**Self-assessment answers: 12 Further trigonometry**

**1.** Using double angle formula, cos 2*θ* = 1 – 2 sin2 *θ*

⇒ 2 sin2 *θ* + sin *θ* – 1 = 0

⇒ (2 sin *θ* + 1)(sin *θ* – 1) = 0

⇒ sin *θ* =  or 1

⇒ *θ* = 90°, 210° or 330°*[6 marks]*

**2.** Using the identity 1 + cot2 *x* = csc2 *x*

⇒ csc2 *x* – 3 csc *x* + 2 = 0

⇒ (csc *x* – 2)(csc *x* – 1) = 0

⇒ csc *x* = 2 or 1

⇒ *x* = 0, *[8 marks]*

**3.** (a) Express height of top of picture above horizontal dashed line in terms of *x* in two different ways, then use the compound-angle identity .

3 tan *x*° + 2 = 3 tan(*x*° + 30°)

⇒ 3 tan *x*° + 2 = 

⇒ 3 tan *x*° + 2 − 3 tan2 *x*° − 2 tan *x*° = 3 tan *x*° + 3

⇒ 3 tan2 *x*° + 2 tan *x*° + (3 − 2) = 0 as required.

(b) From calculator, *x*° = 10.3°*[9 marks]*

**4.** (a) *x*

(b) cos(2 arccos *x*) = cos2(arccos *x*) – 1

= *x*2 − 1

(c) *x*2 – 1 = *x*

⇒ *x*2 – *x* – 1 = 0

⇒ *x* = 

Reject  as greater than 1.

⇒ *x* = *[7 marks]*