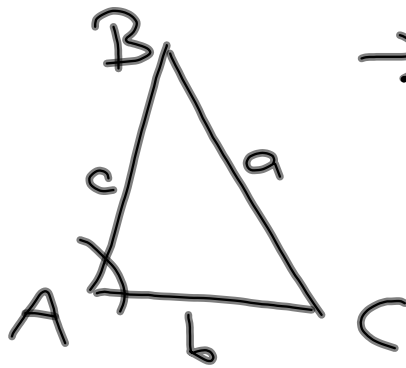


7.2 Law of Cosines



→ any triangle

→ SAS

→ SSS

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

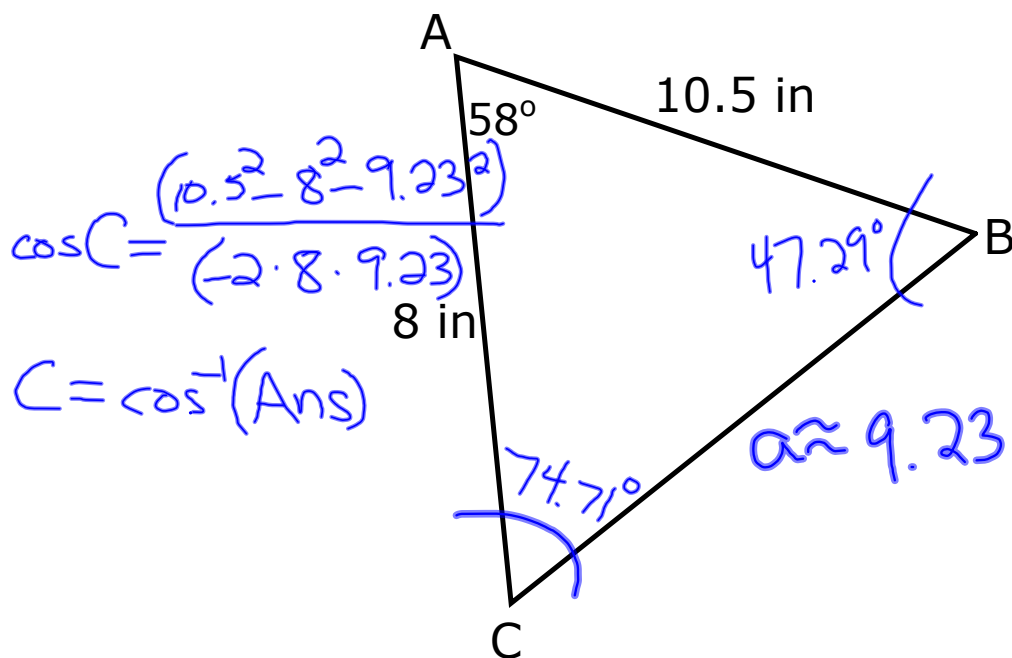
$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$\cos A = \frac{a^2 - b^2 - c^2}{(-2bc)}$$

$$\cos B = \frac{b^2 - a^2 - c^2}{-2ac}$$

$$\cos C = \frac{c^2 - a^2 - b^2}{-2ab}$$

Solve triangle ABC



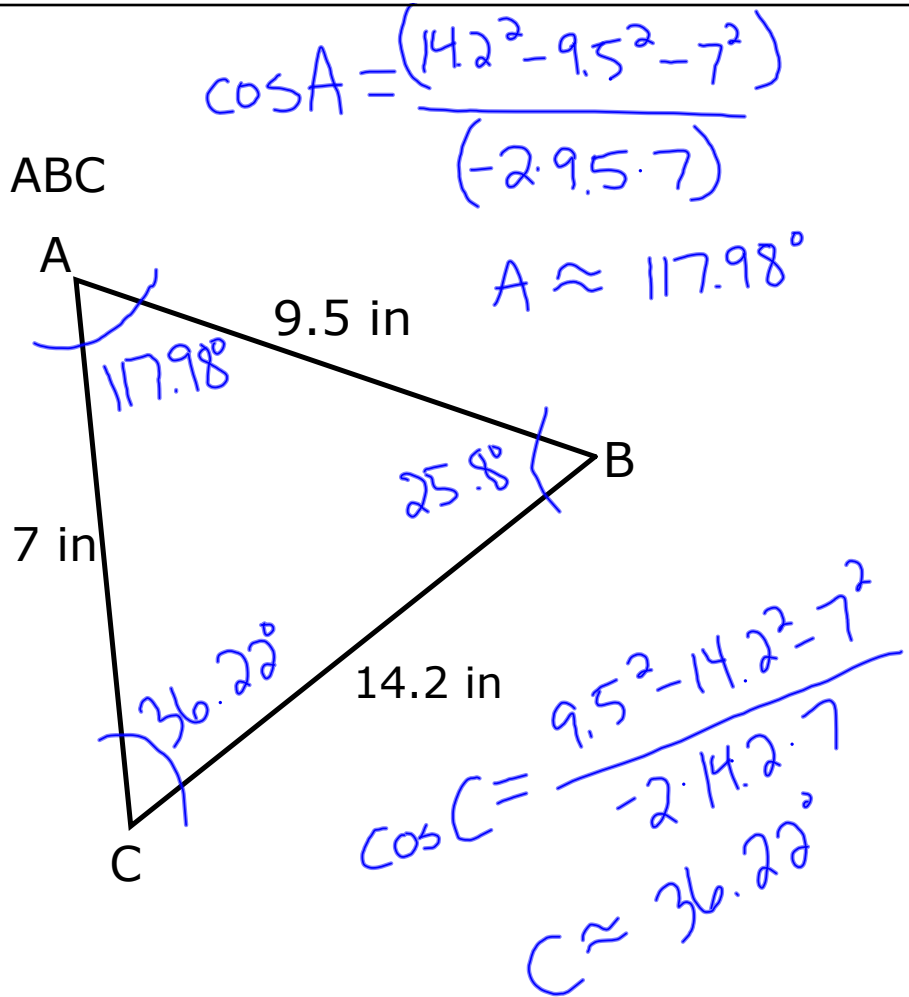
$$\cos C = \frac{(10.5^2 - 8^2 - 9.23^2)}{(-2 \cdot 8 \cdot 9.23)}$$

$$C = \cos^{-1}(\text{Ans})$$

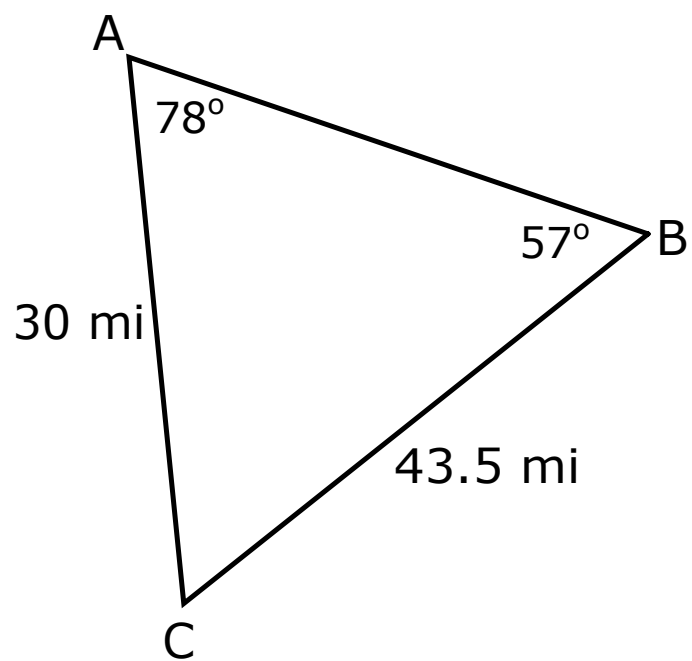
$$a^2 = 10.5^2 + 8^2 - 2(10.5)(8)\cos 58^\circ$$

$$a = \sqrt{(\text{Ans})} \approx 9.23$$

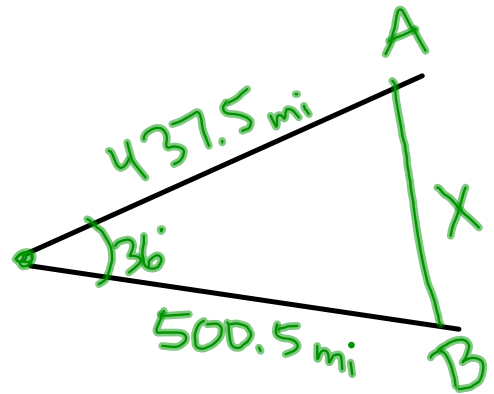
Solve triangle ABC



Solve triangle ABC



ex) 2 trains leave the station on dif. tracks that form a 36° angle. Train A travels @ 125 mph & Train B travels @ 143 mph. How far apart after $3\frac{1}{2}$ hrs?



$$D_A = rt = 125(3.5) = 437.5$$

$$D_B = 143(3.5) = 500.5$$

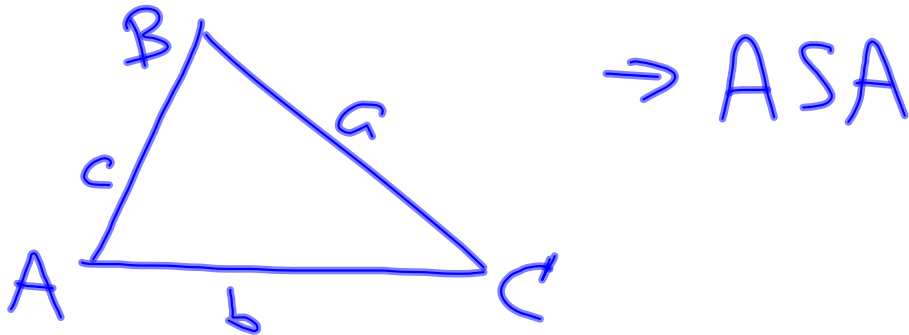
$$X^2 = 437.5^2 + 500.5^2 - 2(437.5)(500.5)\cos 36^\circ$$

$$X = 295.99 \text{ mi}$$

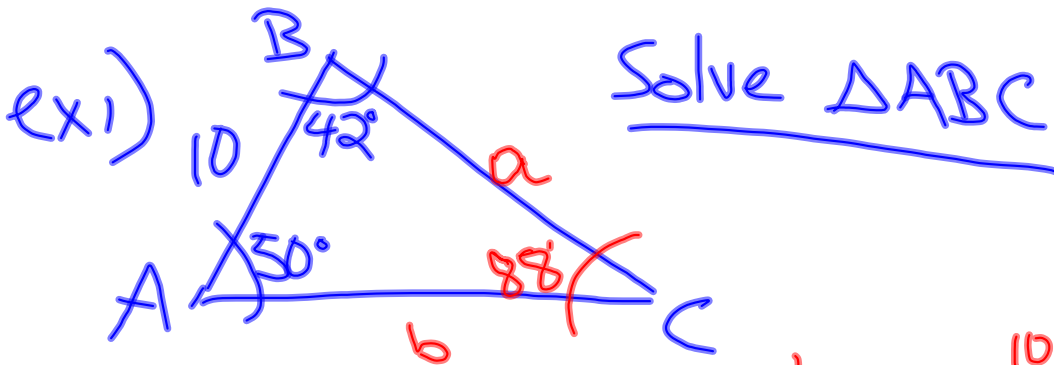
p485

19-25 all

7.3 Law of Sines



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$



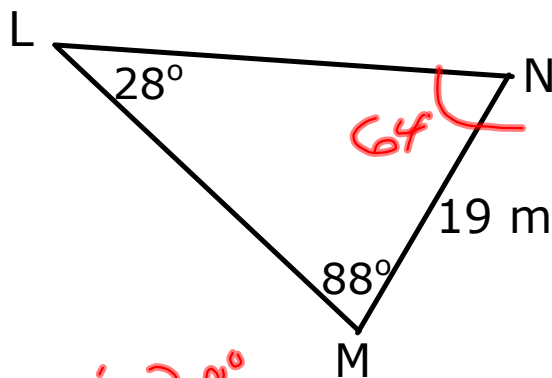
$$\frac{a}{\sin 50^\circ} = \frac{10}{\sin 88^\circ}$$

$$a = \frac{10}{\sin 88} \cdot \sin 50 \approx 7.67$$

$$\frac{b}{\sin 42} = \frac{10}{\sin 88}$$

$$b = \frac{10 \sin 42}{\sin 88} \approx 6.70$$

Solve triangle LMN



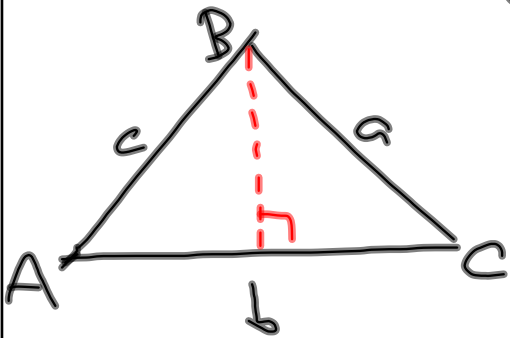
$$\frac{\sin 64}{n} = \frac{\sin 28}{19}$$

$$n \sin 28 = 19 \sin 64$$

$$n = \frac{19 \sin 64}{\sin 28} \approx 36.35 \text{ m}$$

$$\frac{m}{\sin 88} = \frac{19}{\sin 28}$$
$$m = 40.45 \text{ m}$$

Area of Any \triangle



\rightarrow SAS

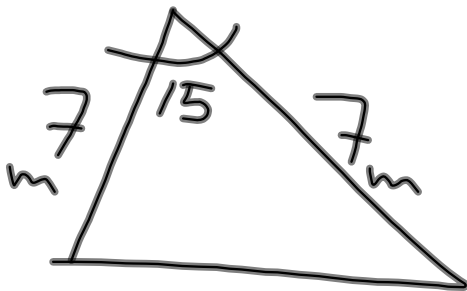
$$A = \frac{1}{2}bh$$

$$\text{Area} = \frac{1}{2}bc \cdot \sin A$$

$$= \frac{1}{2}ac \cdot \sin B$$

$$= \frac{1}{2}a \cdot b \cdot \sin C$$

ex)



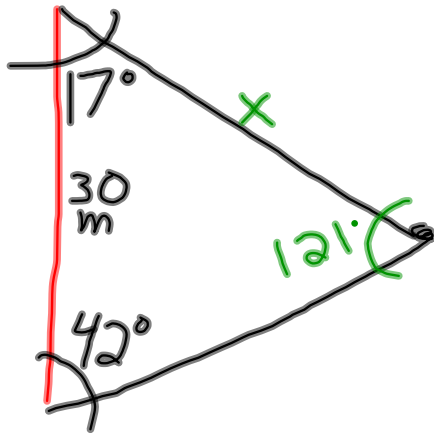
$$A = \frac{1}{2}(7)(7)\sin 15^\circ$$

$$A = 6.34 \text{ m}^2$$

Find the area

ex)

Find the area



$$\frac{x}{\sin 42} = \frac{30}{\sin 121}$$

$$x = \frac{30 \sin 42}{\sin 121}$$

$$x \approx 23.42$$

$$A = \frac{1}{2} (30)(23.42) \sin 17^\circ$$

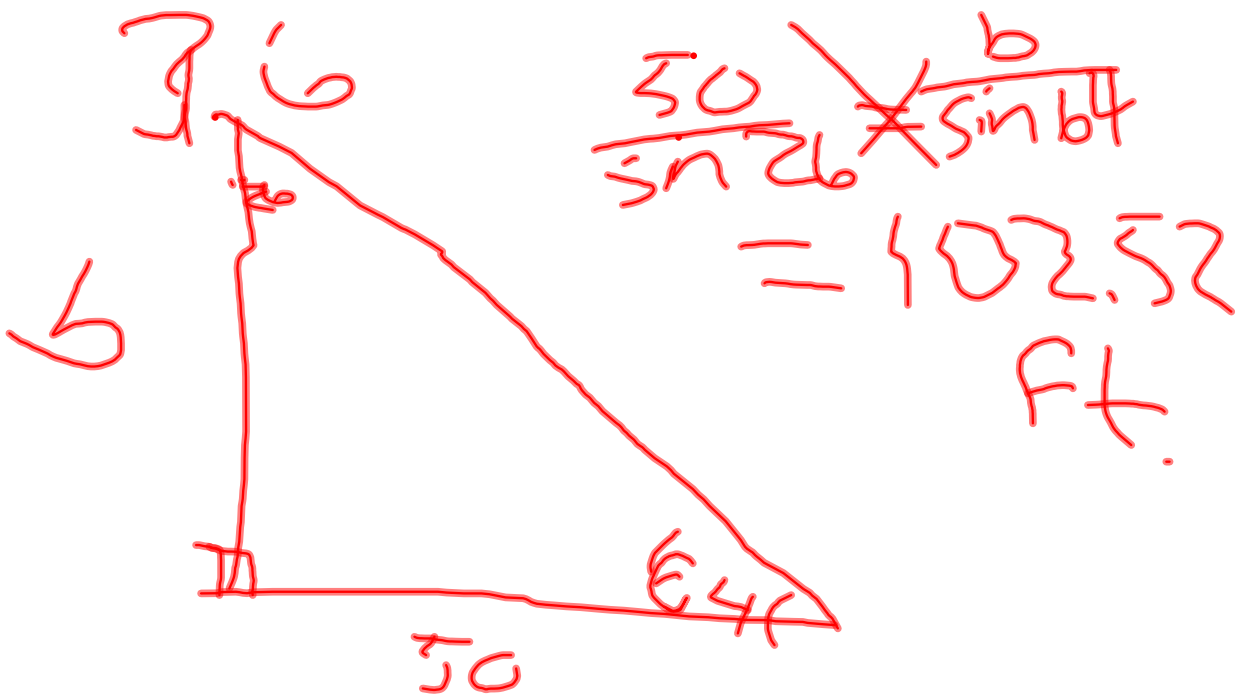
$$A \approx 102.71$$

$$A = 102.69$$

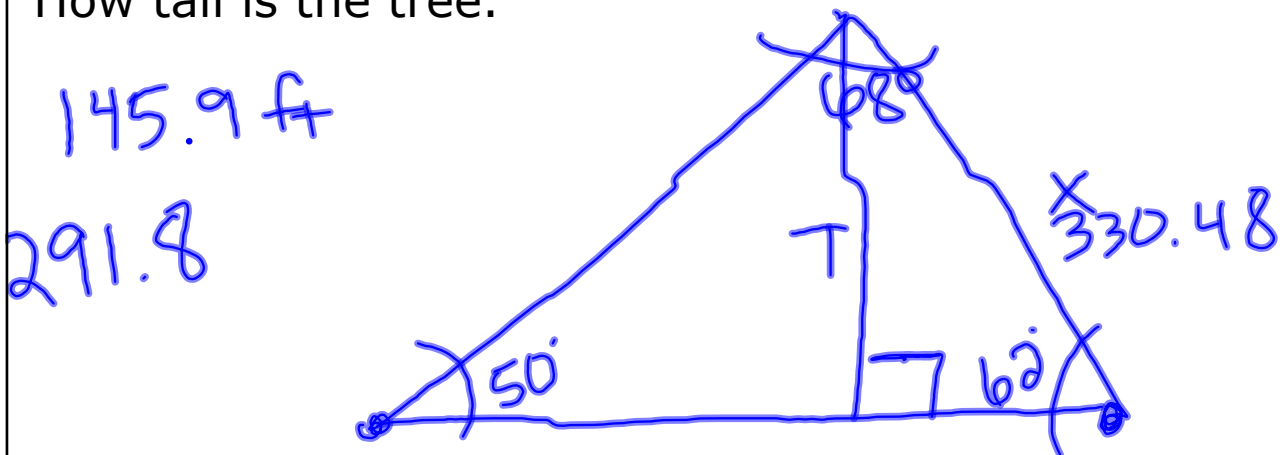
p497

40-48 all

ex1) A tree casts a 50-ft shadow on level ground. The angle of elevation from the tip of the shadow to the tree top is 64 degrees. How tall is the tree?



2) 2 people stand 400 feet apart on level ground. A tree grows on the straight line between them. The angle of elevation from each observer to the top of the tree is 50 degrees and 62 degrees respectively. How tall is the tree.



$$\sin 62 = \frac{T}{330.48}$$

400

$$T = 330.48 \sin 62 = \frac{400}{\sin 68} = \frac{X}{\sin 50}$$

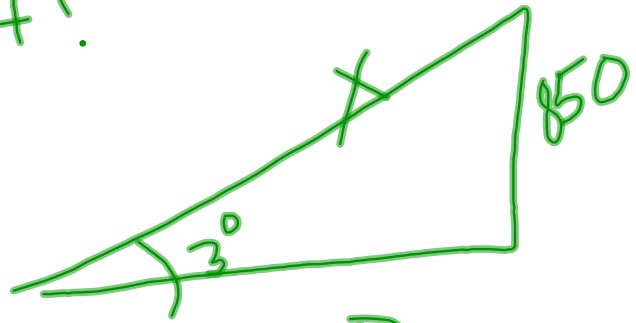
$$T = 291.8 \text{ ft}$$

$$\frac{400 \sin 50}{\sin 68} = X$$

$$X = 330.48$$

Road Rises at an angle of 3° . How long is the road to have an elevation of 850 ft?

1700 ft
16241

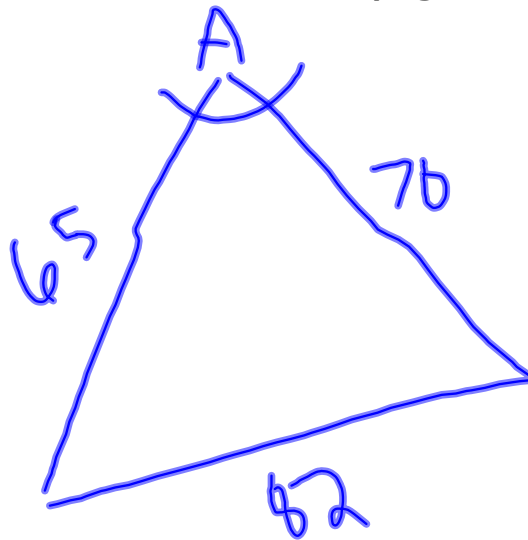


$$\sin 3^\circ = \frac{850}{X}$$

$$X = \frac{850}{\sin 3}$$

3) A triangular deck has sides 65, 70 and 82 feet. You wish to paint the deck, and 1 gallon of paint will cover 400 square feet. How many gallons will you need?

6 gal
5.49



$$A = \frac{1}{2}(s)(s)\sin(K)$$

$$A = \frac{1}{2}(65)(70)\sin A$$

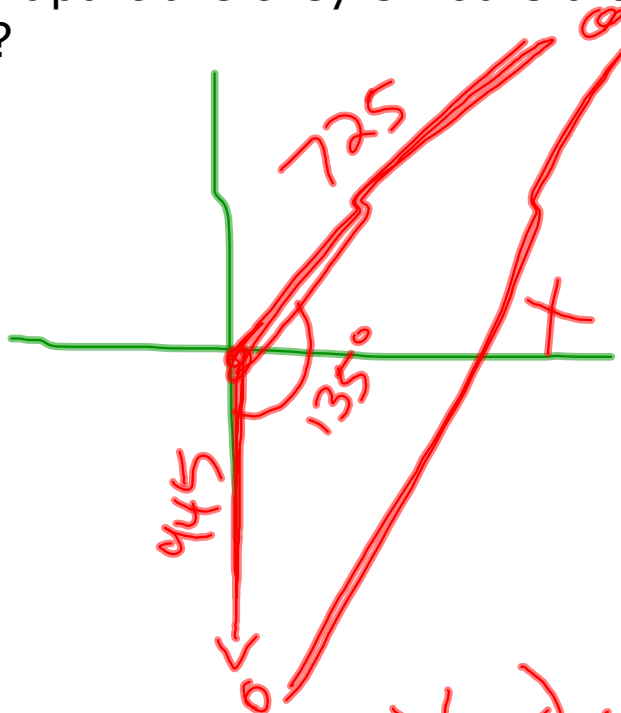
$$\cos A = \frac{82^2 - 65^2 - 70^2}{-2(65)(70)}$$

$$A = 74.70^\circ$$

$$A \approx 2194.37$$

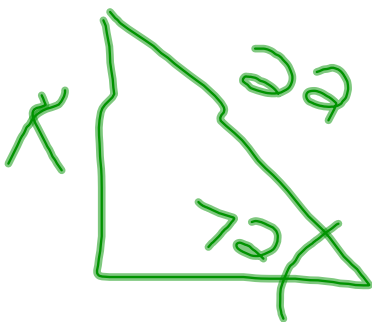
4) A Plane flies due south at 315 mph for 3 hours. A second plane leaves the same airport 30 minutes later and travels directly northeast at 290 mph. How far apart are they 3 hours after the first plane left?

1545.17
677.08
1545.17



$$x^2 = 945^2 + 725^2 - 2(945)(725)\cos 135^\circ$$

5) A 22-ft ladder leans against a vertical wall and forms an angle of 72 degrees with the ground. How high does the top of the ladder hit the wall?



$$\sin 72 = \frac{x}{22}$$

$$22 \cdot \sin 72 = x$$

$$x = 20.92 \text{ ft}$$

P487

28-32 e

P498

50-56 e

(54)

