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A LEVEL MATHS

(28) Small Angle Approximations in Trig

WORKING AT D/E

(1) Given that θ is small, use the formula book to show that $\frac{\sin(4\theta)}{\tan(8\theta)} \approx 0.5$

(2) Given that θ is small, use the formula book to find an approximation for $\frac{1-\cos(\vartheta)}{\sin(\theta)}$

(3) When θ is small, use the formula book to simplify $\frac{\sin(6\theta)}{2\theta}$

WORKING AT B/C

(1) Show that, when θ is small, $\frac{\cos(2\theta)}{\theta\sin(\theta)} \approx \frac{1-2\theta^2}{\theta^2}$

(2) (a) Use your calculator to find the value of $\cos(0.1^c)$ giving your answer to 5dp.

(b) Use the small angle approximation to show that $\cos(0.1^c) \approx 0.995$

(c) Find the percentage error for the approximation.

(3) Given that θ is small, simplify

$$\frac{\theta^2 + \cos\theta - 1}{2\sin\theta}$$

WORKING AT A*/A

(1) (a) Given that θ is small, show that

$$\frac{4 - 4\cos(2\theta) + \vartheta}{\sin(\theta)} = 8\theta + 1$$

(b) Hence, find an approximation the value of $\frac{4-4\cos(2\theta)+\vartheta}{\sin(\theta)}$ when θ is small.