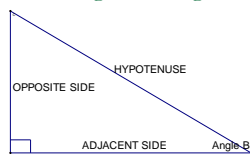


Lesson 26 - Applications of Right Triangle Trigonometry

IB Math Studies 1 – Santowski

1

(A) Review of Right Triangles



- In a right triangle, the primary trigonometric ratios (which relate pairs of sides in a ratio to a given reference angle) are as follows:
 - sine B = opposite side/hypotenuse side \rightarrow (O/H)
 - cosine B = adjacent side/hypotenuse side \rightarrow (A/H)
 - tangent B = opposite/adjacent side \rightarrow (O/A)
- recall SOHCAHTOA as a way of remembering the trig. ratio and its corresponding sides

2

(B) Review of Trig Ratios

- | | |
|--|---|
| <ul style="list-style-type: none"> Evaluate and interpret: <ul style="list-style-type: none"> (a) $\sin(32^\circ)$ (b) $\cos(69^\circ)$ (c) $\tan(10^\circ)$ | <ul style="list-style-type: none"> Evaluate and interpret: <ul style="list-style-type: none"> (a) $\sin(x) = 0.4598$ (b) $\cos(x) = 0.7854$ (c) $\tan(x) = 1.432$ |
|--|---|

3

(B) Review of Trig Ratios

- If $\sin(x) = 2/3$, determine the values of $\cos(x)$ & $\tan(x)$
- If $\cos(x) = 5/13$, determine the value of $\sin(x) + \tan(x)$
- If $\tan(x) = 5/8$, determine the sum of $\sin(x) + 2\cos(x)$
- If $\tan(x) = 5/9$, determine the value of $\sin^2(x) + \cos^2(x)$
- A right triangle with angle $\alpha = 30^\circ$ has an adjacent side 4 units long. Determine the lengths of the hypotenuse and side opposite α .

4

(C) Review of Trig Ratios and Triangles

- | | |
|-----|-------|
| C = | _____ |
| a = | _____ |
| c = | _____ |
- | | |
|-----|-------|
| A = | _____ |
| C = | _____ |
| c = | _____ |

5

(C) Review of Trig Ratios and Triangles

- | | |
|-----|-------|
| B = | _____ |
| b = | _____ |
| c = | _____ |
- d) Sketch a triangle where $A = 25^\circ$, $C = 90^\circ$ and $b = 12$. Solve for the missing measures.

| | |
|-----|-------|
| B = | _____ |
| a = | _____ |
| c = | _____ |

6

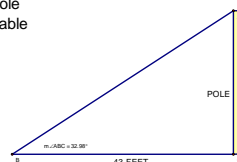
(D) Examples – Right Triangle Trigonometry

- Using the right triangle trig ratios, we can solve for unknown sides and angles:
- ex 1. Find a in $\triangle ABC$ if $b = 2.8$, $C = 90^\circ$, and $A = 35^\circ$
- ex 2. Find A in $\triangle ABC$ if $b = 4.5$ and $a = 3.5$ and $B = 90^\circ$
- ex 3. Solve $\triangle ABC$ if $b = 4$, $a = 1.5$ and $B = 90^\circ$

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(E) Examples – Right Triangle Trigonometry

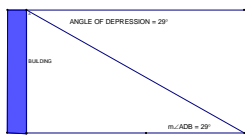
- A support cable runs from the top of the telephone pole to a point on the ground 43 feet from its base. If the cable makes an angle of 32.98° with the ground, find (rounding to the nearest tenth of a foot):
 - a. the height of the pole
 - b. the length of the cable



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(E) Examples – Right Triangle Trigonometry

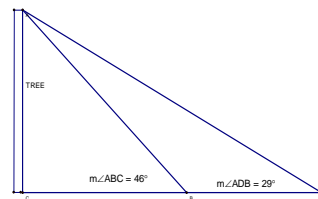
- Mr Santowski stands on the top of his apartment building (as part of his super-hero duties, you know) and views a villain at a 29° angle of depression. If the building I stand upon is 200 m tall, how far is the villain from the foot of the building?



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(E) Examples – Right Triangle Trigonometry

- You are hiking along a river and see a tall tree on the opposite bank. You measure the angle of elevation of the top of the tree and find it to be 46.0° . You then walk 50 feet directly away from the tree and measure the angle of elevation. If the second measurement is 29° , how tall is the tree? Round your answer to the nearest foot.



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(E) Examples – Right Triangle Trigonometry

- 3) A child looks up in front of himself and sees a hot air balloon in the sky. The angle of elevation from the child to the balloon is 52° . The distance from the child to the spot on the ground directly under the balloon is 75 feet. How high is the balloon? (Disregard the distance from the ground to the child's eyes.)
- 4) If you are 6 feet tall and stand 15 feet away from the bottom of a building that is 170 feet tall and look up to the roof, what is the angle of elevation from your head to the top of the building?
- 5) How long must a ladder be if it is to be leaned against a house at a point 9 feet above the ground resting at least 3 feet from the bottom edge of the wall (to avoid damaging the flower bed)?

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(F) Links

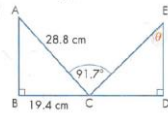
- For help with right triangle trig:
<http://id.mind.net/~zona/mmts/trigonometryRealms/introduction/rightTriangle/trigRightTriangle.html>

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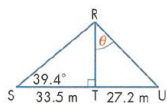
Examples – Right Triangle Trigonometry

4. Find the measure of $\angle \theta$, to the nearest tenth of a degree.

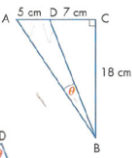
a)



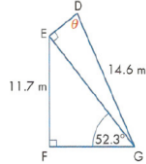
c)



b)



d)



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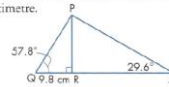
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Examples – Right Triangle Trigonometry

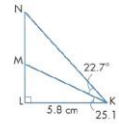
5. Find AB, to the nearest tenth of a metre.



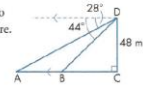
6. Find RS, to the nearest tenth of a centimetre.



9. Find MN, to the nearest tenth of a centimetre.



10. Find AB, to the nearest metre.



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(G) Homework

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