

IM2 Book 3 Selected Answers

Mr. Spence

April 2025

1. $10\sqrt{2}$
2. (a) $A = \left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$, $B = \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$
(b) $\cos()$
(c) $\sin()$
3. (a) $\cos(40^\circ)$
(b) $\sin(40^\circ)$
4. (a) $m_{OA} = 1$, $m_{OB} = \frac{\sqrt{3}}{3}$
(b) $\tan()$
5. 470 ft
6. $\frac{3}{5}$
7. Length of line: 3.42 ft
Distance to bobber: 9.40 ft
8. 23.82 ft
9. (a) π ; $(-1, 0)$
(b) $\frac{\pi}{2}$; $(0, 1)$
10. –
11. –
12. –
13. $\cos A = \frac{\sqrt{21}}{5}$, $\tan A = \frac{2}{\sqrt{21}}$, $\sin^2 A + \cos^2 A = 1$
14. (a) 79 ft
(b) $7,873 \text{ ft}^2$
(c) 135 ft
15. 67°

16. 21.6°
17. No
18. 54.8 ft
19. $\frac{2\pi}{3}$
20. $\frac{6\pi}{5}, \frac{9\pi}{5}$
21. $\sin^2 \theta + \cos^2 \theta = 1$
22. length = 5.22; Area = 12.68
23. $\frac{ab \sin C}{2}$
24. 9.9 in^2
25. $(-1, 0), (-1, 0)$
26. -
27. $\pi - \alpha$
28. (a) $(0, 1)$
 (b) $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$
 (c) $\left(\frac{-1}{2}, \frac{\sqrt{3}}{2}\right)$
 (d) $\left(\frac{-\sqrt{3}}{2}, \frac{-1}{2}\right)$
29. (a) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$; $\cos \theta$ gives the x-coordinate; $\sin \theta$ gives the y-coordinate
 (b) $\cos \frac{3\pi}{4} = \frac{-\sqrt{2}}{2}, \sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$
30. (a) $AD = b - x, BD = \sqrt{a^2 - x^2}$
 (b) $c^2 = a^2 + b^2 - 2bx$
 (c) $c^2 = a^2 + b^2 - 2ab \cos C$
31. 5.01 in.
32. (a) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right), m = \sqrt{3}$
 (b) $\tan \theta$
33. 205°
34. (a) $\sin \frac{2\pi}{3} = \frac{\sqrt{3}}{2}, \cos \frac{2\pi}{3} = \frac{-1}{2}, \tan \frac{2\pi}{3} = -\sqrt{3}$
 (b) $\sin \frac{4\pi}{3} = \frac{-\sqrt{3}}{2}, \cos \frac{4\pi}{3} = \frac{-1}{2}, \tan \frac{4\pi}{3} = \sqrt{3}$
35. (a) $\sin 135^\circ = \frac{\sqrt{2}}{2}, \cos 135^\circ = \frac{-\sqrt{2}}{2}, \tan 135^\circ = -1$

- (b) $\sin 225^\circ = -\frac{\sqrt{2}}{2}$, $\cos 225^\circ = -\frac{\sqrt{2}}{2}$, $\tan 225^\circ = 1$
36. (a) $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$, $m = -\frac{\sqrt{3}}{3}$
 (b) $\sin\left(-\frac{\pi}{6}\right) = -\frac{1}{2}$, $\cos\left(-\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$, $\tan\left(-\frac{\pi}{6}\right) = -\frac{\sqrt{3}}{3}$
37. $\sin\left(-\frac{2\pi}{3}\right) = -\frac{\sqrt{3}}{2}$, $\cos\left(\frac{5\pi}{2}\right) = 0$, $\tan\left(\frac{2\pi}{3}\right) = -\sqrt{3}$
38. $\cos A = -\frac{\sqrt{91}}{10}$, $\tan A = -\frac{3}{\sqrt{91}}$
39. 2.52 km
40. side length = 16.8 cm, Area = 91.3 cm^2
41. 78.5° , 57.1° , 44.4°
42. (a) $c = p + q$
 (b) $c = |p - q|$
 (c) $c = \sqrt{p^2 + q^2}$
43. (a) $\sin 60^\circ = \sin 120^\circ = \frac{\sqrt{3}}{2}$
 (b) $\sin 30^\circ = \sin 150^\circ = \frac{1}{2}$
 (c) -
44. $\sin \theta = \sin(\pi - \theta)$
45. $\cos \theta = -\cos(\pi - \theta)$
46. $\tan \theta = \tan(\theta + \pi)$
47. $\cos x = -\frac{\sqrt{4-a^2}}{2}$, $\tan x = -\frac{a}{\sqrt{4-a^2}}$
48. (a) $\frac{\pi}{6}$, $\frac{5\pi}{6}$
 (b) $\sin(x) = \frac{1}{2}$
49. $\frac{\pi}{3}$, $\pi - \frac{\pi}{3}$
50. $\cos 280^\circ \approx 0.174$, $\cos 100^\circ = \cos 260^\circ \approx -0.174$, $\sin 190^\circ \approx -0.174$
51. (a) $\cos 310^\circ < \cos 311^\circ$
 (b) $\sin 76^\circ > \sin 106^\circ$
 (c) $\sin 81^\circ = \sin 99^\circ$
 (d) $\tan 89^\circ > \tan 71^\circ$
52. $BC = 4.01$
53. (a) 1
 (b) 1

- (c) $\frac{\sqrt{3}}{2}$
 - (d) $\frac{\sqrt{2}}{2}$
54. (a) $\frac{\sqrt{3}}{2}$
- (b) $\frac{\sqrt{3}}{2}$
 - (c) $-\sqrt{3}$
 - (d) $\frac{\sqrt{2}}{2}$
55. (a) $\theta = \frac{5\pi}{6}, \frac{7\pi}{6}$
- (b) $\theta = 0, \pi$
 - (c) $\theta = \frac{3\pi}{2}$
56. (a) $\theta = 0^\circ, 180^\circ$
- (b) $\theta = 135^\circ, 225^\circ$
 - (c) $\theta = 45^\circ, 225^\circ$
57. –
58. (a) $\cos B = \frac{106-x^2}{90}$
- (b) $\cos D = \frac{58-x^2}{42}$
 - (c) $\cos B = -\cos D$
 - (d) $x = 4$
59. (a) $\sin(-\alpha) = -\sin(\alpha)$
- (b) $\sin(180 - \alpha) = \sin(\alpha)$
 - (c) $\sin(360 + \alpha) = \sin(\alpha)$
 - (d) $\cos(-\alpha) = \cos(\alpha)$
 - (e) $\cos(180 - \alpha) = -\cos(\alpha)$
 - (f) $\cos(90 - \alpha) = \sin(\alpha)$
60. (a) $A = 109^\circ$
- (b) $A = 230^\circ, 310^\circ$
 - (c) No solutions
 - (d) $A = 110^\circ$
61. (a) $\frac{\sqrt{2}}{2}$
- (b) 0
 - (c) $\frac{-\sqrt{3}}{2}$
 - (d) -1
 - (e) $\frac{-\sqrt{3}}{2}$

(f) 0

62. $\theta = 60^\circ, 300^\circ$

63. (a) $h = b \sin A, h = a \sin B$

(b) $\frac{\sin A}{a} = \frac{\sin B}{b}$

(c) $\frac{b}{\sin B} = \frac{a}{\sin A}$

64. $NC = 8.08 \text{ in.}, CY = 3.19 \text{ in.}$

65. (a) $3.42 \text{ ft} < l < 10 \text{ ft}$

(b) $l = 3.42 \text{ ft}$

(c) $0 \text{ ft} \leq l < 3.42 \text{ ft}$

66. (a) $\theta = 140^\circ$

(b) $\theta = 300^\circ$

(c) $\theta = 50^\circ, 310^\circ$

67. (a) $\tan \theta = \frac{\sqrt{b^2 - a^2}}{a}$

(b) $\cos(\pi + \theta) = \frac{-a}{b}$

(c) $\sin(\pi + \theta) = \frac{-\sqrt{b^2 - a^2}}{b}$

(d) $\cos(\pi - \theta) = \frac{-a}{b}$