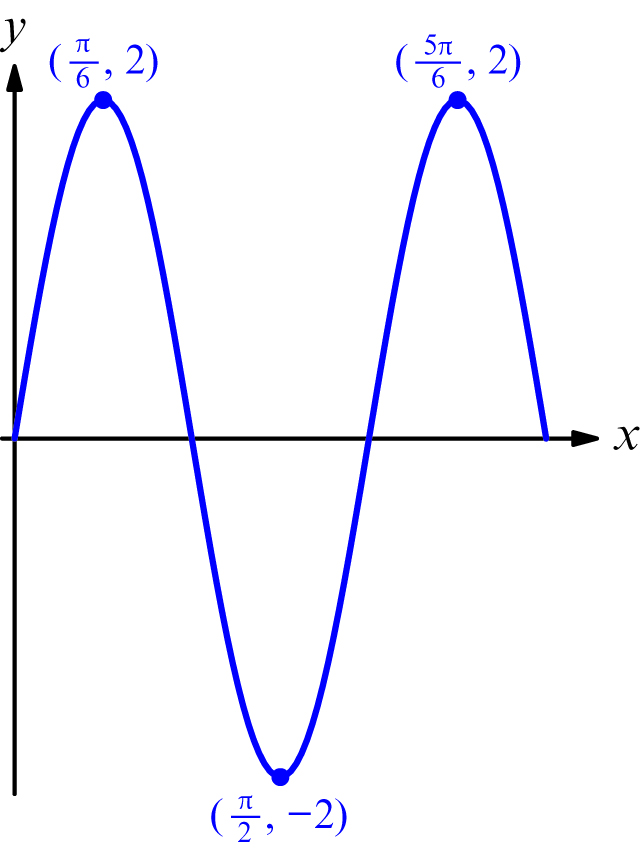
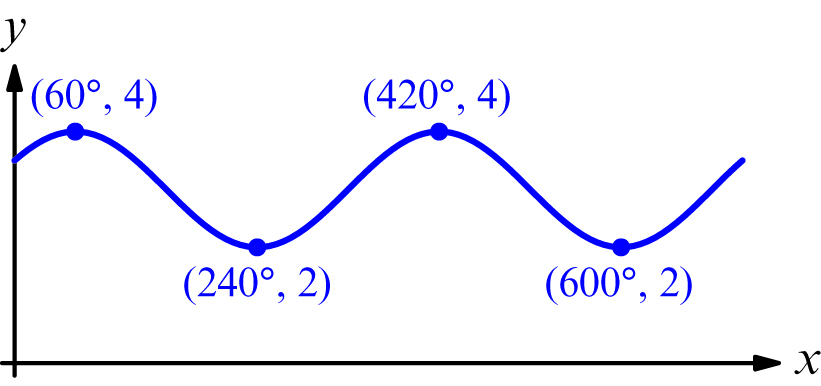
**Self-assessment: 9 Circular measure and trigonometric functions**

**1.** Find the constants *a*, *b*, *c*, *d* in the equations of the two graphs below:

(a) *y* = *a* sin (*bx*)



(b) *y* = cos(*x*° − *d*°) + *c*



*(accessible to students on the path to grade 5 or 6) [7 marks]*

**2.** Find the exact period of the function *f* (*x*) = sin 4*x* + sin 6*x*.

*(accessible to students on the path to grade 3 or 4) [3 marks]*

**3.** The depth of water in a harbour varies with time as *h* = 8.6 + 1.2 sin, where *h* is the depth measured in metres and *t* is time in hours after midnight.

(a) Find the depth of the water at 2 p.m.

(b) What is the least depth of the water?

(c) At what times is the depth of the water 8.1 m?

(d) A ship can enter the harbour when the water depth is above 9 m. Find the times when the ship can enter the harbour.

*(accessible to students on the path to grade 3 or 4) [8 marks]*

**4. Do not use a calculator to answer this question.**

Let *f* (*x*) = 3 sin for x ∈ [0, 2π].

(a) Find the exact value of .

*(accessible to students on the path to grade 5 or 6)*

(b) Find the exact values of all the zeroes of *f*.

(c) State the minimum value of 5 – *f* (*x*).

Another function is defined by *g*(*x*) = tan for *x* ∈ [0, 2π].

*(accessible to students on the path to grade 3 or 4)*

(d) Find the exact value of .

(e) By sketching graphs, or otherwise, find the number of solutions of the equation *f* (*x*) = *g* (*x*).

*(accessible to students on the path to grade 5 or 6)*

*[12 marks]*