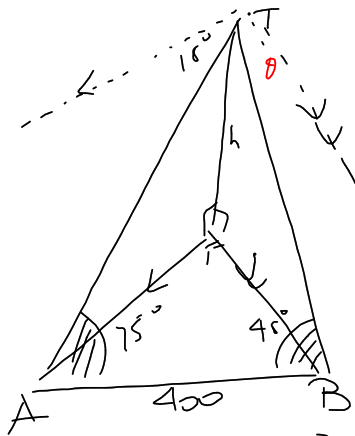


3c)

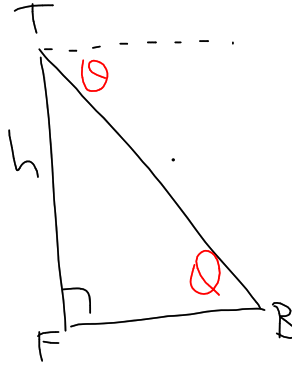


$$BT = \frac{400 \sin 75^\circ}{\sin 57^\circ}$$

$$a) TA = \frac{400 \sin 48^\circ}{\sin 57^\circ}$$

$$b) h = \frac{400 \sin 48^\circ \sin 18^\circ}{\sin 57^\circ}$$

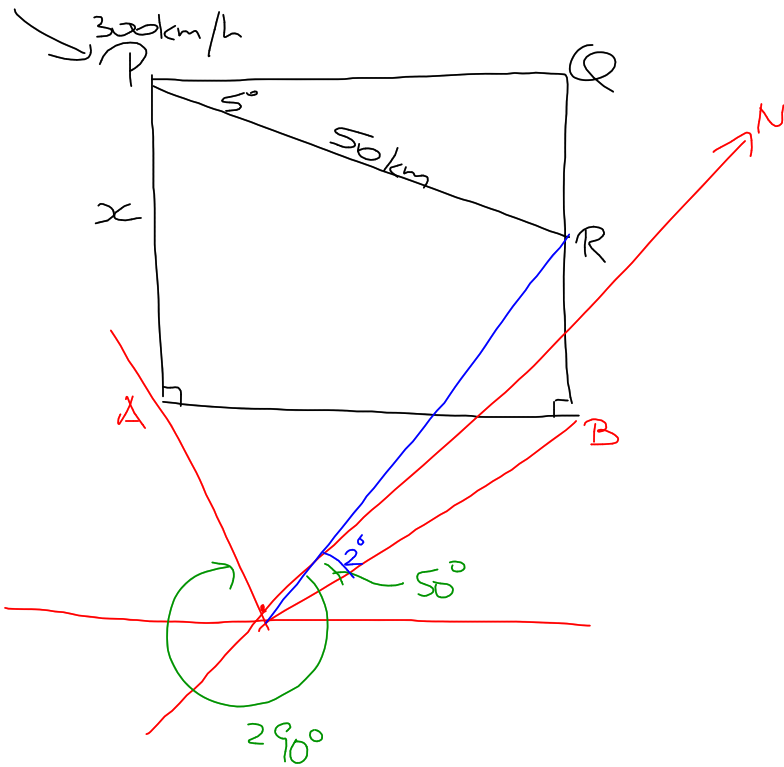
$$= \underline{110 \text{ m}}$$



$$\frac{h}{BT} = \sin \theta$$

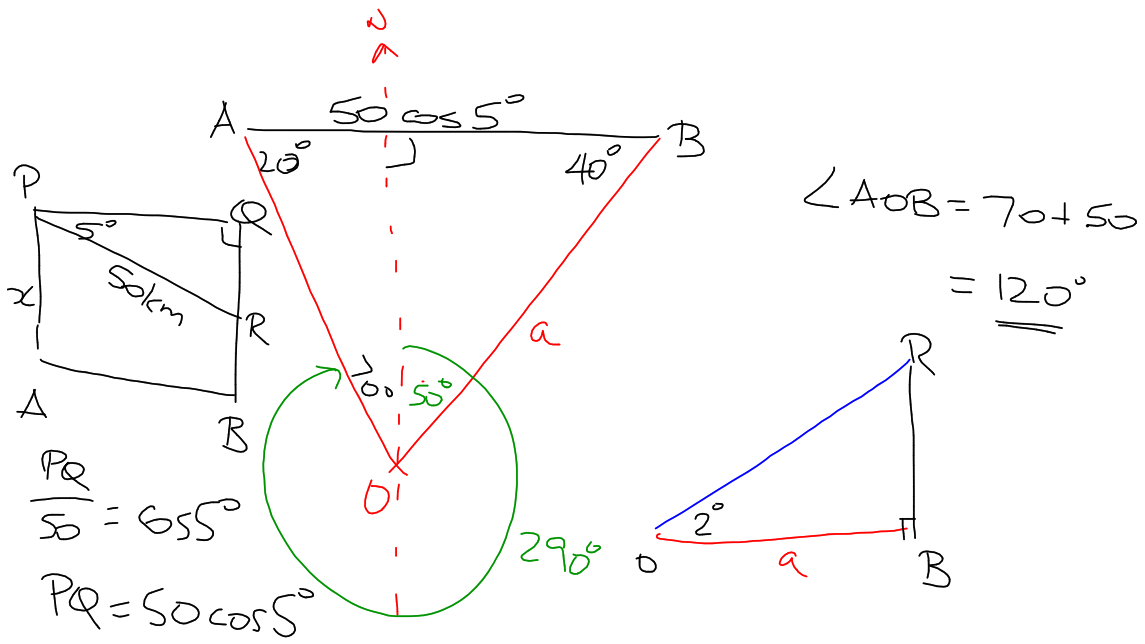
$$\theta = \underline{14^\circ}$$

9



a)

$$\begin{aligned} S &= \frac{d}{t} \\ d &= S \times t \\ &= 300 \times \frac{1}{6} \\ &= \underline{\underline{50 \text{ km}}} \end{aligned}$$



$$\frac{a}{\sin 20^\circ} = \frac{50 \cos 5^\circ}{\sin 120^\circ}$$

$$a = \frac{50 \cos 5^\circ \sin 20^\circ}{\sin 120^\circ}$$

$$\underline{a = 19670} \quad (\text{to nearest } 10\text{m})$$

d)

$$\frac{QR}{50} = \sin 5^\circ$$

$$QR = 50 \sin 5^\circ$$

$$\frac{BR}{a} = \tan 2^\circ$$

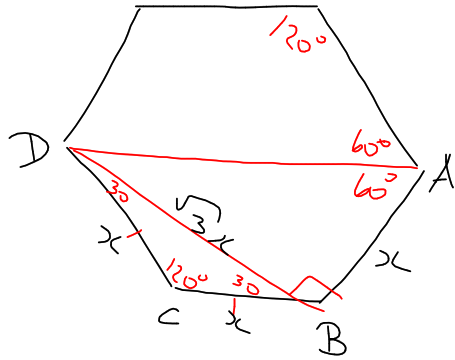
$$BR = a \tan 2^\circ$$

$$= \frac{50 \cos 5^\circ \sin 20^\circ \tan 2^\circ}{\sin 120^\circ}$$

$$x = QR + BR$$

$$= \underline{\underline{50.45 \text{ m}}}$$

11b)



$$BD^2 = x^2 + x^2 - 2x \cdot x \cdot \cos 120^\circ$$
$$= 2x^2 + 2x^2 \cdot \frac{1}{2}$$

$$= 3x^2$$

$$\underline{BD = \sqrt{3}x}$$

$$AD^2 = x^2 + (\sqrt{3}x)^2$$

$$= x^2 + 3x^2$$

$$= 4x^2$$

$$\underline{\underline{AD = 2x}}$$

|| d₁

$$\cot \alpha = \frac{2x}{h}$$

$$\cot \beta = \frac{\sqrt{3}x}{h}$$

$$\cot \gamma = \frac{x}{h}$$

$$\cot^2 \beta + \cot^2 \gamma$$

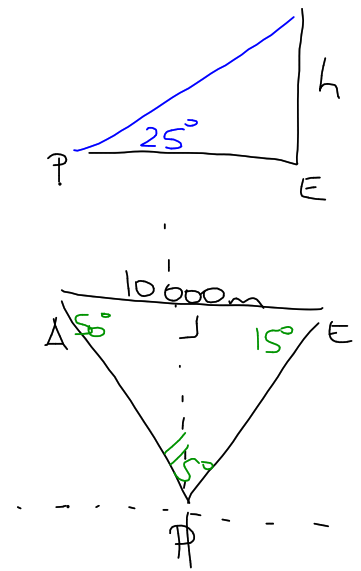
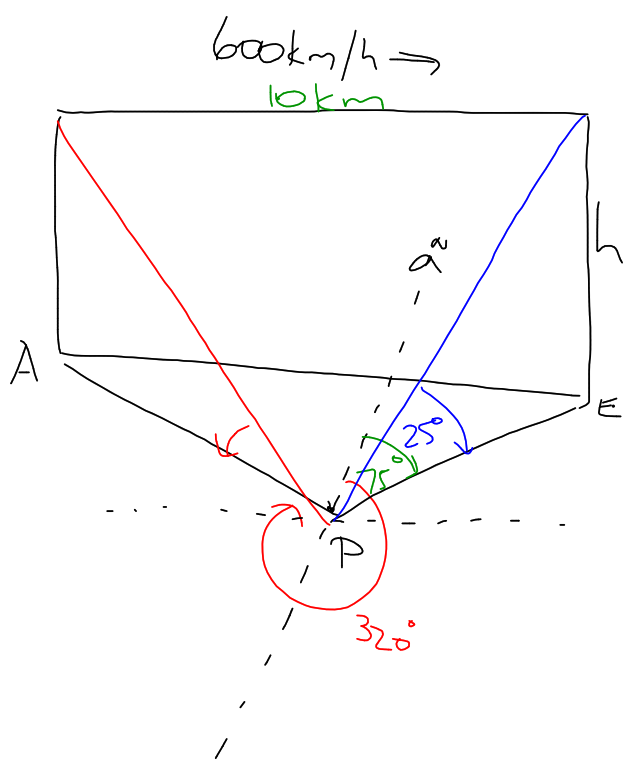
$$= \frac{3x^2}{h^2} + \frac{x^2}{h^2}$$

$$= \frac{4x^2}{h^2}$$

$$= \underline{\underline{\cot^2 \alpha}}$$

13

a) 10km



$$\frac{PE}{\sin 50^\circ} = \frac{10000}{\sin 115^\circ}$$

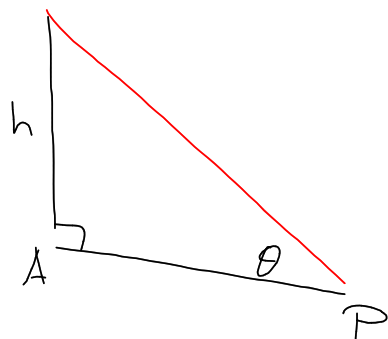
$$\begin{aligned} PE &= \frac{10000 \sin 50^\circ}{\sin 115^\circ} \\ &= \frac{10000 \sin 50^\circ}{\sin 65^\circ} \end{aligned}$$

$$\frac{h}{PE} = \tan 25^\circ$$

$$h = PE \tan 25^\circ$$

$$h = \frac{10000 \sin 50^\circ \tan 25^\circ}{\sin 65^\circ}$$





$$\frac{AP}{\sin 15^\circ} = \frac{10000}{\sin 65^\circ}$$

$$AP = \frac{10000 \sin 15^\circ}{\sin 65^\circ}$$

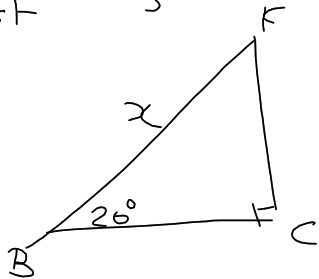
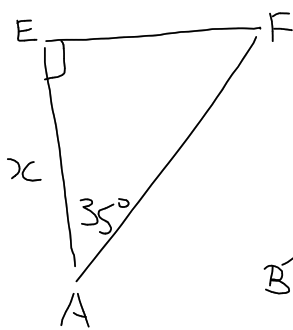
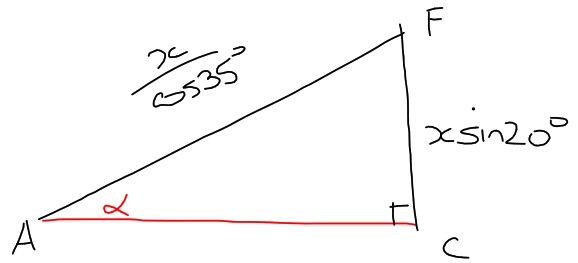
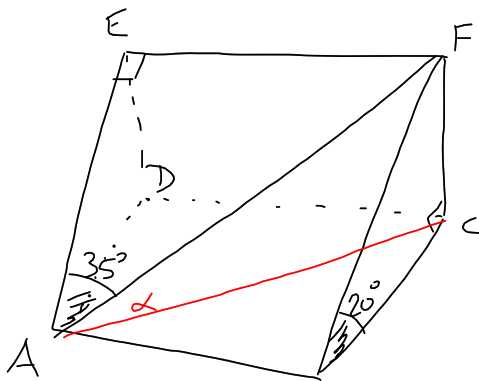
$$\tan \theta = \frac{h}{AP}$$

$$= \frac{10000 \sin 50^\circ \tan 25^\circ}{\sin 65^\circ} \times \frac{\sin 65^\circ}{10000 \sin 15^\circ}$$

$$= \frac{\sin 50^\circ \tan 25^\circ}{\sin 15^\circ}$$

$$\theta = \underline{\underline{54^\circ 4'}}$$

15



$$\frac{x}{FA} = \cos 35^\circ \quad \frac{FC}{x} = \sin 20^\circ$$

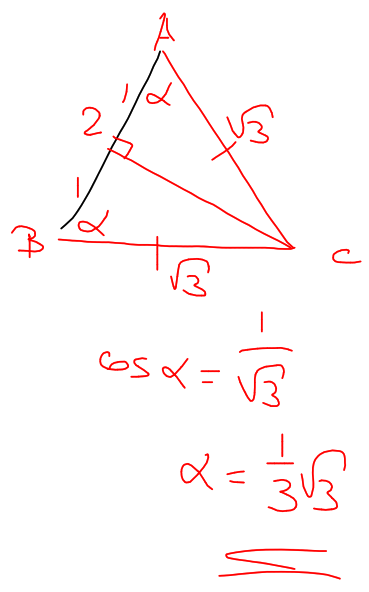
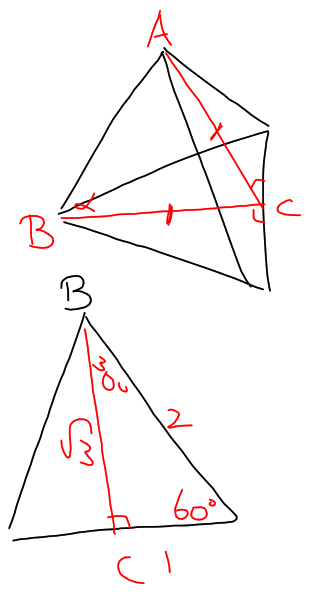
$$FA = \frac{x}{\cos 35^\circ} \quad FC = x \sin 20^\circ$$

$$\sin \alpha = \frac{x \sin 20^\circ}{\frac{x}{\cos 35^\circ}}$$

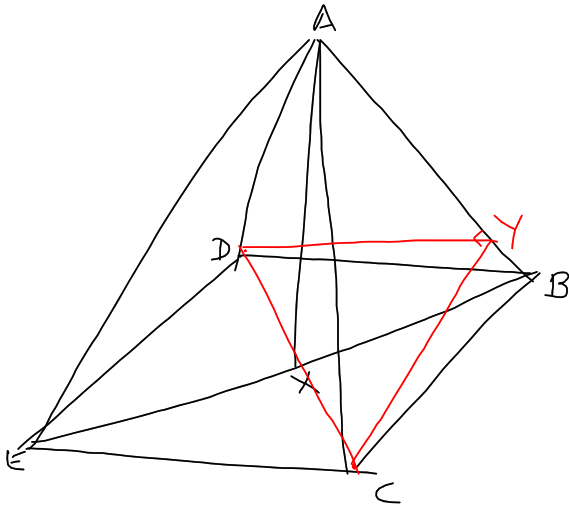
$$= \sin 20^\circ \cos 35^\circ$$

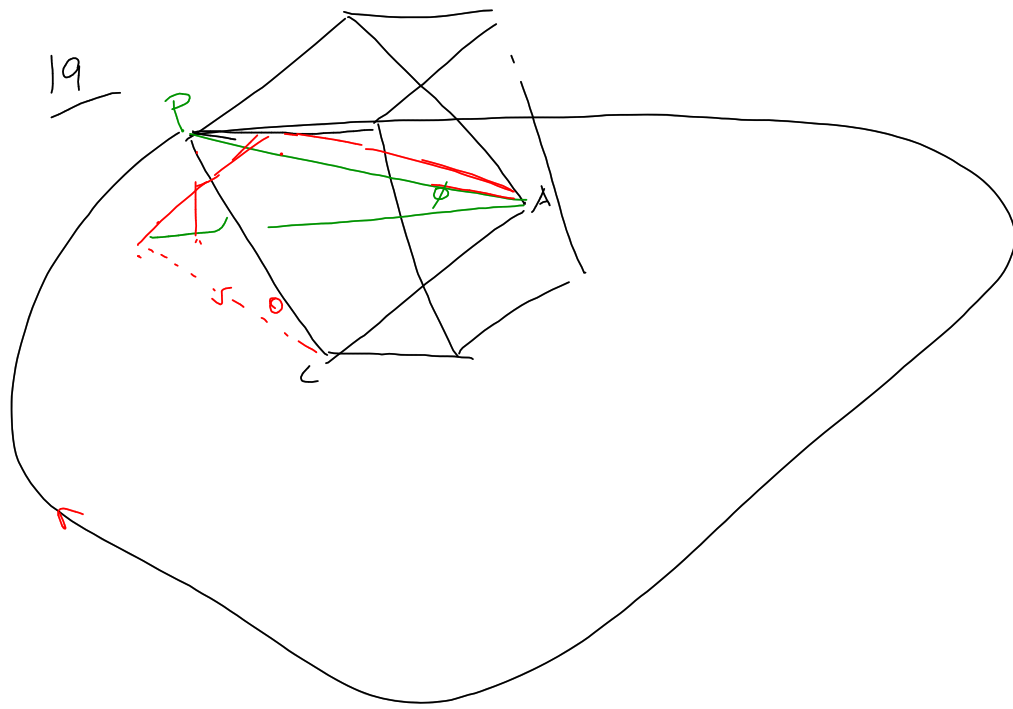
$$\alpha = \underline{\underline{16^\circ 16'}}$$

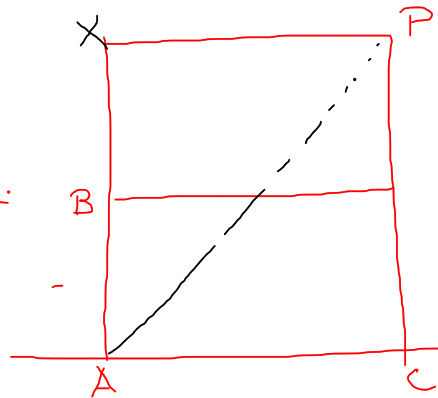
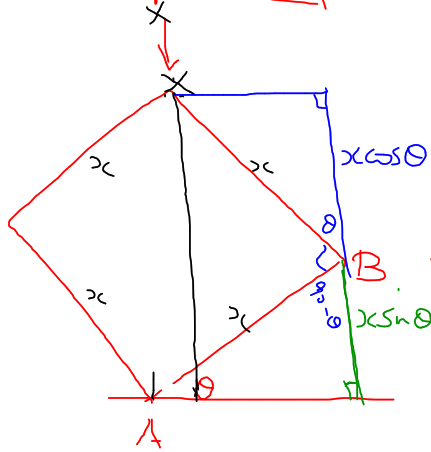
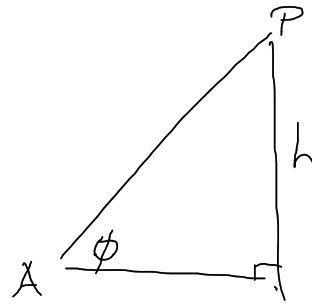
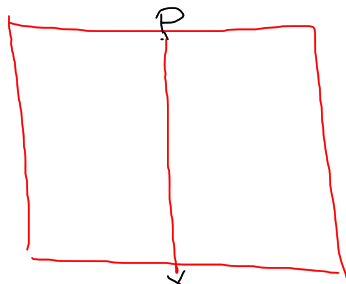
17



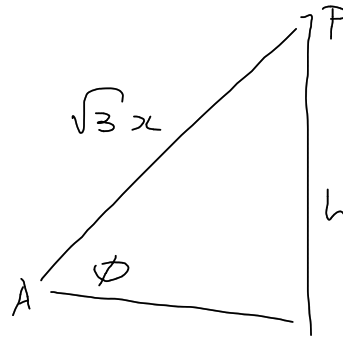
18 /



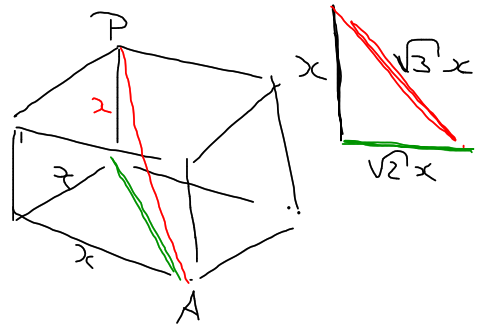




$$\begin{aligned}
 h &= x \cos \theta + x \sin \theta \\
 &= x \cos \theta \left(1 + \frac{\sin \theta}{\cos \theta} \right) \\
 &= \underline{x \cos \theta (1 + \tan \theta)}
 \end{aligned}$$

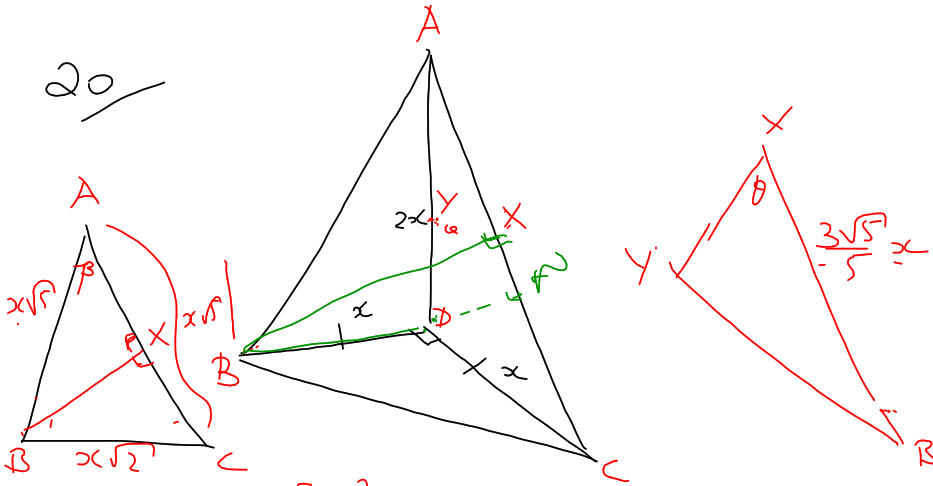


$$\begin{aligned}
 \sin \phi &= \frac{\cos \theta (1 + \tan \theta)}{\sqrt{3}} \\
 \sin^2 \phi &= \frac{1}{3} \left(\cos^2 \theta (1 + \tan \theta)^2 \right)
 \end{aligned}$$



$$\begin{aligned}
\cos^2 \phi &= 1 - \sin^2 \phi \\
&= 1 - \frac{1}{3} \left[\cos^2 \theta (1 + \tan^2 \theta)^2 \right] \\
&= 1 - \frac{1}{3} \left[\cos^2 \theta \left(1 + \frac{\sin^2 \theta}{\cos^2 \theta} \right)^2 \right] \\
&= 1 - \frac{1}{3} \left[\cos^2 \theta \times \frac{(\cos^2 \theta + \sin^2 \theta)^2}{\cos^2 \theta} \right] \\
&= 1 - \frac{1}{3} \times (\cos^2 \theta + 2\sin \theta \cos \theta + \sin^2 \theta) \\
&= 1 - \frac{1}{3} (1 + 2\sin \theta \cos \theta) \\
&= \frac{2}{3} + \frac{2}{3} \sin \theta \cos \theta \\
&= \frac{2}{3} (1 + \sin \theta \cos \theta)
\end{aligned}$$

20



$$\begin{aligned} \cos \beta &= \frac{5+5-2}{2 \times 5} \\ &= \frac{8}{10} \\ &= \frac{4}{5} \end{aligned}$$

$$\begin{aligned} \frac{BX}{x\sqrt{2}} &= \sin \beta \\ BX &= \frac{3}{5} \times x\sqrt{2} \\ &= \frac{3}{5}x \end{aligned}$$

