Geometry Chapter 5, 7 Cumulative Review Name KEY

1. Determine if the three given sides form a Pythagorean Triple.

All 3 sides are whole #'s ("integers") → They fit the Pythagorean Theorem.

a. 5, 12, 13

$13^2 \square 5^2 + 12^2$

$169 \square 25 + 144$

$169 \boxed{=} 169$

Yes, Pythagorean Triple.

b. 6, 11, 14

$14^2 \square 6^2 + 11^2$

$196 \square 36 + 121$

$196 \boxed{>} 157$

No, does not fit Pythagorean Thm.

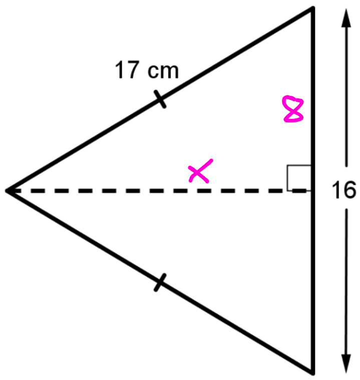
It is an Obtuse △.

$c^2 > a^2 + b^2$

c. 7, $7\sqrt{3}$, 14

No, $7\sqrt{3}$ is not an integer.

2. Find the area of the triangle.

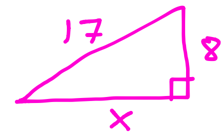


$A = \frac{1}{2}bh$

$A = \underbrace{\left(\frac{1}{2}\right)(16)}(15)$

$= 8 \cdot 15$

$= 120 \text{ cm}^2$



$17^2 = x^2 + 8^2$

$289 = x^2 + 64$

$-64 \qquad -64$

$\sqrt{225} = \sqrt{x^2}$

$15 = x$

3. Determine if a triangle can be formed from the given side lengths. If a triangle can be formed, classify the triangle by its angles.

a. 2, 8, 5

$2 + 5 > 8$

$7 \cancel{>} 8$

Not a △.

b. 13, 10, 16

$10 + 13 > 16$

$23 > 16$ Yes △.

$16^2 \square 10^2 + 13^2$

$256 \square 100 + 169$

$256 \boxed{<} 269$

Acute... $c^2 < a^2 + b^2$

c. 40, 59, 29

$29 + 40 > 59$

$69 > 59$ Yes △

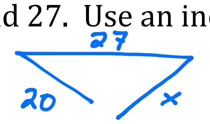
$(59)^2 \square (29)^2 + (40)^2$

$3481 \square 841 + 1600$

$3481 \boxed{>} 2441$

Obtuse... $c^2 > a^2 + b^2$

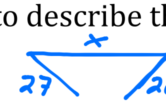
4. Two side lengths of a triangle are 20 and 27. Use an inequality statement to describe the possible lengths of the third side.



$27 - 20 = 7$

$20 + x > 27$

$x > 7$



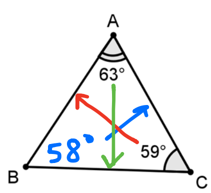
$27 + 20 = 47$

$20 + 27 > x$

$47 > x$

__7__ < *third side length* < __47__

5. Order the SIDES from shortest to longest. Explain your reasoning.



$\overline{AC}$, $\overline{AB}$, $\overline{BC}$

smallest ∡ opposite shortest side

medium ∡ opposite medium side

largest ∡ opposite longest side

$180° - (63° + 59°)$

$= 58°$

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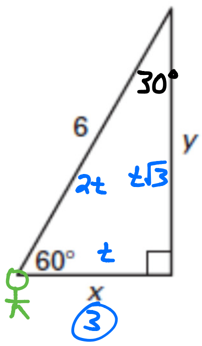
6. Solve for x and y. Give an exact answer and an approximate answer rounded to one decimal place.

a.



Using Trig

$\cos 60° = \frac{x}{6}$

$x = 6(\cos 60°)$

$x = 3$

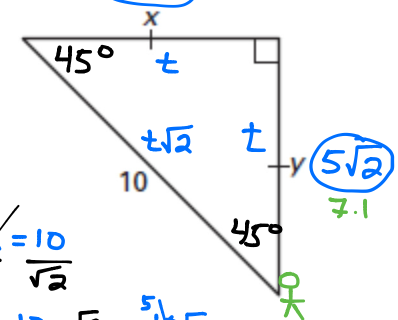
$\sin 60° = \frac{y}{6}$

$y = 6(\sin 60°)$

$y \approx 5.2$

b.

$5\sqrt{2}$ 7.1



$\frac{\cancel{t\sqrt{2}}}{\sqrt{2}} = \frac{10}{\sqrt{2}}$

$t = \frac{10}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{{}^{5}\cancel{10}\sqrt{2}}{{}_{1}\cancel{2}}$

$t = 5\sqrt{2}$

$\sin 45° = \frac{x}{10}$

$x = 10(\sin 45°)$

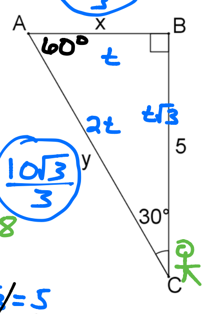
$x \approx 7.1$

$y \approx 7.1$

Isosceles △

c.

$\frac{5\sqrt{3}}{3}$ 2.9



$\frac{5\sqrt{3}}{3} \cdot \frac{2}{1}$

$\frac{10\sqrt{3}}{3}$

5.8

$\frac{\cancel{t\sqrt{3}}}{\sqrt{3}} = \frac{5}{\sqrt{3}}$

$t = \frac{5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{5\sqrt{3}}{3}$

$\tan 30° = \frac{x}{5}$

$x = 5(\tan 30°)$

$x \approx 2.9$

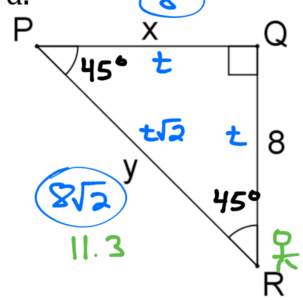
$\cos 30° = \frac{5}{y}$

$y = \frac{5}{\cos 30°}$

$y \approx 5.8$

d.

8



$\tan 45° = \frac{x}{8}$

$x = 8(\tan 45°)$

$x = 8$

$\cos 45° = \frac{8}{y}$

$y = \frac{8}{\cos 45°}$

$y \approx 11.3$

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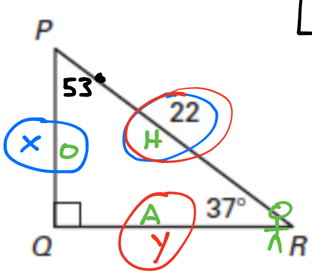
7. Solve the right triangle for all missing sides and angles. Find approximate answers rounded to one decimal place.

a.

$m\measuredangle P = 53°$
$PQ \approx 13.3$
$QR \approx 17.6$



$\sin 37° = \frac{x}{22}$

$x = 22(\sin 37°)$

$x \approx 13.3$

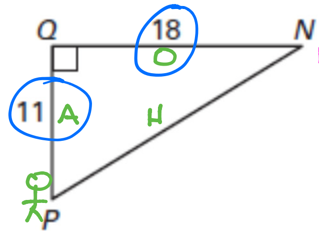
$\cos 37° = \frac{y}{22}$

$y = 22(\cos 37°)$

$y \approx 17.6$

b.

$PN \approx 21.1$
$m\measuredangle P \approx 58.6°$
$m\measuredangle N \approx 31.4°$



$11^2 + 18^2 = c^2$

$445 = c^2$

$21.1 \approx c$

$\tan P = \frac{18}{11}$

$P = \tan^{-1}\left(\frac{18}{11}\right)$

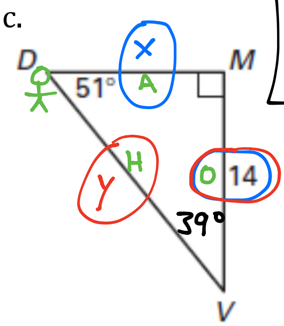
$P \approx 58.6°$

$90° - 58.6°$

$N = 31.4°$

c.

$m\measuredangle V = 39°$
$DM \approx 11.3$
$DV \approx 18.0$



$\tan 51° = \frac{14}{x}$

$x = \frac{14}{\tan 51°}$

$x \approx 11.3$

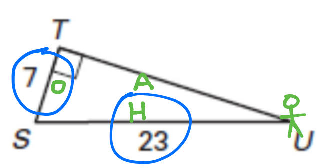
$\sin 51° = \frac{14}{y}$

$y = \frac{14}{\sin 51°}$

$y \approx 18.0$

d.

$TU \approx 21.9$
$m\measuredangle U \approx 17.7°$
$m\measuredangle S \approx 72.3°$



$7^2 + b^2 = 23^2$

$49 + b^2 = 529$

$-49 \quad\quad -49$

$\sqrt{b^2} = \sqrt{480}$

$b \approx 21.9$

$\sin U = \frac{7}{23}$

$U = \sin^{-1}\left(\frac{7}{23}\right)$

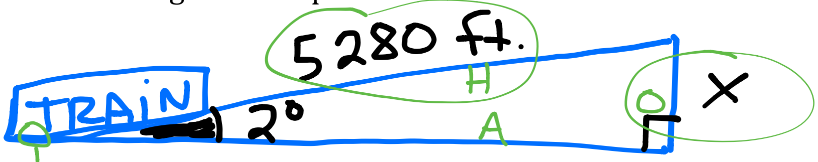
$U \approx 17.7°$

$90° - 17.7$

$S = 72.3°$

8. A train is traveling up a grade with an angle of elevation of 2°. It travels 1 mile (5280 feet).

a. Draw a diagram to represent this situation.



b. What is the vertical change in feet? (Round to one decimal place)

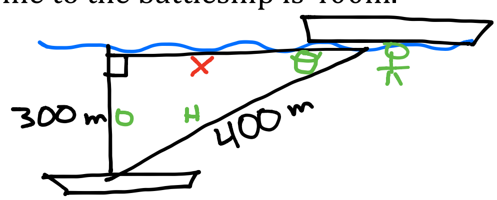
$$\frac{\sin(2^\circ)}{1} = \frac{x}{5280}$$

$$x = 5280(\sin 2^\circ)$$

$$x \approx 184.3 \text{ ft.}$$

9. A submarine that is 300m below the surface of the water locates a battleship on the surface. Sonar says that the straight line distance from the submarine to the battleship is 400m.

a. Draw a diagram to represent this situation.



b. What is the horizontal distance from the battleship to the submarine? (Round to one decimal place)

$$300^2 + x^2 = 400^2$$
$$x^2 = 400^2 - 300^2$$
$$\sqrt{x^2} = \sqrt{70{,}000}$$
$$x \approx 264.6 \text{ meters}$$

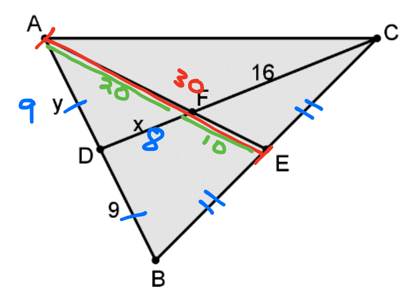
c. What is the angle of depression at the battleship? (Round to one decimal place)

from the horizontal line downwards

$$\sin \theta = \frac{300}{400}$$

$$\theta = \sin^{-1}\left(\frac{300}{400}\right) \approx 48.6^\circ$$

10. Use the picture at the right where $\overline{CD}$ and $\overline{AE}$ are medians of ΔABC.



a. Solve for x and y.

$x = 8$ ... half of 16

$y = 9$ ... midpoint

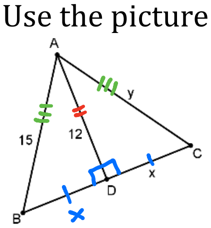
b. If $AE = 30$, then determine AF and FE.

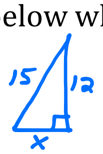
$FE = \frac{1}{3}(AE)$ $\quad AF = 2(FE)$

$FE = \frac{1}{3}(30)$ $\quad AF = 2(10)$

$FE = 10$ $\quad AF = 20$

11. Use the picture below where $\overline{AD}$ is the perpendicular bisector of $\overline{BC}$ to solve for x and y.



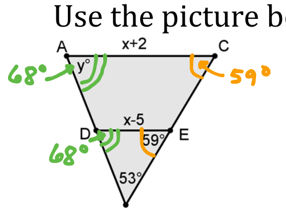


$$x^2 + 12^2 = 15^2$$
$$x^2 + \cancel{144} = 225$$
$$-144 \quad -144$$
$$x^2 = 81$$
$$x = 9$$

$y = 15$ ... ≅ Δ's by SAS

Also, any point on the ⊥ bisector is equidistant to the vertices.

12. Use the picture below where $\overline{DE}$ is a midsegment of ΔABC to solve for x and y.



$$2(DE) = AC$$
$$2(x-5) = x+2$$
$$2x - 10 = \cancel{x} + 2$$
$$-x$$
$$x - \cancel{10} = 2$$
$$+10 \quad +10$$
$$x = 12$$

① parallel to base.

② $\frac{1}{2}$ of the length of the base.

★ Corresponding ∠'s are Congruent.

$y = 68^\circ$