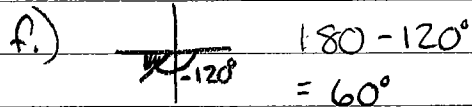
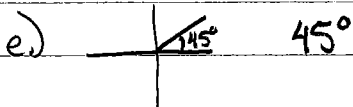
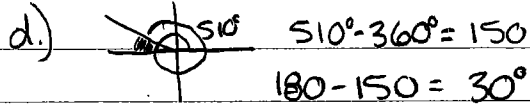
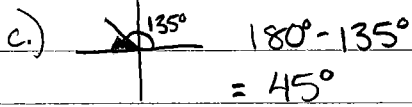
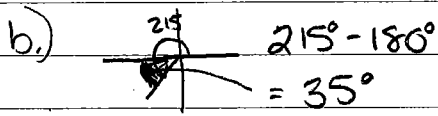
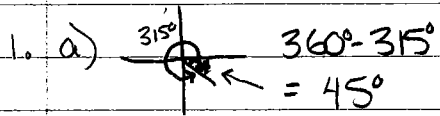
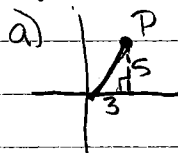


PC11 6.1



2. i) P(3,5)

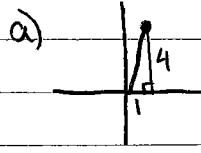


b) $a^2 + b^2 = c^2$
 $3^2 + 5^2 = c^2$
 $34 = c^2$
 $c = \sqrt{34}$

c)
 $\sin \theta = \frac{5}{\sqrt{34}}$
 $\cos \theta = \frac{3}{\sqrt{34}}$
 $\tan \theta = \frac{5}{3}$

d) $\theta = \sin^{-1}\left(\frac{5}{\sqrt{34}}\right)$
 $\theta = 59^\circ$

ii) P(1,4)

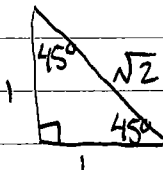
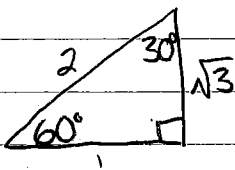


b) $a^2 + b^2 = c^2$
 $1^2 + 4^2 = c^2$
 $17 = c^2$
 $c = \sqrt{17}$

c)
 $\sin \theta = \frac{4}{\sqrt{17}}$
 $\cos \theta = \frac{1}{\sqrt{17}}$
 $\tan \theta = \frac{4}{1}$

d) $\theta = \sin^{-1}\left(\frac{4}{\sqrt{17}}\right)$
 $\theta = 76^\circ$

3.



$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

30°: LS $\tan 30^\circ = \frac{1}{\sqrt{3}}$ RS $\frac{\sin 30^\circ}{\cos 30^\circ} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{2} \div \frac{\sqrt{3}}{2} = \frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

LS = RS

$\therefore \tan 30^\circ = \frac{\sin 30^\circ}{\cos 30^\circ}$

60°: LS $\tan 60^\circ = \sqrt{3}$ RS $\frac{\sin 60^\circ}{\cos 60^\circ} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{2} \div \frac{1}{2} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$

LS = RS

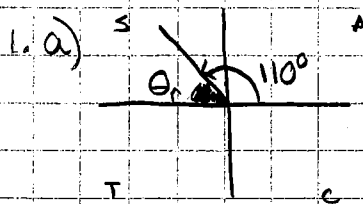
$\tan 60^\circ = \frac{\sin 60^\circ}{\cos 60^\circ}$

45°: LS $\tan 45^\circ = 1$ RS $\frac{\sin 45^\circ}{\cos 45^\circ} = \frac{\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}} = \frac{1}{\sqrt{2}} \div \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{1} = 1$

LS = RS

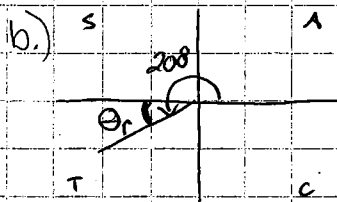
$\tan 45^\circ = \frac{\sin 45^\circ}{\cos 45^\circ}$

Pre-Calculus Math II (6.2 a)



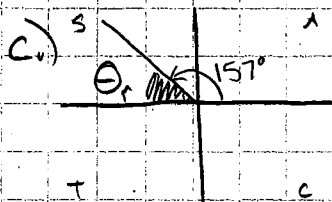
$$\theta_r = 180^\circ - 110^\circ = 70^\circ$$

$$\sin 110^\circ = \sin 70^\circ = 0.940$$



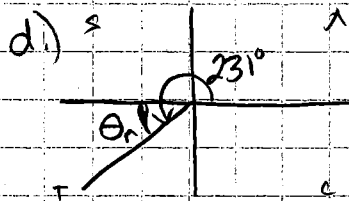
$$\theta_r = 200^\circ - 180^\circ = 20^\circ$$

$$\tan 200^\circ = \tan 20^\circ = 0.364$$



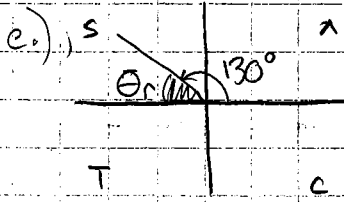
$$\theta_r = 180^\circ - 157^\circ = 23^\circ$$

$$\tan 157^\circ = -\tan 23^\circ = -0.425$$



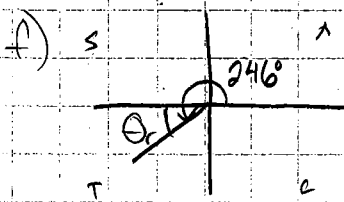
$$\theta_r = 231^\circ - 180^\circ = 51^\circ$$

$$\sin 231^\circ = -\sin 51^\circ = -0.777$$



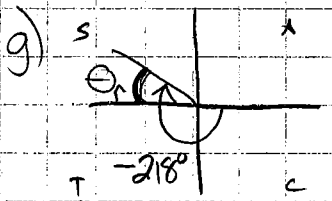
$$\theta_r = 180^\circ - 130^\circ = 50^\circ$$

$$\cos 130^\circ = -\cos 50^\circ = -0.643$$



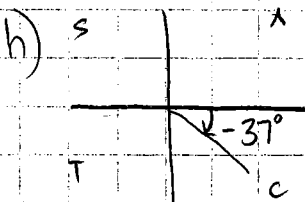
$$\theta_r = 246^\circ - 180^\circ = 66^\circ$$

$$\sin 246^\circ = -\sin 66^\circ = -0.914$$



$$\theta_r = 218^\circ - 180^\circ = 38^\circ$$

$$\tan(-218^\circ) = -\tan 38^\circ = -0.781$$

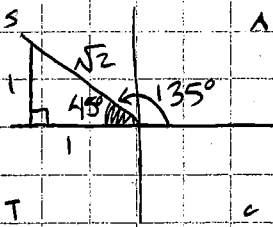


$$\theta_r = 37^\circ$$

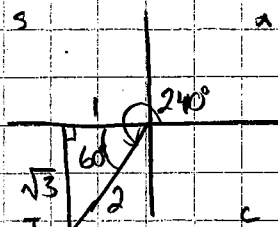
$$\cos(-37^\circ) = \cos 37^\circ = 0.799$$

PC11 6.2a) con't...2.

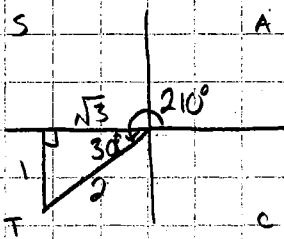
2. a) $\cos(135^\circ) = -\frac{1}{\sqrt{2}}$



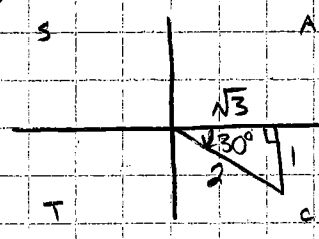
b) $\sin 240^\circ = -\frac{\sqrt{3}}{2}$



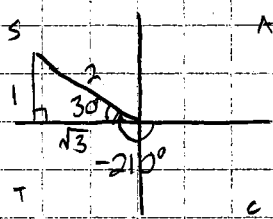
c) $\tan 210^\circ = \frac{1}{\sqrt{3}}$



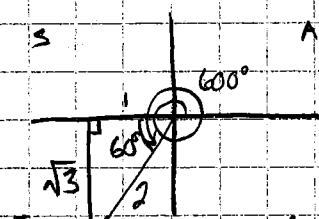
d) $\cos(-30^\circ) = \frac{\sqrt{3}}{2}$



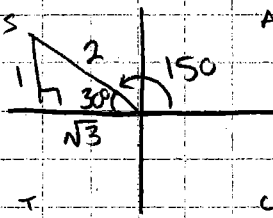
e) $\sin(-210^\circ) = \frac{1}{2}$



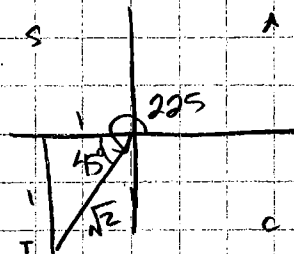
f) $\tan(600^\circ) = \sqrt{3}$



g) $\tan(150^\circ) = -\frac{1}{\sqrt{3}}$



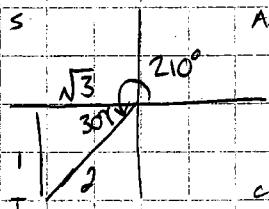
h) $\sin 225^\circ = -\frac{1}{\sqrt{2}}$



3. a) $-2 \tan(210^\circ)$

$= -2 \left(\frac{1}{\sqrt{3}} \right)$

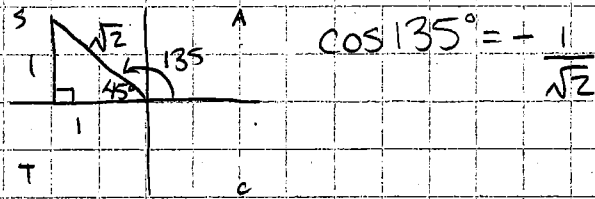
$= -\frac{2}{\sqrt{3}}$



$\tan 210^\circ = \frac{1}{\sqrt{3}}$

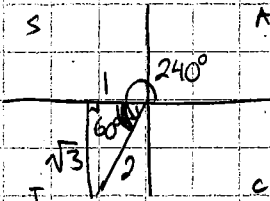
PC11 6.2a con't...3

$$\begin{aligned}
 3.b) \quad & \sqrt{2} \cos(135^\circ) + 1 \\
 & = \sqrt{2} \left(-\frac{1}{\sqrt{2}} \right) + 1 \\
 & = -1 + 1 \\
 & = 0
 \end{aligned}$$



$$\cos 135^\circ = -\frac{1}{\sqrt{2}}$$

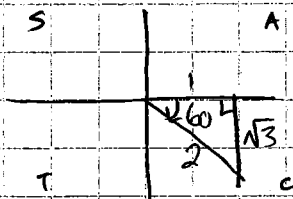
$$\begin{aligned}
 c.) \quad & \cos(135^\circ) + \sin(240^\circ) \\
 & = -\frac{1}{\sqrt{2}} + \frac{-\sqrt{3}}{2} \\
 & = \frac{-1 \cdot \sqrt{2} - \sqrt{3}}{\sqrt{2} \cdot \sqrt{2}} = \frac{-\sqrt{2} - \sqrt{3}}{2}
 \end{aligned}$$



$$\sin 240^\circ = \frac{-\sqrt{3}}{2} \quad \cos 135^\circ = -\frac{1}{\sqrt{2}}$$

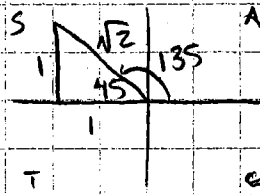
From above

$$\begin{aligned}
 d.) \quad & \sin^2(-60^\circ) \\
 & = (\sin(-60^\circ))^2 \\
 & = \left(\frac{-\sqrt{3}}{2} \right)^2 \\
 & = \frac{3}{4}
 \end{aligned}$$

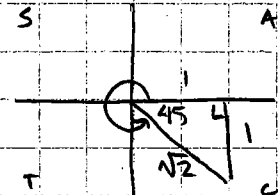


$$\sin(-60^\circ) = \frac{-\sqrt{3}}{2}$$

$$\begin{aligned}
 e.) \quad & (\sin(135^\circ) + \cos(315^\circ))^4 \\
 & = \left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} \right)^4 \\
 & = \left(\frac{2}{\sqrt{2}} \right)^4 = \frac{16}{4} = 4
 \end{aligned}$$

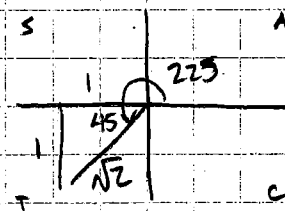


$$\sin 135^\circ = \frac{1}{\sqrt{2}}$$



$$\cos 315^\circ = \frac{1}{\sqrt{2}}$$

$$\begin{aligned}
 f.) \quad & 2 \cos(225^\circ) - \sqrt{2} \\
 & = 2 \left(-\frac{1}{\sqrt{2}} \right) - \sqrt{2} \\
 & = \frac{-2}{\sqrt{2}} - \frac{\sqrt{2} \cdot \sqrt{2}}{\sqrt{2}} \\
 & = \frac{-2 - 2}{\sqrt{2}} \\
 & = \frac{-4}{\sqrt{2}} = \frac{-4 \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{-4\sqrt{2}}{2} = -2\sqrt{2}
 \end{aligned}$$



$$\cos 225^\circ = -\frac{1}{\sqrt{2}}$$

PC11 6.2b

1. a) $\cos A = 0.73$
 $\angle A = \cos^{-1}(0.73)$
 $= 43.1^\circ$

b) $\tan A = 0.512$
 $\angle A = \tan^{-1}(0.512)$
 $= 27.1^\circ$

c) $\cos A = 0.165$
 $\angle A = \cos^{-1}(0.165)$
 $= 80.5^\circ$

d) $\tan A = 0.1976$
 $\angle A = \tan^{-1}(0.1976)$
 $= 11.2^\circ$

e) $\sin A = 0.3324$
 $\angle A = \sin^{-1}(0.3324)$
 $= 19.4^\circ$

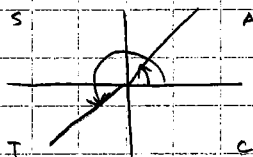
f) $\cos A = 0.6125$
 $\angle A = \cos^{-1}(0.6125)$
 $= 52.2^\circ$

2. a) $\cos B = 0.53$
 $\angle B = 58^\circ$



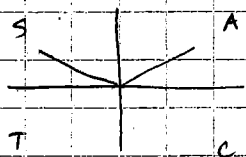
$\angle B_2 = 360^\circ - 58^\circ$
 $= 302.0^\circ$

b) $\tan B = 1.314$
 $\angle B = 52.7^\circ$



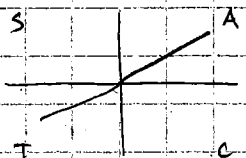
$\angle B_2 = 180^\circ + 52.7^\circ$
 $= 232.7^\circ$

c) $\sin B = 0.65$
 $\angle B = 40.5^\circ$



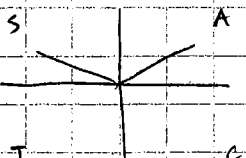
$\angle B_2 = 180 - 40.5$
 $= 139.5$

d) $\tan B = 0.976$
 $\angle B = 44.3$



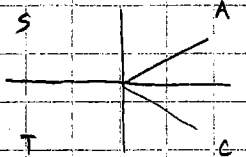
$\angle B_2 = 180 + 44.3$
 $= 224.3$

e) $\sin B = 0.784$
 $\angle B = 51.6^\circ$



$\angle B_2 = 180 - 51.6$
 $= 128.4^\circ$

f) $\cos B = 0.125$
 $\angle B = 82.7^\circ$



$\angle B_2 = 360 - 82.7$
 $= 277.2^\circ$

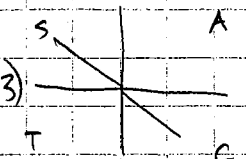
g) $\cos B = -0.235$
 Ref $\angle B = \cos^{-1}(0.235)$
 $= 76.4$



$\angle B_1 = 180 - 76.4$
 $= 103.6^\circ$

$\angle B_2 = 180 + 76.4$
 $= 256.4^\circ$

h) $\tan B = -0.243$
 Ref $\angle B = \tan^{-1}(0.243)$
 $= 13.6$

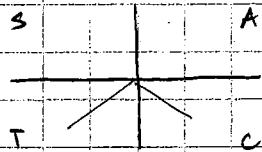


$\angle B_1 = 180 - 13.6$
 $= 166.3^\circ$

$\angle B_2 = 360 - 13.6$
 $= 346.3^\circ$

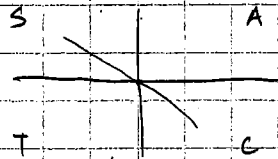
PC11 6.2b con't...2.

2 i.) $\sin B = -0.543$
 Ref $\angle B = \sin^{-1}(0.543)$
 $= 32.9$



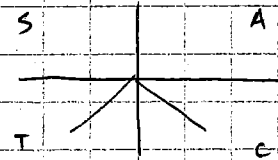
$\angle B_1 = 180 + 32.9 = 212.9^\circ$
 $\angle B_2 = 360 - 32.9 = 327.1^\circ$

j.) $\tan B = -1.2976$
 Ref $\angle B = \tan^{-1}(-1.2976)$
 $= 52.4$



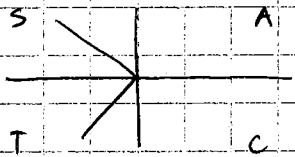
$\angle B = 180 - 52.4 = 127.6^\circ$
 $\angle B_2 = 360 - 52.4 = 307.6^\circ$

k.) $\sin B = -0.8324$
 Ref $\angle B = \sin^{-1}(-0.8324)$
 $= 56.3$



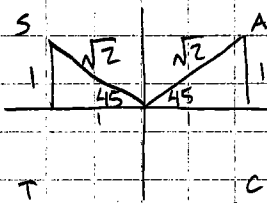
$\angle B = 180 + 56.3 = 236.3^\circ$
 $\angle B_2 = 360 - 56.3 = 303.7^\circ$

l.) $\cos B = -0.255$
 Ref $\angle B = \cos^{-1}(-0.255)$
 $= 75.2$



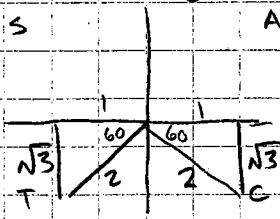
$\angle B_1 = 180 - 75.2 = 104.8$
 $\angle B_2 = 180 + 75.2 = 255.2$

3. a.) $\sin x = \frac{1}{\sqrt{2}}$



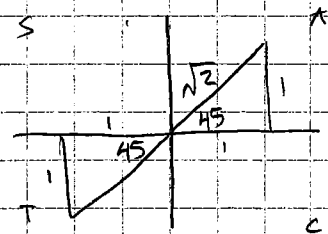
$x = 45^\circ$
 $x = 180 - 45 = 135^\circ$

b.) $\sin x = -\frac{\sqrt{3}}{2}$



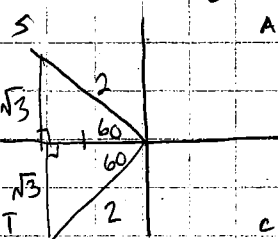
$x = 180 + 60 = 240^\circ$
 $x = 360 - 60 = 300^\circ$

c.) $\tan x = 1$



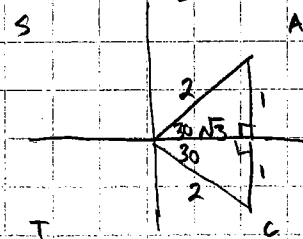
$x = 45^\circ$
 $x = 180 + 45 = 225^\circ$

d.) $\cos x = -\frac{1}{2}$



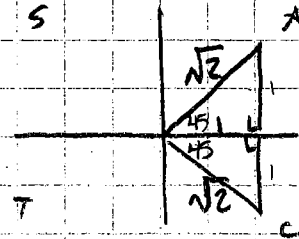
$x = 180 - 60 = 120^\circ$
 $x = 180 + 60 = 240^\circ$

e.) $\cos x = \frac{\sqrt{3}}{2}$



$x = 30^\circ$
 $x = 360 - 30 = 330^\circ$

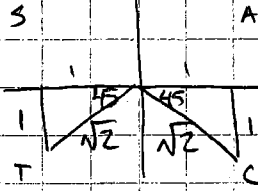
f.) $\cos x = \frac{1}{\sqrt{2}}$



$x = 45^\circ$
 $x = 360 - 45 = 315^\circ$

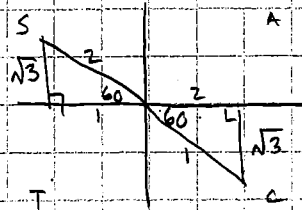
PC11 6.20 cont...3.

3.g) $\sin x = -\frac{1}{\sqrt{2}}$



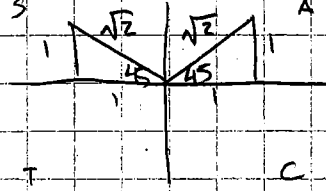
$x = 180 + 45$
 $= 225$
 $x = 360 - 45$
 $= 315$

h.) $\tan x = -\sqrt{3}$



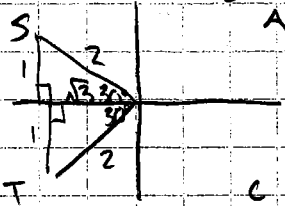
$x = 180 - 60$
 $= 120$
 $x = 360 - 60$
 $= 300$

i.) $\sin x = \frac{\sqrt{2}}{2} = \frac{\sqrt{2}\sqrt{2}}{2\sqrt{2}} = \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}}$



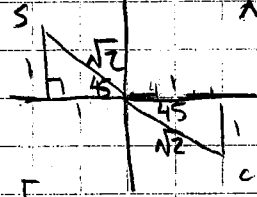
$x = 45$
 $x = 180 - 45$
 $= 135$

j.) $\cos x = -\frac{\sqrt{3}}{2}$



$x = 180 - 30$
 $= 150$
 $x = 180 + 30$
 $= 210$

k.) $\tan x = 1 = \frac{1}{1}$



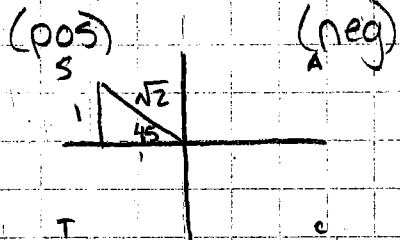
$x = 180 - 45$
 $= 135$
 $x = 360 - 45$
 $= 315$

l.) $\cos x = -\frac{1}{\sqrt{2}}$



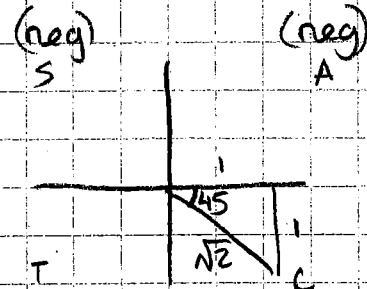
$x = 180 - 45$
 $= 135$
 $x = 180 + 45$
 $= 225$

4. $\sin x = \frac{1}{\sqrt{2}}$ & $\cos x < 0$



$x = 180 - 45$
 $= 135$

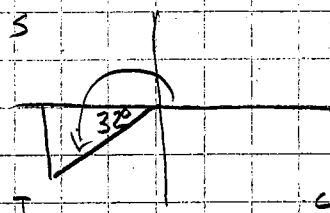
5. $\tan x = -1$ & $\sin x < 0$



$x = 360 - 45$
 $= 315$

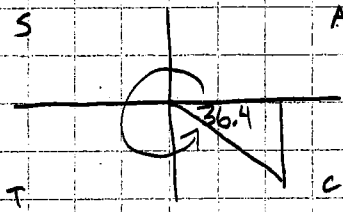
PC11 6.2b con't... 4

6. $\sin A < 0$ + $\tan A = 0.625$
 $\angle A = \tan^{-1}(0.625)$
 $= 32.0^\circ$
 (ref \angle)
 $\sin \rightarrow \text{neg}$
 $\tan \rightarrow \text{pos}$



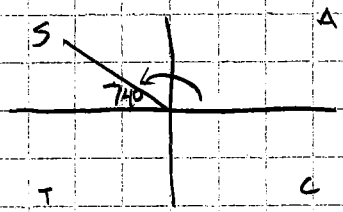
$\angle A = 180 + 32$
 $= 212.0^\circ$

7. $\cos A > 0$ $\sin A = -0.593$
 $A_r = \sin^{-1}(0.593)$
 $= 36.4^\circ$
 (ref \angle)
 $\cos \rightarrow \text{pos}$
 $\sin \rightarrow \text{neg}$



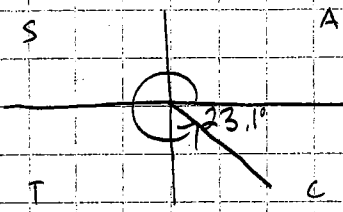
$\angle A = 360 - 36.4$
 $= 323.6^\circ$

8. $\tan A < 0$ + $\cos A = -0.276$
 $A_r = \cos^{-1}(0.276)$
 $= 74.0^\circ$
 (ref angle)
 $\tan \rightarrow \text{neg}$
 $\cos \rightarrow \text{neg}$



$\angle A = 180 - 74^\circ$
 $= 106^\circ$

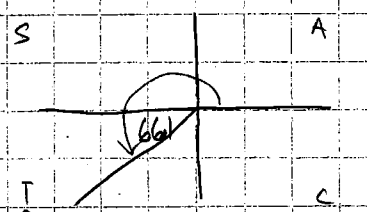
9. $\sin B = -0.3926$ + $\tan B < 0$
 $B_r = \sin^{-1}(0.3926)$ $\sin \rightarrow \text{neg}$
 $B_r = 23.1^\circ$ $\tan \rightarrow \text{neg}$



$\angle B = 360 - 23.1^\circ$
 $= 336.9^\circ$

$\cos 336.9 = 0.9198$
 If there is no rounding: $= 0.9197$

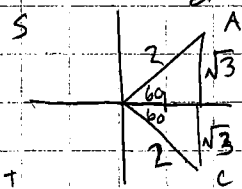
10. $\tan B = 2.26$ + $\cos B < 0$
 $B_r = \tan^{-1}(2.26)$ $\cos \rightarrow \text{neg}$
 $= 66.1$ $\tan \rightarrow \text{pos}$



$\angle B = 180 + 66.1$
 $= 246.1$

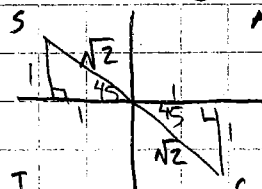
$\sin 246.1 = -0.9143$
 If there is no rounding: $= -0.9145$

11. a) $2\cos x - 1 = 0$
 $2\cos x = 1$
 $\cos x = \frac{1}{2}$



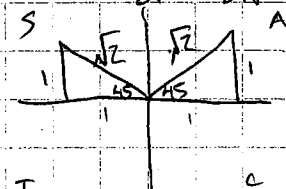
$x = 60^\circ$
 $x = 360 - 60$
 $= 300^\circ$

b) $3\tan x + 3 = 0$
 $3\tan x = -3$
 $\tan x = \frac{-3}{3} = \frac{-1}{1}$



$x = 180 - 45$
 $= 135^\circ$
 $x = 360 - 45$
 $= 315^\circ$

c) $2\sin x - \sqrt{2} = 0$
 $2\sin x = \sqrt{2}$
 $\sin x = \frac{\sqrt{2}}{2} = \frac{\sqrt{2} \cdot \sqrt{2}}{2\sqrt{2}} = \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}}$



$x = 45^\circ$
 $x = 180 - 45$
 $= 135^\circ$

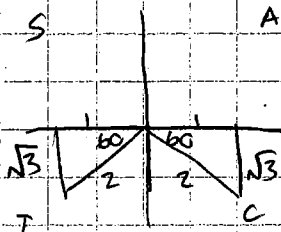
PC11 6.2b cont., 5.

11. d) $2\sqrt{3} + 4\sin x = 0$

$4\sin x = -2\sqrt{3}$

$\sin x = \frac{-2\sqrt{3}}{4}$

$\sin x = -\frac{\sqrt{3}}{2}$



$x = 180 + 60$

$= 240^\circ$

$x = 360 - 60$

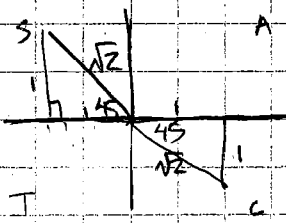
$= 300^\circ$

e) $1 - 3\tan x = 4$

$-3\tan x = 3$

$\tan x = \frac{3}{-3}$

$\tan x = -1$



$x = 180 - 45$

$= 135^\circ$

$x = 360 - 45$

$= 315^\circ$

f) $7\sin x - 2 = 4$

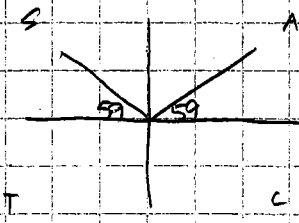
$+2 +2$

$7\sin x = 6$

$\sin x = \frac{6}{7}$

no special triangle

$\angle x = \sin^{-1}(\frac{6}{7}) = 59.0^\circ$



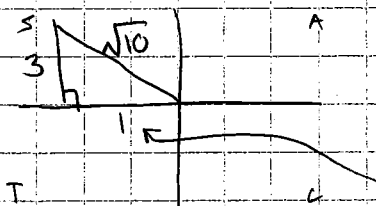
$x = 59^\circ$

$x = 180 - 59^\circ$

$= 121^\circ$

12. $\sin x = \frac{3}{\sqrt{10}}$ + $\tan x < 0$

$\sin \rightarrow \text{pos.}$
 $\tan \rightarrow \text{neg.}$



$x^2 + 3^2 = (\sqrt{10})^2$

$x^2 + 9 = 10$

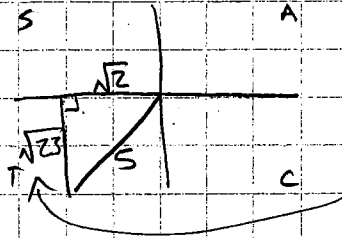
$x^2 = 1$

$x = 1$

$\tan x = -3$

13. $\cos x = -\frac{\sqrt{2}}{5}$ + $\sin x < 0$

$\cos \rightarrow \text{neg.}$
 $\sin \rightarrow \text{neg.}$



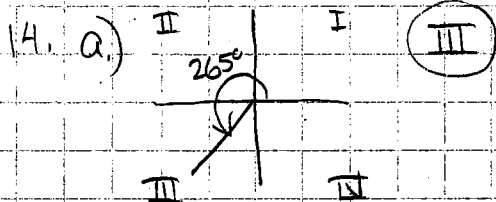
$y^2 + (\sqrt{2})^2 = 5^2$

$y^2 + 2 = 25$

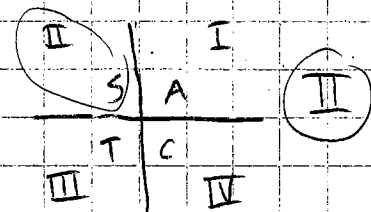
$y^2 = 23$

$y = \sqrt{23}$

$\tan x = \frac{\sqrt{23}}{\sqrt{2}}$



b) $\sin x > 0$ (pos)
 $\cos x < 0$ (neg)



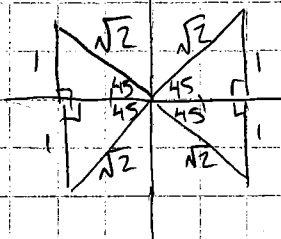
15. a) $2\sin^2 x - 1 = 0$

$2\sin^2 x = 1$

$(\sin x)^2 = \frac{1}{2}$

$\sin x = \pm \sqrt{\frac{1}{2}}$

$= \pm \frac{1}{\sqrt{2}}$

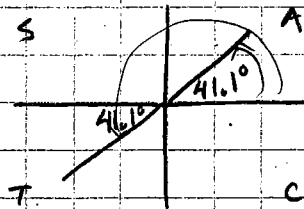


$x = 45^\circ, 135^\circ, 225^\circ, 315^\circ$

PC 11 6.2b con't...6

5.b) $3 \tan^3 x - 2 = 0$
 $3 \tan^3 x = 2$
 $\tan^3 x = \frac{2}{3}$

$\tan x = \sqrt[3]{\frac{2}{3}}$
 $\tan x = 0.87358\dots$
 $\angle x = 41.1^\circ$

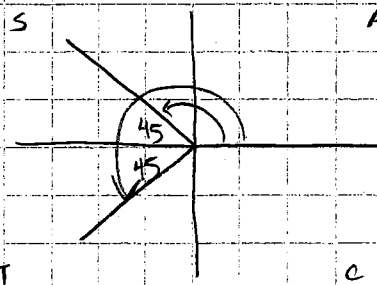


$x_1 = 41.1^\circ$
 $x_2 = 180 + 41.1^\circ$
 $= 221.1^\circ$

c) $2\sqrt{2} \cos^3 x + 1 = 0$
 $2\sqrt{2} \cos^3 x = -1$
 $\cos^3 x = -\frac{1}{2\sqrt{2}}$

$\cos x = \sqrt[3]{\frac{-1}{2\sqrt{2}}}$
 $\cos x = -0.707\dots$
 $x_{ref} = \cos^{-1}(0.707\dots)$

$x_{ref} = 45^\circ$



$x_1 = 180 - 45$
 $= 135^\circ$
 $x_2 = 180 + 45$
 $= 225^\circ$

d) $6 \cos^2 x - \cos x - 1 = 0$

Let $m = \cos x$

$6m^2 - m - 1 = 0$
 $6m^2 - 3m + 2m - 1 = 0$
 $3m(2m - 1) + 1(2m - 1) = 0$
 $(2m - 1)(3m + 1) = 0$

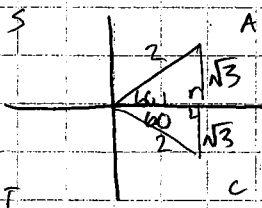
$2m - 1 = 0$ $3m + 1 = 0$
 $2 \cos x - 1 = 0$ $3 \cos x + 1 = 0$

$\cos x = \frac{1}{2}$

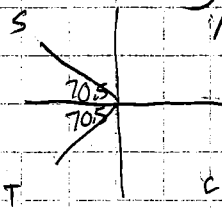
$\cos x = -\frac{1}{3}$

not a special triangle

$\angle x_{ref} = \cos^{-1}\left(\frac{1}{3}\right)$

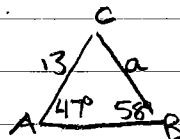


$x_1 = 60^\circ$
 $x_2 = 300^\circ$



$x_3 = 180 - 70.5$
 $= 109.5$
 $x_4 = 180 + 70.5$
 $= 250.5^\circ$

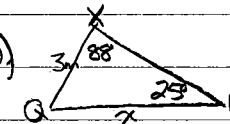
PC11.6.4a

1. a) 

$$\frac{a}{\sin 47^\circ} = \frac{13}{\sin 58^\circ}$$

$$a = \frac{13 \sin 47^\circ}{\sin 58^\circ}$$

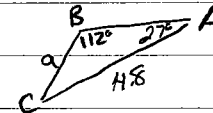
$$a = 11.2$$

b) 

$$\frac{x}{\sin 88^\circ} = \frac{3}{\sin 25^\circ}$$

$$x = \frac{3 \sin 88^\circ}{\sin 25^\circ}$$

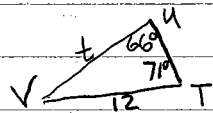
$$x = 7.1$$

c) 

$$\frac{a}{\sin 27^\circ} = \frac{48}{\sin 112^\circ}$$

$$a = \frac{48 \sin 27^\circ}{\sin 112^\circ}$$

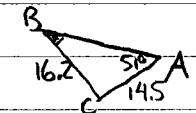
$$a = 23.5$$

d) 

$$\frac{t}{\sin 71^\circ} = \frac{12}{\sin 66^\circ}$$

$$t = \frac{12 \sin 71^\circ}{\sin 66^\circ}$$

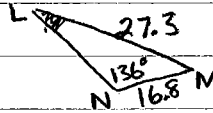
$$t = 12.4$$

2a) 

$$\frac{\sin B}{14.5} = \frac{\sin 51^\circ}{16.2}$$

$$\sin B = \frac{14.5 \sin 51^\circ}{16.2}$$

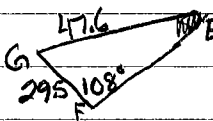
$$\angle B = 44.1^\circ$$

b) 

$$\frac{\sin L}{16.8} = \frac{\sin 136^\circ}{27.3}$$

$$\sin L = \frac{16.8 \sin 136^\circ}{27.3}$$

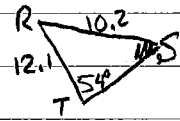
$$\angle L = 25.3^\circ$$

2 c) 

$$\frac{\sin E}{29.5} = \frac{\sin 108^\circ}{47.6}$$

$$\sin E = \frac{29.5 \sin 108^\circ}{47.6}$$

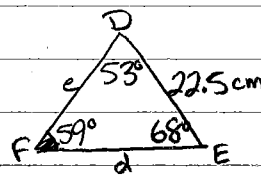
$$\angle E = 36.1^\circ$$

d) 

$$\frac{\sin S}{12.1} = \frac{\sin 54^\circ}{10.2}$$

$$\sin S = \frac{12.1 \sin 54^\circ}{10.2}$$

$$\angle S = 73.7^\circ$$

3. a) 

$$180 - 53 - 68 = 59^\circ = \angle F$$

$$\frac{e}{\sin 68^\circ} = \frac{22.5}{\sin 59^\circ}$$

$$e = \frac{22.5 \sin 68^\circ}{\sin 59^\circ}$$

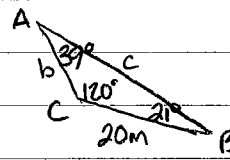
$$e = 24.3 \text{ cm}$$

$$\frac{d}{\sin 53^\circ} = \frac{22.5}{\sin 59^\circ}$$

$$d = \frac{22.5 \sin 53^\circ}{\sin 59^\circ}$$

$$d = 20.96$$

$$\approx 21.0 \text{ cm}$$

b) 

$$180 - 120 - 21 = 39^\circ = \angle A$$

$$\frac{b}{\sin 21^\circ} = \frac{20}{\sin 39^\circ}$$

$$b = \frac{20 \sin 21^\circ}{\sin 39^\circ}$$

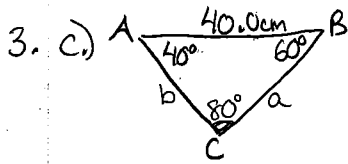
$$b = 11.4 \text{ m}$$

$$\frac{c}{\sin 120^\circ} = \frac{20}{\sin 39^\circ}$$

$$c = \frac{20 \sin 120^\circ}{\sin 39^\circ}$$

$$c = 27.5 \text{ m}$$

PC II 6.4a con't...



$$180 - 40 - 60 = 80^\circ = \angle C$$

$$\frac{a}{\sin 40^\circ} = \frac{40}{\sin 80^\circ}$$

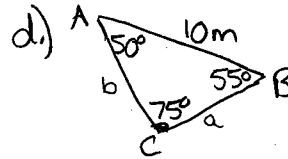
$$a = \frac{40 \sin 40^\circ}{\sin 80^\circ}$$

$$a = 26.1 \text{ cm}$$

$$\frac{b}{\sin 60^\circ} = \frac{40}{\sin 80^\circ}$$

$$b = \frac{40 \sin 60^\circ}{\sin 80^\circ}$$

$$b = 35.2 \text{ cm}$$



$$180 - 50 - 55 = 75^\circ = \angle C$$

$$\frac{a}{\sin 50^\circ} = \frac{10}{\sin 75^\circ}$$

$$a = \frac{10 \sin 50^\circ}{\sin 75^\circ}$$

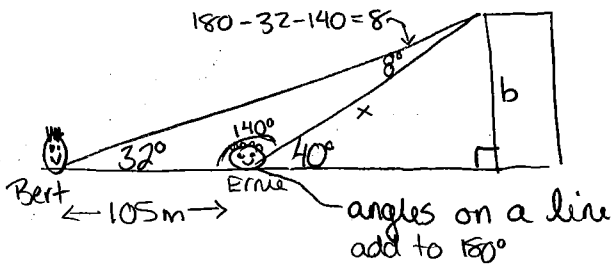
$$a = 7.9 \text{ m}$$

$$\frac{b}{\sin 55^\circ} = \frac{10}{\sin 75^\circ}$$

$$b = \frac{10 \sin 55^\circ}{\sin 75^\circ}$$

$$b = 8.5 \text{ m}$$

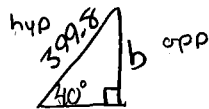
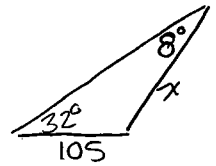
4.



$$\frac{x}{\sin 32^\circ} = \frac{105}{\sin 8^\circ}$$

$$x = \frac{105 \sin 32^\circ}{\sin 8^\circ}$$

$$x = 399.8$$

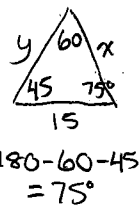
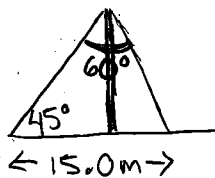


$$\sin 40^\circ = \frac{b}{399.8}$$

$$b = 399.8 \sin 40^\circ$$

$$b = 256.99 \text{ m}$$

5.



$$180 - 60 - 45 = 75^\circ$$

$$\frac{x}{\sin 45^\circ} = \frac{15}{\sin 60^\circ}$$

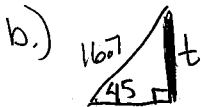
$$x = \frac{15 \sin 45^\circ}{\sin 60^\circ}$$

$$x = 12.2 \text{ m}$$

$$\frac{y}{\sin 75^\circ} = \frac{15}{\sin 60^\circ}$$

$$y = \frac{15 \sin 75^\circ}{\sin 60^\circ}$$

$$y = 16.7 \text{ m}$$



$$\sin 45^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 45^\circ = \frac{t}{16.7}$$

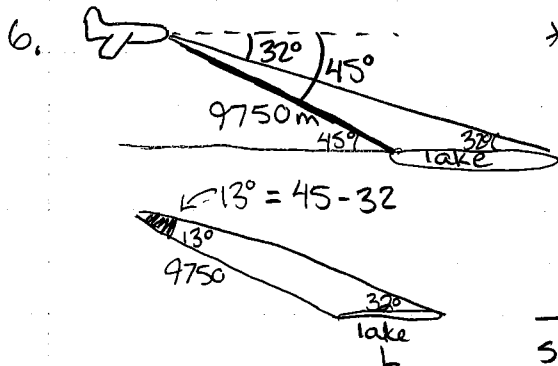
$$t = 16.7 \sin 45^\circ$$

$$t = 11.8 \text{ m}$$

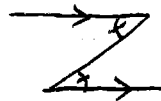
a) two wires are 12.2 m and 16.7 m long.

b) Telephone Pole is 11.8 m tall.

PC11 6.4a con't...3.



* Note: Angle of depression = angle of elevation (alternate interior angles of // lines)

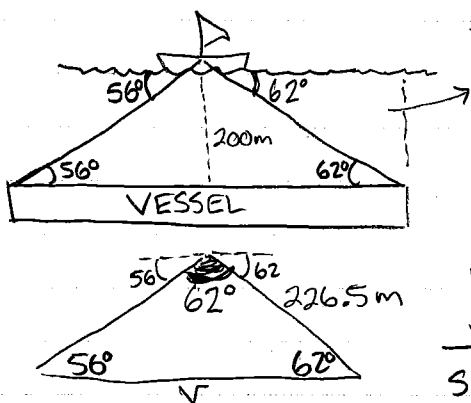


$$\frac{L}{\sin 13} = \frac{9750}{\sin 32}$$

$$L = \frac{9750 \sin 13}{\sin 32} = 4138.9$$

∴ Width of the Lake is 4139 m.

7.
* See note in #6.



$$\sin 62^\circ = \frac{200}{n}$$

$$n = \frac{200}{\sin 62}$$

$$n = 226.5 \text{ m}$$

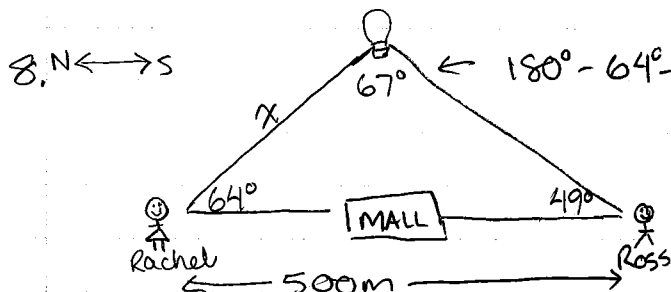
$$180 - 56 - 62 = 62^\circ$$

$$\frac{v}{\sin 62} = \frac{226.5}{\sin 56}$$

$$v = \frac{226.5 \sin 62}{\sin 56}$$

$$v = 241.2 \text{ m}$$

∴ The vessel is 241.2m long.



$$\frac{x}{\sin 49} = \frac{500}{\sin 67}$$

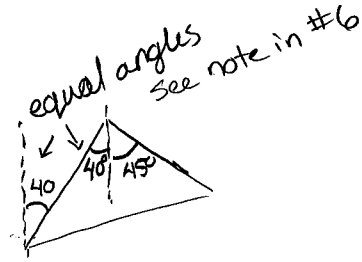
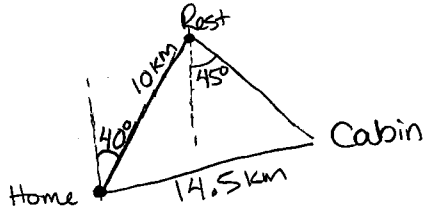
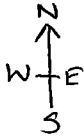
$$x = \frac{500 \sin 49}{\sin 67}$$

$$x = 409.9 \text{ m}$$

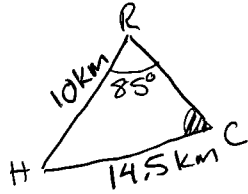
Rachel is 409.9 m from the hot air balloon

PC11 6.Aa con't...4

9.



∴ We have this Δ:



Find ∠C:

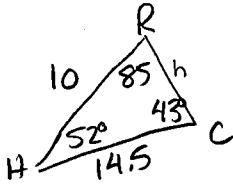
$$\frac{\sin C}{10} = \frac{\sin 85}{14.5}$$

∠H:

$$180^\circ - 85^\circ - 43^\circ = 52^\circ$$

$$\sin C = \frac{10 \sin 85}{14.5}$$

$$\angle C = 43^\circ$$



Find h:

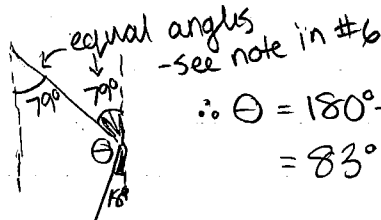
$$\frac{h}{\sin 52^\circ} = \frac{14.5}{\sin 85}$$

$$h = \frac{14.5 \sin 52}{\sin 85}$$

$$h = 11.5 \text{ km}$$

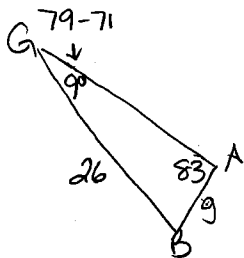
∴ Stella travelled 11.5 km on the second leg of her trip.

10.



$$\therefore \theta = 180^\circ - 79^\circ - 18^\circ$$

$$= 83^\circ \quad (\text{Angles on a line add to } 180^\circ)$$



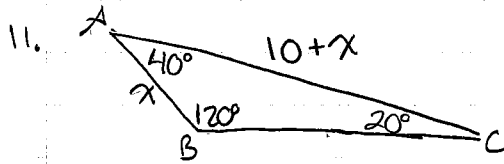
$$\frac{g}{\sin 9^\circ} = \frac{26}{\sin 83^\circ}$$

$$g = \frac{26 \sin 9^\circ}{\sin 83^\circ}$$

$$g = 3.6$$

∴ She has 3.6 km remaining on her trip

PC11 6.4a cont., 5.



$$\frac{x}{\sin 20^\circ} = \frac{10+x}{\sin 120^\circ}$$

$$x \sin 120^\circ = (10+x) \sin 20^\circ$$

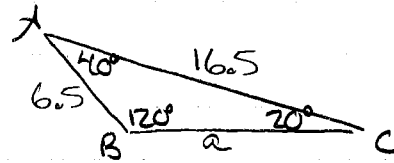
$$x \sin 120^\circ = 10 \sin 20^\circ + x \sin 20^\circ$$

$$x \sin 120^\circ - x \sin 20^\circ = 10 \sin 20^\circ$$

$$x (\sin 120^\circ - \sin 20^\circ) = 10 \sin 20^\circ$$

$$x = \frac{10 \sin 20^\circ}{\sin 120^\circ - \sin 20^\circ}$$

$$x = 6.5$$



$$\frac{a}{\sin 40^\circ} = \frac{16.5}{\sin 120^\circ}$$

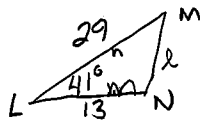
$$a = \frac{16.5 \sin 40^\circ}{\sin 120^\circ}$$

$$a = 12.2$$

$$\begin{aligned} \text{Perimeter} &= 6.5 + 16.5 + 12.2 \\ &= 35.2 \text{ cm.} \end{aligned}$$

PC11 6.5

1. a)



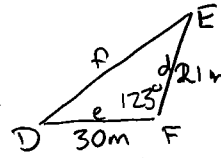
$$l^2 = m^2 + n^2 - 2mn \cos L$$

$$l^2 = 13^2 + 29^2 - 2(13)(29) \cos 41^\circ$$

$$l^2 = 440.9$$

$$l = 20.999 = 21 \text{ cm}$$

b.)



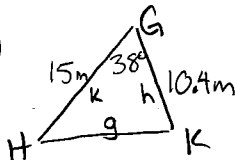
$$f^2 = d^2 + e^2 - 2de \cos F$$

$$f^2 = 21^2 + 30^2 - 2(21)(30) \cos 125^\circ$$

$$f^2 = 2027.245$$

$$f = 45 \text{ m}$$

c.)



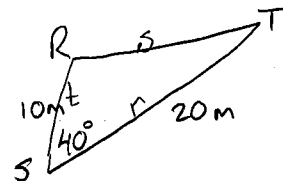
$$g^2 = h^2 + k^2 - 2hk \cos G$$

$$g^2 = 10.4^2 + 15^2 - 2(10.4)(15) \cos 38^\circ$$

$$g^2 = 87.3$$

$$g = 9.3 \text{ m}$$

d.)



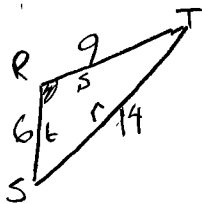
$$s^2 = t^2 + r^2 - 2tr \cos S$$

$$s^2 = 10^2 + 20^2 - 2(10)(20) \cos 40^\circ$$

$$s^2 = 193.6$$

$$s = 13.9 \text{ m}$$

2. a)



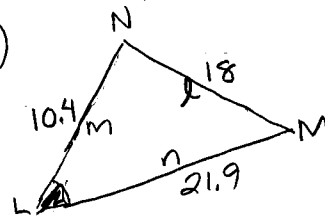
$$\cos R = \frac{r^2 - s^2 - t^2}{-2st}$$

$$\cos R = \frac{14^2 - 9^2 - 6^2}{-2(9)(6)}$$

$$\cos R = -0.731481$$

$$\angle R = 137^\circ$$

b.)



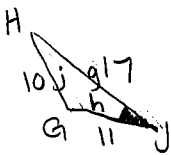
$$\cos L = \frac{l^2 - m^2 - n^2}{-2mn}$$

$$\cos L = \frac{18^2 - 10.4^2 - 21.9^2}{-2(10.4)(21.9)}$$

$$\cos L = 0.579053$$

$$\angle L = 54.6^\circ$$

c.)



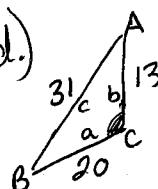
$$\cos J = \frac{j^2 - h^2 - g^2}{-2hg}$$

$$\cos J = \frac{10^2 - 17^2 - 11^2}{-2(11)(17)}$$

$$\cos J = 0.828877$$

$$\angle J = 34^\circ$$

d.)



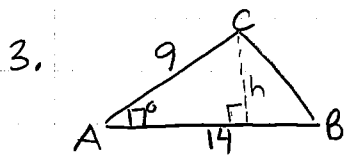
$$\cos C = \frac{c^2 - a^2 - b^2}{-2ab}$$

$$\cos C = \frac{31^2 - 20^2 - 13^2}{-2(20)(13)}$$

$$\cos C = -0.753846$$

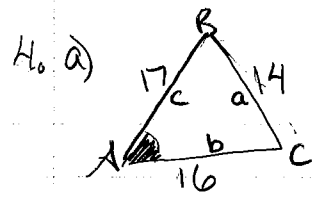
$$\angle C = 138.9^\circ$$

PC11 6.5 cont...2.

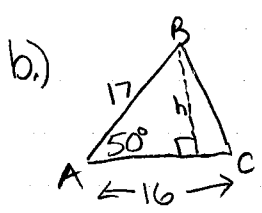


And height: $\sin 17^\circ = \frac{h}{9}$
 $h = 9 \sin 17^\circ$
 $h = 2.6$

Area = $\frac{1}{2}bh$
 $= \frac{1}{2}(14)(2.6)$
 $= 18.2 \text{ cm}^2$

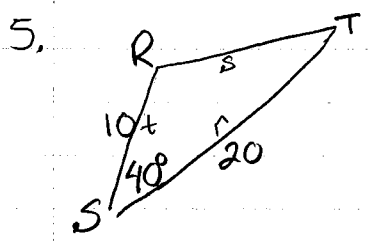


Smallest angle is opposite the shortest side.
 $\cos A = \frac{a^2 - b^2 - c^2}{-2bc}$
 $\cos A = \frac{14^2 - 16^2 - 17^2}{-2(16)(17)}$ } $\cos A = 0.641544$
 $\angle A = 50^\circ$



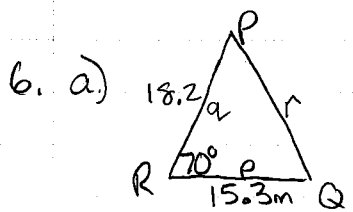
determine height.
 $\sin 50^\circ = \frac{h}{17}$
 $h = 17 \sin 50^\circ$
 $h = 13 \text{ mm}$

Area = $\frac{1}{2}bh$
 $= \frac{1}{2}(16)(13)$
 $A = 104 \text{ mm}^2$

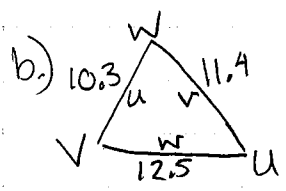


Find RT first.
 $s^2 = r^2 + t^2 - 2rt \cos S$
 $s^2 = 20^2 + 10^2 - 2(20)(10) \cos 40^\circ$
 $s^2 = 193.58$
 $s = 13.9 \text{ m}$

$\frac{\sin T}{10} = \frac{\sin 40}{13.9}$
 $\sin T = \frac{10 \sin 40^\circ}{13.9}$
 $\sin T = 0.462437$
 $\angle T = 27.5^\circ$



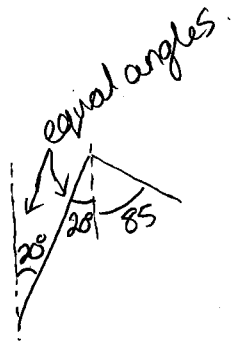
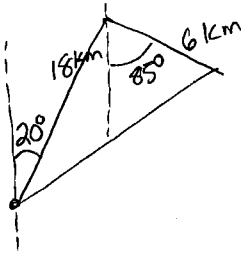
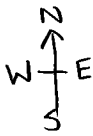
$r^2 = p^2 + q^2 - 2pq \cos R$
 $r^2 = 15.3^2 + 18.2^2 - 2(15.3)(18.2) \cos 70^\circ$
 $r^2 = 374.85$
 $r = 19.4 \text{ m}$



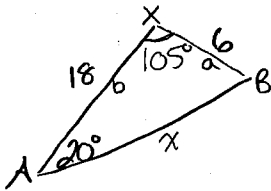
$\cos V = \frac{v^2 - u^2 - w^2}{-2uw}$
 $\cos V = \frac{11.4^2 - 10.3^2 - 12.5^2}{-2(10.3)(12.5)}$ } $\cos V = 0.514097$
 $\angle V = 59^\circ$

PC11 6.5 con't...3

7.



∴ We have the triangle:



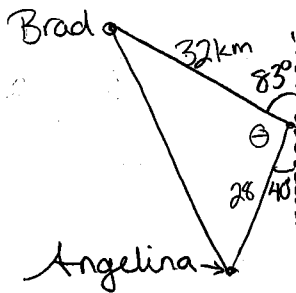
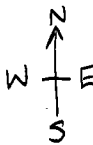
$$x^2 = a^2 + b^2 - 2ab \cos X$$

$$x^2 = 6^2 + 18^2 - 2(6)(18) \cos 105^\circ$$

$$x^2 = 415.9$$

$$x = 20.3$$

8.

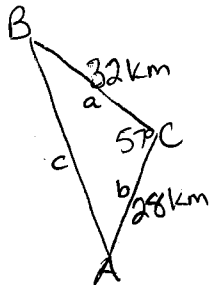


$$16 \text{ km/h in 2 hours} = 32 \text{ km}$$

$$14 \text{ km/h in 2 hours} = 28 \text{ km}$$

$$\Theta = 180^\circ - 83^\circ - 40^\circ = 57^\circ$$

(Angles on a line add to 180°)



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

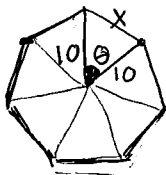
$$c^2 = 32^2 + 28^2 - 2(32)(28) \cos 57^\circ$$

$$c^2 = 832.0$$

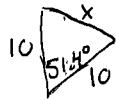
$$c = 28.8 \text{ km}$$

∴ Brad & Angelina are 28.8 km apart.

9.



$$\Theta = 360 \div 7 = 51.4^\circ \leftarrow \text{each angle (there are 7)}$$



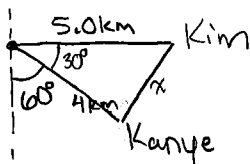
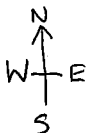
$$x^2 = 10^2 + 10^2 - 2(10)(10) \cos 51.4^\circ$$

$$x^2 = 75.2$$

$$x = 8.7$$

$$\text{Perimeter} = 7(8.7) = 60.9 \text{ cm}$$

10.



$$x^2 = 5.0^2 + 4.0^2 - 2(5.0)(4.0) \cos 30^\circ$$

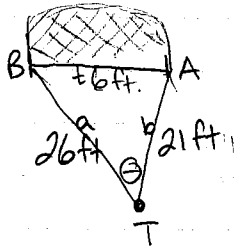
$$x^2 = 6.36$$

$$x = 2.5$$

Kim & Kanye are 2.5 km apart.

PC11 6.5 con't...4

11.



$$t^2 = a^2 + b^2 - 2ab \cos T$$

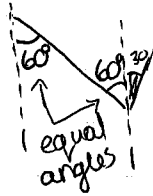
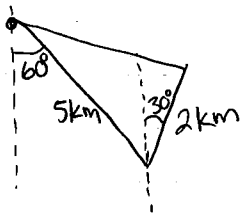
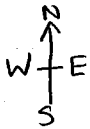
$$\cos T = \frac{t^2 - a^2 - b^2}{-2ab}$$

$$\cos \theta = \frac{6^2 - 26^2 - 21^2}{-2(26)(21)}$$

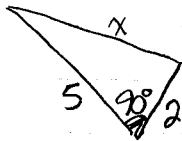
$$\cos \theta = 0.9899$$

$$\theta = 8.1^\circ$$

12



We have this triangle:



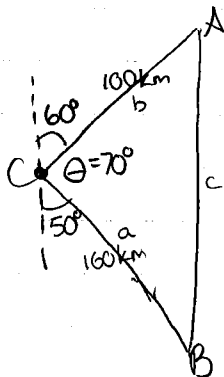
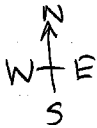
$$x^2 = 5^2 + 2^2 - 2(5)(2) \cos 90^\circ$$

$$x^2 = 29$$

$$x = 5.4 \text{ km}$$

Channing is 5.4 km from camp so he can still communicate

13



$$\theta = 180^\circ - 60^\circ - 50^\circ = 70^\circ$$

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

$$c^2 = 160^2 + 100^2 - 2(160)(100) \cos 70^\circ$$

$$c^2 = 24655.4$$

$$c = 157 \text{ km}$$

The airplanes are 157 km apart.