

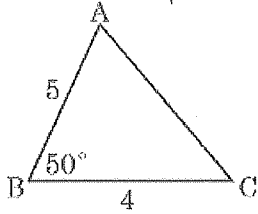
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Date: _____

Pre-Calculus 11: Ch2 Trigonometry HW Lesson 7 Cosine Law

1. Given each triangle, find the value of the indicated side or angle.

a) $AC = 3.91$

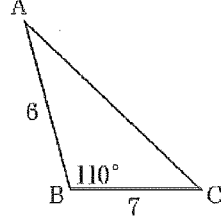


$$16 + 25 - 2(20)\cos 50^\circ$$

$$AC^2 = 15.3$$

$$AC = 3.91$$

b) $AC = 11.6$

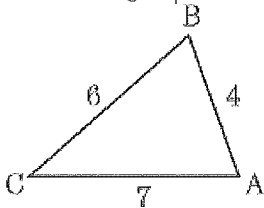


$$AC^2 = 36 + 49 - 2(42)\cos 110^\circ$$

$$AC^2 = 113.73$$

$$AC = 11.6$$

c) $\angle B = 86.4^\circ$

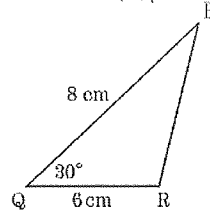


$$49 = 36 + 16 - 2(24)\cos B$$

$$-3 = -48 \cos B$$

$$\angle B = 86.4^\circ$$

d) $PR = 4.11 \text{ cm}$

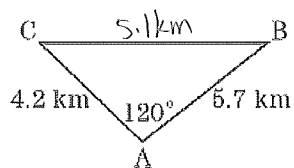


$$PR^2 = 64 + 36 - 2(48)\cos 30^\circ$$

$$PR^2 = 16.86$$

$$PR = 4.11 \text{ cm}$$

e) $\angle B = 45.5^\circ$



$$CB^2 = 50.13 - 2(4.2)(5.7)\cos 120^\circ$$

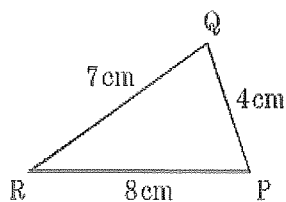
$$CB^2 = 26.19$$

$$CB = 5.1$$

$$\frac{\sin 120^\circ}{5.1} = \frac{\sin B}{4.2}$$

$$\angle B = 45.5^\circ$$

f) $\angle Q = 89^\circ$

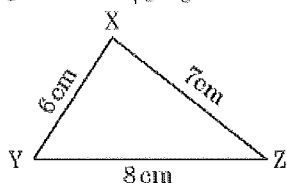


$$64 = 49 + 16 - 2(28)\cos Q$$

$$-1 = -56\cos Q$$

$$Q = 89^\circ$$

g) $\angle Z = 46.6^\circ$



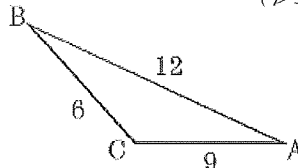
$$36 = 49 + 64 - 2(56)\cos Z$$

$$36 = 49 + 64 - 112\cos Z$$

$$-77 = -112\cos Z$$

$$\angle Z = 46.6^\circ$$

h) (Obtuse) $\angle C = 123.11^\circ$



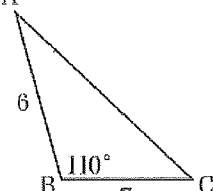
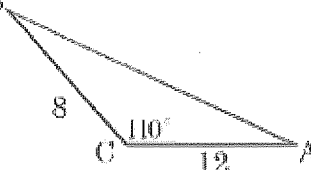
$$144 = 36 + 81 - 2(54)\cos C$$

$$59 = -108\cos C$$

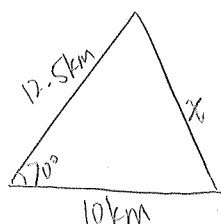
$$-0.546 = \cos C$$

$$\angle C = 180 - 56.89$$

$$= 123.11^\circ$$

i) $\angle A = 38.1^\circ$ $AC = 2.1$  $AC^2 = 36 + 49 - 2(42)\cos 110^\circ$ $AC^2 = 113.73$ $AC = 10.66$ $\frac{\sin 110^\circ}{10.66} = \frac{\sin \angle A}{7}$ $\angle A = 38.1^\circ$	j) $\angle B = 42.98^\circ$ $BA = 16.54$  $BA^2 = 64 + 144 - 2(96)\cos 110^\circ$ $BA^2 = 273.67$ $BA = 16.54$ $\frac{\sin \angle B}{12} = \frac{\sin 110^\circ}{16.54}$ $\angle B = 42.98^\circ$
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2. Two hikers start out from the same place at 9:00am. The first hiker walks at 4km/h and the second hiker walks at 5km/h. If the angle between the two hikers is 70° then, to 3 decimal places, how far apart are the hikers at 11:30am? $9:00 - 11:30 = 2.5 \text{ hr}$



$$x^2 = 156.25 + 100 - 2(125)\cos 70^\circ$$

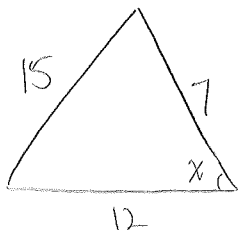
$$x^2 = 2.1376$$

$$x = 1.462 \text{ km}$$

$$2.5 \text{ hr} \times \frac{4 \text{ km}}{\text{hr}} = 10 \text{ km}$$

$$2.5 \text{ hr} \times \frac{5 \text{ km}}{\text{hr}} = 12.5 \text{ km}$$

3. Triangle $\triangle ABC$ has sides of length 7, 12, and 15cm. To the nearest degree, what is the measure of the largest angle of the triangle?

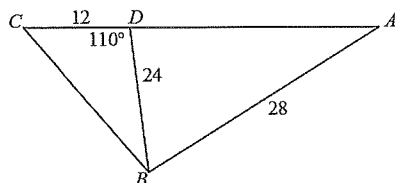


$$225 = 49 + 144 - 2(84)\cos x$$

$$-32 = -168\cos x$$

$$x = 101^\circ$$

4. Find the measure of angle "A"



$$CB^2 = 24^2 + 12^2 - 2(12 \cdot 24)\cos 110^\circ$$

$$CB^2 = 720 - 576\cos 110^\circ$$

$$CB^2 = 917$$

$$CB = 30.3$$

$$576 = 1062.1 - 2(363.6)\cos C$$

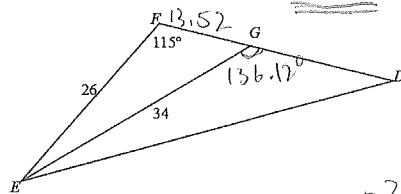
$$-486.1 = -727.2\cos C$$

$$\angle C = 48^\circ$$

$$\frac{\sin A}{30.3} = \frac{\sin 48^\circ}{28}$$

$$\angle A = 53.5^\circ$$

5. Given that line GE bisects angle "E", find the length of ED



$$34^2 = 26^2 + FG^2 - 2(26 \cdot FG) \cos 115^\circ$$

$$1156 = 676 + FG^2 + 21.98FG$$

$$FG^2 + 21.98FG - 480 = 0$$

$$FG = \frac{-21.98 \pm \sqrt{483.12 - 4(-480)}}{2}$$

$$FG = 13.52$$

$$\frac{\sin \angle FEG}{13.52} = \frac{\sin 115^\circ}{34}$$

$$\angle FEG = 21.12^\circ$$

Since it bisects,

$$\angle FED = 2(21.12^\circ)$$

$$\angle FED = 42.25^\circ$$

$$\angle G = 43.88^\circ$$

$$\angle D = 180 - 21.12 - 136.12$$

$$\angle D = 22.76^\circ$$

$$\frac{\sin 115^\circ}{ED} = \frac{\sin 22.76^\circ}{26}$$

$$ED = 60.8$$

6. In $\triangle ABC$, M is a point on BC such that $BM = 5$ and $MC = 6$. If $AM = 3$ and $AB = 7$, determine the exact value of AC .

$$9 = 49 + 25 - 2(35) \cos \angle B$$

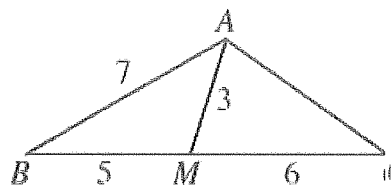
$$-65 = -70 \cos \angle B$$

$$\angle B = 21.8^\circ$$

$$AC^2 = 49 + 121 - 2(77) \cos 21.8^\circ$$

$$AC^2 = 27$$

$$AC = 5.2$$



using Stewart's Theorem

$$7^2(6) + x^2(5) = 11(3^2 + 5 \cdot 6)$$

$$294 + 5x^2 = 429$$

$$x^2 = 27 \quad x = 5.2$$

7. In the diagram, $AC = 2x$, $BC = 2x + 1$ and $\angle ACB = 30^\circ$.

If the area of $\triangle ABC$ is 18, what is the value of x ?

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$18 = \frac{1}{2} (2x+1)(2x) \sin 30^\circ$$

$$18 = \frac{1}{2} (2x+1)(2x) \frac{1}{2}$$

$$18 = \frac{(2x+1)(2x)}{4}$$

$$72 = (2x+1)(2x)$$

$$72 = 4x^2 + 2x$$

$$4x^2 + 2x - 72 = 0$$

$$2x^2 + x - 36 = 0$$

$$x = 4$$

