

Consolidation 5.4

1. a) $\sin x = \frac{1}{2}$ b) $\tan x = \frac{\sqrt{3}}{3}$ c) $\operatorname{cosec} x = 2$
2. a) $\cos x \approx 0,38$ b) $\cot x = \frac{5}{12}$ c) $\operatorname{cosec} x \approx 1,08$
3. a) $\cot x \approx 0,88$ b) $\cos x \approx 0,66$ c) $\sec x = \frac{4}{3} \approx 1,33$

Consolidation 5.4 (suite)

4. a) $\frac{\sqrt{6} - \sqrt{2}}{4}$ b) $\sqrt{3} - 2$ c) $\frac{\sqrt{6} - \sqrt{2}}{4}$
- d) $-\sqrt{6} - \sqrt{2}$ e) $\sqrt{6} + \sqrt{2}$ f) $-\sqrt{3} - 2$
5. a) $\cos^2 x$ b) $\tan x$
- c) 1 d) $\operatorname{cosec} x$
- e) $\cot^2 x$ f) $\sin x$

Consolidation 5.4 (suite)

6. a) $\frac{3 \sin x}{\cos x} + \frac{\cos x}{\sin x} = \frac{5}{\sin x}$
 $\frac{3 \sin^2 x}{\cos x \sin x} + \frac{\cos^2 x}{\sin x \cos x} - \frac{5 \cos x}{\sin x \cos x} = 0$
 $3(1 - \cos^2 x) + \cos^2 x - 5 \cos x = 0$
 $-2 \cos^2 x - 5 \cos x + 3 = 0$
 $(\cos x + 3)(-2 \cos x + 1) = 0$
 $\cos x = -3$
 $\cos x = \frac{1}{2}$
 $x = \frac{\pi}{3}$
 $x = \frac{5\pi}{3}$
- b) $2 \sin^2 x + \cos x = 1$
 $2(1 - \cos^2 x) + \cos x - 1 = 0$
 $-2 \cos^2 x + \cos x + 1 = 0$
 $(\cos x - 1)(-2 \cos x - 1) = 0$
 $\cos x = 1$
 $\cos x = -\frac{1}{2}$
 $x = 0$
 $x = \frac{2\pi}{3}$
 $x = \frac{4\pi}{3}$
 $x = 2\pi$

$$\begin{aligned} \text{c)} \quad 2 \operatorname{cosec} x &= \sin x + 1 \\ 2 &= \sin^2 x + \sin x \\ 0 &= \sin^2 x + \sin x - 2 \end{aligned}$$

$$(\sin x - 1)(\sin x + 2) = 0$$

$$\sin x = 1$$

$$\sin x = -2$$

$$x = \frac{\pi}{2}$$

$$\text{d)} \quad 2 - 3 \sin^2 x - 2 \cos x = 0$$

$$2 - 3(1 - \cos^2 x) - 2 \cos x = 0$$

$$3 \cos^2 x - 2 \cos x - 1 = 0$$

$$(\cos x - 1)(3 \cos x + 1) = 0$$

$$\cos x = 1$$

$$\cos x = -\frac{1}{3}$$

$$x = 0$$

$$x = 1,91$$

$$x = 4,37$$

$$x = 2\pi$$

$$\text{e)} \quad \cos^2 x - \sin^2 x + 5 \cos x = 2$$

$$\cos^2 x - (1 - \cos^2 x) + 5 \cos x = 2$$

$$2 \cos^2 x + 5 \cos x - 3 = 0$$

$$(\cos x + 3)(2 \cos x - 1) = 0$$

$$\cos x = -3$$

$$\cos x = \frac{1}{2}$$

$$x = \frac{\pi}{3}$$

$$x = \frac{5\pi}{3}$$

$$\text{f)} \quad \cot^2 x + \operatorname{cosec}^2 x = 7$$

$$\cos^2 x + 1 = 7 \sin^2 x$$

$$(1 - \sin^2 x) + 1 - 7 \sin^2 x = 0$$

$$-\sin^2 x - 7 \sin^2 x + 2 = 0$$

$$\sin^2 x = \frac{1}{4}$$

$$\sin x = \pm \frac{1}{2}$$

$$x = \frac{\pi}{6}$$

$$x = \frac{5\pi}{6}$$

$$x = \frac{7\pi}{6}$$

$$x = \frac{11\pi}{6}$$

$$\text{7. a)} \quad \frac{\sin x \cot^2 x}{\cos x} = \cot x$$

$$\frac{\sin x \frac{\cos^2 x}{\sin^2 x}}{\cos x} = \cot x$$

$$\frac{\cos^2 x}{\sin x} \times \frac{1}{\cos x} = \cot x$$

$$\frac{\cos x}{\sin x} = \cot x$$

$$\text{b)} \quad (1 - \sin x + \cos x)^2 = 2(1 - \sin x)(1 + \cos x)$$

$$2 - 2 \sin x + 2 \cos x - 2 \sin x \cos x = 2(1 - \sin x)(1 + \cos x)$$

$$2(1 - \sin x + \cos x - \sin x \cos x) = 2(1 - \sin x)(1 + \cos x)$$

$$2(1 - \sin x + \cos x(1 - \sin x)) = 2(1 - \sin x)(1 + \cos x)$$

$$2(1 - \sin x)(1 + \cos x) = 2(1 - \sin x)(1 + \cos x)$$

even

$$c) \quad \frac{1 + \tan x}{1 + \cot x} = \frac{\sin x}{\cos x}$$

$$\frac{\frac{\cos x + \sin x}{\cos x}}{\frac{\sin x + \cos x}{\sin x}} = \frac{\sin x}{\cos x}$$

$$\frac{\cancel{\cos x + \sin x}}{\cos x} \times \frac{\sin x}{\cancel{\sin x + \cos x}} = \frac{\sin x}{\cos x}$$

$$\frac{\sin x}{\cos x} = \frac{\sin x}{\cos x}$$

$$d) \quad (1 + \tan^2 x)(1 - \cos^2 x) = \sec^2 x - 1$$

$$(\sec^2 x)(\sin^2 x) = \sec^2 x - 1$$

$$\frac{\sin^2 x}{\cos^2 x} = \sec^2 x - 1$$

$$1 + \tan^2 x = \sec^2 x$$

$$\sec^2 x = \sec^2 x$$

$$e) \quad \frac{\sin x + \tan x}{\operatorname{cosec} x + \cot x} = \sin x \tan x$$

$$\frac{\frac{\sin x \cos x + \sin x}{\cos x}}{\frac{1 + \cos x}{\sin x}} = \sin x \tan x$$

$$\frac{\sin x(\cos x + 1)}{\cos x} \times \frac{\sin x}{1 + \cos x} = \sin x \tan x$$

$$\frac{\sin x \sin x}{\cos x} = \sin x \tan x$$

$$\sin x \tan x = \sin x \tan x$$

$$f) \quad \frac{\sin x}{1 + \cos x} = \frac{1 - \cos x}{\sin x}$$

$$\sin^2 x = (1 - \cos x)(1 + \cos x)$$

$$\sin^2 x = 1 - \cos^2 x$$

$$\sin^2 x = \sin^2 x$$

Consolidation 5.4 (suite)

8. a) $L = 60 \sin \frac{\pi}{5} x + 140$, où L représente la population de lièvres.

b) $P = -3 \cos \frac{\pi}{5}(8) + 5$, soit $\approx 4,08$.

$$L = 60 \sin \frac{\pi}{5}(8) + 140, \text{ soit } \approx 82,94.$$

Il y a 4 lynx et ~~83~~ ⁸³ lièvres, 8 ans après le début de l'étude.

9. a) $d_x = vt \cos \theta$

$$10,4 = (20)(3) \cos \theta$$

$$\theta \approx 80,02^\circ$$

Son angle d'élévation est environ de $80,02^\circ$.

b) $d_y = -4,9t^2 + vt \sin \theta$

$$= -4,9(3)^2 + (20)(3) \sin 80,02^\circ$$

$$\approx 14,99 \text{ m}$$

Son déplacement vertical est environ de 14,99 m.