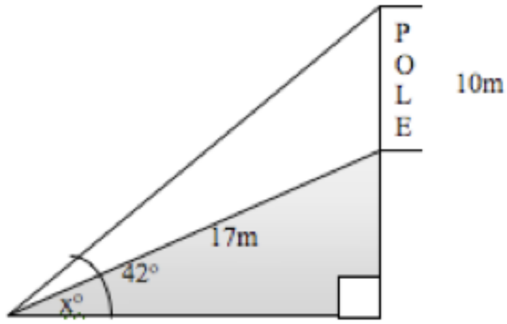
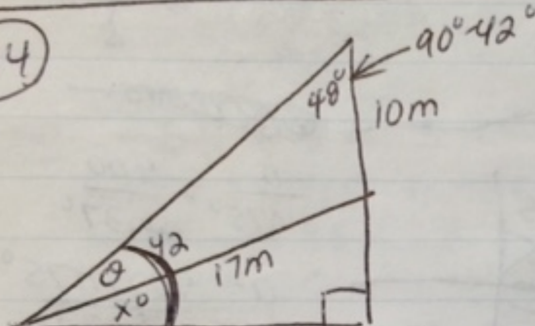
The handwritten problem numbers don't match the review sheet. Ignore them.

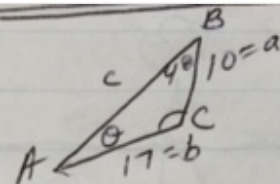
31 *(4 points)*

A 10-meter telephone pole casts a 17-meter shadow directly down the slope when the angle of elevation of the sun is 42° (see figure). Find x, the angle of elevation of the ground.



34





$A = \theta = \underline{\quad}$ $a = 10$

$B = 48°$ $b = 17$

$C = \underline{\quad}$ $c = \underline{\quad}$

$$\frac{10}{\sin A} = \frac{17}{\sin 48°}$$

$$\sin A = \frac{10 \sin 48°}{17}$$

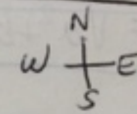
$$A = \sin^{-1}\left(\frac{10 \sin 48°}{17}\right) \approx 25.921° \underset{(2)}{} \ \text{STO} \to A$$

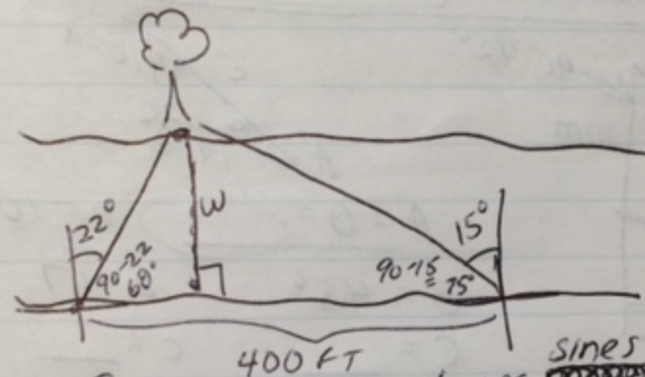
$$x = 42 - \theta$$

$$\boxed{x = 16.078°}$$

32	A surveyor finds that a tree on the opposite bank of a river flowing due east has a bearing of N 22° E from a certain point and a bearing of N 15° W from a point 400 feet downstream. Draw a diagram for this situation. What is the width of the river? *(7 points)*

(32)

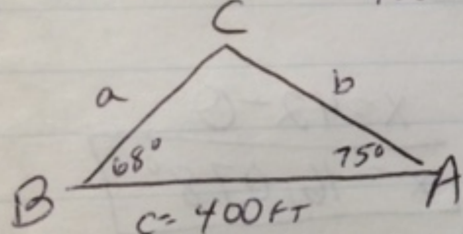




$$\frac{a}{\sin 75°} = \frac{400}{\sin 37°}$$

$$a = \frac{400\sin 75°}{\sin 37°}$$

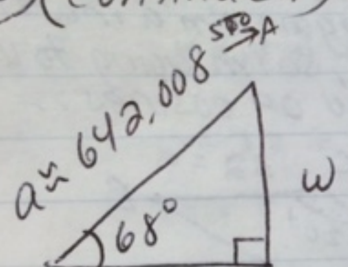
$a \approx 642.008$
STO→A



use law of ~~cosines~~ sines to find either a or b...
then use sohcahtoa in right Δ to find width...

$C = 180-(68+75)$
$= 37°$

(32)(continued)



$$\sin 68° = \frac{w}{a}$$

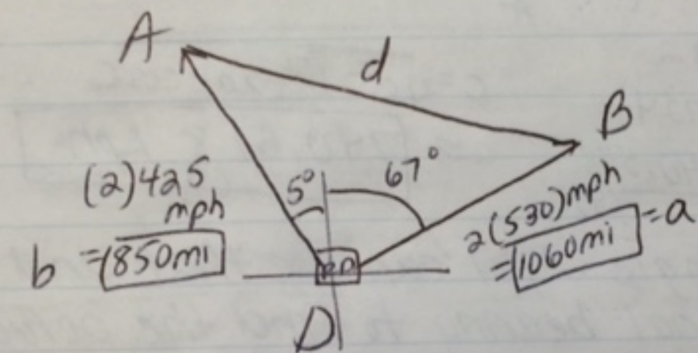
$$a\sin 68° = w$$

$$\boxed{w \approx 595.259 \text{ FT} \ (60)}$$

width of river

33	Two planes leave Raliegh-Durham Airport at approximately the same time. One is flying 425 miles per hour at a bearing 355° and the other is flying 530 miles per hour at a bearing of 67°. Draw a figure that gives a visual representation of this problem after they have flown 2 hours AND find the distance between the two planes. *(9 points)*

(33)



$A =$ $\quad a = 1060$

$B =$ $\quad b = 850$

$D = 67 + 5 = 72°$ $\quad d =$ ____

$d = \sqrt{a^2 + b^2 - 2ab\cos D} \approx \boxed{1135.452 \text{ miles}}$

SPC - ch. 6A review solns - p. 1

① $A = 95°$ $a = 12$

$B =$ ___ $b =$ ___

$C = 40°$ $c =$ ___

(A)

$B = 180 - (95+40) = 45°$ (so NOT C or D)

logically, $\angle B > \angle C$ so side $b >$ side c which means IT's NOT B. (so IT HAS to be A)

but, if you want to do the math...

$$\frac{12}{\sin 95°} = \frac{c}{\sin 40°}$$

$$c \sin 95° = 12 \sin 40°$$

$$c = \frac{12 \sin(40°)}{\sin(95°)} \approx 7.7$$

(A)

---

② $A = 40°$ $a =$ ___

$B = 32°$ $b = 11$

$C =$ ___ $c =$ ___

$C = 180 - (40+32) = 180 - 72 = 108°$ (so NOT A)

logically, $\angle A > \angle B$ so $a < b$... so $a > 11$

which means IT's NOT A, B, D ... so (C)

but if you want to do the math...

$$\frac{a}{\sin 40°} = \frac{11}{\sin 32°}$$

$$a \sin 32° = 11 \sin 40°$$

$$a = \frac{11 \sin 40°}{\sin 32°} \approx 13.3$$ (C)

---

③ $A = 33°$ $a =$ ___

$B = 68°$ $b = 8$

$C =$ ___ $c =$ ___

$C = 180 - (33+68) = 79°$ ← so NOT B)

Notice logically

$(\angle C) > (\angle B) > (\angle A)$ so...

$c > b > a$

$c > 8 > a$ ← the only ans that works is (A)

$8.5 > 8 > 4.7$

SPC - ch.6A review soln - p.2

(3) (continued)

If you want to do the math...

$$\frac{a}{\sin 33^\circ} = \frac{8}{\sin 68^\circ}$$

$$a \sin 68^\circ = 8 \sin 33^\circ$$

$$a = \frac{8 \sin 33^\circ}{\sin 68^\circ}$$

$$a \approx 4.7$$

(A)

---

(4) $A = 32^\circ$ $\quad a = 18$

$B =$ ____ $\quad b = 12$

$C =$ ____ $\quad c =$ ____

$$\frac{18}{\sin 32^\circ} \times \frac{12}{\sin B}$$

$$18 \sin B = 12 \sin 32^\circ$$

$$\sin B = \frac{12 \sin 32^\circ}{18}$$

$$B = \sin^{-1}(12 \sin(32)/18) \approx 20.7^\circ$$

← this was dumb... all the ans have $B = 20.7^\circ$ so I could have just assumed that to be true (except C)

$$C = 180^\circ - (32^\circ + 20.7^\circ)$$

$$= 127.3^\circ$$ ← so NOT C or B

Now use logic

$C > A > B$ $\quad$ so $\quad c > a > b$

$127.3^\circ \quad 32^\circ \quad 20.7^\circ$ $\quad\quad c > 18 > 12$

so $c > 18$ ... (D)

OR use math

$$\frac{c}{\sin(127.3^\circ)} = \frac{18}{\sin 32^\circ}$$

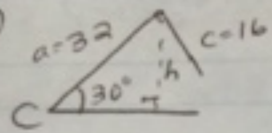
$$c \sin 32^\circ = 18 \sin(127.3^\circ)$$

$$c = 18 \sin(127.3^\circ)/\sin 32^\circ$$

$$\boxed{c \approx 27.0}$$

SPC - ch. 6A review solns - p. 3

(5)

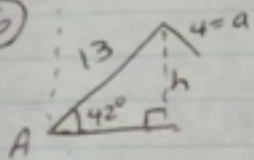


$h = 32\sin 30° = 16$

$c = h$ so $\boxed{\text{ONE } \Delta}$

(B)

(6)

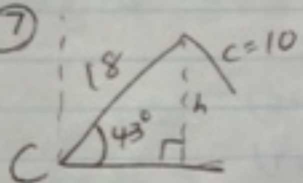


$h = 13\sin 42° \approx 8.699$

$a < h$ so $\boxed{\text{NO } \Delta}$

(C)

(7)

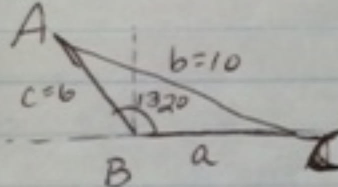


$h = 18\sin 43° \approx 12.276$

$c < h$ so $\boxed{\text{NO } \Delta}$

(A)

(8)



ONE Δ

A = ___	a = ___
B = 132°	b = 10
C = ___	c = 6

$$\frac{10}{\sin 132°} = \frac{6}{\sin C}$$

$$10\sin C = 6\sin 132°$$

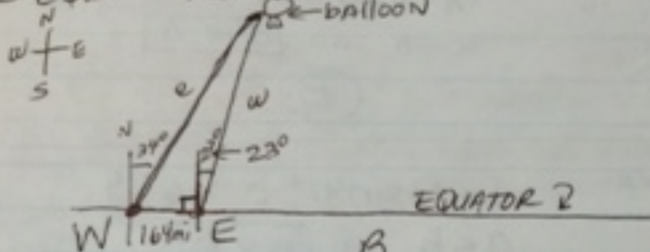
$$\sin C = \frac{6\sin 132°}{10}$$

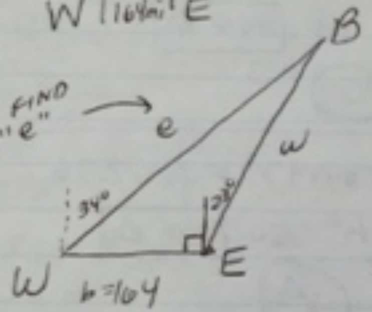
$$C = \sin^{-1}\left(\frac{6\sin 132°}{10}\right) \approx 26.48 = 26.5°$$

ANS (C)

(NO reason to solve the rest of the Δ)

(9) Equator runs WEST TO EAST (or EAST to WEST)





$W = 90 - 34 = 56°$ $\quad w =$

$E = 90 + 23 = 113°$ $\quad e =$

$B = 11°$ $\quad b = 164$ mi

$B = 180 - (W+E)$

$= 180 - (169)$

$B = 11°$

use LAW OF SINES...

$$\frac{164}{\sin 11°} = \frac{e}{\sin 113°}$$

$$e \sin 11° = 164 \sin 113°$$

$$e = \frac{164 \sin 113°}{\sin 11°} \approx 791.2 \text{ mi}$$

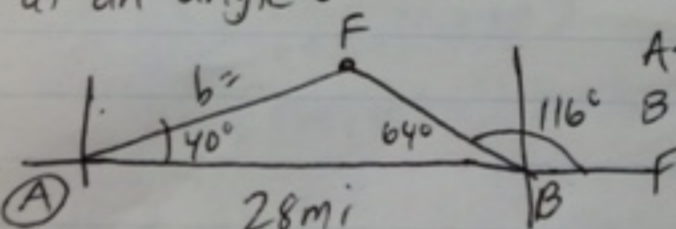
(A)

---

(10) N / W E / S

* super badly worded... they refer to the angles in the mathy sense (where 0° is ⊕ x-axis and we turn counter clockwise... like unit circle)

the HINT is that they say "at an angle of" NOT "bearing"



$A = 40°$ $\quad a = \_\_\_$

$B = 180 - 116 = 64°$ $\quad b =$

$F = 76°$ $\quad f = 28$ mi

$180° - (A+B)$

see next page

SPC-ch.6A review soln - p.5

(10) (continued)

D

$\frac{28}{\sin 76^\circ} \times \frac{b}{\sin 64^\circ}$

$b \sin 76^\circ = 28 \sin 64^\circ$

$b = \frac{28 \sin 64^\circ}{\sin 76^\circ} \approx 25.9 = \boxed{26 \text{ miles}}$

---

(11) $A =$ $\quad a = 20$ $\quad \cos A = \frac{b^2+c^2-a^2}{2bc}$

$B =$ $\quad b = 18$

$C =$ $\quad c = 23$ $\quad A = \cos^{-1}((b^2+c^2-a^2)/(2bc))$

$A = 56.8^\circ$

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

$C = 180 - (A+B)$

$C = 74.4^\circ$

$B = \cos^{-1}((a^2+c^2-b^2)/(2ac))$

$\approx 48.8^\circ$

B

---

(12) $A = 51^\circ$ $\quad a =$ $\quad a^2 = b^2+c^2-2bc\cos A$

$B =$ $\quad b = 14$ $\quad a = \sqrt{(14^2+8^2-2 \cdot 14 \cdot 8 \cos 51^\circ)}$

$C =$ $\quad c = 8$ $\quad a \approx 10.9$ D

$\text{Area} = \frac{1}{2}ab\sin C = \frac{1}{2}bc\sin A = \frac{1}{2}ac\sin B$

(14) $A = 50^\circ, b = 24, c = 18$ D

$\text{Area} = \frac{1}{2}(24)(18)\sin 50^\circ = \boxed{165.47 \text{ FT}^2}$

oops.. skipped 13...

---

(13) $a = 3.3$ $\quad A = 24.2^\circ$ ← b/c all ans have $A = 24.2^\circ$

$b = 7.9$ $\quad B =$ $\quad$ all ans have different B.. so find B..

$c = 6.6$ $\quad C =$ $\quad B = \cos^{-1}((a^2+c^2-b^2)/(2ac))$

$\boxed{B \approx 100.5^\circ}$ B

SPC - ch. 6A review ANS p. 6

(15) Area $= \frac{1}{2} ac \sin B = \frac{1}{2} \cdot 11 \cdot 21 \cdot \sin 73°$

$= 110.45 \text{ cm}^2$ (B)

---

(16) $a = 7, b = 13, c = 4$ ← Does not make a $\triangle$

(two smallest sides must sum to more than the largest side) (A)

$7 + 4 = 11 \quad 11 < 13$

Heron's Formula:

$S = \frac{a+b+c}{2}$ ← sum of all three sides

$a = 17$
$b = 11.5$
$c = 15.1$

Area $= \sqrt{s(s-a)(s-b)(s-c)}$

---

(17) $11.5 + 15.1 > 17$ ✓

$s = (11.5 + 15.1 + 17)/2 = 21.8$

Area $= \sqrt{(21.8(21.8-11.5)(21.8-17)(21.8-15.1)}$

$= 84.98$ (C)

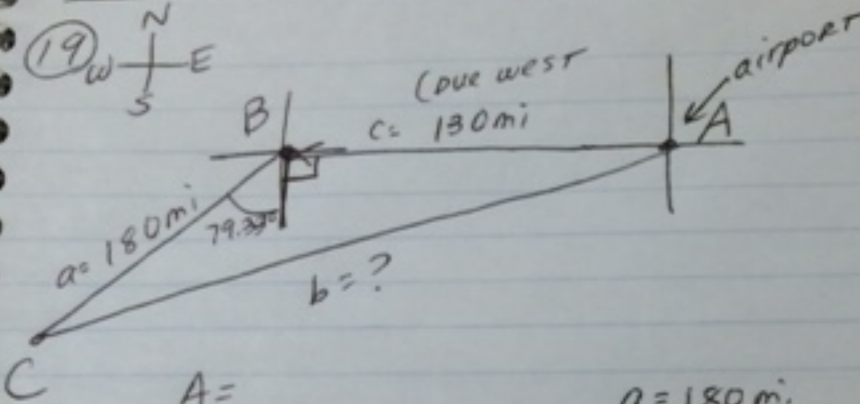
---

(18) $10.4 + 27.6 = 38 < 40$ No $\triangle$

(C)

SPC - ch. 6A review ANS - p. 7

(19)



A = ____   a = 180 mi.

B = 90 + 79.33 = 169.33°   b =

C = ____   c = 130 mi

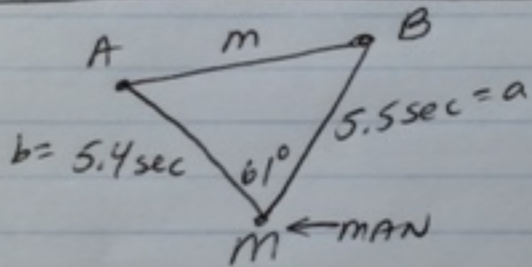
$b^2 = a^2 + c^2 - 2ac\cos B$

$b = \sqrt{(180^2 + 130^2 - 2 \cdot 180 \cdot 130\cos(169.33°))}$

$b \approx 308.69 = \boxed{309 \text{ miles}}$ D

---

(20)



FIND m.

$\boxed{1903\ m}$

M = 61°   m =

A =   a = 5.5 sec

B =   b = 5.4 sec

C

$m = \sqrt{(a^2 + b^2 - 2ab\cos(M))}$

$m \approx 5.53\ldots \text{ sec}$

$\text{DISTANCE} = 5.53\text{ sec} \cdot 344\frac{m}{\text{sec}} = 1903.29$