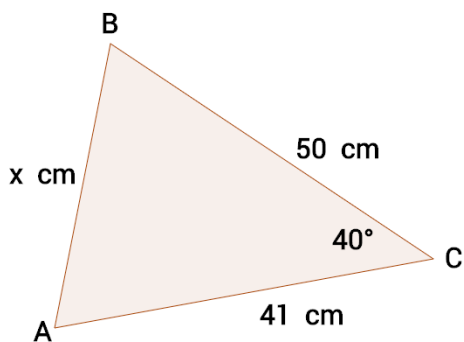


**PART 2 - CALCULATOR ACTIVE QUESTIONS**

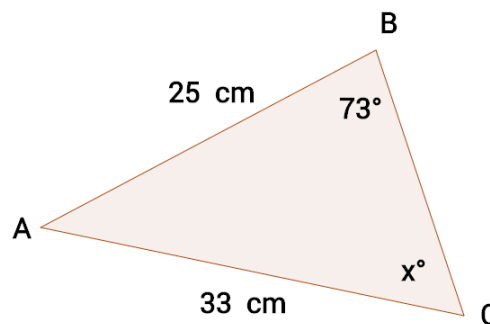
1. Solve for the unknown in each of the diagrams provided below. In terms of showing work, please show (i) key substitutions into appropriate formula(s) & (ii) final answer(s)

**(6 marks)**

(a) Solve for  $x$  (side  $c$ ) in  $\triangle ABC$



(b) Solve for  $\angle BCA$  (angle  $X$ ) in  $\triangle ABC$



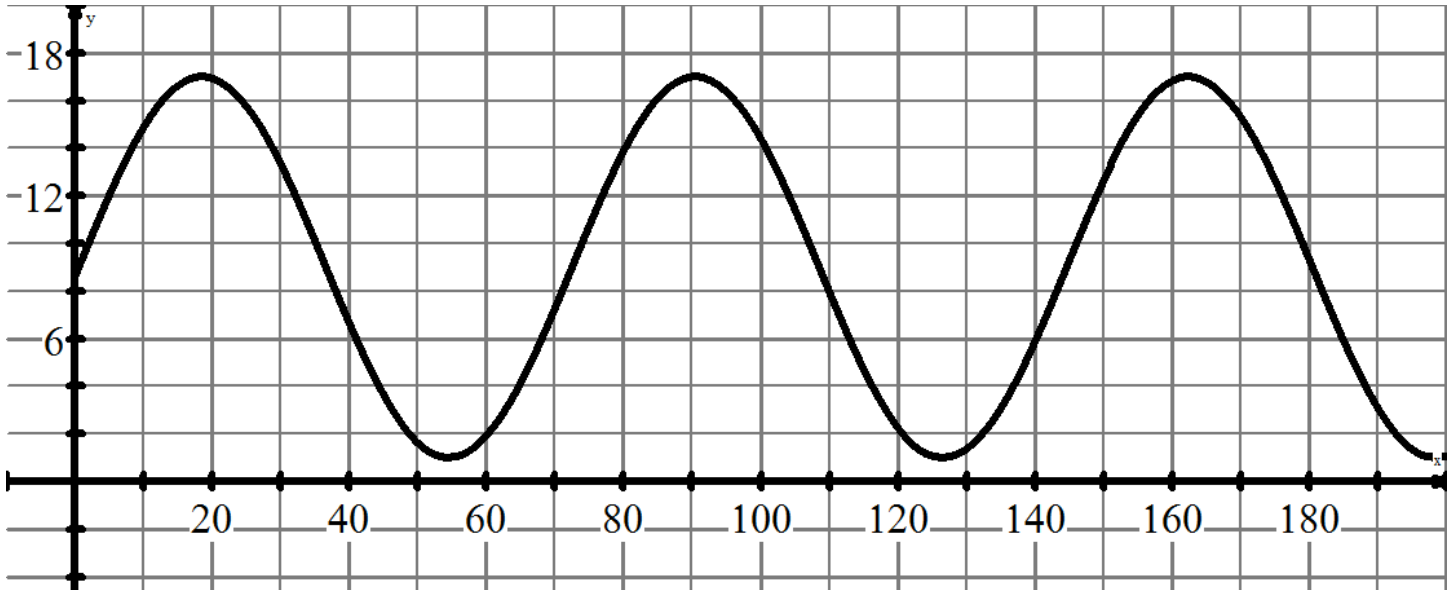
2. The height of a basket on a water wheel at time  $t$  seconds is modelled by the equation  $h(t) = 3\sin(5t)^\circ$ , where  $t$  is time in seconds and  $h$  is the height above the water in meters.

**(6 marks)**

- a. What is the diameter of the water wheel?      b. How high above the water is the basket at 14s?      c. When will the basket first be 0.5 m under water?

3. The height above the ground ( $h$ , in meters) of a rider on a Ferris wheel with a radius of 8 meters is modeled by the equation  $h(t) = 8\sin(5(t - 3)) + 9$ , where  $t$  is measured in seconds. The graph of the function is shown below. Use the graph or the equation, along with your calculator and your thinking skills, to answer the following questions. **Estimated answers from this graph will be given NO credit, so please show/explain key calculator OR algebra steps in your solutions.**

**(10 marks)**

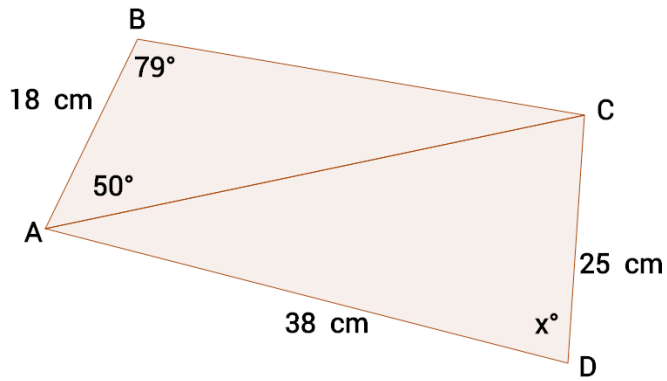


- (a) How long does it take for the wheel to make one revolution?
- (b) Find the height of the rider after 4 minutes.
- (c) At what times will the rider be farthest from the ground, in the first three minutes of the ride?
- (d) Find the first time the rider will reach a height of 12 meters.

4. Here is a diagram showing 2 triangles. Solve for the required angle (labelled as  $x$  in the diagram). Present a neat, easy to read solution & round your final answer to the nearest tenth of a unit.

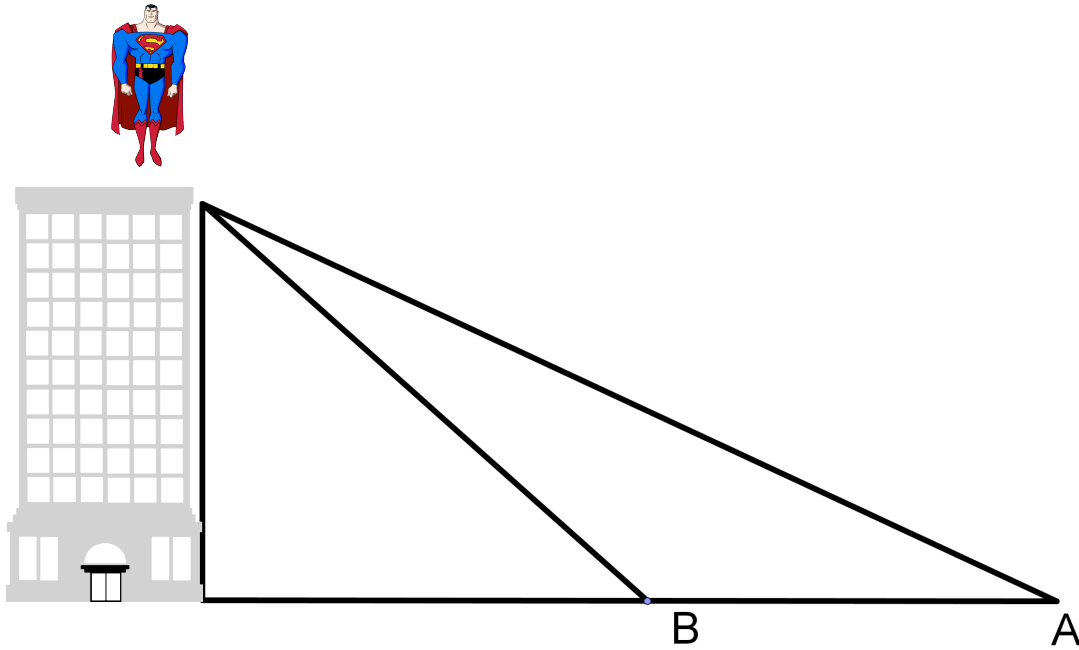
**(6 marks)**

Solve for  $\angle CDA$  (labelled  $x$  in the diagram)



5. Mr. Smith (AKA Superman) is on a 40 meter tall building. He needs to determine the distance between two villains. He observes Villain A with an angle of depression of  $26^\circ$  and he notices Villain B with an angle of depression to now be  $42^\circ$ . Use this data to determine the distance between the two villains. (a partial diagram is provided and hints can be “purchased” for marks, though)

**(6 marks)**



6. John is floating in a sailboat at a harbour. The sailboat rises and falls as the waves pass through the harbour. At a time of  $t = 2$  second, John's sailboat reaches a minimum height of 4 m above the bottom of the harbour. At the time of  $t = 11$  seconds, the sailboat reaches a minimum height of 12 m above the bottom of the harbour.

**(14 marks)**

- (a) Complete the following data table:

|            |   |    |    |    |    |    |
|------------|---|----|----|----|----|----|
| Time (sec) | 2 | 11 | 20 | 29 | 38 | 47 |
| Height (m) | 4 | 12 |    |    |    |    |

- (b) Use the data table to help sketch a graph which expresses John's height from the bottom of the pool with respect to time.



- (c) Determine the period of the wave

- (d) Determine the amplitude of the waves

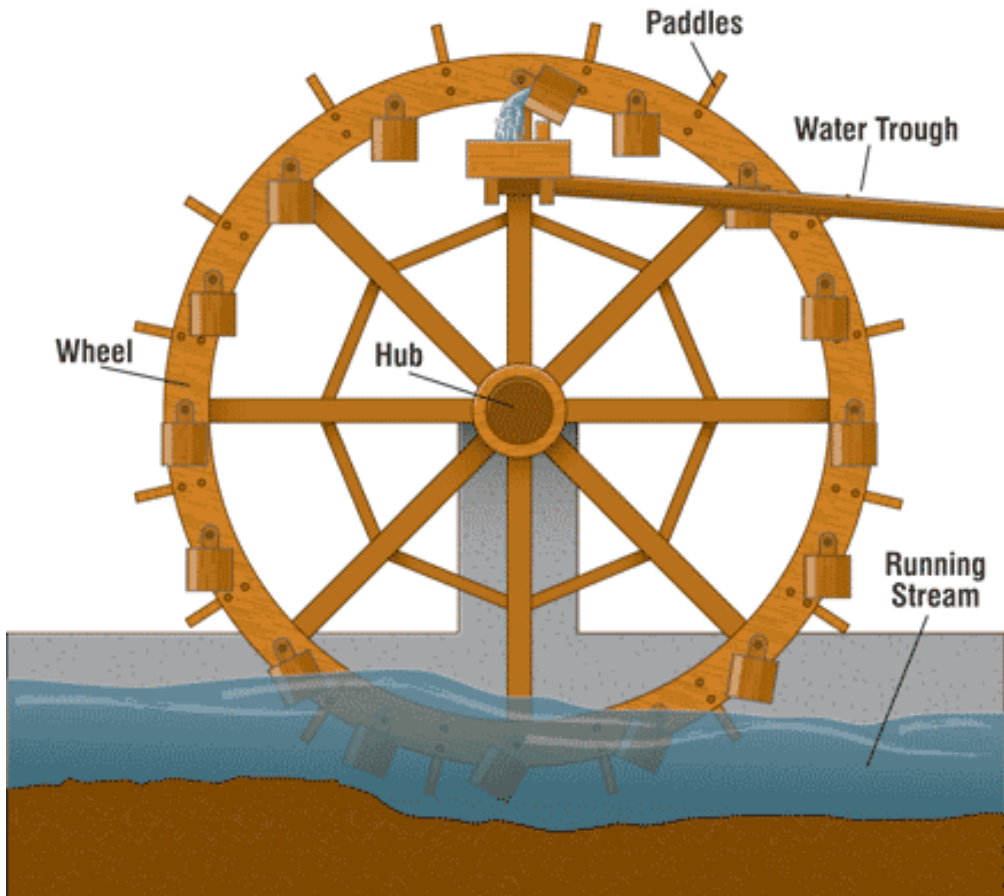
- (e) Determine the equation of the axis of the curve

- (f) Write an equation (in terms of sine OR cosine) to represent John's position above the bottom of the pool as a function of time

- (g) What is John's height above the bottom of the pool after 1 MINUTE?

- (h) When does John reach a height of 7 meters for the THIRD time?

Visual for Q2 → Waterwheel



Visual for Q6 → sailboat rising and falling in waves in harbour

