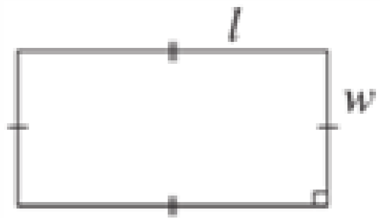
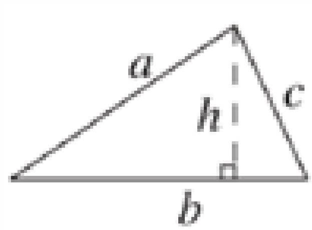
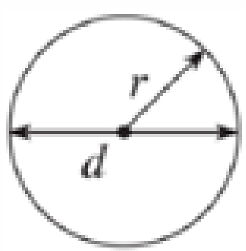
1.4 Surface Areas of Right Pyramids and Right Cones

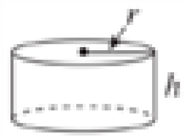
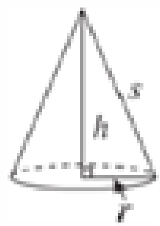
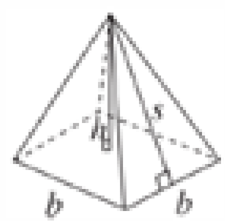


Tetrahedron - pyramid made of congruent triangles

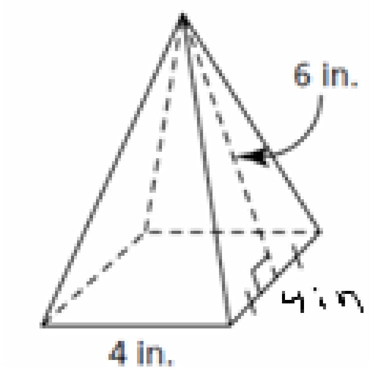
Surface area - sum of the area of all faces

Lateral area - surface area <u>not</u> including the base

Geometric Figure	Perimeter	Area
Rectangle 	$P = 2l + 2w$	$A = lw$
Triangle 	$P = a + b + c$	$A = \frac{bh}{2}$
Circle 	$C = 2\pi r$	$A = \pi r^2$

Geometric Solid	Surface Area	Volume
Cylinder 	$SA = 2\pi r^2 + 2\pi rh$	$V = (\text{area of base}) \times h$
Sphere 	$SA = 4\pi r^2$	$V = \frac{4}{3}\pi r^3$
Cone 	$SA = \pi r^2 + \pi rs$	$V = \frac{1}{3} \times (\text{area of base}) \times h$
Right Square-Based Pyramid 	$SA = 2bs + b^2$	$V = \frac{1}{3} \times (\text{area of base}) \times h$
General Right Prism	SA = the sum of the area of all the faces	$V = (\text{area of base}) \times h$
General Right Pyramid	SA = the sum of the area of all the faces	$V = \frac{1}{3} \times (\text{area of base}) \times h$

Calculate the surface area of this right square pyramid



$$\boxed{SA = 2bs + b^2}$$

$$SA = 4\,\triangle + \square$$

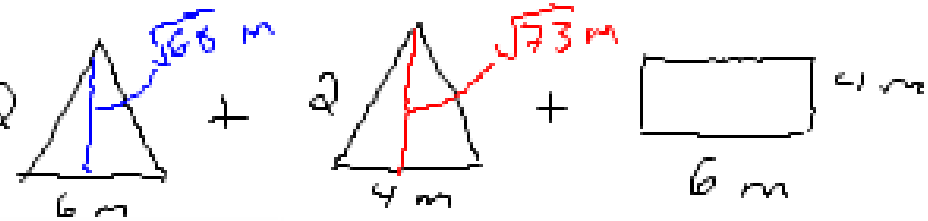
$$SA = 4\left(\frac{bs}{2}\right) + l \cdot w$$

$$= 2bs + l \cdot w$$

$$SA = 2(4)(6) + (4)(4)$$

$$SA = 48 + 16$$

$$\boxed{SA = 64\ in^2}$$

$SA = 2$ 

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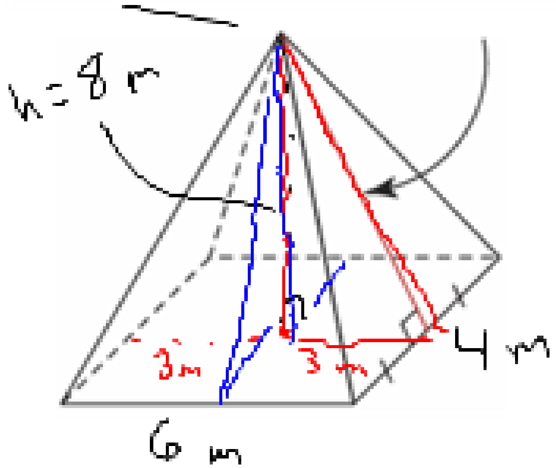
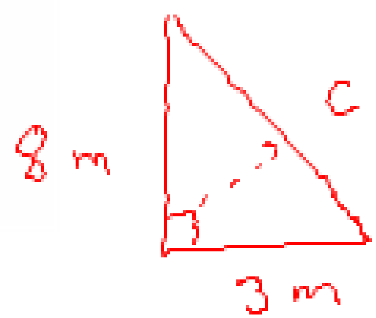
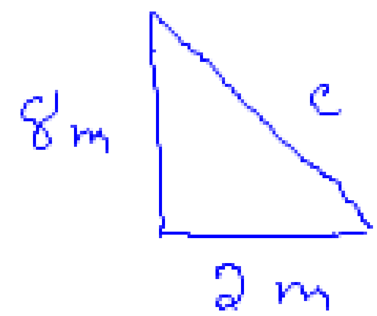
2. A right rectangular pyramid has base dimensions 4 m by 6 m, and a height of 8 m. Calculate the surface area of the pyramid to the nearest square metre.







$c^2 = a^2 + b^2$
$c^2 = (3)^2 + (8)^2$
$c^2 = 9 + 64$
$\sqrt{c^2} = \sqrt{73}$
$c = \sqrt{73}$ m

$c^2 = a^2 + b^2$
$c^2 = (2)^2 + (8)^2$
$c^2 = 4 + 64$
$\sqrt{c^2} = \sqrt{68}$
$c = \sqrt{68}$ m

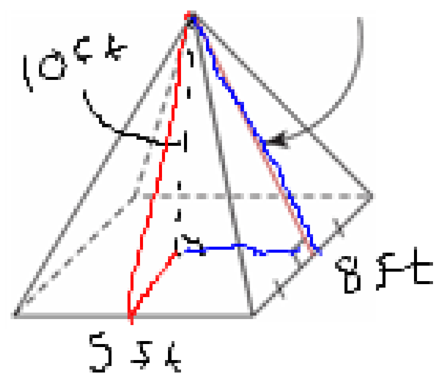
$SA = 2\left(\frac{bs}{2}\right) + 2\left(\frac{bs}{2}\right) + l \cdot w$

$SA = 2\left(\frac{6 \cdot \sqrt{68}}{2}\right) + 2\left(\frac{4 \cdot \sqrt{73}}{2}\right) + (6)(4)$

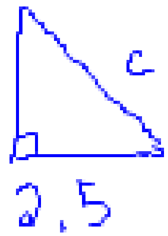
$SA = 49.47 + 34.16 + 24 = 107.63\ m^2$

$\boxed{= 108\ m^2}$

13 b



$SA = \boxed{}\ \text{ft} + 2\triangle_{8\,ft}\ (\sqrt{106.25}) + 2\triangle_{5\,ft}\ (\sqrt{116})$



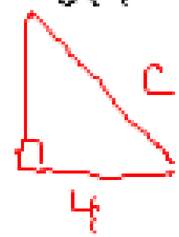
$c^2 = a^2 + b^2$

$c^2 = (2.5)^2 + (10)^2$

$c^2 = 6.25 + 100$

$\sqrt{c^2} = \sqrt{106.25}$

$c = \sqrt{106.25}$



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

$c^2 = (4)^2 + (10)^2$

$\sqrt{c^2} = \sqrt{116}$

$c = \sqrt{116}$

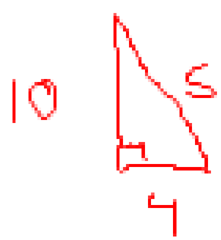
$SA = l \cdot w + 2\left(\frac{bh}{2}\right) + 2\left(\frac{bh}{2}\right)$

$SA = (5)\cdot(8) + 2\left(\frac{8 \cdot \sqrt{106.25}}{2}\right) + 2\left(\frac{5 \cdot \sqrt{116}}{2}\right) = 176\ ft^2$

3. A right cone has a base radius of 4 m and a height of 10 m. Calculate the surface area of this cone to the nearest square metre.

$SA = \underbrace{\pi r^2}_{\text{area of circle (base)}} + \overbrace{\pi r s}^{\text{Lateral area.}}$

* always use π button *



$s^2 = a^2 + b^2$

$s^2 = 4^2 + 10^2$

$\sqrt{s^2} = \sqrt{116}$

$s = \sqrt{116}$

$SA = \pi(4)^2 + \pi(4)(\sqrt{116})$

$SA = 50.265\ldots + 135.3$

$SA = 185.565\ldots$

$SA = 186\ m^2$

$SA = \pi r^2 + \underbrace{\pi r s}_{\text{lateral area.}}$

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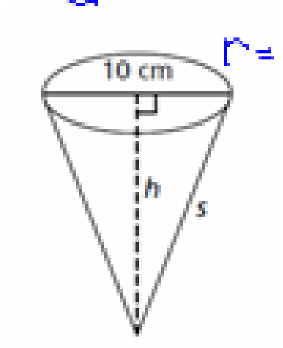
The lateral area of a cone is 220 cm². The diameter of the cone is 10 cm. Determine the height of the cone to the nearest tenth of a centimetre.

d = 10 cm

r = 5 cm

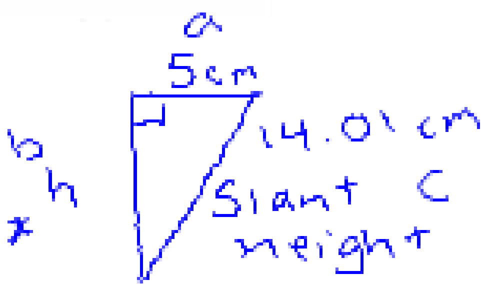


(1) solve for 's'

$LA = 220\ cm^2 = \pi r s$

$\frac{220}{\pi 5} = \frac{\pi (5) s}{\pi 5}$

$\frac{220}{\pi 5} = s = 14.01\ cm$



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

$c^2 - a^2 = b^2$

$(14.01)^2 - (5)^2 = b^2$

$196.28 - 25 = b^2$

$\sqrt{171.28} = \sqrt{b^2}$

$b = 13.087\ cm$

$\boxed{h = 13.1\ cm}$

Homework Review

9, 10

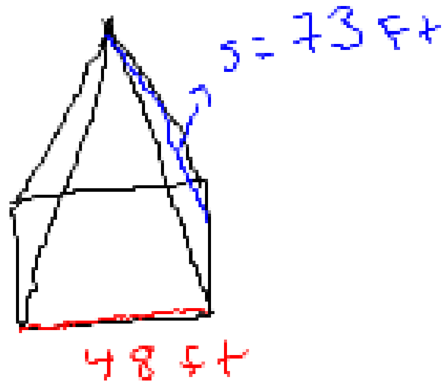
9. $s = 73$ ft

$b = 48$ ft

$$4\left(\frac{bh}{2}\right)$$

$$2bh$$

a)



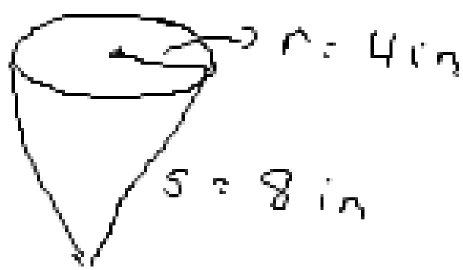
b) $LA = ?$

$$SA = \underbrace{2bs}_{LA} + \underbrace{b^2}_{base}$$

$$LA = 2bs = 2(48)(73)$$

$$= 7008 \text{ ft}^2$$

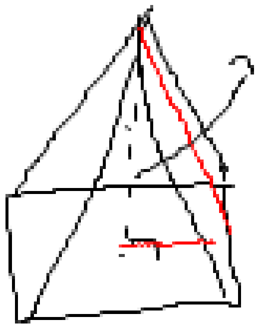
6a.



$$SA = \underbrace{\pi r^2}_{\text{base}} + \underbrace{\pi r s}_{\text{LA}}$$

$$LA = \pi r s = \pi(4)(8) = 100.53 \text{ in}^2 = 101 \text{ in}^2$$

10.

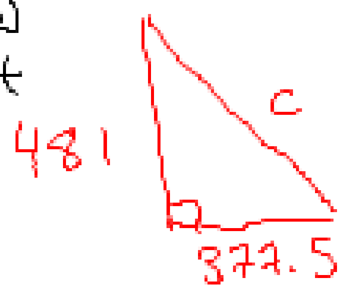


$h = 481\text{ ft}$

$b = 755\text{ ft}$

$$SA = \underbrace{2bs}_{LA} + b^2$$

① find slant height



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

$$c^2 = (377.5)^2 + (481)^2$$

$$c^2 = 142506.25 + 231361$$

$$\sqrt{c^2} = \sqrt{373867.25}$$

$$c = 611.44\ldots\ldots\text{ ft}$$

$$LA = 2(755)(611.44\ldots) = 923274\ \text{ft}^2$$

$$= 923274\ \text{ft}^2$$

4 triangles = 3000 in²

4. A model of the Great Pyramid of Giza is constructed for a museum display. The surface area of the triangular faces is 3000 square inches. The side length of the base is 50 in. Determine the height of the model to a tenth of an inch.

One triangle:

$$\frac{3000 \text{ in}^2}{4} = 750 \text{ in}^2$$

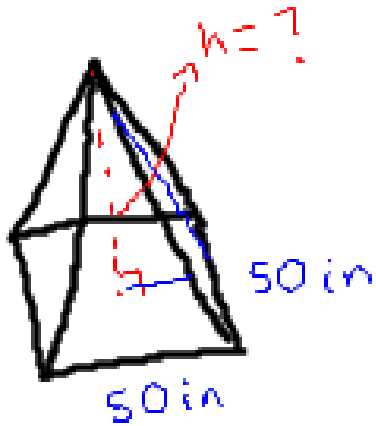
$$\text{Area of triangle} = \frac{b \cdot s}{2}$$

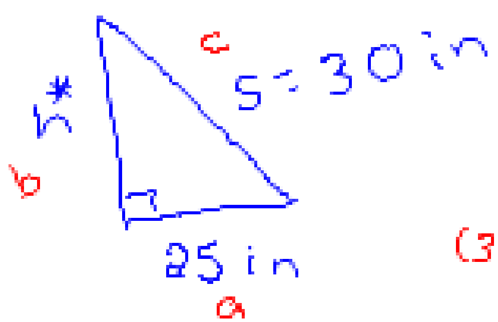
$$750 = \frac{(50)x}{2}$$

$$(2)(750) = 50x$$

$$\frac{1500}{50} = \frac{50x}{50}$$

$$30 \text{ in} = x$$





$$c^2 - a^2 = b^2$$

$$(30)^2 - (25)^2 = b^2$$

$$\sqrt{275} = \sqrt{b^2}$$

$$\boxed{b = 16.6 \text{ in}}$$

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14 - 16, 18, 21