

1. **(CI)** Solve on the domain $-180^\circ \leq x \leq 180^\circ$
 - a. $2\cos(x) - \sqrt{3} = 0$
 - b. $\sqrt{2} - 2\sin(x) = 0$
 - c. $6\sin(x) - 2 = 1$
 - d. $4\tan(x) - 4 = 0$

2. **(CA)** At the beginning of 2015, a lake contains 200 fish. The number of fish is expected to increase at a rate of 5% per year. What is the expected number of fish in that lake at the beginning of 2020?

3. **(CA)** Given the following geometric sequence of numbers: 144, 48, 16, ...
 - a. Write down the common ratio, r , for this sequence.
 - b. What is the 7th term in this sequence?
 - c. Calculate the sum of the first five terms on this sequence
 - d. Calculate the **sum to infinity** of this sequence.

4. **(CI)** Let $f(x) = \sin(x)$ For each of the following, draw a sketch of the new function.
 - a. $g(x) = 2f(x - 30^\circ) + 4$.
 - b. $h(x) = -2f(\frac{1}{3}x) + 1$
 - c. $r(x) = \frac{1}{2}f(3x + 180^\circ)$

5. **(CA)** The depth of water at the end of a fishing pier is given by the function;

$$D(t) = P \sin\left(\frac{\pi}{6}(t - Q)\right) + 10,$$

where D is the depth of the water in meters, and t is the number of hours after midnight.

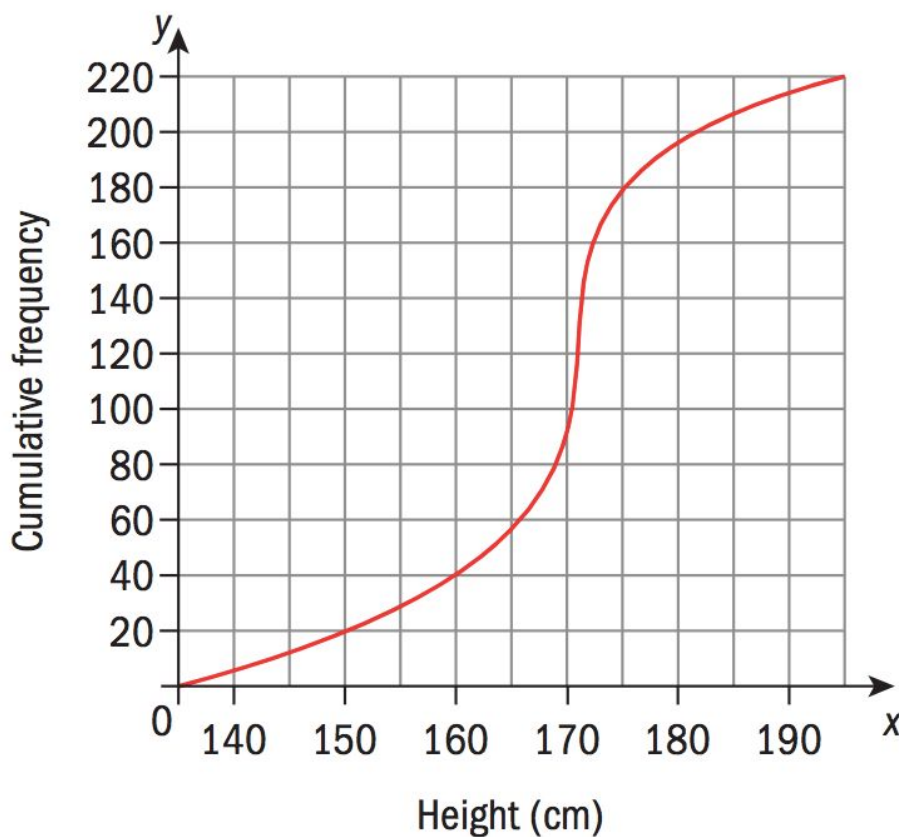
Low tide occurs at 4:00, when the depth of the water is 6m

High tide occurs at 10:00, when the depth of the water is 14m.

- a. Find the values of P and Q .
 - b. Sketch a graph of the function D , for $0 \leq t \leq 24$.
 - c. At what time does the water first reach a height of 8 meters?
 - d. Fishing is prohibited when the water depth is less than 8 meters. How many hours per day is fishing allowed?

6. **(CI)** Using your knowledge of the special right triangles, find the values of the following:
 - a. $\sin(135^\circ)$
 - b. $\cos(315^\circ)$
 - c. $\tan(\frac{\pi}{4})$
 - d. $\sin(450^\circ)$

7. (CI) The following cumulative frequency diagram shows the heights of 220 sunflowers.



- Find the median height of a sunflower.
 - The smallest 25% are sent to home garden shops. How many get sent? What is the range of heights for these sunflowers?
 - The tallest 10% get sent to hotels for display. How many go to hotels? What is the minimum height of a hotel-display sunflower?
 - The middle half of sunflowers are sold immediately. How many is this?
 - The height of the tallest sunflower is 195cm, and the shortest sunflower is 136cm. Draw a box and whisker plot representing the sunflowers.
8. (CI) Given the function $g(x) = \frac{1}{x}, x \neq 0$:
- Sketch $g(x)$ and label the “key” features of this parent function.
 - Given that $f(x) = 4 + 3g(x - 2)$, determine:
 - The transformations being applied to $g(x)$.
 - The equations of the asymptotes of $f(x)$.
 - The x - and y -intercepts of $f(x)$
 - Sketch $f(x)$.
 - The equation of the inverse of $f(x)$.