Answer Key

1. N/A
2. N/A
3. N/A
4. N/A
5. N/A
6. N/A
7. N/A
8. N/A
9. N/A
10. N/A
11. 1
12. 7
13. 4
14. 13
15. 14
16. 11
17. 37
18. 54
19. 64
20. 70
21. 8
22. 4
23. 25
24. 31
25. 30
26. 14
27. 17
28. 27
29. 50
30. 40
31. 34
32. 6
33. 5
34. 7
35. 17
36. 14
37. 90
38. 26
39. 21
40. 4
41. 17
42. 13
43. 20
44. 19
45. 5
46. 13
47. 7
48. 13
49. 28
50. 13
51. N/A
52. N/A
53. N/A
54. N/A
55. N/A
56. N/A
57. N/A
58. N/A
59. N/A
60. N/A
61. 1
62. 7
63. 4
64. 13
65. 14
66. 11
67. 37
68. 54
69. 64
70. 70
71. 8
72. 4
73. 25
74. 31
75. 30
76. 14
77. 17
78. 27
79. 50
80. 40
81. 34
82. 6
83. 5
84. 7
85. 17
86. 14
87. 90
88. 26
89. 21
90. 4
91. 17
92. 13
93. 20
94. 19
95. 5
96. 13
97. 7
98. 13
99. 28
100. 13
101. $4 \times 4 = 16$
102. $64 - 8 = 56$ (books) left
103. $78 - 18 - 27 = 33$
104. $2.00
105. $70 + 10 = 80$
106. $50 + 20 = 70$
107. $10 + 20 = 30$
108. $12 + 8 = 20$
109. $5 \times 8 = 40$
110. $30 \div 5 = 6$
111. $120 \div 20 = 6$ hrs
112. a) $2 \times 5 \times 100 = 1000$
b) 4 boxes
113. $20 \times 10 = 200$
$200 - 80 = 120$
114. 20 (Pamela) & 10 (Queen)
115. 23 (Pamela) & 13 (Queen)
116. 12 cups
117. $8 + 12 = 20$ cups

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MAP 230 (T1) Issue 8

1. $\frac{2}{6}$
2. $\frac{4}{8}$
3. $\frac{3}{7}$
4. $\frac{3}{12}$
5. $\frac{3}{10}$
6. $\frac{4}{7}$
7. $\frac{5}{6}$
8. $\frac{2}{7}$
9. $\frac{3}{6}$
10. $\frac{5}{15}$
11. 25
12. 29
13. 30
14. 32
15. 35
16. 33
17. 28
18. 31
19. 37
20. 38
21. 10.9
22. 10.2
23. 1.1
24. 1.3
25. 14.9
26. 3.7
27. 7.6
28. 4.8
29. 11
30. 3.9
31. 5.5
32. 16
33. 1.1
34. 14.7
35. 11
36. 16.7
37. 4.9
38. 3.5
39. 0.9
40. 1.9
41. 3
42. 3
43. 10
44. 5
45. 2
46. 7
47. 12
48. 2
49. 3
50. 8
51. 25×3 = $75
52. 24÷4 = 6
53. 7×0.25 = $1.75
54. 3×3×2 = 18
55. 280÷4 = 7 hrs
    1:00 + 7:00 = 8:00 P.M.
56. (a) 5 D & 1 N&1 P
    (b) 2 Q&1 N&1 P
    (c) 3×25 = 75, 75 - 56 = 19 ¢
57. 15÷5 = 3
    9×2×3 = 54 lb
58. 84÷14 = 6 cars
59. 70 - 44 = $26
60. 192÷8 = 24
61. 30÷6 = 5 groups
62. 120÷2 = 60
    120÷3 = 40
    60 + 40 = 100
    120 - 100 = 20
63. 17×7 = 119 stamps
64. 105÷7 = 15
65. 95 + 91 + 84 = 270
    270÷3 = 90
66. 125÷8 = 15R5
    15 + 1 = 16 trays
67. 8 + 5 = 13
68. 15÷3 = 5
    5×4 = 20 ft
69. 5 - 1 = 4
70. (a) 91 - 42 = 49
    (b) 42 – 35 = 7
    (c) 91 - 35 = 56
71. 28÷4 = 7
    3×7 = 21
72. 4×2.5 = $10
73. 26 – 16 = 10
    10 ÷ 2 = 5
74. 5×6 + 10 = 40 bars
75. 3.5×4 = $14
    20 – 14 = $6
76. 5×6 = 30
    30÷2 = 15 days

77. $4 \times 1.5 = 6$
    $10 - 6 = \underline{\$4}$
78. 10
79. $18 \div 3 = 6$
    $21 \div 3 = 7$
    $6 \times 7 = \underline{42}$
80. $96 \div 6 = 16$
    $16 \times 2 \times 2 = 64$
81. $\frac{1}{4}$, 25
82. $60 \times 60 \times \frac{3}{4} = \underline{2700 \text{ sec}}$
83. $32 \div 4 = 8$
    $8 \times 8 = \underline{64}$
84. C
85. 45
86. 10
87. 12
88. Chris = 22 - 9 = 13
    Danielle + Chris = 22 + 13 = 35
    Jennie = $2 \times 35 = 70$
89. $1 - \frac{2}{3} = \frac{1}{3}$
    $\frac{1}{3} \times 18 = 6$
90. $42 - 6 \times 3 = 24$
    $24 \div 3 = 8$
    $3 + 8 = \underline{11 \text{ chickens}}$

Answer Key

1. $4\frac{1}{2}$
2. $2\frac{1}{2}$
3. $2\frac{5}{8}$
4. $1\frac{8}{9}$
5. $1\frac{2}{3}$
6. $3\frac{3}{4}$
7. $2\frac{1}{2}$
8. $1\frac{3}{8}$
9. $2\frac{4}{9}$
10. $2\frac{1}{2}$
11. $1\frac{1}{2}$
12. $1\frac{5}{6}$
13. $1\frac{5}{8}$
14. $1\frac{3}{4}$
15. $1\frac{1}{9}$
16. $1\frac{4}{5}$
17. $1\frac{3}{7}$
18. $8\frac{2}{3}$
19. $8\frac{4}{7}$
20. $7\frac{3}{8}$

21. 7/8
22. 5/6
23. 2/3
24. 5/8
25. 3/5
26. 6/7
27. 2/7
28. 3/8
29. 8/9
30. 4/7
31. 2/7
32. 6/7
33. 7/9
34. 4/5
35. 4/7
36. 3/5
37. 3/4
38. 2/3
39. 7/10
40. 5/7

41. $\frac{2}{9}$
42. $\frac{3}{7}$
43. $\frac{3}{10}$
44. $\frac{6}{11}$
45. $\frac{2}{5}$
46. $\frac{5}{6}$
47. $\frac{4}{9}$
48. $\frac{5}{9}$
49. $\frac{7}{8}$
50. $\frac{5}{8}$
51. $\frac{3}{5}$
52. 8/35
53. $\frac{3}{4}$
54. $\frac{5}{12}$
55. 7/30
56. $\frac{3}{5}$
57. $\frac{5}{9}$
58. $\frac{2}{5}$
59. 8/15
60. $\frac{4}{5}$

61. $\frac{13}{2} = 6\frac{1}{2}$
62. $\frac{31}{3} = 10\frac{1}{3}$
63. $\frac{21}{4} = 5\frac{1}{4}$
64. $\frac{27}{4} = 6\frac{3}{4}$
65. $\frac{28}{5} = 5\frac{3}{5}$
66. $\frac{23}{6} = 3\frac{5}{6}$
67. $\frac{41}{8} = 5\frac{1}{8}$
68. $\frac{20}{9} = 2\frac{2}{9}$
69. $\frac{35}{9} = 3\frac{8}{9}$
70. $\frac{79}{10} = 7\frac{9}{10}$
71. $\frac{2}{3}$
72. $\frac{5}{6}$
73. $\frac{5}{9}$
74. $\frac{15}{16}$
75. $\frac{18}{25}$
76. $\frac{7}{32}$
77. $\frac{8}{45}$
78. $\frac{25}{64}$
79. $\frac{64}{105}$
80. $\frac{3}{4}$

81. 22
82. 8
83. 14
84. 22
85. 38
86. 13
87. 10
88. 9
89. 26
90. 13
91. $400 each baby pig
92. $400 each day
93. 400 pages a day
94. $40 each sister
95. 1200
96. $12
97. 43 sheep
98. $15
99. 5 (bulbs)
100. 7 (boxes)

101. $14\times2 + 5 = 33$ (points)
102. $30 - 15 = 15$
$15 + 25 = 40$ days
103. $34\div2 = 17$
$17 - 5 = 12$ (length)
104. $\frac{12}{3}\times\frac{21}{3} = 4\times7 = 28$
105. $200 - 15\times4 = 140$ cm

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Answer Key

1. 18
2. 22
3. 42
4. 46
5. 40
6. 36
7. 44
8. 34
9. 54
10. 58
11. 2/3
12. 1/8
13. 7/10
14. 9/20
15. 14/25
16. 7/36
17. 7/60
18. 8/75
19. 2/3
20. 5/6

21. 0.375
22. 37.5
23. 0.04
24. 1.6
25. 1500
26. 0.6
27. 5
28. 0.8
29. 4
30. 2
31. 9 1/3
32. 17 1/7
33. 35 2/15
34. 38 2/35
35. 38 2/35
36. 77 6/35
37. 77 6/35
38. 109 1/35
39. 109 1/35
40. 117 9/35

41. $\frac{19}{2} = 9\frac{1}{2}$
42. $\frac{40}{3} = 13\frac{1}{3}$
43. $\frac{33}{4} = 8\frac{1}{4}$
44. $\frac{21}{5} = 4\frac{1}{5}$
45. $\frac{19}{6} = 3\frac{1}{6}$
46. $\frac{41}{6} = 6\frac{5}{6}$
47. $\frac{57}{8} = 7\frac{1}{8}$
48. $\frac{47}{9} = 5\frac{2}{9}$
49. $\frac{23}{10} = 2\frac{3}{10}$
50. $\frac{45}{11} = 4\frac{1}{11}$
51. $\frac{1}{240}$
52. $\frac{11}{18}$
53. $\frac{17}{40}$
54. $\frac{23}{192}$
55. $\frac{29}{80}$
56. $\frac{37}{108}$
57. $\frac{43}{210}$
58. $\frac{5}{48}$
59. $\frac{7}{108}$
60. $\frac{88}{225}$

61. 7.5
62. 2.4
63. 3.25
64. 3.875
65. 4.2
66. 8.6
67. 20.6
68. 17
69. 15.5
70. 5 ½
71. 3/20
72. 6 5/6
73. ¾
74. 21/40
75. (16/5)(25/8) = 10
76. (18/5)(25/6) = 15
77. (16/5)(25/8) = 10
78. 24
79. 15
80. 8

81. $\frac{1}{2}$
82. $\frac{1}{2}$
83. $2 + \frac{1}{3} = 2\frac{1}{3}$
84. $5 + \frac{1}{3} = 5\frac{1}{3}$
85. $4 + \frac{1}{3} = 4\frac{1}{3}$
86. $23\frac{1}{3}$
87. $23\frac{1}{4}$
88. $14\frac{2}{5}$
89. $57\frac{1}{6}$
90. $76\frac{2}{3}$
91. $22\frac{1}{3}$
92. $3\frac{1}{3}$
93. $60\frac{1}{12}$
94. $2\frac{7}{16}$
95. $2\frac{3}{5}$
96. 1
97. 96×2 = 192
    a) 192÷3 = \$64
    b) 64÷2 = \$32
98. 7
99. 15÷3 = 5 gallons
    24÷5 = 4.8 minutes
100. 26.25÷2.5 = 10.5
    He can buy 10 books.

101. $(\frac{1}{4}+\frac{1}{2}+1.25)\times 12.50$ = \$25.00
102. C
103. A
    37÷4 = 9R1
104. E
105. D
106. D
107. D
108. B
109. C
    48 is a common multiple of 12 and 16.
110. Eric = 8
    Walter = 6
    Grace = 10
    Anna = 9
111. 5 + 2 = \$7.00
112. 3 hours parking
    5 + 2×2 = \$9.00
113. 3 hours and 20 minutes
    Needed to pay for 4 hours
    5 + 3×2 = \$11.00
114. 15 – 5 = 10
    10÷2 = 5 (hours after first hour)
    1 + 5 = 6 hours
115. 4 hrs 50 min

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Answer Key

1. -4
2. 6
3. 6
4. 11
5. -8
6. 9
7. 10
8. -15
9. -16
10. 8
11. 6.7
12. 1.6
13. -8.5
14. 1.6
15. -6.5
16. 7.2
17. -2.0
18. -8.2
19. -8.5
20. 0.5

21. 17
22. 16
23. -12
24. 41
25. 34
26. -21
27. -38
28. -13
29. -11
30. 41
31. 17
32. 14
33. -16
34. 2
35. 8
36. -7
37. 8
38. -5
39. 7
40. -6

41. -36
42. 11
43. 130
44. 160
45. 500
46. 90
47. 800
48. 86
49. 600
50. 180
51. 405%
52. 702%
53. 102.5%
54. 208%
55. 384%
56. 207.5%
57. 217.5%
58. 306%
59. 0.0035 = 0.35%
60. 5.5 = 550%

61. $-36x$
62. $-5x$
63. $-x$
64. $-3x$
65. $10x$
66. $7x$
67. $x + 9$
68. $10x - 4$
69. $10x + 5$
70. $19x - 5$
71. 1 55/56
72. 21 & 25
73. 85
74. 0.4
75. 2/5
76. 61 1/2
77. 6
78. 7 1/2
79. 2/3
80. 9

81. 8
82. 7
83. 5
84. 7
85. 8
86. 7
87. 8
88. 3
89. -7
90. 9
91. 22 1/3
92. 3 1/3
93. 60 1/12
94. 2 7/16
95. 2 3/5
96. 5 3/5
97. 3 7/8
98. 16 2/5
99. 2 8/9
100. 28 3/8

101. 38
102. 175 in^2
103. 44 pi
104. 18 in
105. 40
106. D
107. 80°
108. $30 \div \frac{3}{5} = 50$
109. 60%
110. $0.50 per oz
111. 13/25
112. 52%
113. 10
114. $24 \times \frac{7}{8} - 6 = 15$
115. 26 lb & 15 oz
116. $136 \div 16 = 8.5$ (lb)
117. 4 ℓb & 4 oz
118. 4 61/63 pounds
119. 72 gal
120. $45 \times \frac{5}{6} = 54$ pounds

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Answer Key

1. 16, 8, 17
2. 25, –10, 15
3. 4, –20, –10
4. 2, 16, 19
5. 25, –20, 28
6. 1, 3, 4, –3
7. 2, 1, 6, –62
8. 2, 3, –5, –74
9. 2, 3, 5, –30
10. 2, 4, –5, –33
11. -1
12. -3
13. 2.5
14. -3/4
15. 6
16. -4
17. -12
18. 1.5
19. 0.5
20. 4.8

21. –1
22. 5/2
23. –1/5
24. 3
25. 5/7
26. (-3)/4
27. 8/3
28. 2/3
29. -2/3
30. 4
31. –4
32. 0
33. B=(5, 2)
34. D=(-3, 8)
35. P = (1, 5)
36. 3/4
37. (-3)/4
38. AC = 10
39. BD = 10
40. 1:2

41. x^{16}
42. $-a^{13}$
43. n^5
44. x^{13}
45. $6x^5$
46. $3t^6$
47. $5n^2$
48. $-36n^4$
49. $-24x^3y^6z^9$
50. 2^{11}
51. 8^3
52. $n = 0$
53. -4
54. $-2n^2 + 3n^3$
55. $-2n^2 - n^3$
56. 12
57. 3.41
58. 3.67
59. True
60. (a) 1 (b) 0

61. $12x^2y^4z^4$

62. $48x^2y^3z^5$

63. $24x^4y^3z^3$

64. $12xy^3z^4$

65. $\frac{5}{9}\frac{1}{z^2}$

66. $\frac{1}{12}\frac{x}{y^4}$

67. $1\frac{3}{5}y$

68. $\frac{1}{4}\frac{x}{y^4z^4}$

69. $3\frac{x}{y^2z}$

70. $2\frac{2y^2z^4}{5\ x^2}$

71. 3×10^{10}

72. 2.45×10^{12}

73. 2.94×10^{11}

74. 4.41×10^{10}

75. 4.9×10^{6}

76. 3.92×10^{16}

77. 3.5×10^{12}

78. 4×10^{12}

79. 4.5×10^{12}

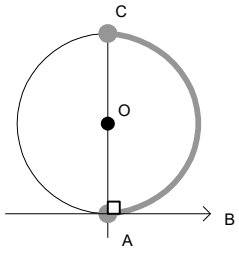
80. 1.96×10^{10}

81. 1.2×10^{-5}
82. 1.4×10^{-5}
83. 1.6×10^{-3}
84. 1.8×10^{-1}
85. 4×10^{2}
86. 5×10^{2}
87. 6×10^{5}
88. 8×10^{2}
89. 9×10^{-6}
90. 1.02×10^{1}
91. 2
92. 40 cm.
93. 20 (W) & 12 (L)
94. $3.68
95. 34.25 in
96. 26 kg
97. B
98. 12
99. 5 5/8 gal
100. $16

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Answer Key

1. $\angle BAC = \frac{1}{2}arc(AC) = \frac{1}{2}(180°) = 90°$. Thus, we have proved $OA \perp AB$.



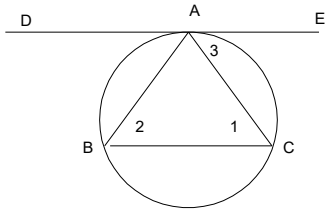
2. Draw a diameter CD parallel to AB. Since $arc(AC) = arc(AD)$, by parallel chord theorem, it follows that
   $arc(AC) = arc(AD) = 90°$
   $\angle AOC = \angle AOD = 90°$
   $\angle BAO = \angle AOC = 90°$ (alternate interior angle)

3. $\angle BAC = \frac{1}{2}(360° - x° - x°) = 180° - x°$

4. The measure of an inscribed angle is half of the corresponding arc (central angle). Therefore, $x = \frac{1}{2}(100) = 50$. Also, $y = 50$.

5. $arc(AXB) = 50°$, therefore, $\angle 1 = \angle 2 = 25°$.

6. $\angle 1 = \angle 2$ (base angles are congruent for isosceles triangle), $\angle 2 = \frac{1}{2}arc(AC)$. $\angle 3 = \frac{1}{2}arc(AC)$. Thus, $\angle 1 = \angle 3$ (alternate interior angle) $\Rightarrow$ DE//BC.

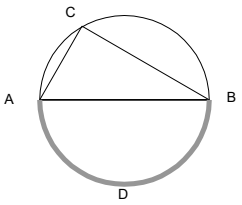


7. $5x = \frac{1}{2}arc(ADC)$ $4x = \frac{1}{2}arc(ABC)$. Therefore, $5x + 4x = \frac{1}{2}[arc(ADC) + arc(ABC)] = \frac{1}{2}(360°) = 180 \Rightarrow x = 20$.

8. $arc(BD) = arc(CE)$, $\angle 1 = \frac{1}{2}(arc\ CE + arc\ BC) = \frac{1}{2}(arc\ BD + arc\ BC) = \angle 2$. $\Rightarrow$ $\angle 1 = \angle 2$ and ΔADE is an isosceles triangle.

9. ΔABC is an isosceles since $\angle 3 = \angle 4$ for $\angle 3 = \angle 1$ and $\angle 4 = \angle 2$.

10. $\angle ACB = \frac{1}{2}arc(ADB) = \frac{1}{2}(180°) = 90°$. Thus, ΔABC is a right triangle and the diameter is the hypotenuse.

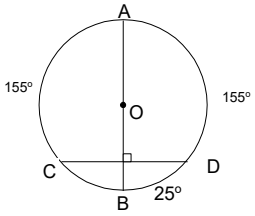


11. $x = 2(60) = 120$

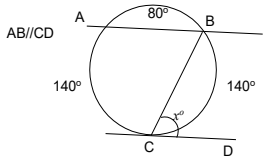
12. $arc(AC) = 70°$
    $x = arc(CD) = 360 - 2(70) - 60 = 160$

13. $x = \angle ACB = \frac{1}{2}arc(ADB) = \frac{1}{2}(180) = 90$. ΔABC is a right triangle. Thus, $y = 90 - 37 = 53$. The diameter = hypotenuse = $\sqrt{12^2 + 16^2} = 20$ cm. Therefore, the radius is 10 cm. The area = 100π cm^2

14. 25°

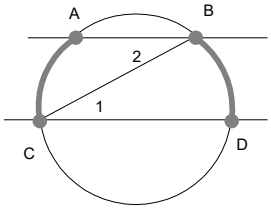


15. 70
    Since AB//CD, *arc* BC = *arc* AC. Thus, *arc* BC = 140°.
    $\angle BCD = \frac{1}{2}(arc\ BC)$. Therefore, $x = \frac{1}{2}(140) = 70$.



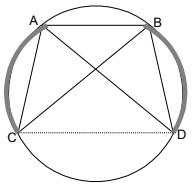
16. Left as exercise.

17. Since AB//CD, $\angle 1 = \angle 2$. Now that $arc(AB) = 2\angle 1 = 2\angle 2 = arc(BD)$,



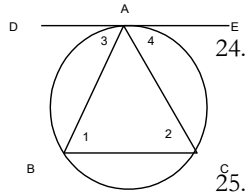
18. Reverse the arguments of the previous problem.

19. Since $arc(CAB) = arc(ABD)$
    $arc(CA) = arc(CAB) - arc(AB)$
    $= arc(ABD) - arc(AB)$
    $= arc(BD) \Rightarrow$ AB//CD

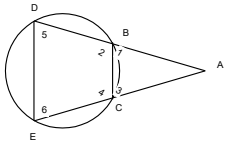


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20. Our goal is to prove that $\angle 1=\angle 2$. But how? Note that $\angle 2=\angle 4$ (alternate interior angle) and $\angle 4 = \frac{1}{2}$(arc AC). We may conclude that $\angle 2=\frac{1}{2}$(arc AC). Similarly, we have $\angle 1=\frac{1}{2}$(arc AB). Since DE//BC (given), arc AB = arc AC, it follows that $\angle 1 = \angle 2$.



21. $\angle 1+\angle 2=180$, $\angle 6+\angle 2=180 \Rightarrow \angle 1=\angle 6$, $\angle 3=\angle 5$ (Similarly). Since $\angle 1=\angle 3$ (Given), we have $\angle 5=\angle 6 \Rightarrow$ ΔADE is an isosceles triangle.

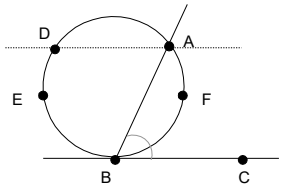


22. $\angle 1=\angle 5 = \frac{1}{2}(180-\angle A)$, we conclude that BC//DE (congruent corresponding angle).

23. Since arc BC = arc CD, arc BD = 2(arc BC), $\angle OAD = \frac{1}{2}$(arc BD)=arc BC, $\angle BOC$ = arc BC. Therefore, it follows that $\angle OAD = \angle BOC$ and thus OC//AD (congruent alternate interior)

24. $\angle BOC = \angle OAD$, arc BC = $\angle BOC$, arc BD = $2\angle OAD$, therefore arc BC = arc CD.

25. Draw an auxiliary (dashed) line AD parallel to BC, hence, *arc*(DEB) = *arc*(AFB) = x. $\angle ABC = \angle BAD$ (alternate interior angle) = $\frac{1}{2}$*arc*(BED) = $\frac{1}{2}x$, by inscribed angle theorem.



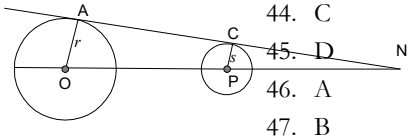
26. EF = $\sqrt{13^2-(6-1)^2} = 12$

27. Let x = MO.
$\frac{1}{x} = \frac{6}{x+13}$
$6x = x + 13$
$5x = 13$
$x = 2.6$

28. OP = $\sqrt{15^2+(9-1)^2} = 17$

29. Let x = MO.
$\frac{1}{x} = \frac{9}{x+17}$
$9x = x + 17$
$8x = 17$
$x = 2\frac{1}{8}$

30. OA$\perp$AN and PC$\perp$CN, therefore, ΔOAN ~ ΔPCN, and hence $\frac{ON}{PN} = \frac{r}{s}$.



31. $\angle$OME=$\angle$FMP (vertex angle), $\angle$OEM=$\angle$PFM =90° $\Rightarrow$ ΔOEM ~ ΔPFM (AA). Hence, we have OM:MP = r:s.

32. Combine the proofs of the two problems.

33. OM : MP = 5 : 10 = 1 : 2, thus OM = $\frac{1}{3}(21) = 7$

34. B
35. C
36. C
37. A
38. B
39. C
40. A
41. D
42. A
43. A
44. C
45. D
46. A
47. B
48. A
49. $(3,4)$and $(4,3)$
50. 14
51. A
52. B
53. 6

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