- 1. **(CA, F2.9, F2.10)** Mr. Santowski is taking medicine for *MATHITIS*. Once he has taken the medicine, it gets used up by his body and the amount of medicine that remains in his body is modelled by the equation $A(t) = 50(0.7)^{0.2t}$, where A is measured in milligrams and t is measured in hours. *(Cirrito 7.2, p209)*
 - a. Determine the initial dose of medicine.
 - b. Evaluate A(12) and interpret the meaning of the result.
 - c. Every 12 hours, Mr. S takes **another dose**. Prepare a sketch of the graph, on the domain $0 \le t \le 48$.
 - d. How much medicine does he have in his body after
 - i. taking the second dose.
 - ii. taking the third dose.
 - e. At what time(s) in the first 36 hours does Mr. Santowski have at least 40 mg of medicine in his body?
- (CA, GT3.2, GT3.4) The diagram shows a circle of radius 8 metres. The points ABCD lie on the circumference of the circle. (*Cirrito 9.4, p 287; Cirrito 9.7, p309*)

BC = 14 m, CD = 11.5 m, AD = 8 m, angle ADC=104°, and angle BCD=73°

- a. Find AC.
- b. Find:
 - i. the measure of angle ACD;
 - ii. Hence, find the measure of angle ACB.
- c. Find the area of triangle ADC.
- d. Hence or otherwise, find the total area of the shaded regions.



- 3. (CI, F2.2) Let $f(x) = \sqrt{x-5}$ for $x \ge 5$. (Cirrito 5.4.1, p148; Cirrito 5.4.2, p157)
 - a. Find $f^{-1}(2)$.
 - b. Let g(x) be a function such that g^{-1} exists for all real numbers. Given that g(30) = 3, find $f \circ g^{-1}(3)$.

- 4. **(CI, F2.2)** Determine the inverse of the following functions; *(Cirrito 5.4, p.148)*
 - a. $f(x) = \sqrt{x} + 2$
 - b. $g(x) = 3e^{2x+1}$
 - c. $h(x) = \frac{3x+4}{x-5}$
- (CA, GT3.3) A girl walking due east along a straight horizontal road observes a church spire on a true bearing of 076°. After walking 1500 meters further she observes the spire on a true bearing of 067°.

(Cirrito 9.2, p.278)

- a. Draw a diagram for this situation
- b. How far is the church from the road?
- 6. **(CI, GT3.7)** Sketch the graph of the curve with equation given by;

(Cirrito 10.3, p.337)

- a. $y = 3cosx, 0 \le x \le 2\pi$.
- b. $y = \frac{1}{3}cos(2x), -\frac{\pi}{2} \le x \le \frac{\pi}{2}$
- c. $y = 2sin(\frac{x}{3}), \ 0 \le x \le 3\pi.$
- 7. (CI, F2.9) Solve the following equations (*Cirrito 7.4, p.221*)
 - a. $log_2(x+1) log_2x = log_23$.
 - b. $log_{10}(x+1) log_{10}x = log_{10}3$
 - c. $log_{10}(x+2) log_{10}x = 2log_{10}4$
- 8. **(CI, GT3.8)** If $0 \le x \le 2\pi$, find:

(Cirrito 10.4, p.351)

a.
$$sin(x) = \frac{1}{\sqrt{2}}$$

b.
$$sin(3x) = \frac{1}{2}$$

C. $sin(\frac{x}{2}) = \frac{1}{2}$