Additional Mathematics Exercise 16 Answers

(*Applications of Differentiation to Practical Problems*)

1. (a) $y = 10 - x$ (b) 5

2. (a) – (b) $8\sqrt{15}$ cm

3. (a) $(400 - 2\pi r^2)\ \text{m}^2$ (b) $x = 100,\ r = \dfrac{100}{\pi}$

4. (a) $S^2 = b^2 + b + 1$ (b) $\left(\dfrac{1}{\sqrt{2}}, -\dfrac{1}{2}\right), \left(-\dfrac{1}{\sqrt{2}}, -\dfrac{1}{2}\right)$

5. (a) $\left(2\sin\theta - \dfrac{1}{2}\theta\right)\text{cm}^2$ (b) 1.32

6. (a) – (b) 66.2° (c) $\dfrac{3}{20}$

7. (a) – (b) $5\sqrt{6}$

8. (a) $\text{CD} = (200\sec\theta)\ \text{m},\ \text{AD} = (1000 - 200\tan\theta)\ \text{m}$

   (b) $y = 200\sec\theta - \dfrac{200}{3}\tan\theta + \dfrac{1000}{3}$

   (c) 521.90 s

9. (a) 40 (b) – (c) $60\sqrt{5}$ m

10. (a) velocity = –9, acceleration = –6

    (b) when $t = 1$, $x = 0$; when $t = 5$, $x = -32$

11. $\dfrac{1}{48\pi}$ m/min

12. (a) $V = \dfrac{1}{6\sqrt{\pi}} A^{\frac{3}{2}}$ (b) $\sqrt{12}\ \text{cm}^3\text{s}^{-1}$

13. (a) $\dfrac{1}{9\pi}\ \text{cm s}^{-1}$ (b) $\dfrac{2\sqrt{5}}{3}\ \text{cm}^2\ \text{s}^{-1}$

14. increasing at $\dfrac{4}{145}\ \text{rad s}^{-1}$

15. (a) $0.64\ \text{m s}^{-1}$ (b) $\dfrac{1}{6}\ \text{rad s}^{-1}$

16. (a) – (b) $\dfrac{40}{9}\ \text{m s}^{-1}$ (towards the lamp)

    (c) 4 m