



<https://www.buymeacoffee.com/DrBennison>

- 1) Find the cartesian equation of the curve defined parametrically by  
 $x = 3 \cos(\theta) + 2$   
 $y = 3 \sin(\theta) - 4$

- 2) Find the binomial expansion of  $(2 + 3x)^{\frac{1}{6}}$  up to the term including  $x^3$ .  
Use your expansion to approximate  $2.03^{\frac{1}{6}}$ .

- 3) Determine a sequence of transformations from  $y = \cos(x)$  to  
 $y = 4 \cos\left(2x + \frac{\pi}{2}\right)$

- 4) Prove that the triangle with sides of length  $\sqrt{2n+1}$ ,  $n$  and  $n+1$  is right angled.

- 5) Calculate the area and perimeter of a sector of a circle with radius 4 cm and angle subtended at the centre of  $\frac{5\pi}{6}$ .

- 12) A large tank in the shape of a cuboid is to be made from  $54 \text{ m}^2$  of metal. The tank has a horizontal base and no top. The height of the tank is  $x$  m. Two opposite vertical faces are squares.  
Show that the volume  $V \text{ m}^3$  of the tank is given by  $V = 18x - \frac{2}{3}x^3$  and find the maximum value of  $V$

- 11) The line with equation  $2x + y - 3 = 0$  does not intersect the circle with equation  $x^2 + kx + y^2 + 4y = 4$   
a) Show that  $5x^2 + (k - 20)x + 17 > 0$   
b) Find the range of possible values of  $k$

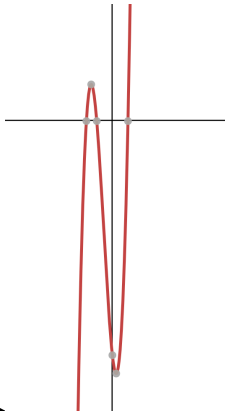
- 10) Find the intersection points of the graphs  $y = |x - 3|$  and  $y = 2|x| + 1$ . *Hint: draw a sketch to help.*

- 9) Prove that  
 $4 \cos^2(\theta) - 3 \sin^2(\theta) = \frac{1}{2} + \frac{7}{2} \cos(2\theta)$

- 8) Cans of baked beans are known to be produced normally with a mean weight of 200g and standard deviation 5g. A sample of 10 cans are found to have a mean weight of 193g. Test at the 5% significance level whether this is an indication that the mean weight has decreased.

- 7) Solve the equation  
 $2^{2x} - 24(2^x) - 256 = 0$

- 6) Sketch graphs of  $f'(x)$  and  $f''(x)$  for the function shown below.



**A-Level  
Paper 3  
Revision  
Clock**