

Week 2            Monday 26 August  
Chapter Three:    Geometry and Trigonometry  
Topic:            3.3 Sine, Cosine Tangent: Sides  
IB Syllabus:     Right-angled trigonometry  
                      Use of the ratios of sine, cosine, and tangent  
Lesson Obj:      Students will find side lengths of right triangles  
                      Students will apply principles of trigonometry to real-life problems.

Review and Intro:

0.      Vocab on board: sine, cosine, tangent
1.      Introduce 4Pics 1 Word
2.      Review similar triangles with SMARTBoard.
3.      If all the corresponding angles are congruent, then the corresponding sides form ratios.
4.      These ratios, in a right triangle, are called trigonometric ratios.

Core Lesson:

5.      Sine, cosine, tangent
6.      Do 1; students do 2 through 8. [only find missing side – not whole triangle]
7.      Do 17; students do 18-20
8.      Do 21; students do 22-23

Check for Understanding:

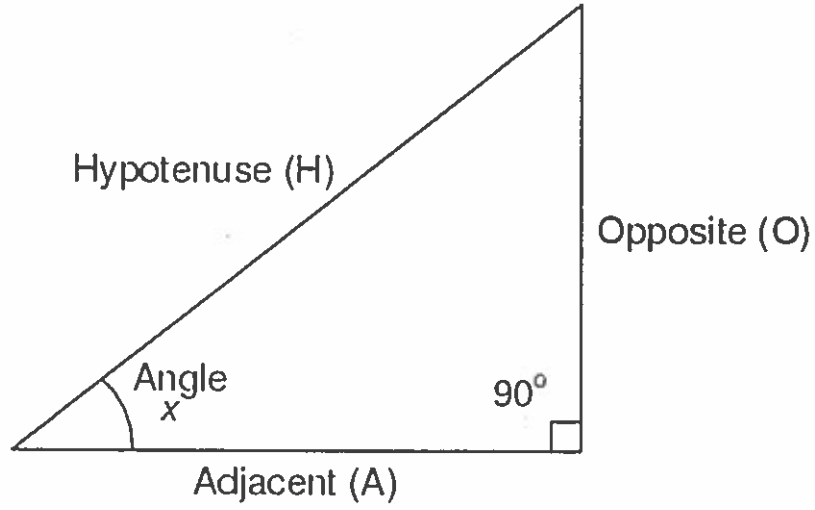
9.      Check student work throughout
10.     IB Practice 1 and 2

Assignment:

Students will read 103-110:  
Students will complete 108:1-6 all; 109-110:1-7 all

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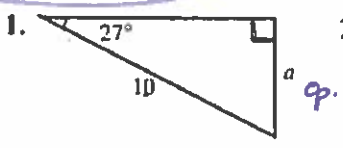
3.3 The Sine, Cosine, and Tangent Ratios: Finding the sides of right triangles



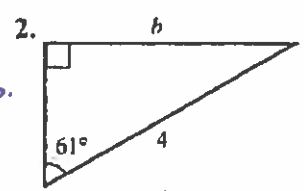
SOH - CAH - TOA

$\sin x = \frac{O}{H}$     $\cos x = \frac{A}{H}$     $\tan x = \frac{O}{A}$

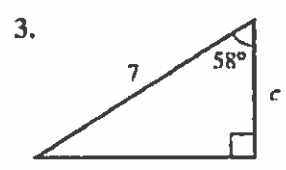
Degree mode



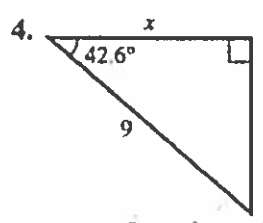
$\sin 27 = \frac{a}{10}$   
 $10 \sin 27 = a$   
 $a = 4.54$



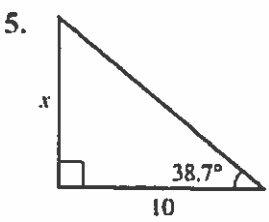
$\sin 61 = \frac{b}{4}$   
 $3.498 = b$



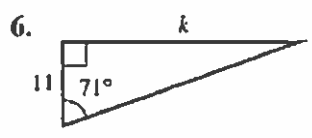
$\cos(58) = \frac{c}{7}$   
 $c = 3.71$



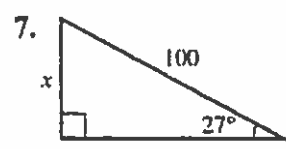
$\cos(42.6) = \frac{x}{9}$   
 $x = 6.62$



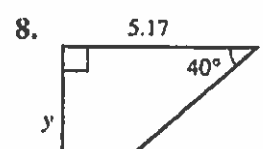
$\tan(38.7) = \frac{x}{10}$   
 $x = 8.01$



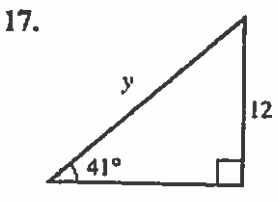
$\tan(71) = \frac{k}{11}$   
 $k = 31.95$



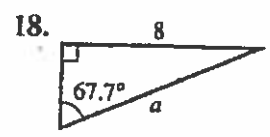
$\sin(27) = \frac{x}{100}$   
 $x = 45.40$



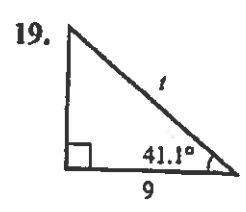
$\tan 40 = \frac{y}{5.17}$   
 $y = 4.34$



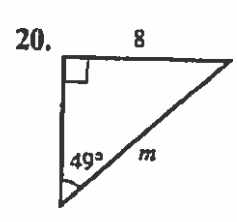
$\sin(41) = \frac{12}{y}$   
 $18.29 = y$



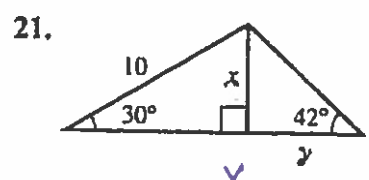
$\sin(67.7) = \frac{8}{a}$   
 $8.65 = a$



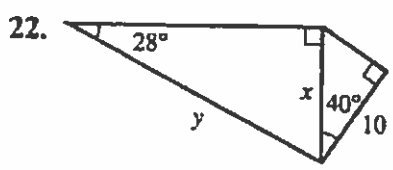
$\cos(41.1) = \frac{9}{t}$   
 $11.94 = t$



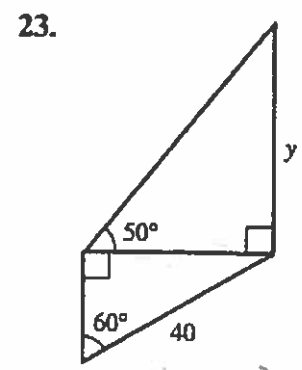
$\sin(49) = \frac{8}{m}$   
 $10.60 = m$



$\sin 30 = \frac{x}{10}$   
 $10 \cdot \sin 30 = x$   
 $x = 5$   
 $\tan 42 = \frac{5}{y}$   
 $5 = \tan 42 \cdot y$



$\cos(40) = \frac{10}{x}$   
 $x = 13.05$   
 $\sin(28) = \frac{13.05}{y}$   
 $27.81 = y$



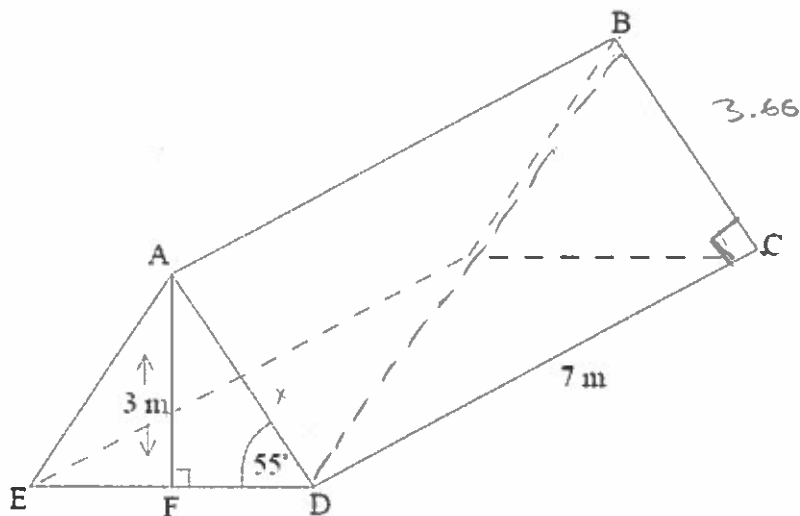
$\sin(60) = \frac{x}{40}$   
 $46.19 = x$   
 $\tan(50) = \frac{y}{46.19}$   
 $38.76 = y$

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3.3 IB Practice

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1. The following diagram shows a sloping roof.  
The surface ABCD is a rectangle.



- a) Calculate AD      SoH CaH TOa

$$\sin(55) = \frac{3}{x}$$

$$3.66 = x$$

$$\underline{AD = 3.66 \text{ m}}$$

- b) Calculate the length of the diagonal DB.

$$a^2 + b^2 = c^2$$

$$3.66^2 + 7^2 = c^2$$

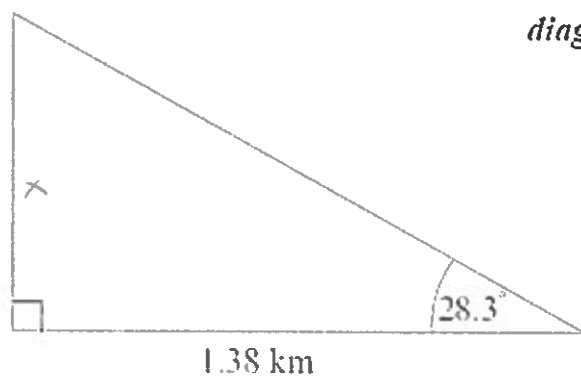
$$\sqrt{657.21} = \boxed{25.64 \text{ m}}$$

2. José stands 1.38 kilometres from a vertical cliff.  $1 \text{ km} = 1000 \text{ m}$

a) Express this distance in metres.

$$\frac{1}{1000} = \frac{1.38}{x} \quad x = \underline{1380} \quad \boxed{1380 \text{ meters}} = 1.38 \text{ kilometers}$$

b) José estimates the angle between the horizontal and the top of the cliff and uses it to find the height of the cliff, as shown in the diagram. Find the height of the cliff according to José's calculation. Express your answer in metres, to the nearest whole metre.



Soh Cah Toa

$$\tan(28.3) = \frac{x}{1380 \text{ m}}$$

$$x = 743.05 \text{ m}$$

743 meters =  
height of cliff

c) The actual height of the cliff is 718 metres. Calculate the percentage error made by José when calculating the height of the cliff.

$$\frac{|\text{experimental} - \text{theoretical}|}{\text{theoretical}} \times 100$$

$$\frac{|718 - 743|}{743} \times 100$$

3.36% error