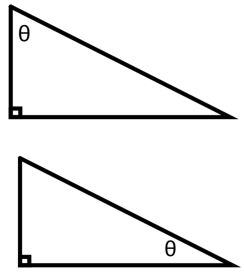
Lesson 4.0: Review of Trigonometry

Recall: In a right triangle, the primary trig ratios are:

sine $\sin\theta =$

cosine $\cos\theta =$

tangent $\tan\theta =$

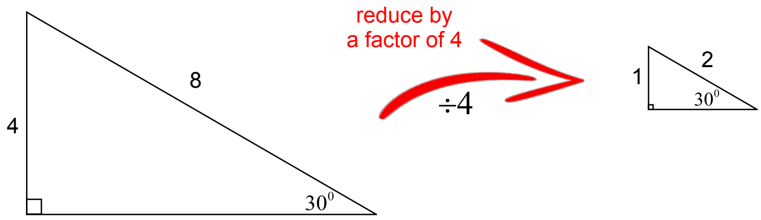


adj

opp

hyp

These ratios compare the lengths of the sides of a triangle. Trig stems from similar triangles. Any right triangle with a 30 ⁰ angle (for example), whatever its size, will have the same ratio of sides lengths because the angles are the same!



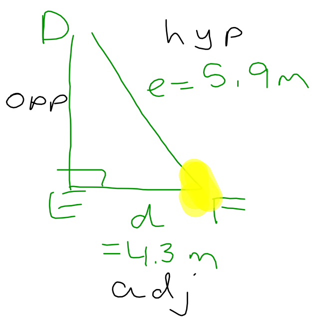
$\sin 30^0 =$

$\sin 30^0 =$

Recall: To "solve a triangle" means to find the measures of all 3 sides and all 3 angles.

Ex. 1 In ΔABC, <A = 90º, <B = 32º, and c = 19.2 cm. Solve the triangle. Include a well-labelled diagram.

Ex. 2 In ΔDEF, <E = 90º, d = 4.3 m, and e = 5.9 m. Solve for $< F$.



$\cos F = \frac{adj}{hyp}$

$\cos F = \frac{4.3}{5.9}$

$F = \cos^{-1}\left(\frac{4.3}{5.9}\right)$

$F \doteq 43^\circ$

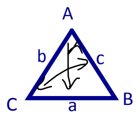
But what if the triangle is not right-angled?

Recall:

→ side-angle pairs

The Sine Law

In ΔABC,



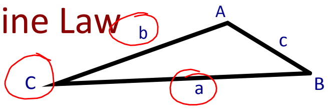
looking for side length

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad or \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

looking for an angle

The Cosine Law

In ΔABC,



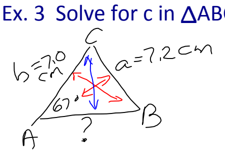
2 sides and the contained angle

$c^2 = a^2 + b^2 - 2ab\cos C$ rearrange --> $\cos C = \dfrac{a^2 + b^2 - c^2}{2ab}$

(Used when finding a side). (Used when finding an angle).

We will derive these formulas in lesson 4.4 A

Ex. 3 Solve for c in ΔABC, if <A = 67º, a = 7.2 cm, and b = 7.0 cm.



① $\frac{\sin B}{b} = \frac{\sin A}{a}$

$\frac{\sin B}{7.0} = \frac{\sin 67}{7.2}$

$\sin B = \frac{7.0 \sin 67}{7.2}$

$B = \sin^{-1}\left(\frac{7.0 \sin 67}{7.2}\right)$

$B \doteq 64°$ *Keep in calc.

② $\angle C = 180 - 67 - 64$

$\doteq 49°$

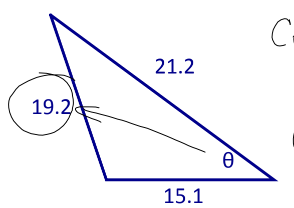
③ $\frac{c}{\sin C} = \frac{a}{\sin A}$

$\frac{c}{\sin 49} = \frac{7.2}{\sin 67}$

$c = \frac{7.2 \sin 49}{\sin 67}$

$c \doteq 5.9\text{cm}$

Ex. 4 Solve for the unknown angle θ.

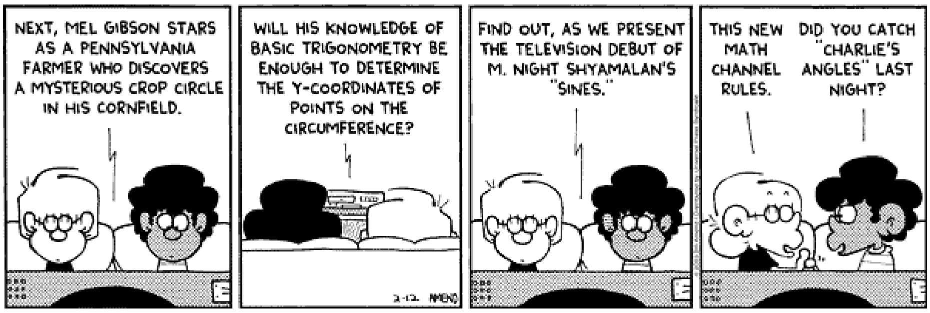


$\cos\theta = \frac{a^2 + b^2 - c^2}{2ab}$

$\cos\theta = \frac{[(21.2)^2 + (15.1)^2 - (19.2)^2]}{2(21.2)(15.1)}$

$\theta \doteq 61°$

p.220


NEXT, MEL GIBSON STARS AS A PENNSYLVANIA FARMER WHO DISCOVERS A MYSTERIOUS CROP CIRCLE IN HIS CORNFIELD.
WILL HIS KNOWLEDGE OF BASIC TRIGONOMETRY BE ENOUGH TO DETERMINE THE Y-COORDINATES OF POINTS ON THE CIRCUMFERENCE?
FIND OUT, AS WE PRESENT THE TELEVISION DEBUT OF M. NIGHT SHYAMALAN'S "SINES."
THIS NEW MATH CHANNEL RULES.
DID YOU CATCH "CHARLIE'S ANGLES" LAST NIGHT?
2-12 AMEND