FOM 11

Practice Test

Ch.4 – Obtuse Triangle Trigonometry

Name: ___________

Block: _____

Multiple Choice

Identify the choice that best completes the statement or answers the question.

B 1. Calculate sin 16° to four decimal places. Predict another term that equals sin 16°.

a. –0.2756; sin 164°
b. 0.2756; sin 164°
c. 0.2756; –sin 16°
d. none of the above

$\sin 16 = 0.2756$

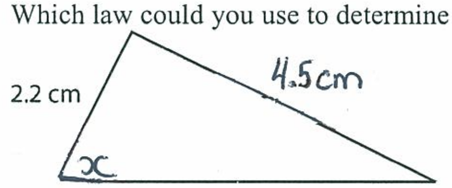
We know $\sin\theta = \sin(180-\theta)$

so $\sin 16 = \sin(180-16)$

$180-16 = 164$

Check: $\sin 164 = 0.2756$ ✓

C 2. Which law could you use to determine the unknown angle in this triangle?



- Cosine law – you need all 3 sides, or 2 sides & the angle between.

- Sine Law – you need one pair (angle & opposite side) and one other piece of information.

a. the sine law only
b. neither the sine law nor the cosine law
c. the cosine law only
d. the sine law and the cosine law

We know all 3 sides, so we could use Cosine Law to find angle x.

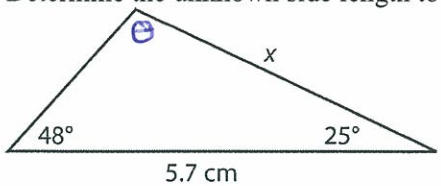
ex: $4.5^2 = 2.2^2 + 5.0^2 - 2(2.2)(5.0)\cos x$

$-9.59 = -22\cos x$

$0.4359090909 = \cos x$

$x = 64.2°$

A ____ 3. Determine the unknown side length to the nearest centimetre.



a. $\boxed{4.4 \text{ cm}}$
b. 4.3 cm
c. 4.6 cm
d. 4.7 cm

① Find 3rd angle.

$\theta = 180 - 48 - 25 = 107°$

② Use Sine Law to find x

$$\frac{x}{\sin 48} = \frac{5.7}{\sin 107}$$

$$x = \frac{5.7 \times \sin 48}{\sin 107}$$

$$x = 4.429$$

$$\boxed{x = 4.4 \text{cm}}$$

A ____ 4. Which set of measurements can produce two possible triangles?

a. $\boxed{\angle A = 28°,\ a = 10.5 \text{ m},\ b = 15.0 \text{ m}}$
b. $\angle A = 28°$, $a = 7.0$ m, $b = 15.0$ m
c. $\angle A = 28°$, $a = 16.0$ m, $b = 15.0$ m
d. $\angle A = 28°$, $a = 5.5$ m, $b = 15.0$ m

The Ambiguous Case occurs when $h < a < b$

and the height is found by $b\sin A$

so we want $b\sin A < a < b$

a) $b\sin A = 15 \times \sin 28 = 7.04$ $\quad 7.04 < 10.5 < 15$ ✓ 2 possible △'s
$h < a < b$

b) $b\sin A = 15 \times \sin 28 = 7.04$ $\quad a < h$ which means no triangle can be formed.

c) $a > b$ so don't need to find height, it cannot be ambiguous case $\Rightarrow$ one triangle is possible

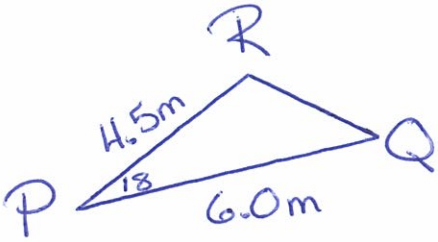
d) $b\sin A = 15 \times \sin 28 = 7.04$ $\quad a < h \Rightarrow$ no triangle can be made.

*SSA means you are given 2 sides and an angle opposite one of those 2 sides.

A

5. In ΔPQR, $\angle P = 18°$, $q = 4.5$ m, and $r = 6.0$ m.
Which statement is true for this set of measurements?

a. $\boxed{\text{This is not a } SSA \text{ situation.}}$
b. This is a *SSA* situation; no triangle is possible.
c. This is a *SSA* situation; only one triangle is possible.
d. This is a *SSA* situation; two triangles are possible.



We are given 2 sides and the angle between so it is SAS, not SSA.

C

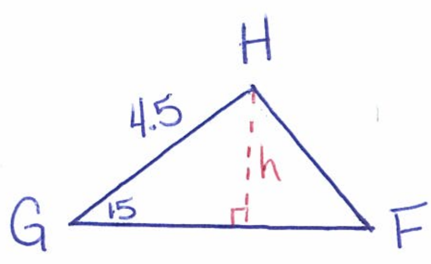
6. In ΔFGH, $GH = 4.5$ cm and $G = 15°$.
What is the height of the triangle from base *GF?*

this should be the base length.

a. 1.5 cm
b. 1.3 cm
c. $\boxed{1.2 \text{ cm}}$
d. 0.9 cm

use grade 10 primary trig ratios:

$$\frac{\sin 15}{1} = \frac{h}{4.5}$$



OR just use Sine Law.

$$\frac{h}{\sin 15} = \frac{4.5}{\sin 90}$$

$$h = \frac{4.5 \times \sin 15}{\sin 90}$$

$$h = 1.1647$$

Short Answer

7. Write another term using the tangent ratio that is equivalent to tan 48°.

We know $\tan\theta = -\tan(180-\theta)$

so $\tan 48 = -\tan(180-48)$

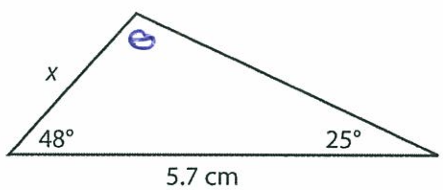
$\boxed{\tan 48 = -\tan 132}$

Check:

$\tan 48 = 1.1106$

$-\tan 132 = 1.1106$

8. Determine the unknown side length to the nearest tenth of a centimetre.



① Find 3rd Angle.

$\theta = 180-48-25 = 107°$

② Use Sin Law to find x.

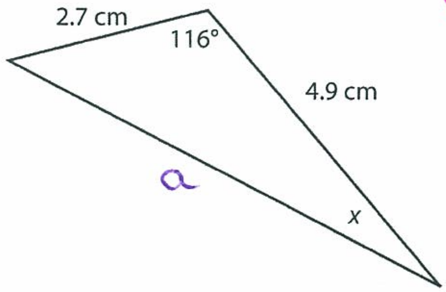
$$\frac{x}{\sin 25} = \frac{5.7}{\sin 107}$$

$$x = \frac{5.7 \times \sin 25}{\sin 107}$$

$$x = 2.51899$$

Round length to the nearest tenth } $\boxed{x = 2.5\text{cm}}$

9. Determine the unknown angle measure to the nearest degree.



① Use Cosine Law to find a:

$a^2 = 2.7^2 + 4.9^2 - 2(2.7)(4.9)\cos 116$

$a^2 = 31.3 - 26.46\cos 116$

$a^2 = 42.89930054$

$a = \sqrt{42.89930054}$

$a = 6.550$

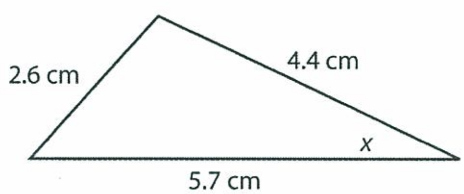
② Now use Sine Law to find x:

$$\frac{\sin x}{2.7} = \frac{\sin 116}{6.550}$$

$\sin x = 0.3704952557$

$x = \sin^{-1}(0.3704952557) = 21.746$ $\boxed{x = 22°}$

10. Determine the unknown angle measure to the nearest degree.



We have to use Cosine Law. Make sure you start with the opposite side from the angle you want to find.

$2.6^2 = 5.7^2 + 4.4^2 - 2(5.7)(4.4)\cos x$

$6.76 = 51.85 - 50.16\cos x$

$-51.85 \quad -51.85$

$$\frac{-45.09}{-50.16} = \frac{-50.16\cos x}{-50.16}$$

$0.898923445 = \cos x$

$x = \cos^{-1}(0.898923445) = 25.983$

$\boxed{x = 26°}$

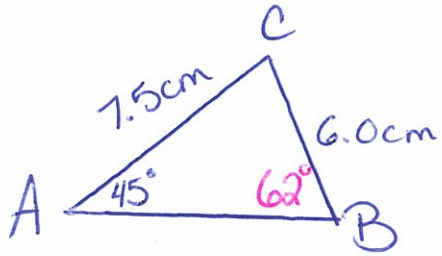
11. In ΔABC, $\angle A = 45°$, $a = 6.0$ cm, and $b = 7.5$ cm. Determine the number of triangles (zero, one, or two) that are possible for these measurements. Draw the triangle(s) to support your answer.

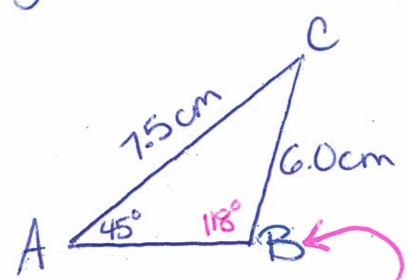
$a < b$ so we need to find height. $h = b\sin A$

$h = 7.5 \times \sin 45$

$5.3 < 6.0 < 7.5 \quad (h < a < b)$ $\qquad h = 5.303$

Which means $\boxed{\text{2 triangles are possible}}$





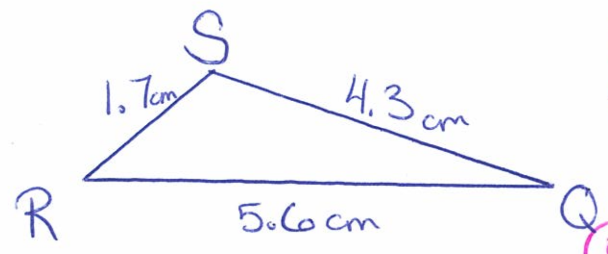
$\dfrac{\sin B}{7.5} = \dfrac{\sin 45}{6.0}$

$B = 62° \longrightarrow$ OR $180 - 62 = 118°$

$\sin B = 0.883883\ldots$

Problem

12. In ΔQRS, $q = 1.7$ m, $r = 4.3$ m, and $s = 5.6$ m. Solve ΔQRS by determining the measure of each angle to the nearest degree. Show your work and draw ΔQRS.



You can find any of the angles first. Using Cosine Law just make sure the side opposite the angle you are trying to find comes first in the equation.

① Find S:

$5.6^2 = 1.7^2 + 4.3^2 - 2(1.7)(4.3)\cos S$

$31.36 = 21.38 - 14.62\cos S$

$-21.38 \quad -21.38$

$\dfrac{9.98}{-14.62} = \dfrac{-14.62\cos S}{-14.62}$

$-0.682626539 = \cos S$

$S = \cos^{-1}(0.682626539)$

$\boxed{S = 133°}$

② Now use Cosine Law or Sine Law to find another angle.

$\dfrac{\sin R}{4.3} = \dfrac{\sin 133}{5.6}$

$\sin R = \dfrac{4.3 \times \sin 133}{5.6}$

$\sin R = 0.5615751637$

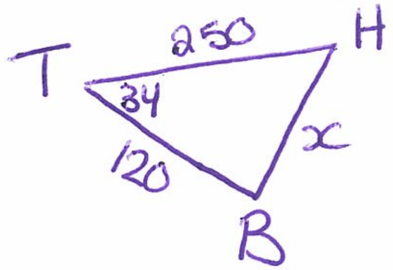
$\boxed{R = 34°}$

③ Use Angle Sum Δ to find 3rd Angle.

$Q = 180 - 133 - 34 = 13°$

$\boxed{Q = 13°}$

13. While golfing, Beth hits a tee shot from point T toward a hole at H. However, the ball veers 34° and lands at B. The scorecard says that H is 250 m from T. Beth walks 120 m to her ball. Sketch a diagram of this situation. How far, to the nearest metre, is her ball from the hole? Show your work.



Use Cosine Law

$x^2 = 120^2 + 250^2 - 2(120)(250)\cos 34$

$x^2 = 76900 - 60000\cos 34$

$x^2 = 27157.74565$

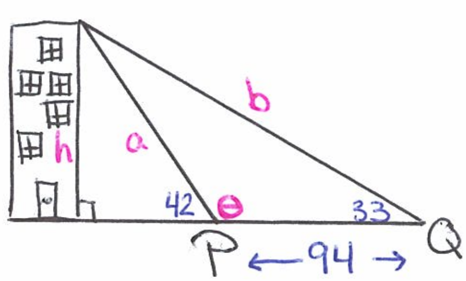
$x = \sqrt{27157.74565}$

$x = 164.796$

$x = 165\text{m}.$

$\boxed{\text{Beth's ball is 165m from the hole.}}$

14. A building is observed from two points (looking in the same direction), P and Q, that are 94.0 m apart. The angle of elevation is 42° at P and 33° at Q. Sketch the situation. Determine the height of the building to the nearest tenth of a metre.

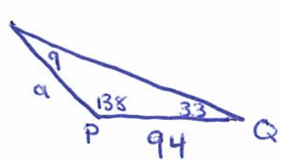


① Find θ & 3rd angle in the Obtuse triangle on the right.

$\theta = 180 - 42 = 138°$

3^{rd} angle $= 180 - 33 - 138 = 9°$

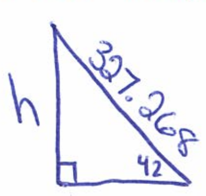
② Find either a OR b.



$\frac{a}{\sin 33} = \frac{94}{\sin 9}$

$a = \frac{94 \cdot \sin 33}{\sin 9} = 327.268$

③ Now find height



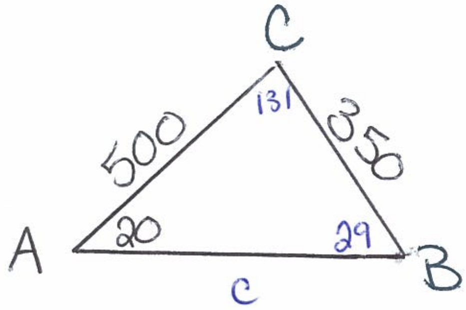
$\frac{h}{\sin 42} = \frac{327.268}{\sin 90}$

$h = \frac{327.268 \times \sin 42}{\sin 90} = 218.985$

$\boxed{\text{The building is 219.0m tall}}$

15. A landowner says that his property is triangular, with one side 500 m long and another side 350 m long. The opposite angle to the 350 m side measures 20°. Determine two possible lengths of the third side, to the nearest metre. Show your work.

Ambiguous Case!



Find B:

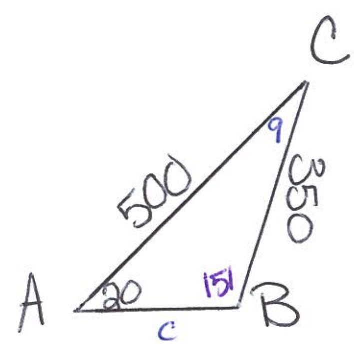
$$\frac{\sin B}{500} = \frac{\sin 20}{350}$$

$$\sin B = \frac{500 \times \sin 20}{350}$$

$$\sin B = 0.4886002048$$

$$B = \sin^{-1}(0.4886002048)$$

$$B = 29°$$



OR $180 - 29 = 151°$

(Now we have a 2nd Δ)

Find C:

$$C = 180 - 20 - 29 = 131°$$

Find C:

$$C = 180 - 20 - 151 = 9°$$

Find side c:

$$\frac{c}{\sin 131} = \frac{350}{\sin 20}$$

$$c = \frac{350 \times \sin 131}{\sin 20}$$

$$c = 772.318$$

$$= 772\text{ m}$$

Find side c:

$$\frac{c}{\sin 9} = \frac{350}{\sin 20}$$

$$c = \frac{350 \times \sin 9}{\sin 20}$$

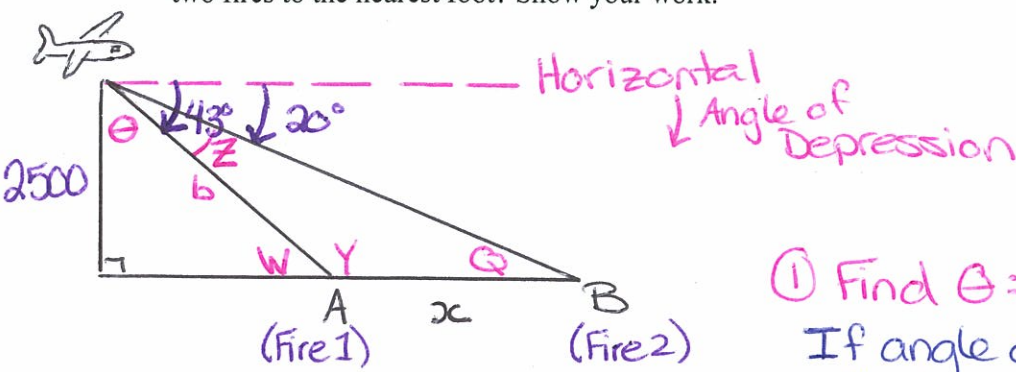
$$c = 160.084$$

$$= 160\text{ m}$$

The 3rd side is either 772m OR 160m

the plane is not inbetween the 2 fires.

16. An airplane is flying directly toward two forest fires. From the airplane, the angle of depression to one fire is 43° and 20° to the other fire. The airplane is flying at an altitude of 2500 ft. What is the distance between the two fires to the nearest foot? Show your work.



① Find θ:

If angle of depression is 43° then $\theta = 90 - 43 = 47°$

② Find other Angles:

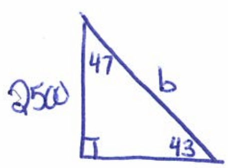
$W = 180 - 47° - 90° = 43°$

$Y = 180 - 43 = 137°$

$Z = 43 - 20 = 23°$

$Q = 180 - 137 - 23 = 20°$

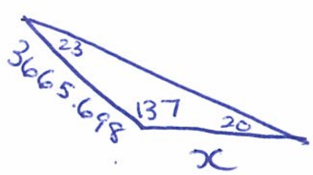
③ Find side b:



$$\frac{b}{\sin 90} = \frac{2500}{\sin 43}$$

$$b = \frac{2500 \times \sin 90}{\sin 43} = 3665.698$$

④ Find x:



$$\frac{x}{\sin 23} = \frac{3665.698}{\sin 20}$$

$$x = \frac{3665.698 \times \sin 23}{\sin 20}$$

$x = 4187.7718 = 4188$ ft.

The fires are 4188 ft apart