Law of Cosines Worksheet - Key

1.

A. $x^2 = 17^2 + 22^2 - 2(17)(22)\cos 42$

$x^2 = 217.13$

$x = \sqrt{217.13} = \boxed{14.7}$

B. $35^2 = 39^2 + 47^2 - 2(39)(47)\cos\theta$

$\frac{35^2 - 39^2 - 47^2}{-2(39)(47)} = \cos\theta$

$0.6833 = \cos\theta$

$\boxed{\theta = 46.9^\circ}$

C. $13^2 = 9.4^2 + 7^2 - 2(9.4)(7)\cos\theta$

$\frac{13^2 - 9.4^2 - 7^2}{-2(9.4)(7)} = \cos\theta$

$-0.2404 = \cos\theta$

$\boxed{\theta = 103.9^\circ}$

D. $x^2 = 23^2 + 20^2 - 2(23)(20)\cos 47^\circ$

$x^2 = 301.56$

$x = \sqrt{301.56} = \boxed{17.36}$

E. $x^2 = 55^2 + 50^2 - 2(55)(50)\cos 61$

$x^2 = 2858.5$

$x = \sqrt{2858.5} = \boxed{53.5}$

F. $4.9^2 = 8.3^2 + 9.1^2 - 2(8.3)(9.1)\cos\theta$

$\frac{4.9^2 - 8.3^2 - 9.1^2}{-2(8.3)(9.1)} = \cos\theta$

$0.8453 = \cos\theta$

$\boxed{\theta = 32.3^\circ}$

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2. A $z^2 = 29^2 + 15^2 - 2(29)(15)\cos 122$

$z^2 = 1527.0$

$\boxed{z = 39} = \boxed{39.08}$

$\angle Y = 180 - 38.99 - 122$

$\boxed{\angle Y = 19.01^\circ}$

$\frac{\sin X}{29} = \frac{\sin 122}{39.08} \rightarrow \sin X = 0.6293$

$\boxed{\angle x = 38.99^\circ}$

2. B Solve $\angle i$ first (biggest side)

$i^2 = g^2 + h^2 - 2(g)(h)\cos I$

$\frac{15^2 - 13^2 - 8^2}{-2(13)(8)} = \cos i$

$0.0385 = \cos i$

$\angle i = 87.80°$

$\frac{\sin g}{13} = \frac{\sin 87.80}{15}$

$\sin g = 0.8660$

$\angle g = 60°$

$\angle h = 180 - 87.8 - 60$

$\angle h = 32.20°$

2 C. $m^2 = 31^2 + 28^2 - 2(31)(28)\cos 62$

$m^2 = 929.99$

$m = 30.50$

$\frac{\sin 62}{30.50} = \frac{\sin n}{31}$

$\sin n = 0.8974$

$\angle n = 63.8°$

$\angle o = 180 - 63.8 - 62$

$\angle o = 54.18°$

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3. Biggest Angle 1st

$\frac{11^2 - 8^2 - 4^2}{-2(8)(4)} = \cos\theta$

$-0.6406 = \cos\theta$

$129.8° = \theta$

$\frac{\sin\alpha}{8} = \frac{\sin 129.8}{11}$

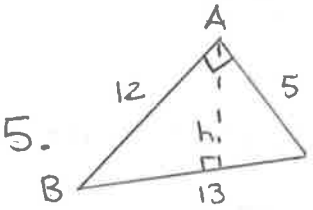
$\sin\alpha = 0.5588$

$\alpha = 33.97°$

$\beta = 180 - 33.97 - 129.8$

$\beta = 16.23°$

5.



Need height

$\frac{13^2 - 12^2 - 5^2}{-2(13)(12)} = \cos A$

$0 = \cos A$

$\angle A = 90°$

Since $\angle A = 90°$

height is 5

and base is 12

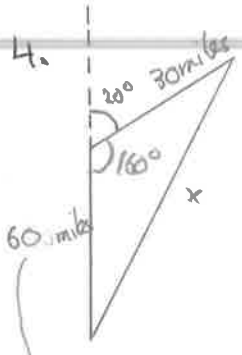
13 is the hypotenuse

So Area is $\frac{bh}{2}$

$\frac{12 \cdot 5}{2} = 30$

Area = $30cm^2$

4.



$x^2 = 60^2 + 30^2 - 2(60)(30)\cos 160$

$x^2 = 7882.89$

$x = \sqrt{7882.89}$

$x = 88.79$ miles

Travelling 30m/h so after 2 hours 60 miles