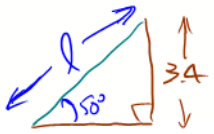
MCR3U - Chapter 5: Trigonometric Ratios - Practice

1. A ladder is leaning against a 3.4 m tall building at an angle of elevation of 50°. Determine the length of the ladder to the nearest tenth of a metre.

   a. 3.9 m
   b. 3.0 m
   c. 4.4 m
   d. 5.3 m



$\sin(50) = \frac{3.4}{\ell}$

$\Rightarrow \ell = \frac{3.4}{\sin(50)} = 4.4\text{ m}$

2. Determine the value of θ to the nearest degree if $\cot\theta = 0.75$.

   a. 53°
   b. 37°
   c. 45°
   d. 42°

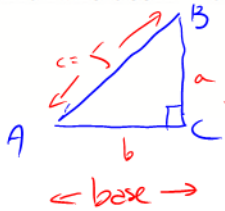
$\cot(\theta) = 0.75$

$\Rightarrow \tan(\theta) = \frac{1}{0.75} = 1.\dot{3}$

$\Rightarrow \theta = \tan^{-1}(1.\dot{3}) = 53°$

3. The hypotenuse, c, of right $\triangle ABC$ is 5.0 cm long. Given the trigonometric ratio $\cos A = 0.75$ for angle A, what is the area of the triangle to the nearest tenth of a cm²?

   a. 5.4 cm
   b. 6.2 cm
   c. 7.3 cm
   d. 8.0 cm



$\cos A = \frac{b}{c}$

$\Rightarrow 0.75 = \frac{b}{5}$

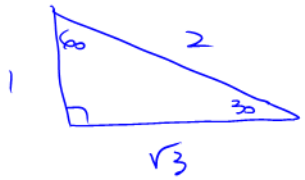
$A = \frac{1}{2}bh$
$= \frac{1}{2}(3.75)(3.3)$
$\doteq 6.2\text{ cm}^2$

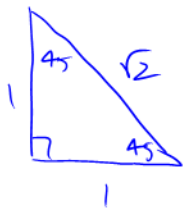
base: $b = (5)(0.75) = 3.75$

height: $a^2 = c^2 - b^2$
$\Rightarrow a = \sqrt{5^2 - 3.75^2}$
$= 3.3$

4. Determine the exact value of $\tan^2 45° - \cos 30°$.

   a. $2 - \frac{\sqrt{3}}{2}$
   b. $1 + \frac{\sqrt{3}}{2}$
   c. $1 - \sqrt{3}$
   d. $\frac{2-\sqrt{3}}{2}$

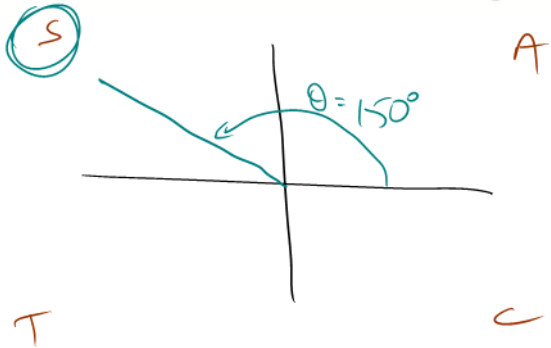




$\tan^2(45) - \cos(30) = \left(\frac{1}{1}\right)^2 - \frac{\sqrt{3}}{2} = \frac{1}{1} - \frac{\sqrt{3}}{2} = \frac{2-\sqrt{3}}{2}$ (common denom)

5. For the angle $\theta = 150°$ moving counter-clockwise in standard position, determine which primary trigonometric ratio is positive.

   a. sine
   b. cosine
   c. tangent
   d. none are positive



150° is a quadrant 2 angle

⇒ sine is positive!

6. Use the trigonometric ratio $\sin\theta = -0.2761$ to determine which of the following is the correct value of θ to the nearest degree if $0° \le \theta \le 360°$.

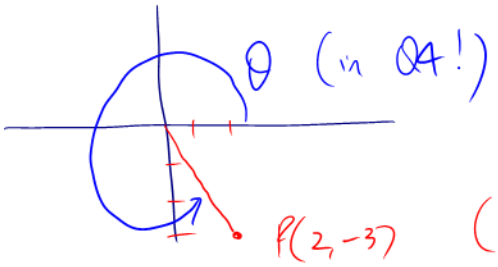
a. 164°
b. 82°
c. 16°
d. 344°

Note: no need to calculate for this one: Sine is negative in Q3 or Q4

a) is Q2, b) is Q1, c) is Q1, d is Q4

7. $P(2,-3)$ lies on the terminal arm of an angle in standard position. What is the value of the principal angle θ to the nearest degree?

a. 56° Q1
b. 146° Q2
c. 236° Q3
d. 304° Q4



d. 304° is the only option for Q4.

8. Which of the following completes the missing step to the following proof.

$$\frac{\cos^2\theta}{1-\sin\theta} = 1+\sin\theta$$

L.S.:

$$\frac{\cos^2\theta}{1-\sin\theta}$$

$$= ???$$

$$= \frac{(1-\sin\theta)(1+\sin\theta)}{1-\sin\theta}$$

$$= 1+\sin\theta$$

= R.S.

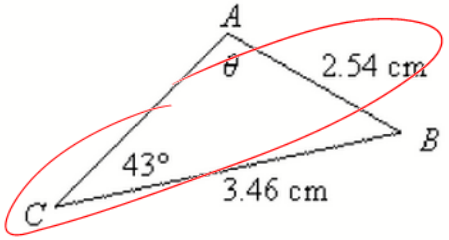
a. $\frac{1-\sin^2\theta}{1-\sin\theta}$
b. $\frac{\cos^2\theta+\sin^2\theta}{1-\sin\theta}$
c. $\frac{\cos^2\theta}{1-\sin\theta}\cdot\frac{1+\sin\theta}{1+\sin\theta}$
d. $\frac{\cos^2\theta}{1-\sin\theta}\cdot\frac{\sin^2\theta}{\sin^2\theta}$

$= \frac{1-\sin^2\theta}{1-\sin\theta}$ (difference of squares.)

$= \frac{(1-\sin\theta)(1+\sin\theta)}{1-\sin\theta}$

or Trig Identities.

9. Determine the measure of the angle θ to the nearest degree.



BOOM SINE LAW

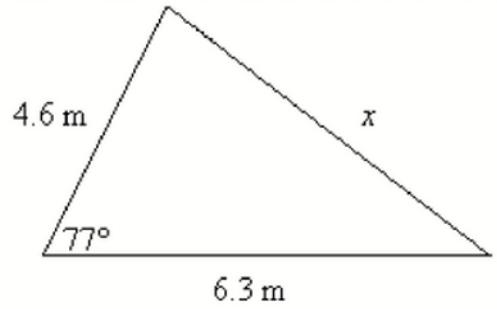
$$\frac{\sin(\theta)}{3.46} = \frac{\sin(43)}{2.54}$$

$$\Rightarrow \theta = \sin^{-1}\left(\frac{(3.46)(\sin(43))}{2.54}\right)$$

$$\doteq 68°$$

a. $\theta = 62°$
b. $\theta = 64°$
c. $\theta = 66°$
d. $\theta = 68°$

10. Determine x to the nearest tenth of a metre.



Not a right Δ $\Rightarrow$ NOT SOH CAH TOA
No corresponding pair $\Rightarrow$ NOT SINE LAW
} Boom: COSINE LAW

$x^2 = 6.3^2 + 4.6^2 - 2(6.3)(4.6)\cos(77)$

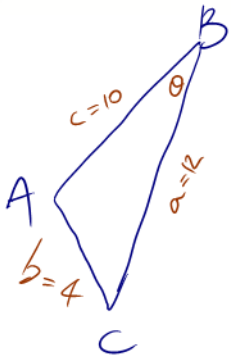
$\Rightarrow x = \sqrt{\quad\quad}$

$\doteq 6.9$

a. 7.5 m
b. 7.9 m
c. 6.2 m
(d.) 6.9 m

11. A woman has a triangular garden with side lengths of 10 m, 12 m, and 4 m. Determine the angle between the side lengths of 10 m and 12 m to the nearest degree.

a. 15°
b. 16°
c. 17°
(d.) 18°



No SOH CAH TOA
No SINE LAW
Boom: COSINE LAW (for angles!)

the cosine law - rearranged to isolate the angle.

$\cos(B) = \dfrac{a^2 + c^2 - b^2}{2ac}$

$\Rightarrow \cos(B) = \dfrac{12^2 + 10^2 - 4^2}{2(12)(10)}$

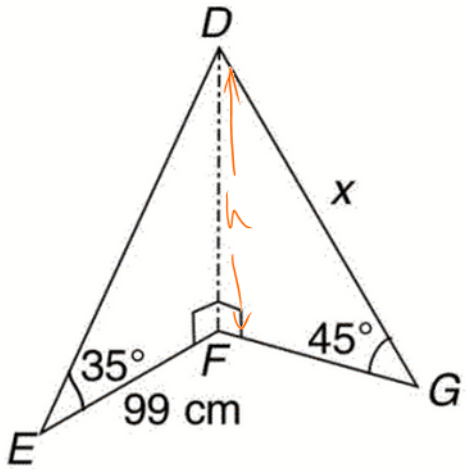
$\Rightarrow B = \cos^{-1}\left(\dfrac{12^2 + 10^2 - 4^2}{2(12)(10)}\right) \doteq 18°$

12. If 3 sides are known for a triangle, what piece of information can be found and what method is used?

a. side, sine law
b. side, cosine law
c. angle, sine law
(d.) angle, cosine law

Taking a look at #11 above - we found an angle using Cosine Law

13. Determine the value of x to the nearest cm.

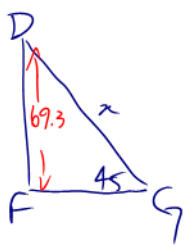


Note: DF is common to both Δs! $\Rightarrow$ Find it!

$\tan(35) = \dfrac{h}{99}$

$\Rightarrow h = (99)(\tan(35))$

$\doteq 69.3$



$\sin(45) = \dfrac{69.3}{x}$

$\Rightarrow x = \dfrac{69.3}{\sin(45)} = 98$ cm

a. 47 cm
b. 68 cm
c. 74 cm
(d.) 98 cm