

Answer Key

1. $\frac{6}{10}$
2. $\frac{5}{10}$
3. $\frac{1}{7}$
4. $\frac{2}{5}$
5. $\frac{3}{4}$
6. $\frac{3}{10}$
7. $1\frac{5}{9}$
8. $1\frac{1}{10}$
9. $1\frac{3}{8}$
10. $1\frac{4}{8}$
11. $1\frac{4}{5}$
12. $\frac{1}{3}$
13. $1\frac{4}{5}$
14. $\frac{1}{9}$
15. $1\frac{2}{4}$
16. $\frac{2}{7}$
17. $1\frac{3}{10}$
18. $\frac{3}{6}$
19. $\frac{4}{6}$
20. $1\frac{4}{10}$
21. $1/3$
22. $2/3$
23. $1/2$
24. $1/4$
25. $3/4$
26. $2/5$
27. $1/8$
28. $1/4$
29. $3/8$
30. $5/8$
31. $1/8$
32. $1/4$
33. $3/8$
34. $5/8$
35. $3/4$
36. $7/8$
37. $1/6$
38. $1/4$
39. $2/3$
40. $3/4$
41. $1/6$
42. $\frac{3}{4}$
43. $\frac{4}{6} = \frac{2}{3}$
44. $\frac{3}{8} + \frac{4}{8} = \frac{7}{8}$
45. $1 - \frac{3}{8} - \frac{4}{8} = \frac{1}{8}$
46. $\frac{3}{6} = \frac{1}{2}$ mile
47. 3 miles
48. $\frac{3}{4}$
49. $\frac{2}{9}$
50. $\frac{7}{6}$
51. 42
52. 24
53. 49
54. 63
55. 25
56. 49
57. 63
58. 35
59. 54
60. 36
61. $\frac{22}{3}$
 $7 \times 3 + 1 = 22$
62. $\frac{37}{5}$
 $7 \times 5 + 2 = 37$
63. $\frac{13}{4}$
 $3 \times 4 + 1 = 13$
64. $\frac{19}{4}$
 $4 \times 4 + 3 = 19$
65. $\frac{35}{3}$
 $11 \times 3 + 2 = 35$
66. $\frac{15}{4}$
 $3 \times 4 + 3 = 15$

MAP 230 (T1) Issue 3

67. $\frac{27}{5}$
 $5 \times 5 + 2 = 27$
68. $\frac{43}{6}$
 $7 \times 6 + 1 = 43$
69. $\frac{24}{7}$
 $3 \times 7 + 3 = 24$
70. $\frac{35}{8}$
 $4 \times 8 + 3 = 35$
71. (a) $3 \times 4 \times 2 = 24$ balls
 (b) $1.25 \times 24 = 24 + 6 = \30.00
72. $20 \div 2 = 10$
 $10 - 2 = 8$
73. $20 \div 2 = 10$
 $10 + 4 = 14$ (present)
74. $22 + 2 = 24$ (the sum of their present ages)
 (a) $24 \div 3 = 8$ (Juan)
 (b) $8 \times 2 = 16$ (Bill)
75. Method I)
 $9 \div 3 = 3$
- Method II)
 $90 \times 2 = 180$
 $90 - 9 = 81$
 $180 + 81 = 261$
 $261 \div 3 = 87$
 $90 - 87 = 3$
76. $30 \div 6 = 5$ (days a pound)
 $4 \times 5 = 20$ days
77. $50 + 70 = \$120$
78. $22 + 15 + 17 = 54$ gold coins
79. $3 \times 3 = 9$
 $9 + 9 = 18$
 $24 - 18 = 6$
80. $134 \div 8 = 16R6$
 Ans = 6
81. $144 \div 6 = 24$ cages
82. $33 \times 6 = \$198$
83. $869 + 791 = 1660$ books
84. $68 \div 17 = 4$ gladioli
85. $7 \times 8 + 12 \times 5 = 56 + 60 = 116$
86. B
87. VS, VC, VD
 SC, SD
 CD
 Ans = 6
88. $4 \times 7 = 68$
89. 180
90. A
91. C
 $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$
92. $4 \times 2 \times 1 = \underline{8}$
93. $4 \times (1 + 2 + 1 + 2) = 24$
 $2 \times 1 \times 2 = 4$
 $24 + 4 = \underline{28}$
94. C
95. $1 + (-3 + 5) + (-7 + 9) +$
 $(-11 + 13) + (-15 + 17) = \underline{2}$
96. B
97. D
 $12 \div 2.4 = 120 \div 24 = 5$
98. A
99. C
100. A

Answer Key

1. $21\frac{1}{4}$
 2. $20\frac{1}{6}$
 3. $19\frac{1}{8}$
 4. $3\frac{3}{9}$
 5. $6\frac{1}{6}$
 6. $9\frac{1}{4}$
 7. $4\frac{3}{6}$
 8. $5\frac{1}{8}$
 9. $4\frac{2}{9}$
 10. $4\frac{4}{6}$
 11. $\frac{11}{2}$
 $5 \times 2 + 1 = 11$
 12. $\frac{13}{2}$
 $6 \times 2 + 1 = 13$
 13. $\frac{31}{3}$
 $10 \times 3 + 1 = 31$
 14. $\frac{28}{3}$
 $9 \times 3 + 1 = 28$
 15. $\frac{17}{4}$
 $4 \times 4 + 1 = 17$
 16. $\frac{23}{4}$
 $5 \times 4 + 3 = 23$
 17. $\frac{18}{5}$
 $3 \times 5 + 3 = 18$
 18. $\frac{23}{6}$
 $3 \times 6 + 5 = 23$
 19. $\frac{26}{7}$
 $3 \times 7 + 5 = 26$
 20. 5
 21. $5\frac{1}{2}$
 $11 \div 2 = 5 \text{ r } 1$
 22. $7\frac{1}{2}$
 $15 \div 2 = 7 \text{ r } 1$
 23. $6\frac{1}{3}$
 $19 \div 3 = 6 \text{ r } 1$
 24. $7\frac{1}{3}$
 $22 \div 3 = 7 \text{ r } 1$
 25. $6\frac{2}{3}$
 $20 \div 3 = 6 \text{ r } 2$
 26. $6\frac{1}{4}$
 $25 \div 4 = 6 \text{ r } 1$
 27. $7\frac{2}{3}$
 $23 \div 3 = 7 \text{ r } 2$
 28. $8\frac{1}{3}$
 $25 \div 3 = 8 \text{ r } 1$
 29. $7\frac{1}{4}$
 $29 \div 4 = 7 \text{ r } 1$
 30. 36
 31. 35
 32. 12
 33. 12
 34. 10
 35. 28
 36. 49
 37. 40
 38. 16
 39. 14
 40. 54
 41. 36
 42. 54
 43. 21
 44. 18
 45. 6
 46. 35
 47. 25
 48. 20
 49. 48
 50. $\frac{7}{9}$
 51. $\frac{5}{7}$
 52. $\frac{2}{7}$
 53. $\frac{3}{10}$
 54. $\frac{7}{10}$
 55. $\frac{3}{4}$
 56. $\frac{2}{3}$
 57. $\frac{5}{6}$
 58. $\frac{5}{9}$
 59. $\frac{2}{9}$
 60. $\frac{2}{5}$
 61. $\frac{4}{9}$
 62. $\frac{3}{7}$
 63. $\frac{6}{11}$
 64. $\frac{3}{5}$
 65. $\frac{4}{7}$
 66. $\frac{6}{7}$
 67. $\frac{5}{8}$
 68. $\frac{7}{8}$
 69. $\frac{4}{5}$
 70. 4.5
 71. 2.5
 72. 6.5
 73. 4.75
 74. 6.25
 75. 3.5
 76. 1.25
 77. 7.75
 78. 2.125
 79. 7.6
 80. $5\frac{1}{2}$
 81. $6\frac{1}{4}$
 82. $10\frac{1}{4}$
 83. $\frac{7}{10}$
 84. $\frac{3}{4}$
 85. $\frac{4}{5}$
 86. $\frac{17}{20}$
 87. $3\frac{2}{5}$
 88. $7\frac{1}{10}$
 89. $7\frac{9}{20}$
 90. $64 - 8 = 56$ books
 91. $125 \times 8 = 1000$ cans
 92. $20,200 \times 7 = 141,400$
 93. Jerald: 60
Kerry: 80
Larry: 75
 94. $400 \times 8 = 3200$ m =
3.2 km
 95. $8 \times 4 = 32$ people
 96. $15 + 9 = 24$
 $32 - 24 = 8$ (left)
 97. $2(1.35 + 1.65) = 6$ km
 98. See the following table.
- | | |
|---------|----|
| apples | 3 |
| bananas | 4 |
| peaches | 10 |
| pears | 5 |
99. $3 \times 12 \times 0.5 = \18
 100. $1.2 \div 2 = 0.6$
 $3 \times 12 \times 0.6 = \21.60
 101. $2 \div 5 = 0.4$
 $3 \times 12 \times 0.4 = \14.40
 102. $450 + 367 + 402 + 390 + 451 + 375 = 2435$
 103. $2(7.3 + 8.7) = \$32$
 104. $8 \times 1.5 = \$12$
 105. $150 \times 3 = 450$
(pounds)
 106. $(180 - 10) \div 2 = 85$
(Wilson)
 $180 - 85 = 95$ (Larry)
 107. $200 \div 5 = 40$
 108. $4.5 \times 220 = 4.5 \times 2 \times 110 = 9 \times 110 = \990
 109. 64 ounces = 2 quarts
 $2 \times 15 = 30$ quarts

Answer Key

- | | | | |
|---------------------|---------------------|----------------------|-----------------------|
| 1. $93\frac{3}{5}$ | 6. $65\frac{1}{4}$ | 11. 9 | |
| 2. $71\frac{1}{5}$ | 7. $19\frac{1}{5}$ | 12. 27 | 16. 10 |
| 3. $77\frac{1}{2}$ | 8. $40\frac{1}{2}$ | 13. 9 | 17. 15 |
| 4. $59\frac{1}{9}$ | 9. $66\frac{3}{5}$ | 14. 15 | 18. 20 |
| 5. $69\frac{2}{3}$ | 10. $54\frac{5}{6}$ | 15. 21 | 19. 35 |
| | | | 20. 20 |
| 21. 39 | 26. 56 | 31. $\frac{11}{300}$ | 36. $\frac{2}{135}$ |
| 22. 45 | 27. 51 | 32. $\frac{13}{216}$ | 37. $\frac{106}{135}$ |
| 23. 38 | 28. 57 | 33. $\frac{19}{90}$ | 38. $\frac{13}{36}$ |
| 24. 46 | 29. 50 | 34. $\frac{11}{225}$ | 39. $\frac{25}{96}$ |
| 25. 52 | 30. 58 | 35. $\frac{1}{360}$ | 40. $\frac{31}{45}$ |
| 41. $\frac{2}{3}$ | 46. $\frac{7}{32}$ | 51. 0.625 | 56. 0.4 |
| 42. $\frac{2}{5}$ | 47. $\frac{16}{45}$ | 52. 12.5 | 57. 150 |
| 43. $\frac{8}{9}$ | 48. $\frac{10}{63}$ | 53. 0.075 | 58. 0.5 |
| 44. $\frac{15}{16}$ | 49. $\frac{35}{96}$ | 54. 0.08 | 59. 0.0125 |
| 45. $\frac{18}{25}$ | 50. $\frac{3}{4}$ | 55. 75 | 60. 0.0625 |
| 61. 650 | 66. 15.625 | 71. 4.5 | 76. 3.5 |
| 62. 1.75 | 67. 51.2 | 72. 2.5 | 77. 1.25 |
| 63. 37.9 | 68. 0.725 | 73. 6.5 | 78. 7.75 |
| 64. 325 | 69. 3.25 | 74. 4.75 | 79. 2.125 |
| 65. 1750.2 | 70. 8.75 | 75. 6.25 | 80. 7.6 |

MAP 250+ (T1) Issue 3

81. (a)

Just think of buying 4 for \$4.50.

$$(20 \div 4) \times 4.5 = \$22.50$$

(b) $27 \div 4.5 \times 4 = 24$ plants

82. $13 \times (3.25 + 0.75) = \52.00

83. $\frac{2}{5}$

84. $7:4 = 175:100$

85. $\frac{3}{4} \times 12 = 9$

$$\frac{2}{3} \times 12 = 8$$

$$9 + 8 = 17$$

86. $120:144 = 10:12 = 5:6$

87.
$$\frac{3(\text{pure})}{7(\text{alcohol})} = \frac{\Delta(\text{pure})}{56(\text{alcohol})}$$

$$\Delta = \boxed{24}$$

88. $10/20 = \$0.50$ (unit price for 20-piece)

$$12/40 = \$0.30$$
 (unit price for 40-piece)

So, the 40-piece pack is cheaper.

89. 31

90. $\frac{1}{5} \times 60 = \12

91. $60 + 12 = \$72$

92. False

0 is a whole number, but it is not positive.

93. True

since the remainder is 0 when it is divided by 2.

94. Total cost = $30 \times 55 = 1650$

Steel	Weight	Price per ton	Subtotal
Type I	6 tons	\$50	\$300
Type II	7 tons	\$60	\$420
Type III	12 tons	\$70	\$840
Type IV	5 tons	\$80	\$400
	30 tons		Total: \$1960

$$\text{Total profit} = 1960 - 1650 = \boxed{310}$$

95. $600 \times 0.4 = \$240$

96. $\frac{1}{2}$

97. $\frac{1}{3}$

98. $6.4 \div 2 = 3.2$

$$3.2 + 13.9 = 17.1$$

99. $12 \div 3 = 4$

$$4 \times 5 = \$20$$

100. $3\frac{1}{2} \times 52 = 156 + 26 = 182$ hours

101. Brian: \$2.00

Alex: \$6.00

102. Charlie: $90 \div 9 = \$10$

Brian: $2 \times \text{Charlie} = \20

Alex: $3 \times \text{Brian} = \60

103. Charlie: $540 \div 9 = \$60$

Brian: $2 \times \text{Charlie} = \120

Alex: $3 \times \text{Brian} = \360

104. $1\frac{3}{4} + 2\frac{1}{8} = 3\frac{11}{12}$ mi

105. $25 + 30 = 55$

$$55 \div 7 = 7R6$$

Saturday = 6 days earlier than Friday

106. $16 + 6 = 22$ (cups)

107. Reed: 83 TDs

Rice: 160 TDs

108. 1

109. $\frac{7}{8}$

110. 55

Answer Key

1. 3
2. 16
3. 13
4. 11
5. -6
6. 14
7. 12
8. 3
9. -16
10. 18
11. 7
12. -7
13. 27
14. 4
15. 3
16. 1
17. 25
18. -7
19. -24
20. -5
21. -2
22. -27
23. 22
24. 3
25. 4
26. -3
27. -7
28. 1
29. 4
30. -7
31. 15° C higher
32. 115
33. $15 + 15 = 30$
34. $150 + 15 = 165$
35. $6 \times 50 + 1000 = 1300$
36. $-7 - 3 = -10$
37. $-2 - 3 = -5$
38. $-30 - 70 = -100$
39. $-3 - 7 = -10$
40. $-3000 - 7000 = -10,000$
41. 550%
42. 35%
43. 125%
44. 236%
45. 320%
46. 1.5
47. 0.45
48. 1.65
49. 12.34
50. 8
51. $\frac{12}{35}$
52. $\frac{17}{72}$
53. $\frac{1}{56}$
54. $\frac{4}{21}$
55. $\frac{3}{16}$
56. $\frac{10}{63}$
57. $\frac{3}{25}$
58. $\frac{5}{54}$
59. $\frac{1}{15}$
60. $\frac{11}{24}$
61. 8
62. -2
63. -9
64. -7
65. 5
66. 12
67. 8
68. 2
69. 54
70. -36
71. 32
72. $1/16$
73. 18
74. 8
75. -80
76. -6
77. -12
78. 6
79. $\frac{50}{200} = \frac{25}{100} = 25\%$
80. $\frac{12}{96} = \frac{1}{8} = 0.125 = 12.5\%$
81. D
 $\frac{8}{20} = 40\%$
82. B
 $10 + 12 + 3 = 25$
 $\frac{3}{25} = \frac{12}{100} = 12\%$
83. $\frac{0.2 \times 5}{100 \times 5} = \frac{1}{500} = 1/500$
84. $45 \div 60 = 0.75 = 75\%$
85. $\frac{18}{24} = \frac{3}{4} = 75\%$
86. $\frac{14}{24} = \frac{7}{12} = \frac{700}{12}\% = \frac{175}{3}\% = 58 \frac{1}{3}\%$
87. $100/250 = 0.4 = 40\%$
88. $\frac{6}{24} = \frac{1}{4} = 0.25 = 25\%$
89. $\frac{10}{25} = 40\%$
90. Total = 25
(a) $\frac{16}{25} = 64\%$ (boys)
(b) $\frac{9}{25} = 36\%$ (girls)
91. $120 \div 3 = 40$
92. $(21 - 12) \div 3 = 3$
 $3 + 1 = 4$ (to include both 12 and 21)
Verify: 12, 15, 18, 21
93. $(120 - 12) \div 3 = 40 - 4 = 36$
 $36 + 1 = 37$
94. $(1200 - 12) \div 4 = 300 - 3 = 297$
 $297 + 1 = 298$
95. $(1000 - 10) \div 5 = 200 - 2 = 198$
 $198 - 1 = 197$
96. Dw
97. A
 $356 - 87 = 269$
98. $620 - (-55) = 675$ ft

Math Power

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Answer Key

1. $7/3$
2. -4
3. $x = -3$
4. $x = \frac{16}{3}$
5. $x = -1$
6. $x = -5$
7. $x = 2$
8. $x = 3$
9. $x = -2$
10. $x = -4$
11. 3.2×10^{18}
12. 3.4×10^{16}
13. 3.6×10^5
14. 3.8×10^9
15. 9×10^{-10}
16. 1.08×10^{-7}
17. 1.44×10^{-9}
18. 1.8×10^{-15}
19. 2.16×10^{-9}
20. 2.52×10^{-12}
21. 2×10^{-1}
22. 2.1×10^5
23. 2.25×10^{-1}
24. 2.3×10^{-5}
25. 2.5×10^{-5}
26. 3×10^3
27. 4×10^3
28. 5×10^{-17}
29. 6×10^{10}
30. 7×10^{-14}
31. $x^2 - 5x + 6$
32. $x^2 + 4x - 21$
33. $x^2 + x - 12$
34. $x^2 - x - 6$
35. $x^2 - 4x + 3$
36. $x^2 + 5x - 24$
37. $2x^2 + 7x + 6$
38. $12x^2 - 19x + 4$
39. $10x^2 + 17x + 3$
40. $2x^2 + x - 21$
41. $-14, 49$
42. $0.4, 0.04$
43. $(2x - 9)^2$
44. $(3x - 4)^2$
45. $25, (4x + 5)^2$
46. $-12, 36$
47. $0.6, 0.09$
48. $(2x - 7)^2$
49. $(3x - 2)^2$
50. $49, (4x + 7)^2$
51. $2 + 1$ & $2 - 1$
Roots = 3 & 1
52. $-2 + 5$ & $-2 - 5$
Roots = 3 & -7
53. -4 & 1
 $-4 + 1$ & $-4 - 1$
Roots = -3 & -5
54. 4 & 8
 $4 + 8$ & $4 - 8$
Roots = 12 & -4
55. -5 & 1
 $-5 + 1$ & $-5 - 1$
Roots = -4 & -6
56. vertical: $\angle 4$
adjacent: $\angle 2$
57. Vertical angle pairs:
 $(\angle 1, \angle 4), (\angle 2, \angle 5),$
 $(\angle 3, \angle 6).$
Adjacent pairs $(\angle 1,$
 $\angle 6), (\angle 6, \angle 5), (\angle 5,$
 $\angle 4), (\angle 4, \angle 3), (\angle 3,$
 $\angle 2), (\angle 2, \angle 1).$
58. 75°
 $180^\circ - 105^\circ = 75^\circ$
since $\angle 1$ and $\angle 2$ are
linear pair with
respect to line M .
59. 105°
 $180^\circ - 75^\circ = 105^\circ$
since $\angle 2$ and $\angle 3$ are
linear pair with
respect to line L .
60. vertical angles
congruent
61. 75°
 $\angle 4 = \angle 2 = 75^\circ$ for
vertical angles.
62. Yes, it is always true.
63. 150°
The angle is 30° since
 $90 - 60 = 30$. Therefore,
its supplementary
angle is $180^\circ - 30^\circ =$
 150° .
64. 60°
The complementary
angle for 60° is 30° .
65. 120°
Divide 180° into $2 + 1$
parts. Each part gets
 60° . The angle in the
question should get
two parts, thus it has
 120° .
66. 45°
The complementary
angle for 45° is still
 45° .
67. $60 - x = 25 + 3x + 15$
 $60 - x = 40 + 3x$
 $20 = 4x$
 $x = 5$
 $\angle AOB = (60 - x)^\circ =$
 55°
68. 70
69. 65
70. $36 \times \frac{5}{7+5} = 15$ (Alex)
 $36 \times \frac{7}{7+5} = 21$ (Brian)
71. Let x : the measure of
the angle, $90 - x$: the
complement, and
 $180 - x$: the
supplement
 $\frac{1}{4}(90 - x) + \frac{1}{5}(180 - x) =$
 36
 $5(90 - x) + 4(180 - x) =$
 720
 $1170 - 9x = 720$
 $9x = 450$
 $x = 50^\circ$
72. $5 \times \frac{1}{2} = 2.5$ mi (Kirk
was ahead)
 $7 - 5 = 2$ mi per hour
(Nancy was faster)
 $2.5 \div 2 = 1.25$ hr = 1
hr 15 min
73. 2 hr 6 min = 2.1 hr
 $7 \times \frac{12}{2.1} = \frac{12}{0.3} = 40$
letters

MAP 270+ (T1) Issue 3

74. Method I:

#pennies	#nickels	difference
5	5	20¢
6	4	14¢
7	3	8¢

Method II:

Assume there are equal number of pennies and nickels. The difference of values is

$$5(5 - 1) = 20.$$

However, the actual difference is only 8¢. The slack is

$$20 - 8 = 12¢.$$

We need to exchange some nickels with pennies.

Each exchange will make a difference $5 + 1 = 6¢$ in value. How many times do we need to exchange?

$$12 \div 6 = 2 \text{ (times)}$$

Therefore, there are

$$5 + 2 = 7 \text{ (pennies) and}$$

$$5 - 2 = 3 \text{ (nickels).}$$

75. Let one family pick p peaches, and the other pick $4p$ peaches.

$$p + 4p = 240$$

$$5p = 240$$

$$p = 48$$

76. $(120-2x)(90-2x) = \frac{1}{2}(120)(90)$

By factoring 2 out, we reduce the problem.

$$4(60-x)(45-x) = \frac{1}{2}120 \cdot 90$$

Cancel 4 out from both sides:

$$(60-x)(45-x) = 1350$$

$$x^2 - 105x + 1350 = 0$$

$$(x-90)(x-15) = 0$$

$$x = 15 \text{ ft (90 not desired, why?)}$$

77. $1 + 20\% = 1.2$

$$36 \div 1.2 = \$30.00$$

78. $1 - 20\% = 0.8$

$$0.80 \times \$30 = \$24.00$$

79. $36 - 24 = \$12.00$

80. Let Pete be x years old, so Bob be $x+10$. In 3 years, Pete will be $x+3$ and Bob will be $x+13$.

$$\text{Bob} = 2 \cdot \text{Pete}$$

$$x+13 = 2(x+3)$$

$$x+13 = 2x + 6$$

$$x = 7 \text{ (Pete)}$$

$$x + 10 = 17 \text{ (Bob)}$$

81. 1 mpm (mark per minute)

82. $\frac{1}{12}$ mpm (mark per minute)

83. $\frac{1}{12}:1 = 1:12$

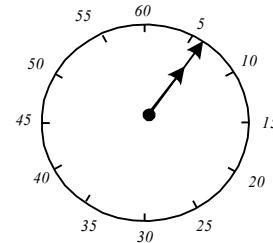
84. It is 12:00 when the two hands meet for the first time after 11:00, therefore, they won't meet between 11 and 12.

When the hour hand points to 1, the minute hand points to 12, therefore, the minute hand cannot catch up with the hour hand between 12 and 1.

85. The two hands cannot meet between 12 and 1. (Why?) The first time they meet must be slightly passing 1. Therefore, let's think of starting from 1:00 A.M., that is, the hour hand is 5 marks ahead.

Method I)

Let x be the number of marks from 1:00 that the hour hand is going to meet with the minute hand. Then, the minute hand moves $12x$ marks.



Note that the minute hand must have traveled one full round to meet with the minute hand:

$$12x = 5 + x$$

$$x = \frac{5}{11}$$

Method II)

The relative speed between the two hands is $(1 - \frac{1}{12})$

$= \frac{11}{12}$ mark per minute. The distance is 5 marks. The

$$\text{time (number of minutes)} = \frac{5}{1 - \frac{1}{12}} = \frac{60}{11} = 5\frac{5}{11} \text{ (min).}$$

Both methods reach the same conclusion that they will meet at $1:5\frac{5}{11}$ A.M..

86. $2:10\frac{10}{11}$ A.M.

87. Method I)

Let x be the number of marks from 6:00 that the hour hand is going to meet with the minute hand.

Then, the minute hand moves $12x$ marks. Note that the hour hand is 30 marks ahead of minute hand, the difference between x and 30:

$$12x = x + 30$$

$$x = \frac{30}{11} = 2\frac{8}{11}$$

Method II)

The distance between the two hands is 30 marks.

The time needed for the hour hand to catch up is

$$\frac{30}{1 - \frac{1}{12}} = \frac{360}{11} = 32\frac{8}{11}.$$

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88. 22 times

Here is the list of meeting time.

$$1:\frac{60}{11} = 1:5\frac{5}{11}$$

$$2:\frac{120}{11} = 2:10\frac{10}{11}$$

$$3:\frac{180}{11} = 2:16\frac{4}{11}$$

$$4:\frac{240}{11}$$

$$5:\frac{300}{11}$$

$$6:\frac{360}{11}$$

$$7:\frac{420}{11}$$

$$8:\frac{480}{11}$$

$$9:\frac{540}{11}$$

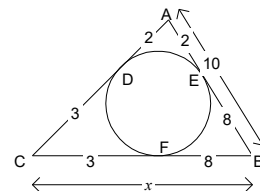
$$10:\frac{600}{11}$$

$$11:\frac{660}{11} = 12:00$$

89. It is a regular 11-sided polygon.

Answer Key

1. (3, 0)
2. (8, 0)
3. (-2, 0)
4. (3, 5)
5. (3, -5)
6. (-12, 0)
7. (-25, 0)
8. (1, 0)
9. (-12, 13)
10. (-12, -13)
11. (8, 2)
12. (21, 2)
13. (-5, 2)
14. (8, 15)
15. (8, -11)
16. (3, -10)
17. (5, 0)
18. (-5, 0)
19. (0, 5)
20. (0, -5)
21. (-3, 4)
22. (-3, -4)
23. (3, -4)
24. (14, 2)
25. (-12, 2)
26. (1, 15)
27. (1, -11)
28. (-4, 14)
29. (-4, -10)
30. (6, -10)
31. Let $OQ = 4k$
Let $PQ = 3k$
 $6k^2 = 96$
 $k = 4$
 $3 + 4 + 5 = 12$
 $4 \times 12 = 48$
32. Let $OQ = 5k$
Let $PQ = 12k$
So, $OP = 13k$
 $30k = 90$
 $k = 3$
area =
 $\frac{1}{2}(5)(12)(3^2) = 270$
33. 3, 4, 5
area = 6
34. 5, 12, 13
area = 30
35. 7, 24, 25
area = 84
36. 9, 40, 41
area = 180
37. 3, 4, 5
area = 6
38. 5, 12, 13
area = 30
39. 7, 24, 25
area = 84
40. 9, 40, 41
area = 180
41. A(2, 1), B(-1, 2), C(-2, -1), D(1, -2)
Slope(OA) = $\frac{1}{2}$
Slope(OB) = -2
Slope(OC) = $\frac{1}{2}$
Slope(OD) = -2
42. A(3, 1), B(-1, 3), C(-3, -1), D(1, -3)
Slope(OA) = $\frac{1}{3}$
Slope(OB) = -3
Slope(OC) = $\frac{1}{3}$
Slope(OD) = -3
43. A(3, 2), B(-2, 3), C(-3, -2), D(2, -3)
Slope(OA) = $\frac{2}{3}$
Slope(OB) = $-\frac{3}{2}$
Slope(OC) = $\frac{2}{3}$
Slope(OD) = $-\frac{3}{2}$
44. 13
45. 8
46. $8 \times \frac{5}{12} = \frac{10}{3}$
47. 30
48. $\frac{40}{3}$
49. 9 : 4
50. 3 : 2
51. $5 \times \frac{10}{3} = \frac{50}{3}$
52. $30 - \frac{40}{3} = \frac{50}{3}$
53. Apply the previous result, $AD = AE = 2$.
 $BE = AB - AE = 10 - 2 = 8$. $BF = BE = 8$.
 $CF = CD = 3$. Thus,
 $x = BC = CF + BF = 3 + 8 = 11$.



54. Let $x = \text{radius}$. Since $\triangle AEO \sim \triangle ADB$, $AD = 12$, (Why?) $AE = 13 - BE = 13 - 5 = 8$
 $AE:EO = AD:BD$
 $8:x = 12:5$
 $12x = 40$
 $x = 10/3$
The radius is $\frac{10}{3}$.
55. $\sqrt{13^2 - 5^2} = 12 \text{ cm}$
56. $\text{area}(\triangle APO) = 30$
 $\text{area}(\triangle AQO) = 30$
 $\text{area}(\triangle POQ) = 60 = \frac{1}{2}AO \times PQ$
 $PQ = \frac{120}{13}$.