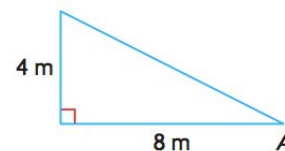


## IM2 Problem Set 2.6 - Skills Review and Coordinate Geometry Extensions

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"><li>• How do I determine the measure of angles in geometric shapes, without direct measurement?</li><li>• How do I solve for sides or angles in right triangles?</li><li>• How can I solve problems that require geometric models using right triangles??</li></ul>
---------------------------	---

### Part 1 - Skills Review

1. Determine the values of the three primary trigonometric ratios for  $\angle A$ . Then determine the measure of  $\angle A$  to the nearest tenth of a degree.



2. Determine the value of  $x$  to one decimal place:

a.  $\tan 46^\circ = \frac{x}{14.2}$

b.  $\cos 29^\circ = \frac{17.3}{x}$

c.  $\sin x^\circ = \frac{12}{15.75}$

3. ABCD is a rectangle with  $AB = 15$  cm and  $BC = 10$  cm. What is the measure of  $\angle BAC$  to the nearest tenth of a degree?

4. In  $\triangle PQR$ ,  $\angle R = 90^\circ$  and  $p = 12.0$  cm. Determine:

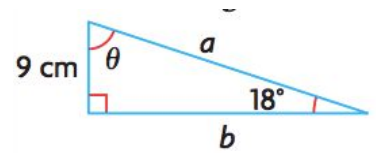
- the value of  $r$  when  $\angle Q = 62^\circ$
- the measure of  $\angle P$  when  $q = 16.5$  cm.

5. Maria needs to load cars onto a transport truck. She is planning to drive up a ramp onto the truck bed. The truck bed is 1.5 m high and the maximum angle of the slope of the ramp is  $35^\circ$ .

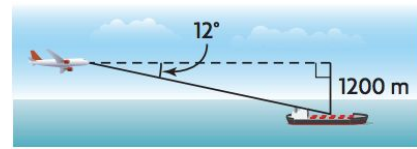
- How far is the rear of the truck from the point where the ramp touches the ground?
- How long should the ramp be? Round your answer to one decimal place.
- Maria has the idea that if she doubles the length of the ramp, then she can reduce the angle of the ramp by half. Show/explain whether or not she is correct.



6. When you are being asked to solve a triangle, it means you need to know the measure of all three angles and all three sides. Solve this triangle:



7. A search and rescue plane is flying at an altitude of 1200 m toward a disabled ship. The pilot notes that the angle of depression to the ship is  $12^\circ$ .
- What is the direct distance between the plane and the ship?
  - How much further does the plane need to fly to end up directly above the ship, assuming that the plane maintains the same altitude?
  - (Extension)** If the airplane has an airspeed of 200 km/hr, how long does it take before the airplane is directly above the ship?
  - (Extension)** Now assume that the pilot descends her plane at an angle of  $5^\circ$ . What is the height of the airplane when it is directly above the ship?



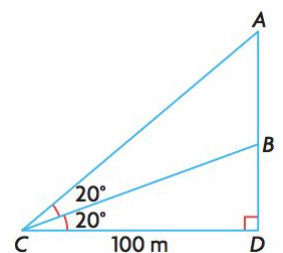
8. A cyclist pedals his bike 6.5 km up a mountain road, which has a steady incline. By the time he has reached the top of the mountain, he has climbed 1.1 km vertically. Calculate the angle of the road.



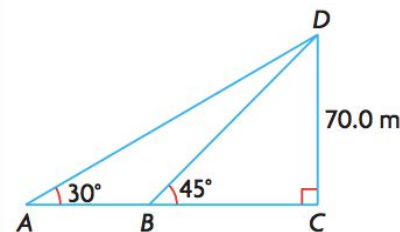
9. Explain why  $\sin^{-1}(1.5)$  gives an error when you try to do it on the calculator.

10. The angle of elevation from the top of a 16 m building to the top of a second building is  $48^\circ$ . The buildings are 30 m apart. What is the height of the taller building?

11. Calculate the length of AB using the information provided in the diagram.



12. A hiker estimates that from point A, the angle of elevation to the top of a cliff at point D is  $30^\circ$ . When the hiker moves forward to point B, he now estimates the angle of elevation to the top of the cliff to be  $45^\circ$ . If the height of the cliff is 70 m, calculate the distance that the hiker moved forward. **EXTENSION CHALLENGE to Q11.** You have assumed in this problem that the hiker walked along a level path, AC as in the diagram. If the hiker had walked along an inclined path of  $10^\circ$ , what is the distance that the hiker moved forward?



13. A plane takes off in along a straight line path and elevates along this path for 10 seconds, when it reaches a height of 300m. If the plane is travelling at 60 m/s, at what angle is the plane ascending?

## Part 2 – Challenge Problems - Coordinate Geometry and Trigonometry

14. Here are four points: A(-6,4), B(2,5), C(5,-2) and D(-1,-4). Determine:

- a. what type of quadrilateral it is.
- b. the measure of each of the angles

15. Here are three points: A(-5,3), B(1,5) and C(4,2). Determine:

- a. the measure of the angles of this triangle.
- b. the point at which the perpendicular bisectors meet (call it point D).
- c. the distance between point D and each of 3 points A, B, and C. What do you notice and what does this suggest?

16. Using the same three points of A(-5,3), B(1,5) and C(4,2). Determine:

- a. the area of the triangle.
- b. Now, determine the length of all three sides.
  - i. Determine the semi-perimeter of the triangle.
  - ii. Now use Herron's formula to find the area of the triangle.
- c. You have already determined the measure of the angle at vertex C. Multiply the length of side BC and the length AC and the sine ratio of the angle at vertex C. Divide by two. What do you notice and explain why this happens