

IM1H Book 1 Selected Answers

IM1H Dream Team

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1. (a) $A_{ABCD} = 25$, $A_{BCEF} = 9$
(b) –
(c) –
(d) $A = 34$
(e) $l = \sqrt{34}$
(f) –
2. $l = 4\sqrt{5}$
3. Yes
4. –
5. –
6. $AB = \sqrt{41}$
7. $l = 5\sqrt{2}$
8. $l = \sqrt{5}$, No
9. 12
10. $(12, 2), (2, 2)$
11. No
12. $d = 10\sqrt{2}$
13. (a) $C = (5, 0)$. Answers may vary.
(b) $D = (5, 1)$. Answers may vary.
(c) $x = 5$
(d) –
14. (a) 13, 17, 13, 17
(b) –

15. (a) $AP = BP = 2\sqrt{5}$
 (b) $(3, 5), (2, 2), (4, 8)$. Answers may vary.
 (c) No
 (d) $y = 3(x - 2) + 2$
16. $(10, 3), (-6, 3)$
17. $-$
18. (a) $(0, 0), (6, 0)$. Answers may vary.
 (b) $(0, 4), (4, 2)$. Answers may vary.
 (c) $(0, 4), (2, 2)$. Answers may vary.
19. $AB = BC = \sqrt{10}$
20. $C = (6, 3)$. Infinite. Answers may vary for C .
21. $(0, 0), (\sqrt{13}, 0)$. Answers may vary.
22. $(0, 0), (2, 3)$
23. $(0, 0), (\sqrt{13}, 0), (2 + \sqrt{13}, 3), (\sqrt{13}, 6), (0, 6), (-2, 3)$. Answers may vary.
24. $24 - 12\sqrt{2}, 24\sqrt{2} - 24$
25. There are an infinite number of different ways.
26. 208m
27. $AP = BP = 5\sqrt{2}$.
 2 more equidistant points: $Q = (2, 2), R = (5, 3)$. Answers may vary.
 All equidistant points: $y = \frac{1}{3}(x - 2) + 2$.
28. Short leg: $21 - 7\sqrt{5}$
 Long leg: $42 - 14\sqrt{5}$
 Hypotenuse: $21\sqrt{5} - 35$
29. $\frac{5}{12}$
30. $(0, 5 + 4\sqrt{2}), (0, 5 - 4\sqrt{2})$
31. (a) $(0, 0), (4, 1)$. Answers may vary.
 (b) No.
32. Yes.
33. (a) Yes.
 (b) \overline{KL}
 (c) $\angle KLM$

- (d) $\angle BAC$
 - (e) They're congruent.
34. They sum to 90° .
35. It's a right angle.
36. (a) $-$
 (b) $\frac{b}{a}$ is the negative reciprocal of $\frac{-a}{b}$.
37. $-$
38. $-$
39. A line with an undefined slope is perfectly vertical while a line with a slope of 0 is perfectly horizontal.
40. $n = \frac{49}{4}$
41. $x = 1$. Answers may vary.
42. $y = 1$. Answers may vary.
43. They're the same line. $-50x + 30y = 90$.
44. $-$
45. No.
46. (a) $y = \frac{1}{2}(x - 5) + 5$
 (b) $4x - 5y = 8$
47. Yes.
48. $(\frac{15}{8}, \frac{15}{8})$
49. $m = -1$
50. Yes.
51. (a) $-$
 (b) $\angle Q$; CPTC
52. $\triangle ACT \cong \triangle ION$
 $\triangle ATC \cong \triangle INO$
 $\triangle CAT \cong \triangle OIN$
 $\triangle CTA \cong \triangle ONI$
 $\triangle TAC \cong \triangle NIO$
 $\triangle TCA \cong \triangle NOI$

53. $\triangle BAL \cong \triangle GEL$
 $\triangle ELB \cong \triangle ALG$
 $\triangle GEA \cong \triangle BAE$
 $\triangle ABG \cong \triangle EGB$
54. $\angle ABC$ or $\angle CBA$ or $\angle B$ (different ways of writing the same thing).
55. \overline{AB}
56. (a) $PNMRQ$
(b) $\angle Q$
57. (a) $d_{AP} = \sqrt{(x+1)^2 + (y-5)^2}$
(b) $d_{BP} = \sqrt{(x-5)^2 + (y-2)^2}$
(c) $\sqrt{(x+1)^2 + (y-5)^2} = \sqrt{(x-5)^2 + (y-2)^2}$
(d) $4x - 2y = 1$
(e) $(2, 3.5)$
(f) $m_{AB} = -\frac{1}{2}$; $m_P = 2$
(g) —
58. (a) The distance between (x, y) and $(3, 5)$ is equal to the distance between (x, y) and $(7, -1)$.
(b) $2x - 3y = 4$
59. (a) —
(b) —
(c) $(6, 9.5)$
(d) $(6.2, 9.8)$
60. (a) $10x - 8y = -35$
(b) $(4.5, 10)$. Answers may vary.
(c) $\overline{PA} = \overline{PB}$
61. (a) $(21, 16)$
(b) $(30, 22)$
(c) $(3 + 3t, 4 + 2t)$
62. —
63. $x = 1 + t$; $y = 2 + 3t$. Answers may vary.
64. $(-3.5, -0.5)$
65. $(0, 16.9)$

66. (a) –
 (b) $\frac{\Delta y \text{ from a 1 unit increase in } t}{\Delta x \text{ from a 1 unit increase in } t}$
 (c) $y = \frac{11}{3} + \frac{2}{3}x$
67. –
68. (a) $[7, 2]$
 (b) $[14, 8]$
 (c) $[-7, -4]$
 (d) $[7, 4]$
69. (a) $[3, 6]$
 (b) $[3, -2]$
 (c) $[-100, 40]$
70. (a) 12 miles east and 16 miles north
 (b) 20 miles
 (c) 10 miles/hour
71. (a) 48 miles
 (b) 4.8 hours
 (c) 28.8 miles east and 38.4 miles north of his departure point.
72. (a) $A' = (6, 5)$, $B' = (8, -2)$, $C' = (11, 4)$
 (b) $B'' = (-1, 0)$, $C'' = (2, 6)$
73. $K' = (5, 3)$, $L' = (9, 0)$, $M' = (6, -4)$. Each vertex slides $\sqrt{29}$.
74. It depends on whether the triangle is supposed to be right.
75. (a) 5 units/second
 (b) $[3, 4]$
 (c) $(-3 + 3t, 1 + 4t)$
 (d) $\frac{4}{3}$
76. Yes, yes, yes, no.
77. (a) $[4, -12]$
 (b) $[-4, 12]$
78. $(a + 2, b - 4)$
79. Answers may vary. $(0, 0)$, $(7, 1)$, $(12, 6)$, $(5, 5)$
80. (a) 132 miles east and 110 miles north

- (b) $(-3 + 90t, 5 + 70t)$
81. $[8, 06]$
82. –
83. –
84. (a) –
 (b) –
 (c) SSA doesn't always imply congruence because in scenarios like (b) there are two incongruent triangles that satisfy SSA.
85. –
86. –
87. –
88. –
89. –
90. –
91. –
92. –
93. –
94. (a) 2 AM
 (b) It means that Kirby's position is determined by time.
 (c) $(-6, 1.5)$
 (d) $(-4t, -3t + 6)$
95. (a) If point P is equidistant from the coordinate axes, then point P is on the line $y = x$.
 (b) No, $(-1, 1)$ is a counterexample.
 (c) Answers may vary. If $ABCD$ is a square, then $ABCD$ is a rectangle.
 (d) Answers may vary. If A , B , and C are not colinear, then A , B , and C form a triangle.
96. If a triangle has side lengths a , b , and c such that $a^2 + b^2 = c^2$, then the triangle has a right angle, and the side with length c is the hypotenuse.
97. –
98. (a) –

- (b) $d = \sqrt{(3-2t)^2 + (4+t)^2}$
 - (c) $(\frac{8}{5}, \frac{21}{5})$
 - (d) $(\frac{4}{5}, \frac{23}{5})$
99. –
100. (a) $s = 3\sqrt{5}$ miles/minute
 (b) $4\sqrt{10}$ miles
 (c) $t = 8$ minutes
101. (a) –
 (b) $\sqrt{13}$
102. (a) $(2, 1)$
 (b) $[-12, 5]$
 (c) $(x, y) = (2 - 24t, 1 + 10t)$
103. (a) $[-6, 8]$
 (b) $[-\frac{3}{5}, \frac{4}{5}]$
 (c) $[\frac{3}{5}, -\frac{4}{5}]$
 (d) $[6, -8]$
 (e) $[\frac{3}{5}c, -\frac{4}{5}c]$
104. (a) $[60, -15]$
 (b) $[5, 5\sqrt{2}]$
 (c) $[\frac{3}{8}, \frac{-1}{3}]$
 (d) $[\frac{p^2}{q}, p]$
105. (a) 5
 (b) 10,080
 (c) 2016
 (d) $5t$
106. –
107. –
108. –
109. They are congruent.
110. –
111. –

112. (a) $x = \frac{3}{5}t + 9$; $y = \frac{4}{5}t - 2$
 (b) $x = \frac{3}{20}t + 9$; $y = \frac{1}{5}t - 2$
 (c) $x = -\frac{3}{5}t + 9$; $y = -\frac{4}{5}t - 2$
 (d) $x = -3t + 9$; $y = -4t - 2$

113. –

114. –

115. –

116. (a)

$$P_3 = (-17, 19)$$

$$P_2 = (-9, 12)$$

$$P_{-2} = (23, -16)$$

$$P_{1.5} = (-5, \frac{17}{2})$$

(b) $y = \frac{33}{8} - \frac{7}{8}x$

(c) Both the x - and y -coordinates are changing at a constant rate.

117. (a) $\vec{AB} = [2, -9]$

(b) $\vec{AB} = [3t, -4t]$

118. (a) $[-\frac{8}{5}, \frac{14}{5}]$

(b) $[4, -7]$

(c) $[\frac{4}{\sqrt{65}}, -\frac{7}{\sqrt{65}}]$

(d) $[8, -14]$

(e) $[7, 4]$

(f) $[-\frac{4c}{\sqrt{65}}, \frac{7c}{\sqrt{65}}]$

119. (a) It moves 3 meters to the left and 4 meters up every second.

(b) It moves 180 meters to the left and 240 meters up every second.

(c)

$$x = -2 - 180t$$

$$y = 6 + 240t$$

120. (a) $t = 1\text{s}$

(b) The bug is on the line to the right of the x -intercept.

121. (a) $m = -4$

- (b) $s = \sqrt{17}$ units/minute
 - (c) $t = 3$ minutes
 - (d) $t = 3$ minutes
 - (e) -95 or 194 seconds
122. y -intercept: $(0, -\frac{26}{3})$
 x -intercept: $(\frac{13}{2}, 0)$
123. I would find the length of all 4 sides and make sure there were two distinct pairs of congruent adjacent sides.
124. $-$
125. $-$
126. $-$
127. $-$
128. (a) $(5, \frac{71}{12})$
(b) 7.58
129. $-$
130. $-$
131. 68 cm^2
132. (a) $-$
(b) No
133. $(-\frac{1}{3}, 2), (\frac{4}{3}, 3)$
134. $(-5, 6)$. Answers may vary.
135. $(\frac{48}{13}, \frac{32}{13})$
136. $(\frac{96}{13}, \frac{40}{13})$
137. $(4, -1)$
138. (a) $(2, 3)$
(b) $t = \frac{37}{18}$
(c) The value of t at which P_t intersects $4x + 3y = 18$.
(d) $(\frac{13}{6}, \frac{28}{9})$
(e) $(-\frac{5}{2}, 0)$
139. The opposite sides have the same slope, so they must be parallel.
140. (a) The direction vector has the same slope as the line.

- (b) Answers may vary. $[5, -2], [15, -6]$.
- (c) They all have the same slope. In other words, they're all multiples of $[5, -2]$.
141. (a) $m = -\frac{a}{b}$
- (b) $[a, b]$ has a slope of $\frac{b}{a}$, and every direction vector has a slope of $-\frac{a}{b}$, so their slopes are opposite reciprocals.
142. $[2, -3]$
143. $(x, y) = (-19 + 8t, -7 + 6t)$
144. (a) $(x, y) = (1 + 4t, 5 + 12t)$
- (b) $(-6, -16)$
- (c) $4\sqrt{10}$ units/hour
145. $x = \frac{4}{11}$
146. $-$
147. $-$
148. $\triangle A \cong \triangle B \cong \triangle C \cong \triangle E$
149. 45°
150. Answers may vary. $[-\frac{18}{13}, \frac{12}{13}]$.
151. $(-1, -7)$
152. (a) $(3, 0), (0, 2)$
- (b) $[2, 3]$
- (c) $(x, y) = (6 + 2t, 3 + 3t)$
- (d) $t = -\frac{15}{13}$
- (e) $(\frac{48}{13}, -\frac{6}{13})$
- (f) $(\frac{48}{13}, -\frac{6}{13})$
153. (a) $[8, -6]$
- (b) $[-\frac{9}{2}, -6]$
154. (a) 2
- (b) $-\frac{1}{2}$
- (c) They are perpendicular.
- (d) $\sqrt{5}$
155. $y = \frac{2}{3}(x - 1) + 5$

156. (a) It's isosceles.
 (b) It's equilateral.
157. (a) There's a typo in this question. It should say $\overline{BA} > \overline{BE}$.
 (b) –
 (c) $\overline{BA} + \overline{CA} > \overline{BE} + \overline{CA} > \overline{BE} + \overline{CE} = \overline{BC}$
158. $\sqrt{5}$
159. (a) –
 (b) Reflect $\triangle KLM$ over $y = 2x$.
 (c) $(3, -4)$
160. (a) –
 (b) $(\frac{72}{13}, \frac{30}{13})$
 (c) Rotate $\triangle ARM$ counterclockwise.
161. The positions are moving in the same direction, but they start at different points, and one is moving three times faster than the other.
162. (a) $[2, 1]$
 (b) $(x, y) = (2t, t)$
 (c) $Q = (\frac{8}{5}, \frac{4}{5})$
 (d) $\overrightarrow{AQ} = [\frac{8}{5}, \frac{4}{5}]$
 (e) $B = (\frac{16}{5}, \frac{8}{5})$
 (f) $t = \frac{8}{5}$
163. $Q = (1, 2)$
164. $P = (1, 2)$
165. $F \rightarrow$ midpoint of $\overline{GH} \rightarrow D$. There are 4 possible paths.