Resource for Day 9 – Trigonometry – Tuesday 31 October

1. Simplify without a calculator:

   a. $\dfrac{2\sin(180°-\theta)\cos200°\sin160°}{\cos(\theta-270°)\sin(-40°)}$

   b. $\cos75°$

   c. $\dfrac{\cos(90°-2\theta)}{\cos(-\theta)\sin(90°-\theta)+\sin\theta\sin(-\theta)}$

2. If $\cos24° = g$ then determine the following in terms of g:

   a. $\cos336°$ b. $\tan166°$

   c. $\sin138°$ d. $\cos66°$

   e. $\cos192°$

3. Determine the general solution of the following equations:

   a. $2\tan\theta + 1 = -2$ b. $\sin2\theta\cos40° - \cos2\theta\sin40° = -\dfrac{1}{2}$

   c. $\tan2\theta = \tan(\theta + 10°)$ d. $3\cos^2\theta - 2\sin\theta - 2 = 0$

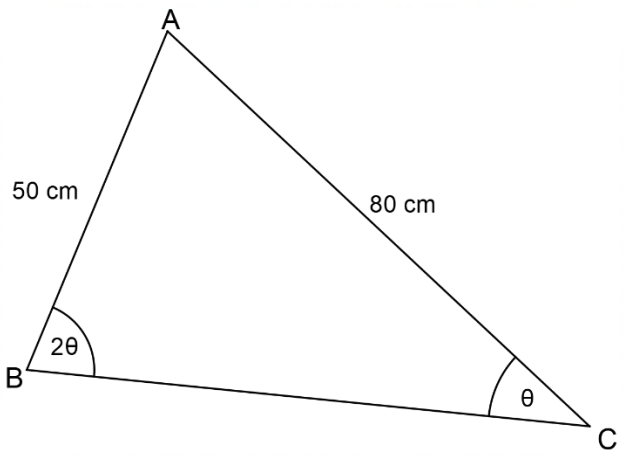
   e. $3\cos(2\theta) + 5\sin(2\theta) = 0$

4. Determine the maximum value of $y = 5(\sin\theta\cos40° + \cos\theta\sin40°) - 3$

5. Find the smallest angle in a triangle with sides of 5 cm, 6 cm and 7 cm.

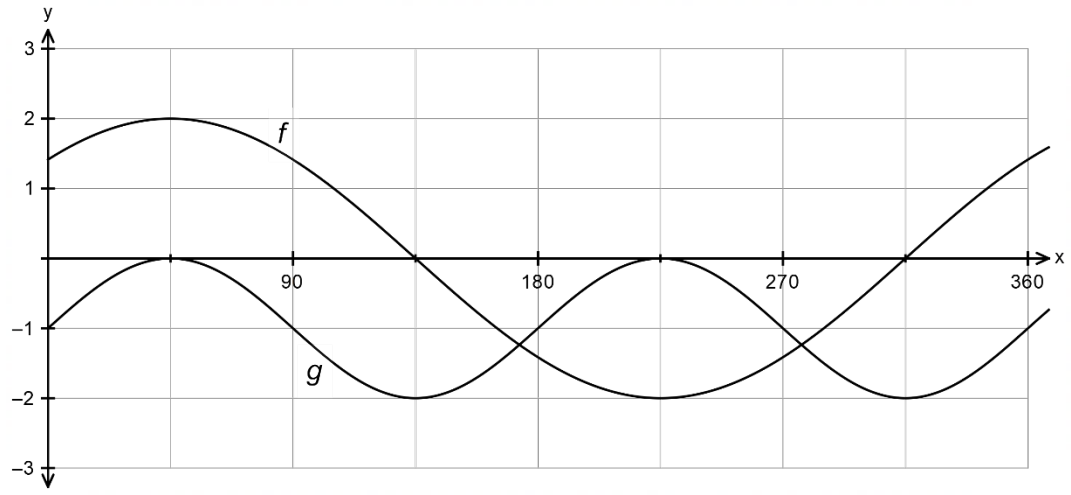
6. Prove that: $\dfrac{\cos2\theta - \cos\theta}{\sin2\theta + \sin\theta} = \dfrac{\cos\theta - 1}{\sin\theta}$

7. Find the area of ΔABC



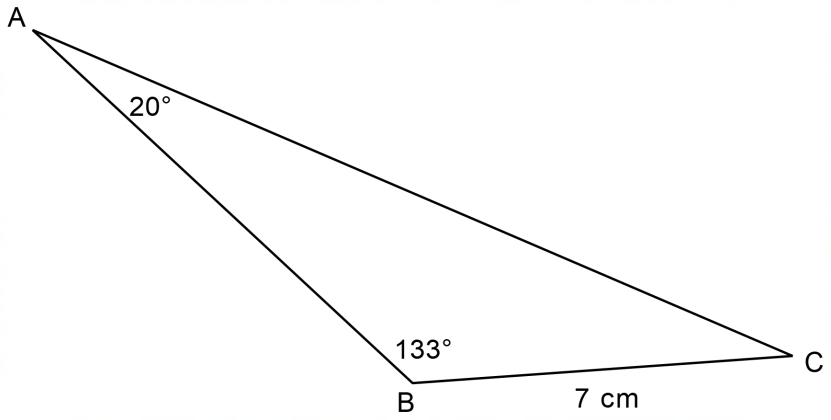
8. Prove that: $\sin 3\theta = 3\sin\theta - 4\sin^3\theta$

9. Consider the functions *f* and *g* drawn below:



Determine their equations.

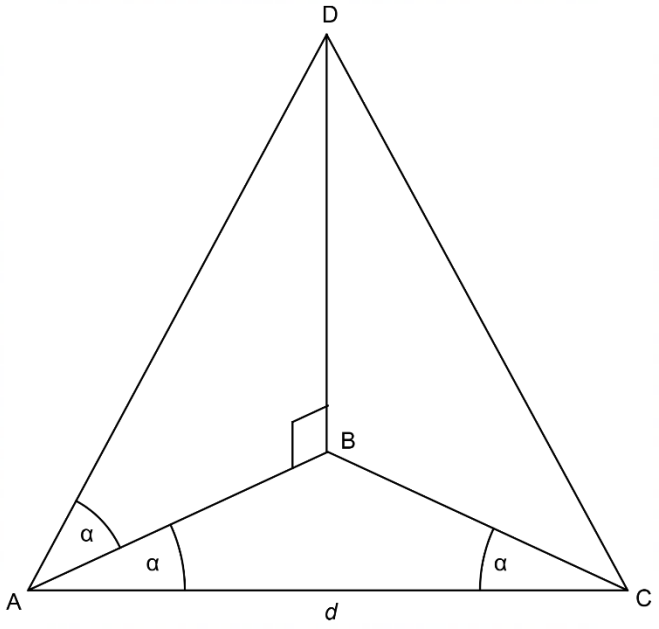
10. Determine the area of ΔABC to one decimal place.



11. Prove that: $\dfrac{\sin\theta}{\cos\theta - \sin\theta} + \dfrac{\sin\theta}{\cos\theta + \sin\theta} = \tan 2\theta$

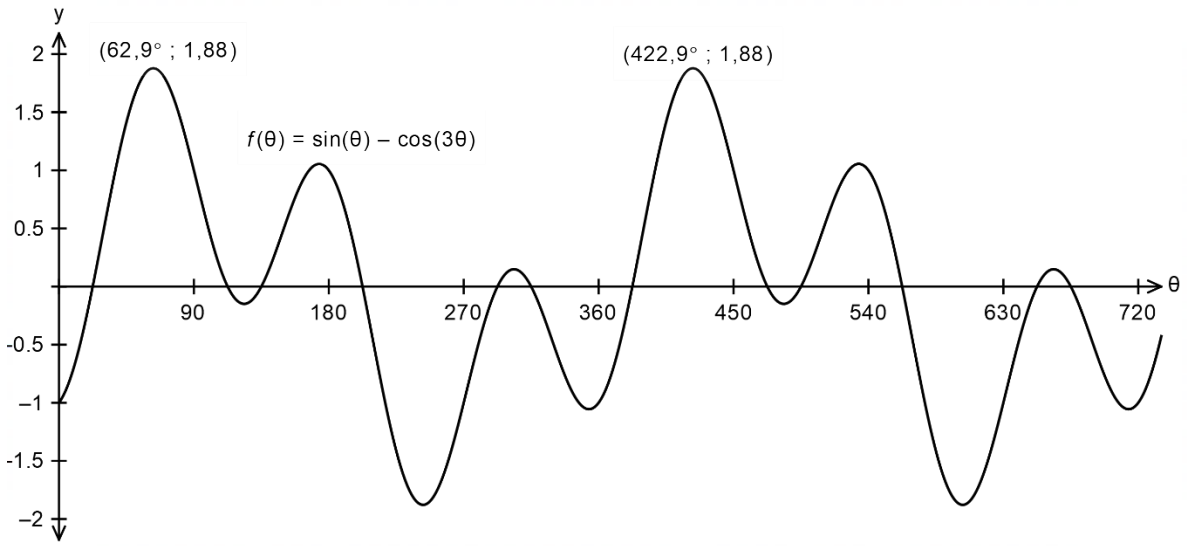
12. A vertical tower DB has its foot B in the same horizontal plane as points A and C.

A and C are d metres apart. $\hat{BAC} = \hat{BCA} = \alpha$ and the angle of elevation of D from A is α.



Prove that the height of the tower is given by $DB = \dfrac{d\sin\alpha}{2\cos^2\alpha}$

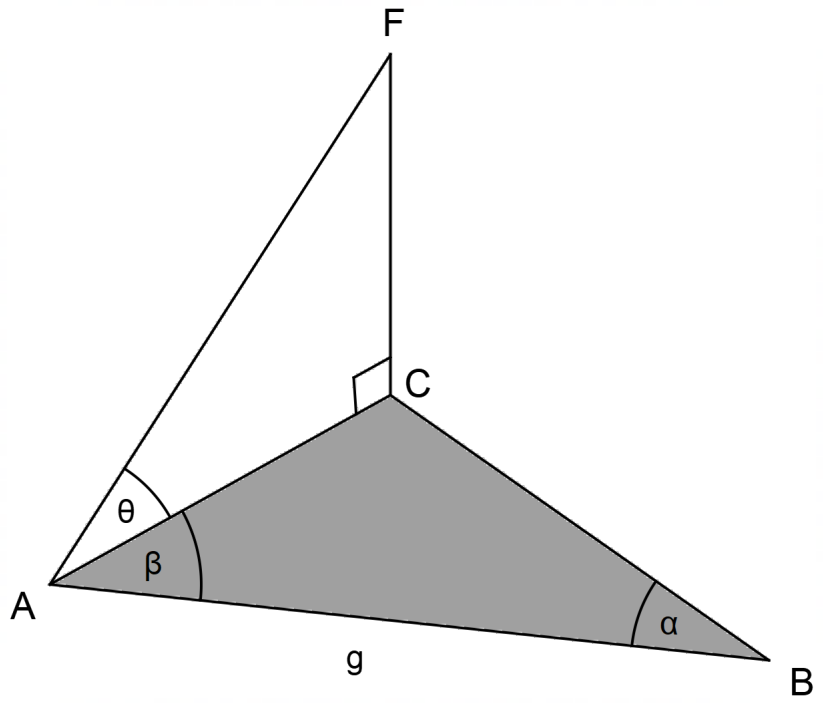
13. The function $f(\theta) = \sin(\theta) - \cos(3\theta)$ is drawn below for $\theta \in [0°;720°]$



a) Give the period of f

b) Determine a general solution for the x-intercepts of f.

14. In the picture A, B and C are in the same horizontal plane. C is the foot of a **vertical** tower, FC. The distance between A and B is *g*. The angle of elevation of F from A is θ.
$\hat{CAB} = \beta$ and $\hat{CBA} = \alpha$.



Show that $FC = \dfrac{g\sin\alpha\tan\theta}{\sin(\alpha+\beta)}$