

East Los Angeles College
Department of Mathematics
Math 241
Test 3

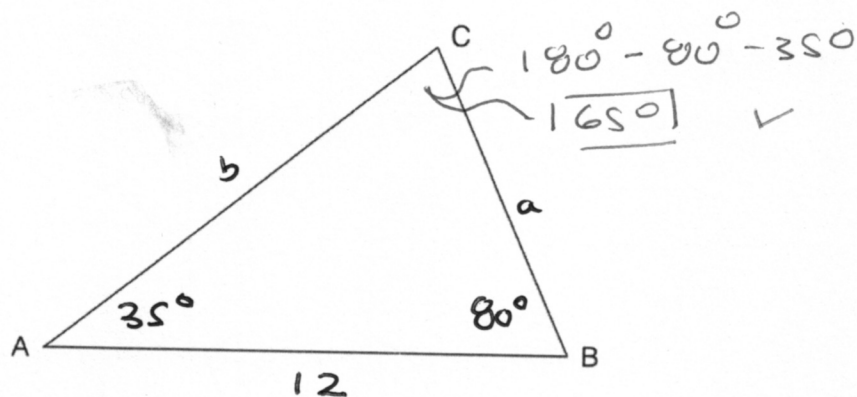
34 ✓

32 ✓

Solutions

Solve the following triangles.

1.



(ASA) law of Sines ✓

$$\frac{\sin(65^\circ)}{12} = \frac{\sin(80^\circ)}{b}$$

$$b = \frac{12 \sin(80^\circ)}{\sin(65^\circ)}$$

$$\boxed{b \approx 13} \quad \checkmark$$

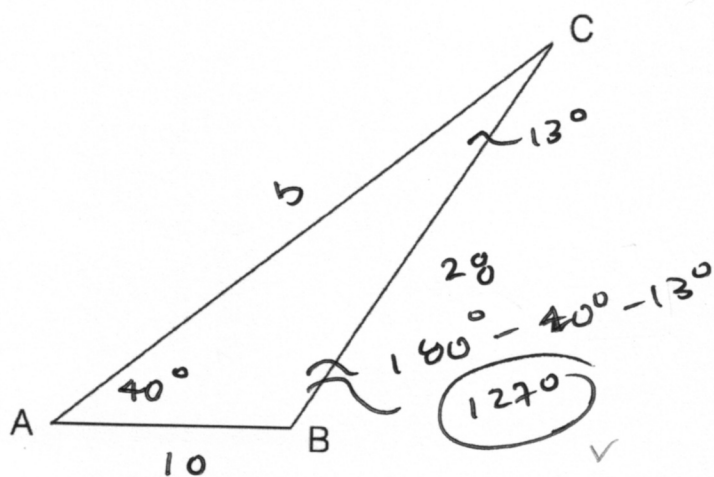
$$\frac{\sin(65^\circ)}{12} = \frac{\sin(35^\circ)}{a}$$

$$a = \frac{12 \sin(35^\circ)}{\sin(65^\circ)}$$

$$\boxed{a \approx 7.6} \quad \checkmark$$

✓
S

2.



$$\frac{\sin(127^\circ)}{b} = \frac{\sin(40^\circ)}{28}$$

$$b = \frac{28 \sin(127^\circ)}{\sin(40^\circ)}$$

$$b \approx 34.8$$

(SSA) law of Sines

$$\frac{\sin(40^\circ)}{28} = \frac{\sin(c)}{10}$$

$$\sin(c) = \frac{10 \sin(40^\circ)}{28}$$

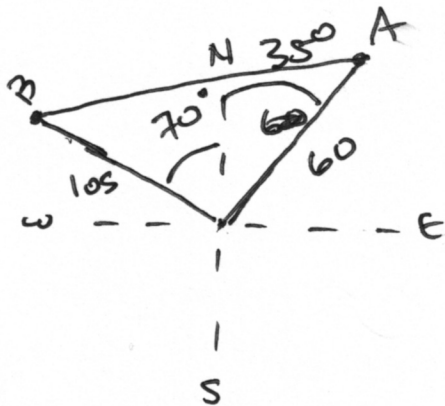
$$\sin(c) = 0.23 ;$$

$$c = \sin^{-1}(0.23)$$

$$c_1 \approx 13^\circ ; c_2 = 180 - 13$$

$$c_2 = 167^\circ$$

3. Two boats leave the same port at the same time. Boat A travels at 20 mph in the direction N35°E and boat B travels at 35 mph in the direction N70°W. In 3 hours, how far apart are the boats?

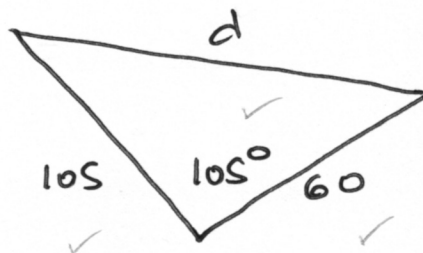


note :

Boat A ; $d = 20 \cdot 3$
 $d = 60 \text{ miles}$

Boat B ; $d = 35 \cdot 3$
 $d = 105 \text{ miles}$

ie,



law of cosines

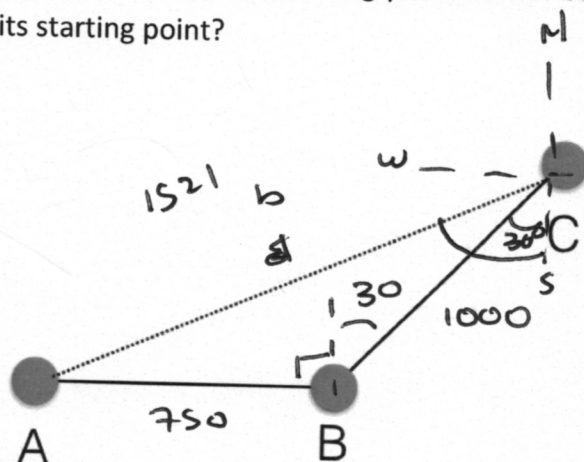
$$d^2 = 105^2 + 60^2 - 2 \cdot 105 \cdot 60 \cos(105^\circ)$$

$$d = \sqrt{\text{answer}} ; d^2 \approx 17,986$$

$$d = \sqrt{17,986} ;$$

$$\underline{d \approx 133.7}$$

4. A plane traveling at 500 mph due East for 1.5 hours changes course to N30E for 2 hours. How far away is the plane from its starting point? What bearing should the plane head in order to return to its starting point?



note
 $\overline{AB} = 500 \cdot 1.5$
 $= 750 \text{ miles}$ ✓

$\overline{BC} = 500 \cdot 2$
 $= 1000 \text{ miles}$ ✓

Starting Point

what is $\overline{AC}$?

law of cosines

$$b^2 = 750^2 + 1000^2 - 2 \cdot 750 \cdot 1000 \cdot \cos(120^\circ)$$

$b = \sqrt{\text{previous}}$

$b \approx 1521 \text{ miles}$ ✓

Bearing from C to A

S 55 W what is θ ?

$\theta = C + 30^\circ$;

what is C ?

law of sines

$$\frac{\sin(C)}{750} = \frac{\sin(120^\circ)}{1521}$$

$\sin(C) = \frac{750 \sin(120^\circ)}{1521}$

$\sin(C) \approx 0.427$

$C \approx \sin^{-1}(0.427)$

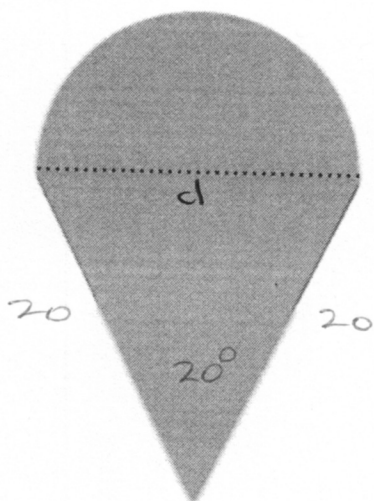
$C \approx 25.3^\circ$ ✓

ie, $\theta = 25.3 + 30$

$\theta = 55.3^\circ \approx 55^\circ$

S 55 W ✓

5. Determine the area and the perimeter of the shaded region.



law of cosines

$$d^2 = 20^2 + 20^2 - 2 \cdot 20 \cdot 20 \cos(20^\circ)$$

$$d = \sqrt{20^2 + 20^2 - 2 \cdot 20 \cdot 20 \cdot \cos(20^\circ)}$$

$$d \approx 7 ; \quad (d \approx 7)$$

$$r = 3.5$$

Area

$$A = \frac{\frac{1}{2} \pi r^2}{\frac{1}{2} \pi r^2} + \frac{\frac{1}{2} d \cdot h}{\frac{1}{2} d \cdot h} ; \quad S = \frac{20 + 20 + 7}{2}$$

$$S = \frac{47}{2} ; \quad (S \approx 23.5)$$

Area

$$A = \frac{\pi \cdot 3.5^2}{2} + \sqrt{23.5(23.5-7)(23.5-20)(23.5-20)}$$

$$A \approx 19.2 + 68.9 ; \quad (A \approx 88.1 \text{ units}^2)$$

perimeter

$$P = \frac{\pi r}{\frac{\pi r}{2}} + 20 + 20$$

$$P = \frac{2\pi r}{2} + 20 + 20$$

$$P = \pi \cdot 3.5 + 40 ; \quad P = 10.99 + 40$$

$$(P \approx 50.99 \text{ units})$$

Use identities to fill in the blanks.

$$7) \sec(x) = \frac{1}{\cos(x)}$$

$$8) \cos(-x) = \cos(x)$$

$$9) \tan(x) = \frac{\sin(x)}{\cos(x)}$$

$$10) \sin^2(x) + \cos^2(x) = 1$$

$$11) \tan^2(x) =$$

$$\sec^2(x) - 1$$

$$12) \csc^2(x) = 1 + \cot^2(x)$$