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 $A(t)=50(0.7)^{0.2 t}$, 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 $0 \leq t \leq 48$.
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?
2. (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)
$B C=14 \mathrm{~m}, \mathrm{CD}=11.5 \mathrm{~m}, \mathrm{AD}=8 \mathrm{~m}$, angle $\mathrm{ADC}=104^{\circ}$, and angle $B C D=73^{\circ}$
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 $x \geq 5$. (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 fo $g^{-1}$ (3).
4. (CI, F2.2) Determine the inverse of the following functions;
(Cirrito 5.4, p.148)
a. $\quad f(x)=\sqrt{\bar{x}}+2$
b. $g(x)=3 e^{2 x+1}$
c. $\quad h(x)=\frac{3 x+4}{x-5}$
5. (CA, GT3.3) A girl walking due east along a straight horizontal road observes a church spire on a true bearing of $076^{\circ}$. After walking 1500 meters further she observes the spire on a true bearing of $067^{\circ}$. (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. $y=3 \cos x, 0 \leq x \leq 2 \pi$.
b. $y=\frac{1}{3} \cos (2 x),-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$
c. $y=2 \sin \left(\frac{x}{3}\right), 0 \leq x \leq 3 \pi$.
7. (CI, F2.9) Solve the following equations
(Cirrito 7.4, p.221)
a. $\log _{2}(x+1)-\log _{2} x=\log _{2} 3$.
b. $\log _{10}(x+1)-\log _{10} x=\log _{10} 3$
c. $\log _{10}(x+2)-\log _{10} x=2 \log _{10} 4$
8. (CI, GT3.8) If $0 \leq x \leq 2 \pi$, find:
(Cirrito 10.4, p.351)
a. $\quad \sin (x)=\frac{1}{\sqrt{2}}$
b. $\quad \sin (3 x)=\frac{1}{2}$
c. $\quad \sin \left(\frac{x}{2}\right)=\frac{1}{2}$
