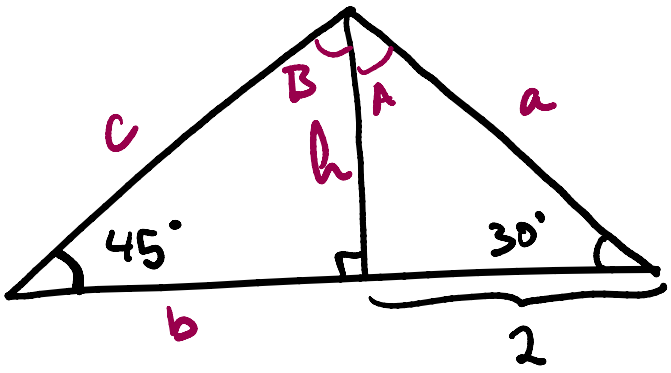
Exam 1 Solutions

Thursday, June 24, 2021 9:34 AM

Problem 1.

To find: A, B, a, b, c, h.



SOHCAHTOA:

$$\tan 30^\circ = \frac{h}{2}$$

$$2\tan 30^\circ = h$$

$$\boxed{h = \frac{2}{\sqrt{3}}}$$ 2 unit circle

Then $\sin(45^\circ) = \frac{h}{c}$

$$\frac{1}{\sqrt{2}} = \frac{h}{c}$$

cross multiply ↳

$$c = \sqrt{2}\,h$$

$$\boxed{c = \frac{2\sqrt{2}}{3}}$$

Since the left triangle has a 45° angle, h and b are equal.

$$\boxed{b = \frac{2}{\sqrt{3}}}$$

Sum of the angles is 180° gives us

$$45^\circ + B + 90^\circ = 180^\circ$$

$$\boxed{B = 45^\circ}$$

$B = 90°$

and $30° + A + 90° = 180°$

$\boxed{A = 60°.}$

Last, Pythagorean theorem:

$$2^2 + h^2 = a^2$$

$$4 + \left(\frac{2}{\sqrt{3}}\right)^2 = a^2$$

$$4 + \frac{4}{3} = a^2$$

$\boxed{a = \sqrt{4 + \frac{4}{3}}}$

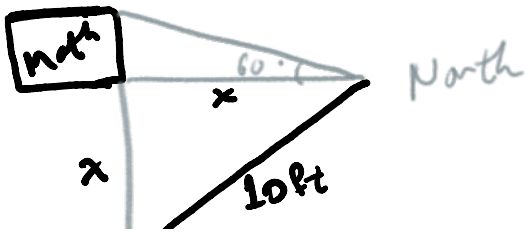
or $a = 2\sqrt{1 + \frac{1}{3}}$

$a = 2\sqrt{4/3}$

$\boxed{a = \frac{4}{\sqrt{3}}}$

} all acceptable

Problem 2.



Using the Pythagorean theorem,

$x^2 + x^2 = 10^2$

$2x^2 = 100$

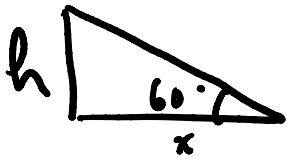
$$2x^2 = 100$$

$$x^2 = 50$$

$$x = \sqrt{50}$$

or $\boxed{x = 5\sqrt{2}}$ feet

Next, using SohCahToa,



$$\tan(60°) = \frac{h}{x}$$

$$h = x\tan(60°)$$

$$\boxed{h = 5\sqrt{2}\cdot\sqrt{3}}$$ ↓ unit circle. feet.

Problem 3.

$$2\sin(\pi) + \cos(\pi) + \sin\left(\frac{\pi}{6}\right).$$

From unit circle, $\sin(\pi) = 0$

$\cos(\pi) = -1$

$\sin(\pi/6) = \frac{1}{2}$

Plug these in:

$$2\cdot 0 + (-1) + \frac{1}{2}$$

$$= -1 + \frac{1}{2}$$

$= -1 + \frac{1}{2}$

$= -\frac{1}{2}$.

Yes, it is possible, because $-\frac{1}{2}$ is within the range -1 to 1, which are the possible values of $\sin\theta$.

The angle could be $\boxed{\theta = 210^\circ}$.

(Other answers are also possible.)