1 Show that the equation $\sin^2 x = 3\cos x - 2$ can be expressed as a quadratic equation in $\cos x$ and hence solve the equation for values of x between 0 and 2π. **[5]**

2

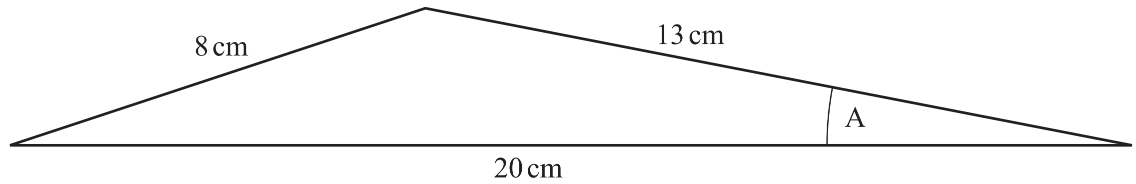

Fig. 9.1

(i) Jean is designing a model aeroplane. Fig. 9.1 shows her first sketch of the wing's cross-section. Calculate angle A and the area of the cross-section. **[5]**

(ii) Jean then modifies her design for the wing. Fig. 9.2 shows the new cross-section, with 1 unit for each of x and y representing one centimetre.

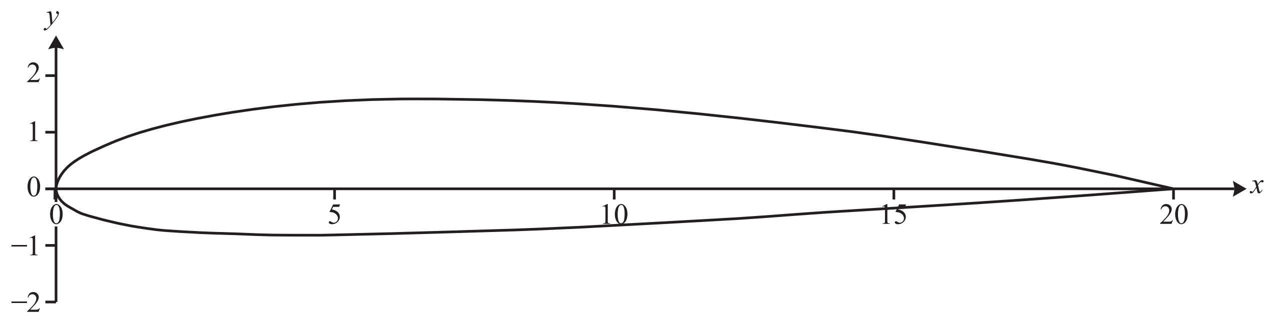

Fig. 9.2

Here are some of the coordinates that Jean used to draw the new cross-section.

Upper surface		Lower surface	
x	y	x	y
0	0	0	0
4	1.45	4	−0.85
8	1.56	8	−0.76
12	1.27	12	−0.55
16	1.04	16	−0.30
20	0	20	0

Use the trapezium rule with trapezia of width 4 cm to calculate an estimate of the area of this cross-section. **[6]**

3 Simplify $\dfrac{\sqrt{1-\cos^2\theta}}{\tan\theta}$, where θ is an acute angle. **[3]**

4 Solve the equation $\tan 2\theta = 3$ for $0° < \theta < 360°$. **[3]**

5 Solve the equation $\sin 2\theta = 0.7$ for values of θ between 0 and 2π, giving your answers in radians correct to 3 significant figures. **[5]**

6 Solve the equation $\tan\theta = 2\sin\theta$ for $0° \leqslant \theta \leqslant 360°$. **[4]**

7 Showing your method clearly, solve the equation $4\sin^2\theta = 3 + \cos^2\theta$, for values of θ between 0° and 360°. **[5]**

8 Show that the equation $4\cos^2\theta = 4 - \sin\theta$ may be written in the form

$$4\sin^2\theta - \sin\theta = 0.$$

Hence solve the equation $4\cos^2\theta = 4 - \sin\theta$ for $0° \leqslant \theta \leqslant 180°$. **[5]**

9 Showing your method, solve the equation $2\sin^2\theta = \cos\theta + 2$ for values of θ between 0° and 360°. [5]

10 **(i)** Show that the equation $2\cos^2\theta + 7\sin\theta = 5$ may be written in the form

$$2\sin^2\theta - 7\sin\theta + 3 = 0.$$ [1]

(ii) By factorising this quadratic equation, solve the equation for values of θ between 0° and 180°. [4]