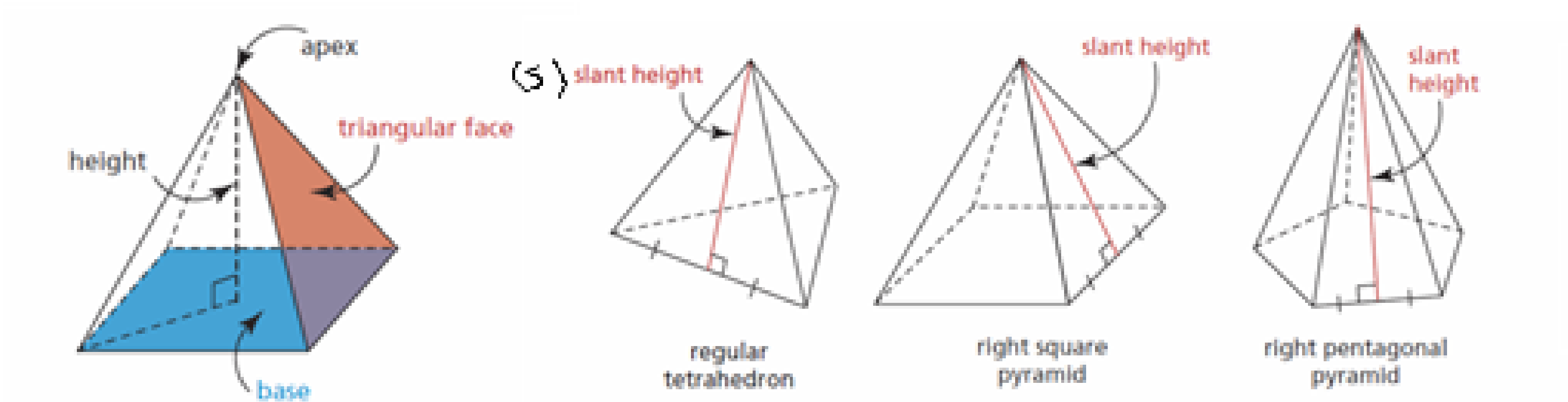
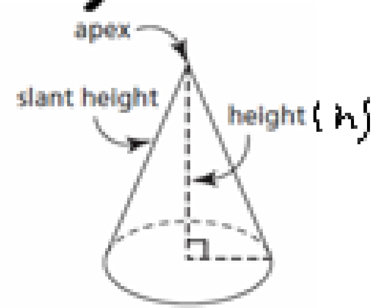
Square units  $in^2$, $cm^2$, $m^2$ .....

# 1.4 Surface Areas of Right Pyramids and Right Cones



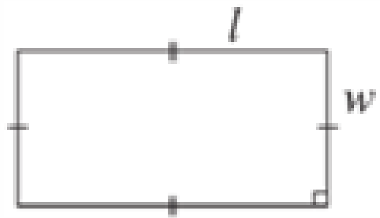
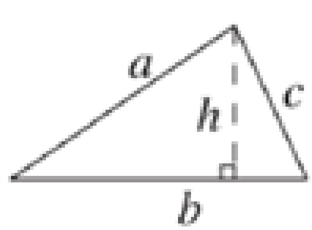
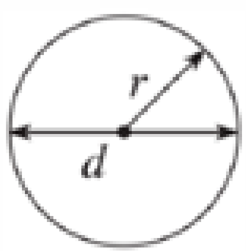

Right cone

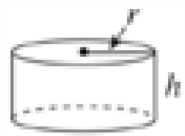
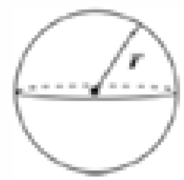
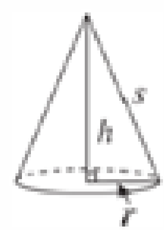
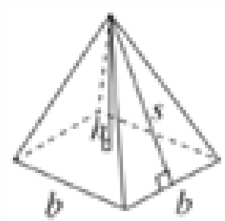



Tetrahedron - 4 triangular faces

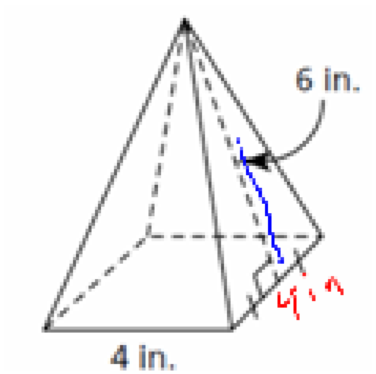
Surface area - area of all faces

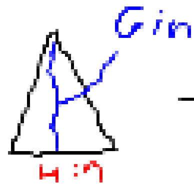
Lateral area - area of faces <u>not</u> including the base.

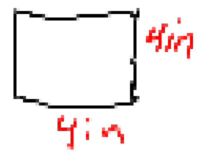
| Geometric Figure | Perimeter | Area |
|---|---|---|
| Rectangle   | $P = 2l + 2w$ | $A = lw$ |
| Triangle   | $P = a + b + c$ | $A = \frac{bh}{2}$ |
| Circle   | $C = 2\pi r$ | $A = \pi r^2$ |

| 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




4 

+ 1 

= SA

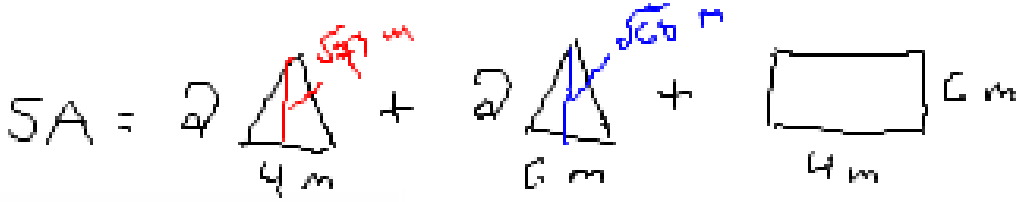
$$4\left(\frac{bh}{2}\right) + (l \cdot w) = SA$$

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

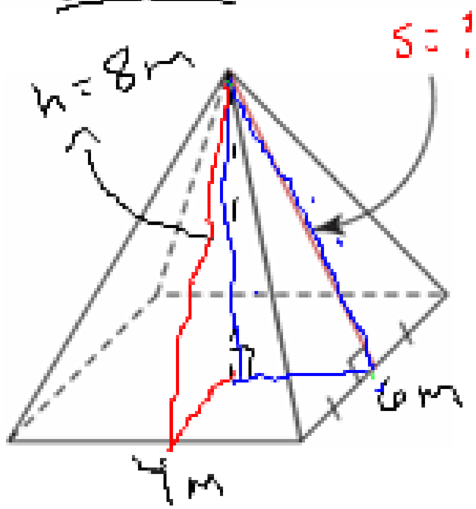
$$4(12) + 16 = SA$$

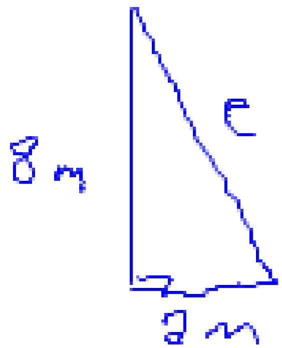
$$48 + 16 = SA$$

$$\boxed{64 \text{ in}^2}$$




**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.



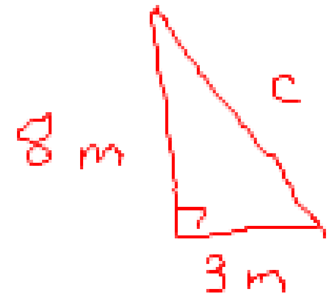

$c^2 = a^2 + b^2$

$c^2 = (2)^2 + (8)^2$

$c^2 = 4 + 64$

$\sqrt{c^2} = \sqrt{68}$

$c = \sqrt{68}$ m




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

$c^2 = (3)^2 + (8)^2$

$c^2 = 9 + 64$

$\sqrt{c^2} = \sqrt{73}$

$c = \sqrt{73}$ m

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

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

$$= 34.176 + 49.47 + 24 = 107.65 \text{ m}^2$$

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

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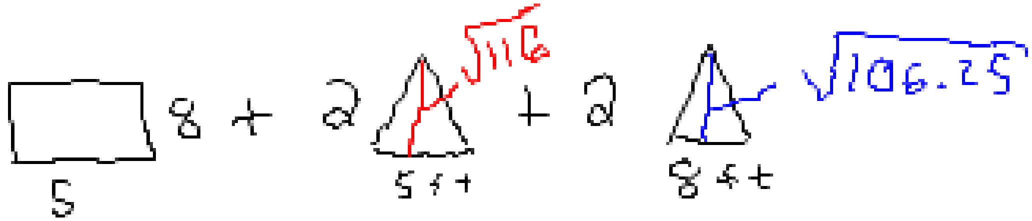
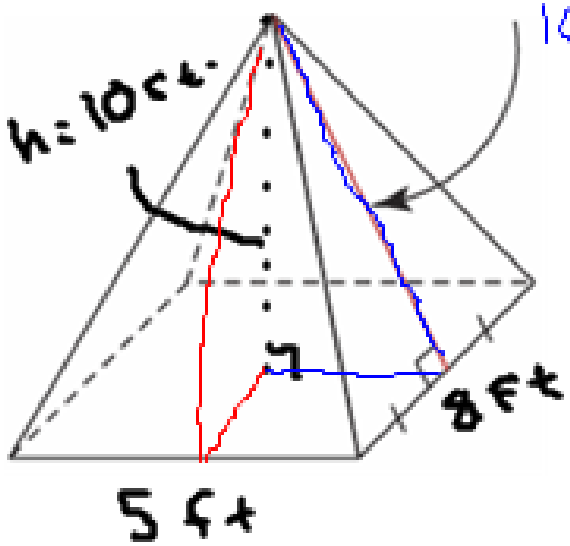
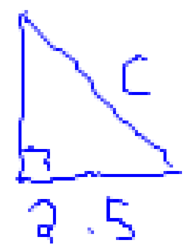
13 b

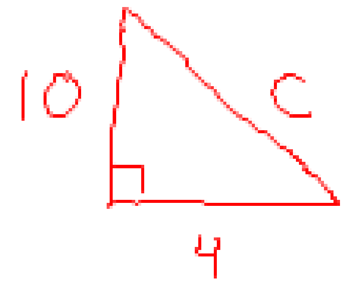
SA =




$$c^2 = a^2 + b^2$$
$$c^2 = (2.5)^2 + (10)^2$$
$$c^2 = 6.25 + 100$$
$$\sqrt{c^2} = \sqrt{106.25}$$
$$c = \sqrt{106.25}$$

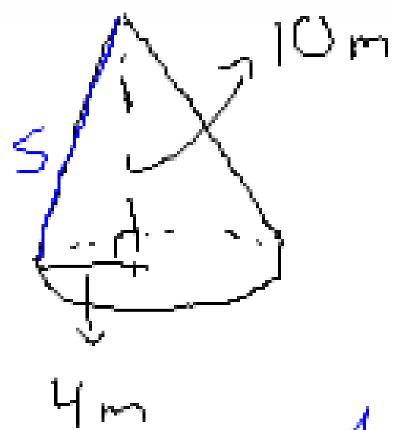



$$c^2 = a^2 + b^2$$
$$c^2 = (4)^2 + (10)^2$$
$$\sqrt{c^2} = \sqrt{116}$$
$$c = \sqrt{116}$$

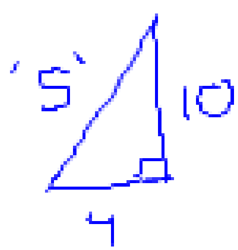
$$SA = l \cdot w + 2\left(\frac{bs}{2}\right) + 2\left(\frac{bs}{2}\right)$$
$$SA = (5)(8) + 2\left(\frac{5 \cdot \sqrt{116}}{2}\right) + 2\left(\frac{8 \cdot \sqrt{106.25}}{2}\right)$$
$$SA = 40 + 53.85 + 82.46 = 176 \text{ ft}^2$$

**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 * *

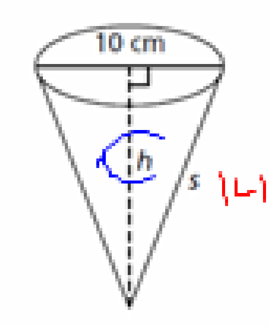



$$s^2 = a^2 + b^2$$
$$s^2 = 4^2 + 10^2$$
$$\sqrt{s^2} = \sqrt{116}$$
$$s = \sqrt{116} \text{ m}$$

$$SA = \pi(4)^2 + \pi(4)(\sqrt{116})$$
$$SA = 185.6094 \text{ m}^2 \doteq 186 \text{ m}^2$$

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

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.



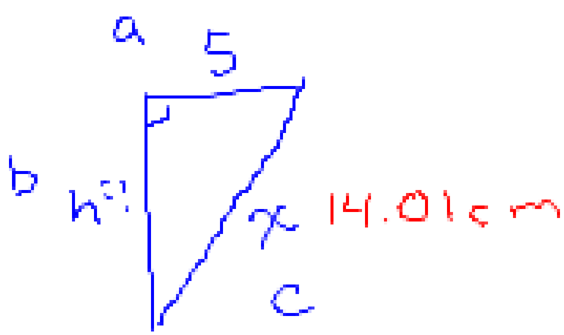

$$\text{L.A.} = \pi r x = 220$$

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

$$x = 14.01 \text{ cm}$$

$d = 10$ cm

$r = \left(\frac{10}{2}\right) = 5$ cm




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

$$-a^2 \quad -a^2$$

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

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

$$b = h = 13.1 \text{ cm}$$

P. 34
#6-12

# Homework Review

9, 10

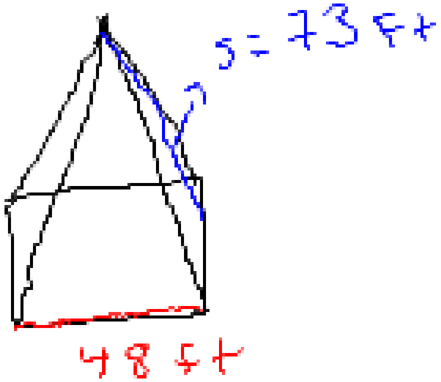
9. $s = 73$ ft

$b = 48$ ft

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

$2bh$

a)



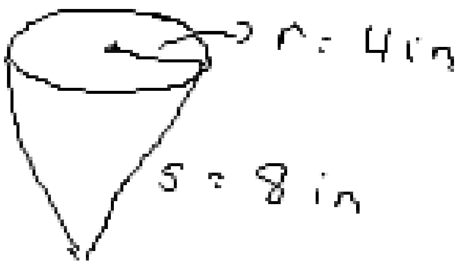

b) $LA = ?$

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

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

$= 7008 \text{ ft}^2$

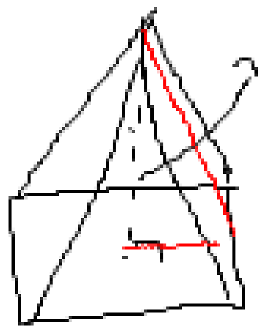
6a.




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

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

10.

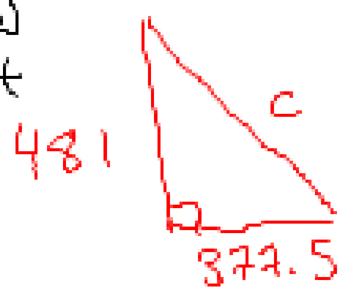


$h = 481\text{ ft}$

$b = 755\text{ ft}$

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

1 find slant height




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

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

$$c^2 = 142506.25 + 231361$$

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

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

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

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

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#14-16, 18, 21

area of 4 triangles = 3000 $in^2$

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.

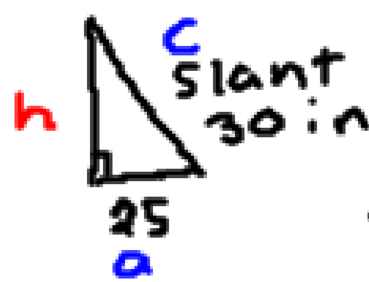
1 triangle: $\frac{3000\ in^2}{4}$

$$\frac{b \cdot x}{2} = 750\ in^2$$

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

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

slant = $x$ = 30 in


$$c^2 = a^2 + h^2$$

$$c^2 - a^2 = h^2$$

$$30^2 - 25^2 = h^2$$

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

$$16.6\ in = h$$