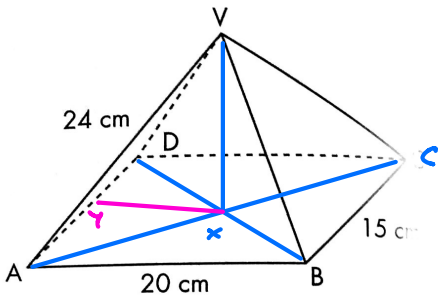
3D Trig Problems - Exercise 15 B Blue Textbook

1 The diagram shows a pyramid. The base is a horizontal rectangle ABCD, 20 cm by 15 cm. The length of each sloping edge is 24 cm. The apex, V, is over the centre of the rectangular base. Calculate these.



a the size of the angle VAC

b the height of the pyramid

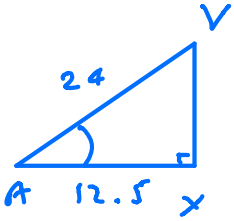
c the volume of the pyramid

d the size of the angle between the face VAD and the base ABCD

a) $AC^2 = 15^2 + 20^2$

$\Rightarrow AC = 25$ cm

$\Rightarrow AX = 12.5$ cm



$\angle VAC = \angle VAX = \cos^{-1}\left(\frac{12.5}{24}\right) = 58.6^\circ$

b) Height $= VX$

$AX^2 + VX^2 = AV^2$

$VX^2 = AV^2 - AX^2$

$= 24^2 - 12.5^2$

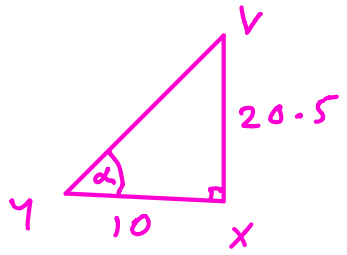
$\Rightarrow VX = 20.5$ cm

c) Volume $= \frac{1}{3} \times$ area of base $\times$ height

$= \frac{1}{3} \times 20 \times 15 \times 20.5$

$= 2050 \text{ cm}^3$

d)



YX = half of length = 10 cm

$$\tan\alpha = \frac{20.5}{10}$$

$$\alpha = \tan^{-1}\left(\frac{20.5}{10}\right)$$

$$\alpha = 64^\circ$$