

6.

In this question you must show detailed reasoning.

- (a) Given that  $x$  is small and in radians, use the small angle approximation for  $\cos \theta$  to show that

$$1 - \cos^2(2x) \approx 4x^2 - 4x^4 \quad (2)$$

- (b) Given that  $x$  is small and in radians, use

- the answer to part (a)
- the small angle approximations for  $\sin \theta$  and  $\tan \theta$

to show that

$$\frac{1 - \cos^2(2x)}{\sin\left(\frac{x}{3}\right)\tan\left(\frac{x}{2}\right)} \approx a + bx^2$$

where  $a$  and  $b$  are constants to be found.

(2)

- (c) Hence, given that  $x$  is **very** small, deduce an approximate value for

$$\frac{1 - \cos^2(2x)}{\sin\left(\frac{x}{3}\right)\tan\left(\frac{x}{2}\right)}$$

giving a reason for your answer.

(2)