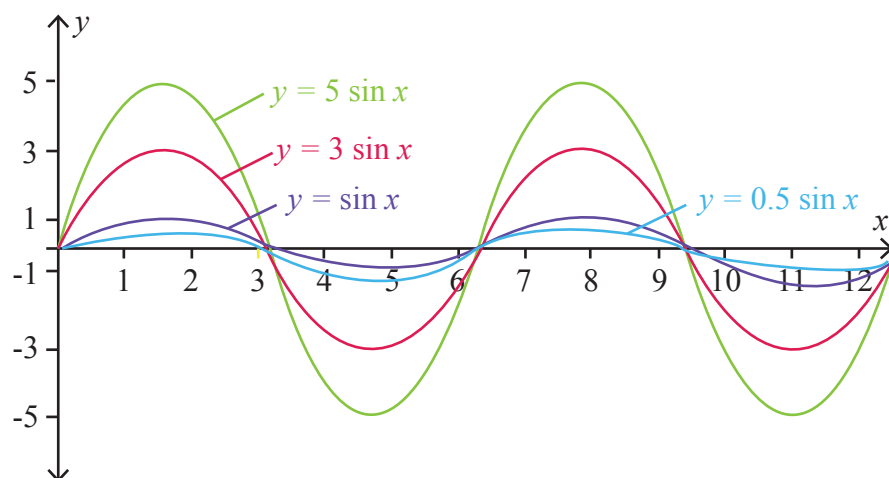Check it Out

- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 516 – 517, *Investigate the Math*, *Questions A – H*

A.

B.   i)   All the graphs have different amplitudes. The original graph has an amplitude of 1. Graphs i), ii), and iii) have amplitudes of 3, 5, and $\frac{1}{2}$ respectively. Thus, the value of a indicates the amplitude of the graph. The greater value of a, the greater the amplitude is. For instance, $y = 3 \sin x$ has a greater amplitude than $y = \sin x$, and $y = 0.5 \sin x$ has a lesser amplitude than $y = \sin x$.

     ii)   The amplitude indicates the radius of the water wheel; therefore, a represents the radius.

Check it Out

• If you have any difficulty with these solutions, please contact your teacher before continuing.

C.
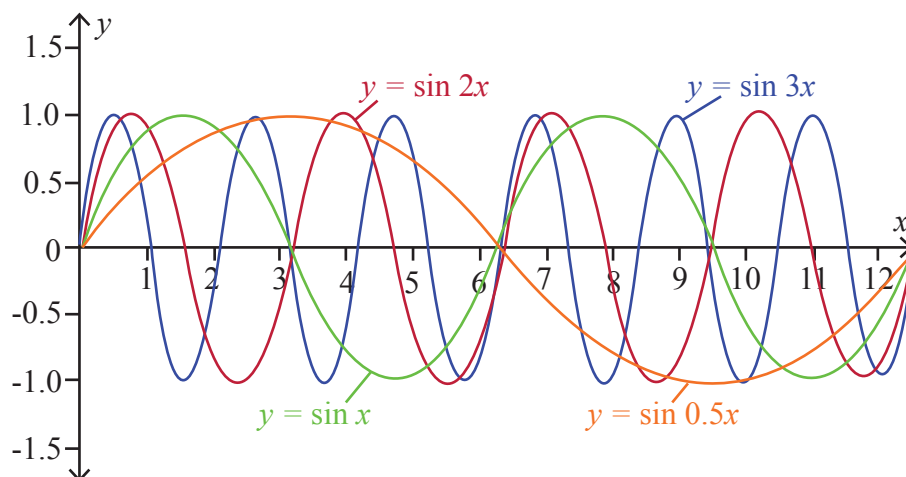
D.   i)   All graphs have different periods. The original graph has a period of 2π, or about 6.28, and it includes two complete cycles. Graphs i), ii), and iii) have periods of about 3.14, 2.09, and 2(6.28) = 12.56, respectively. Four cycles, six cycles, and one cycle, respectively, are shown. The greater the value of b, the smaller the period is. The period of any sinusoidal equation is $\dfrac{2\pi}{b}$. For instance, $y = \sin 2x$ has a lesser period than $y = \sin x$, and $y = \sin x$, and $y = \sin 0.5x$ has a greater period than $y = \sin x$.

     ii) The value of b indicates how fast the water wheel is turning. The greater the value of b, the faster the wheel turns. I know this because when $b = 2$, the wheel completes four turns in 4π radians; therefore, it is turning faster.

- If you have any difficulty with these solutions, please contact your teacher before continuing.

E.
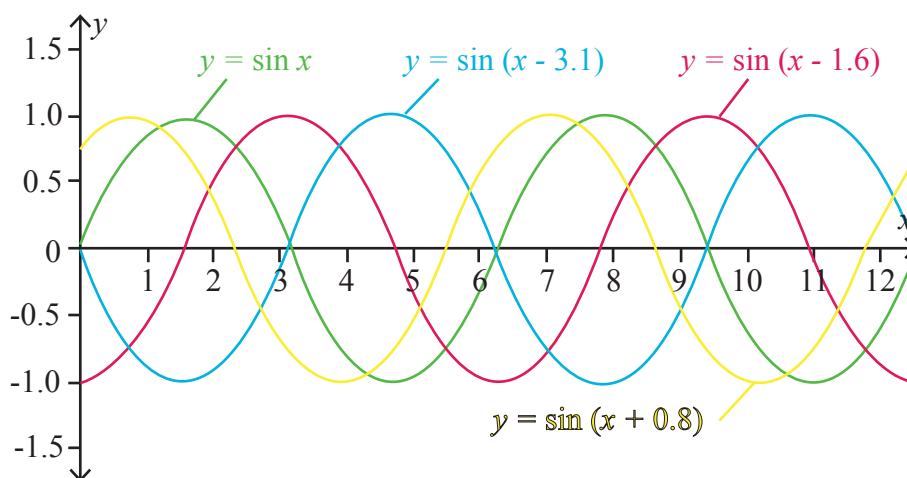
F. i) The graph of $y = \sin x$ has an x-intercept at the origin, and the graph is increasing. Graph i) is the graph of $y = \sin x$ translated 1.6 units to the right, graph ii) is the graph of $y = \sin x$ translated 3.1 units to the right, and graph iii) is the graph of $y = \sin x$ translated 0.8 units to the left or $(6.3 - 0.8) = 5.5$ units to the right. The value of c causes the graph to shift horizontally. If the value of c is subtracted from x, the graph is translated to the right. If it is added to x, the graph is translated to the left.
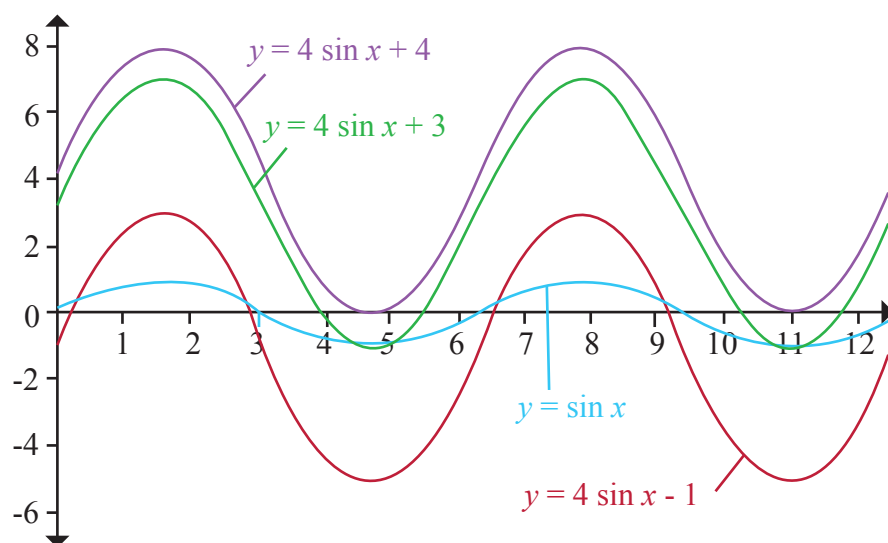
iii) This value gives no information about the water wheel. It indicates only that the measurements began at different positions of the water wheel.

- If you have any difficulty with these solutions, please contact your teacher before continuing.

G.

H.   i)   The value of d affects the midline axis of the graph. The equation of the axis is $y = d$.

     ii) The water level is at $y = d$ on the water wheel, so the value of d tells me now high the water is on the wheel.

Page 517, *Reflecting, Questions I – L*

I.
- The amplitude is a.
- The period is $\dfrac{2\pi}{b}$ or $\dfrac{360°}{b}$.
- The equation of the midline is $y = d$.

J.   The value of c indicates that the graph has been translated horizontally by c units.

K.   Yes. The measurement system is different, but the function itself does not change.

L.   Yes. A cosine function is a sine function that has been translated left by 90° or $\dfrac{\pi}{2}$. It has the same characteristics as a sine function, so the parameters should indicate the same characteristics of the graph.