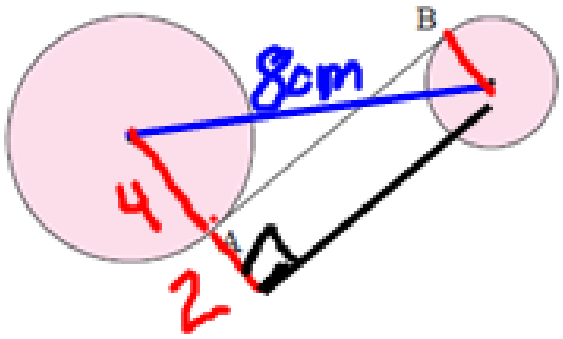
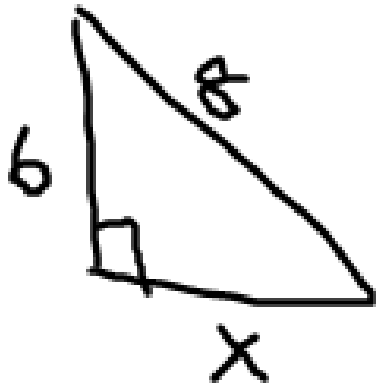
12 The illustration shows two circles of radii 4 cm and 2 cm respectively. The distance between the two centres is 8 cm. Find the length of the common tangent [AB].





$6^2 + x^2 = 8^2$

$36 + x^2 = 64$

$x^2 = 28$

$x = \pm\sqrt{28}$ $x > 0$

$x = \sqrt{28}$

$x = 5.29\text{cm}$

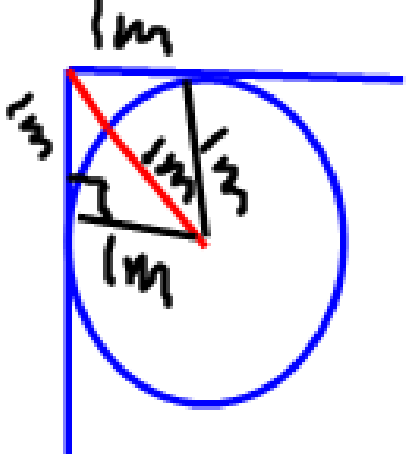
10) circle table

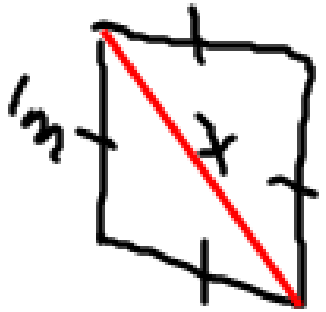
diameter = 2m

corner of room

edges touch adjacent walls

Shortest distance from corner of room to edge of table





$1^2 + 1^2 = x^2$

$1 + 1 = x^2$

$2 = x^2$

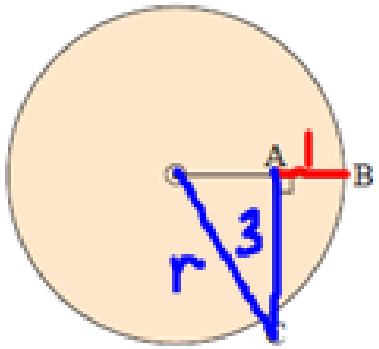
$\pm\sqrt{2} = x$ $x > 0$

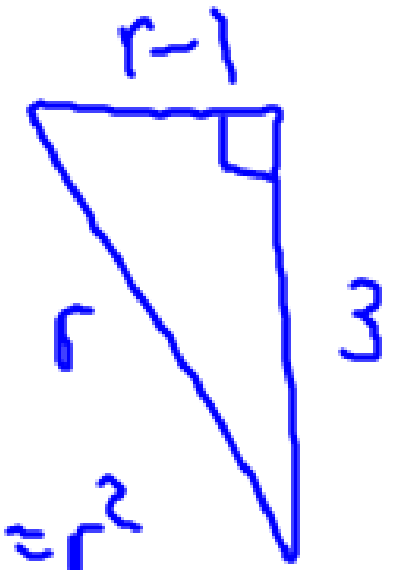
$1.41 \approx x$

1.41 - 1

$= 0.41m$

13 In the given figure, AB = 1 cm and AC = 3 cm. Find the radius of the circle.





$(r-1)^2 + 3^2 = r^2$

$(r-1)(r-1) + 9 = r^2$

$r^2 - r - r + 1 + 9 = r^2$

$-r^2 + r + r$

$+10 = 2r$

$\frac{10}{2} = \frac{2r}{2}$

$5 = r$

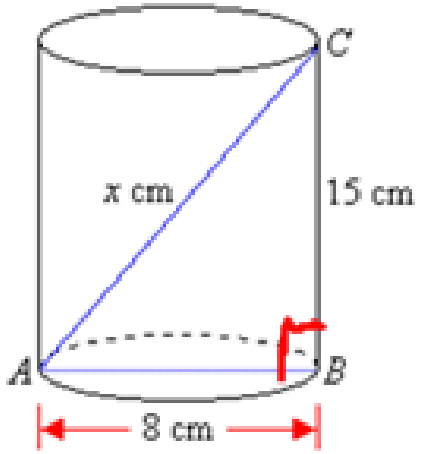
5cm

4E – Three Dimensional Problems

- May need to apply Pythagoras' theorem twice.

Examples:

1. A soft drink can is in the shape of a cylinder with height 15 cm and diameter 8 cm. What is the length of the longest straw that will fit inside the can?



$x > 0$

$\sqrt{289} = x$

17 cm = x

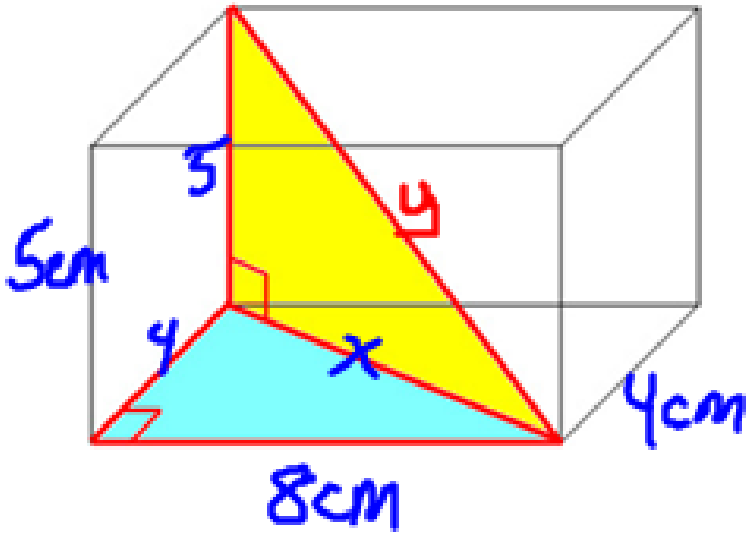
$8^2 + 15^2 = x^2$

$64 + 225 = x^2$

$289 = x^2$

$\pm\sqrt{289} = x$

2. A rectangular prism is 8 cm long by 4 cm wide by 5 cm high. Find the length of the diagonal.



$5^2 + \sqrt{80}^2 = y^2$

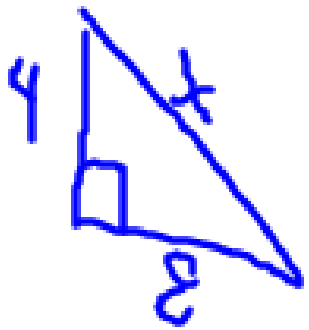
$25 + 80 = y^2$

$105 = y^2$

$\pm\sqrt{105} = y$

$y > 0$

$10.25\text{cm} = y$



$4^2 + 8^2 = x^2$

$16 + 64 = x^2$

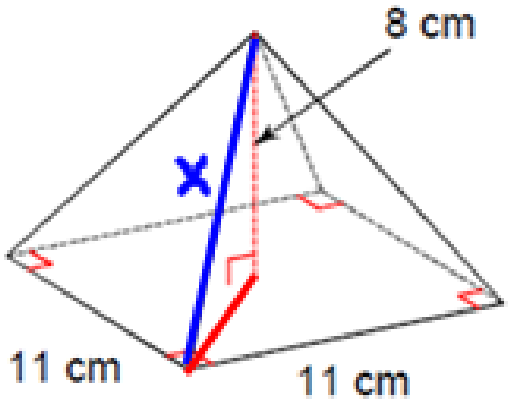
$80 = x^2$

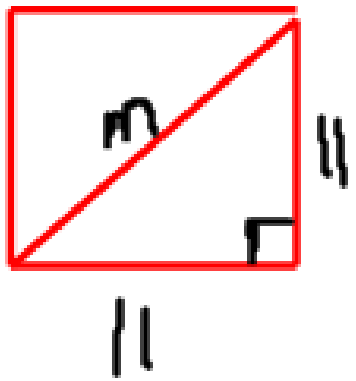
$x > 0$

$\pm\sqrt{80} = x$

$\sqrt{80} = x$

3. A square pyramid has a height of 8 cm, and base length of 11 cm. Determine the length of the slant edges.





$\frac{m}{2} = y$

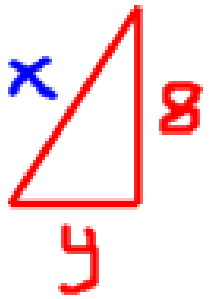
$11^2 + 11^2 = m^2$

$121 + 121 = m^2$

$242 = m^2$

$\pm\sqrt{242} = m$

$y = \frac{m}{2} = \frac{\sqrt{242}}{2}$



$8^2 + \left(\frac{\sqrt{242}}{2}\right)^2 = x^2$

$64 + \frac{242}{4} = x^2$

$\frac{64}{1} + \frac{121}{2} = x^2$

$\frac{128}{2} + \frac{121}{2} = x^2$

$\sqrt{\frac{249}{2}} = x$ ← 11.16cm