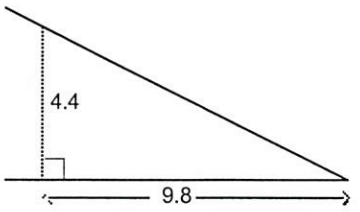
PRACTICE FINAL – TRIGONOMETRY

____ 1. Determine the angle of inclination of the line to the nearest tenth of a degree.

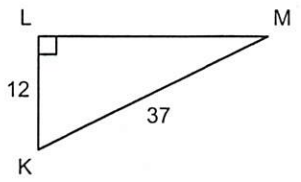


$\tan\theta = \frac{4.4}{9.8}$

$\theta = \tan^{-1}\left(\frac{4.4}{9.8}\right)$

$\theta \simeq 24.2°$

____ 2. Determine $\angle K$ to the nearest tenth of a degree.

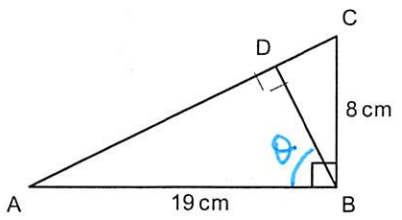


$\cos K = \frac{12}{37}$

$\angle K = \cos^{-1}\left(\frac{12}{37}\right)$

$\angle K \simeq 71.1°$

____ 3. Determine $\angle ABD$ to the nearest tenth of a degree.



$\tan A = \frac{8}{19}$

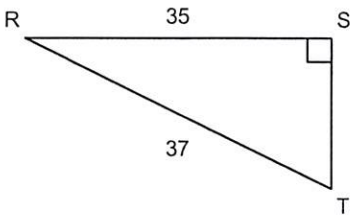
$\angle A = \tan^{-1}\left(\frac{8}{19}\right)$

$\theta = 180 - 90 - \angle A$

$\theta = 90 - \tan^{-1}\left(\frac{8}{19}\right)$

$\theta \simeq 67.2°$

____ 4. Determine the exact value of sin T.



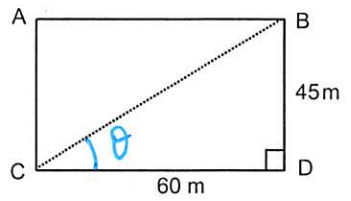
Pythagorean Th: $ST^2 = 37^2 - 35^2$

$ST^2 = 144$

$ST = 12$

$\cos T = \frac{12}{37}$

____ 5. Rhonda goes from C to B following the diagonal. Determine the angle ∠DCB to the nearest degree.



$\tan\theta = \frac{45}{60}$

$\theta = \tan^{-1}\left(\frac{45}{60}\right)$

$\theta \simeq 37°$

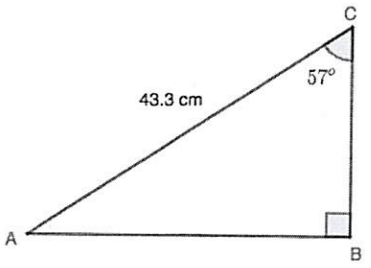
____ 6. From a point located 25ft. from a totem on the ground, the angle of elevation of the top of the totem is 50.1°. What is the height of the totem to the nearest foot?

$\tan 50.1° = \frac{h}{25}$

$h = 25 \times \tan 50.1$

$h \simeq 30\text{ ft}$

7. Determine the area of ΔABC as well as its perimeter to the nearest tenth.



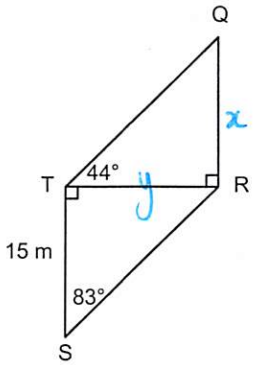
$\tan 57° = \frac{x}{23.6}$

$x = 23.6 \times \tan 57$

$A_{\Delta ABC} = \frac{23.6 \times x}{2} = \frac{23.6 \times 23.6 \tan 57}{2}$

$A \simeq 428.8\text{ cm}^2$

____ 8. Determine length QR to the nearest metre.

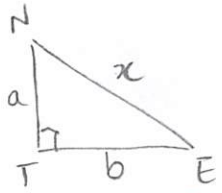


- $\tan 83 = \frac{y}{15}$ so $y = 15 \tan 83$
- $\tan 44 = \frac{x}{y}$ so $x = y \times \tan 44$

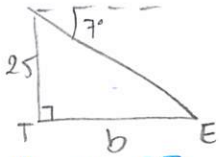
$x = 15 \tan 83 \times \tan 44$

$x \simeq 118\text{ m}$

9. From the top of an observation tower 25 m high, a firefighter sees a fire east of the tower, with a depression angle of 7°. He sees another one north of the tower, with a depressions angle of 3°. How far are the two fires from one another?

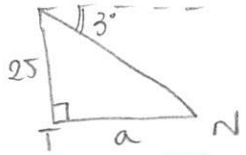


$x^2 = a^2 + b^2$



$\tan 7 = \frac{25}{b}$

$b = 25/\tan 7$



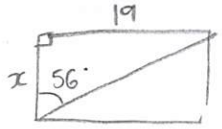
$\tan 3 = \frac{25}{a}$

$a = 25/\tan 3$

$x^2 = \left(\frac{25}{\tan 7}\right)^2 + \left(\frac{25}{\tan 3}\right)^2$

$x \simeq 519\text{ m}$

10. A rectangle has length 19.0 cm. The angle formed by its width (shorter) and its diagonal is 56°. Determine its width to the nearest tenth of a centimetre.

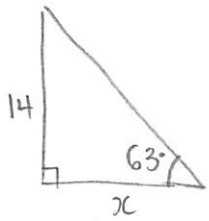


$\tan 56 = \frac{19}{x}$

$x = \frac{19}{\tan 56}$

$x \simeq 12.8\text{ cm}$

11. A flag is attached 14.0 m above the ground. John is laying down on the ground and sees the flag with an elevation angle of 63°. At what distance, to the nearest tenth of a metre, is John to the base of the pole where the flag is attached?

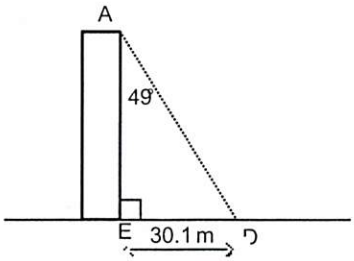


$\tan 63° = \frac{14}{x}$

$x = \frac{14}{\tan 63}$

$x \simeq 7.1\text{ m}$

12. A cable is connected between the top of a tower and the ground. Determine the height of the tower to the nearest tenth.



$\tan 49 = \frac{30.1}{h}$

$h = \frac{30.1}{\tan 49}$

$h \simeq 26.2\text{ m}$

+ more from textbook especially with cos & sin.

PRACTICE FINAL – EXPONENTS

1. Evaluate without a calculator :

a) $\left(\frac{1}{4}\right)^{-3} = 4^3 = 64$

b) $3^{-4} = \frac{1}{3^4} = \frac{1}{81}$

c) $\left(-\frac{8}{5}\right)^{\frac{7}{4}} \cdot \left(-\frac{8}{5}\right)^{\frac{1}{4}} = \left(-\frac{8}{5}\right)^{8/4} = \left(-\frac{8}{5}\right)^2 = \frac{64}{25}$

d) $\frac{1.2^{\frac{1}{3}}}{1.2^{\frac{4}{3}}} = 1.2^{-1} = \left(\frac{12}{10}\right)^{-1} = \frac{10}{12} = \frac{5}{6}$

e) $\left(\frac{2^8 \times 3^{-7}}{2^5 \times 3^{-5}}\right)^{-2} = \left(2^3 \times 3^{-2}\right)^{-2} = 2^{-6} \times 3^4 = \frac{3^4}{2^6} = \frac{81}{64}$

f) $2^7 - 2^5 + 2^0 = 128 - 32 + 1 = 97$

g) $\frac{5^2 - 5^0}{5^2 - 4^2} = \frac{25-1}{25-16} = \frac{24}{9} = \frac{8}{3}$

h) $1.5^{-3} = \left(\frac{3}{2}\right)^{-3} = \left(\frac{2}{3}\right)^3 = \frac{8}{27}$

2. Write $\frac{125}{512}$ as a power with a negative exponent.

$\frac{5^3}{8^3} = \left(\frac{5}{8}\right)^3 = \left(\frac{8}{5}\right)^{-3}$

3. Simplify the following expressions. Give the result with positive exponents only.

a) $m^{-2}n^6 \cdot m^3 n^{-8} = m\,n^{-2} = \frac{m}{n^2}$

b) $\left(\frac{5}{2}a^{-4}b^7\right)^{-3} = \left(\frac{5}{2}\right)^{-3} a^{12} b^{-21} = \left(\frac{2}{5}\right)^3 \frac{a^{12}}{b^{21}} = \frac{8a^{12}}{125b^{21}}$

c) $\left(\frac{3x^2y^{-2}}{5x^{-3}y^{-1}}\right)^{-3} = \left(\frac{3}{5}\right)^{-3}\left(x^5 y^{-1}\right)^{-3} = \left(\frac{5}{3}\right)^3 x^{-15} y^3 = \frac{125y^3}{27x^{15}}$

d) $8x^2y^{-3} \times (2x^{-3}y^{-4})^{-5} \times 4x^{-5}y^3 = 2^3 x^2 y^{-3} \times 2^{-5} x^{15} y^{20} \times 2^2 x^{-5} y^3$

$= x^{12} y^{20}$

e) $\left(\frac{2}{5}x^{-6}y^0\right)^3 = \left(\frac{2}{5}\right)^3 x^{-18} = \frac{8}{125x^{18}}$

f) $\frac{125x^3y^{-7}}{5^2x^{-1}y^{-2}} \times (25x^2y^2)^{-1} = 5x^4y^{-5} \times 5^{-2}x^{-2}y^{-2} = 5^{-1}x^2y^{-7} = \frac{x^2}{5y^7}$

g) $\left(\frac{3x^2x^{-5}y^2y^{-7}}{27x^{-5}y^4}\right)^{-2} = \left(\frac{x^{-3}y^{-5}}{9x^{-5}y^4}\right)^{-2} = \left(\frac{x^2}{9y^9}\right)^{-2} = \left(\frac{9y^9}{x^2}\right)^2 = \frac{81y^{18}}{x^4}$

h) $(5x^{-4}y^2)^{-5} \times 25x^7y^{-3} \times 10x^{-10}y^8 = 5^{-5}x^{20}y^{-10} \times 5^2x^7y^{-3} \times 2\times 5 \times x^{-10}y^8$

$= 5^{-2} \times 2 \times x^{17} y^{-5} = \frac{2x^{17}}{25y^5}$

i) $(3x)^{-5} \times (3x)^4 = 3^{-5}x^{-5}3^4x^4$

$= \frac{1}{3x}$

j) $\frac{27x^{-3}y^{-5}}{9^2x^{-11}y^2} \times (3x^{-12}y^2)^2$

$= \frac{3^3x^8y^{-7}}{3^4} \cdot 3^2x^{-24}y^4$

$= \frac{3^5x^{-16}y^{-3}}{3^4} = \frac{3}{x^{16}y^3}$