10. In this question you should show all stages of your working. Solutions relying entirely on calculator technology are not acceptable.

(a) Given that $1 + \cos 2\theta + \sin 2\theta \neq 0$ prove that

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

(b) Hence solve, for
$$0 < x < 180^{\circ}$$

(b) Hence solve, for
$$0 < x < 180^{\circ}$$

$$\frac{1 - \cos 4x + \sin 4x}{\cos 4x + \sin 4x} = 3\sin 2x$$

 $\frac{1 - \cos 4x + \sin 4x}{1 + \cos 4x + \sin 4x} = 3\sin 2x$

$$\frac{1 - \cos 4x + \sin 4x}{1 + \cos 4x + \sin 4x} = 3\sin 2x$$

$$\sin 2x + \cos 4x + \sin 4x = 3\sin 2x$$

$$\frac{1-\cos 4x+\sin 4x}{1+\cos 4x+\sin 4x}=3\sin 2x$$

$$\frac{1 - \cos 4x + \sin 4x}{1 + \cos 4x + \sin 4x} = 3\sin 2$$
giving your answers to one decimal place where appropria

$$\frac{1 + \cos 4x + \sin 4x}{1 + \cos 4x + \sin 4x} = 3\sin 4x$$
 giving your answers to one decimal place where appropria

$$\frac{1 + \cos 4x + \sin 4x}{1 + \cos 4x + \sin 4x}$$
 giving your answers to one decimal place where appropriate.

 $LHS = \frac{1 - (1 - 2\sin^2\theta) + 2\sin\theta\cos\theta}{1 + (2\cos^2\theta - 1) + 2\sin\theta\cos\theta}$

$$\frac{1}{1 + \cos 4x + \sin 4x} = 3\sin 2x$$
giving your answers to one decimal place where appropris

$$\frac{1 + \cos 4x + \sin 4x}{1 + \cos 4x + \sin 4x} = 3s$$
 giving your answers to one decimal place where approx

using Double Angle Formulae

= 2 sin 0 + 2 sin 0 cost

0 < x < 180° > 0 < 2x < 360°

7 cos 0 + 25100 cos 0

giving your answers to one decimal place where appropriate.

(a)
$$2\theta$$
 on LHS and 1θ on RHS, so need to reduce 2θ 's

$$1 + \cos 4x + \sin 4x$$
wers to one decimal place where appropri

$$1 + \cos 4x + \sin 4x$$

swers to one decimal place where appr

$$\frac{1 + \cos 4x + \sin 4x}{1 + \cos 4x + \sin 4x} = 3\sin 2x$$
ers to one decimal place where appropria

$$\frac{1 + \cos 4x + \sin 4x}{1 + \cos 4x + \sin 4x} = 3\sin 2x$$
swers to one decimal place where appropria

$$\frac{1 - \cos 4x + \sin 4x}{1 + \cos 4x + \sin 4x} = 3\sin 2x$$
decimal place where appropria

= $\frac{2\sin\theta(\sin\theta+\cos\theta)}{2\cos\theta(\cos\theta+\sin\theta)} = \frac{\sin\theta}{\cos\theta} = \frac{\tan\theta}{-\cos\theta} = RHS$ (2marks)

(b) from (a), $1 - \cos 4x + \sin 4x = \tan 2x = 3\sin 2x$ (1 mark)

 $\frac{\sin 2x}{\cos 2x} = 3\sin 2x \Rightarrow \sin 2x = 3\sin 2x \cos 2x \Rightarrow \sin 2x - 3\sin 2x \cos 2x = 0$

=> Sin2x (1-3cos2x)=0 => Sin2x=0 and cos2x= 3 (mark)

in range 0 62x < 360°, cos 2x = \frac{1}{3} => \frac{5}{7} \frac{1}{3} = 70.528..., 360-528....} = 70.528..., 289.471...

 $x = \frac{70.528...}{2}, \frac{389.471...}{2} = 35.26..., 144.73... = 35.3°, 144.7° 1 dp (2 marks)$

in range 0° < 2x < 360°, sin 2x = 0 ⇒ 2x = 180°

$$\frac{4x + \sin 4x}{4x + \sin 4x} = 3\sin 2x$$

$$\frac{4x}{2} = 3\sin 2x$$

Formulae for coszo. The Formulae have been chosen so as to cancel

(4)