Answer Key

1. 19
2. 16
3. 22
4. 21
5. 13
6. 24
7. 45
8. 114
9. 111
10. 189
11. 5
    50
    5
    50
12. 7
    70
    7
    70
13. 8
    80
    8
    80
14. 9
    90
    9
    900
15. 4
    40
    4
    400
16. 23/25
17. 3/35
18. 1/24
19. 11/75
20. 7/36
21. 23/56
22. 47/84
23. 47/105
24. 3 29/36
25. 2 2/9
26. 81
27. 81
28. 126
29. 12600
30. 225
31. 22500
32. 192
33. 19200
34. 315
35. 3150
36. 8/125
37. 4/25
38. 2/5
39. 1/8
40. 1/1024
41. 1/32
42. 4
43. 1/64
44. 2/2
45. 3
46. 2/3
47. 3/7
48. 2/7
49. 7/25
50. 3 1/5
51. 3 1/5
52. 2 5/8
53. 2 5/8
54. 1 1/6
55. 3/4
56. 0.4 = 40%
57. 4
58. 9
59. $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times 144 =$ 360
60. $4\frac{13}{24}$ = 4 13/24
61. 5/7
62. A = 56
63. 882 ÷ 9 = 98
64. 1/21
65. 750÷50 = 1.5 gal per sec
66. 600÷1.5 = 400 sec = 6 min 40 sec
67. Brian:
    ⅒×300 = 30
    50 + 30 = 80

68. C
    Alex: ⅙×300 = 50
    Brian: 80
    Calvin:
    300 - 50 - 80 = 170
    170÷2 = 85
    85 + 10 = 95

69. 54 - 15 - 3×9 = 12
    ½×12×9 = 54
    54 + 9^2 = 135

70. 63 lb 8 oz - 36 lb 9 oz
    = 26 lb & 15 oz

71. 10×10 = 100 (square area)
    ½(20×**10**) = 100
    x = 10 in

72. A = 1
    B = 5
    C = 3
    D = 7
    1535×5 = 7675
    C + D = 3 + 7 = 10

73. 3.25×200 = 650
    15.75×6 = 94.5
    650 + 94.50 = $744.50

74. 343 ÷ 7 = $49.00

75. 35×4 = 140
    140 - 50 = 90
    90÷3 = 30 pounds

76. 3 in (A) & 8 in (B) & 8 in (C) & 3 in (D)

77. 2 in (A) & 10 in (B) & 3 in (C) & 4 in (D)

78. 3 in (A) & 5 in (B) & 2 in (C) & 7 in (D)

79. 5 in (A) & 7 in (B) & 4 in (C) & 2 in (D)

80. 4 in (A) & 6 in (B) & 6 in (C) & 5 in (D)

Answer Key

1. .018
2. .006
3. .014
4. .006
5. .009
6. .016
7. .009
8. .014
9. .0006
10. .0016
11. 16
12. 32
13. 64
14. 128
15. 256
16. 512
17. 27
18. 81
19. 243
20. 729
21. $\begin{array}{r} \frac{10}{15} \\ - \quad \frac{1}{15} \\ \hline \end{array} = \frac{9}{15} = \frac{3}{5}$ = 3/5
22. $\begin{array}{r} 6\frac{15}{20} \\ - \quad \frac{11}{20} \\ \hline \end{array} = 6\frac{4}{20} = 6\frac{1}{5}$ = 6 1/5
23. $\begin{array}{r} 3\frac{16}{30} \\ - \quad \frac{25}{30} \\ \hline \end{array} = 2\frac{21}{30} = 2\frac{7}{10}$ = 2 7/10
24. $\begin{array}{r} \frac{20}{30} \\ - \quad \frac{3}{30} \\ \hline \end{array} = \frac{17}{30}$ = 17/30
25. $\begin{array}{r} \frac{23}{24} \\ + \quad \frac{16}{24} \\ \hline \end{array} = \frac{39}{24} = \frac{13}{8} = 1\frac{5}{8}$ = 1 5/8
26. $\begin{array}{r} \frac{28}{48} \\ - \quad \frac{18}{48} \\ \hline \end{array} = \frac{10}{48} = \frac{5}{24}$ = 5/24
27. $\begin{array}{r} 3\frac{10}{12} \\ - \quad \frac{9}{12} \\ \hline \end{array} = 3\frac{1}{12}$ = 3 1/12
28. $\begin{array}{r} \frac{22}{30} \\ + \quad \frac{21}{30} \\ \hline \end{array} = 1\frac{13}{30}$ = 1 13/30
29. $2\times(3\frac{3}{4} + 8)$ = 23 1/2 (inches)
30. $35\frac{1}{2} + 20\frac{3}{4} + 15\frac{1}{8} = 70\frac{4+6+1}{8}$ = 71 3/8 (pounds)
31. 2/3
32. 3/11
33. 4/23
34. 5/37
35. 6/11
36. 7/51
37. 8/25
38. 9/55
39. 9/25
40. 6
41. 108×(1 -2/9) = 84
42. 28/(1+2/5) = 20
43. 3×20 +4×5 +11×2 = 102
44. 32×(1 -1/8) = 28
45. 47- 12×(3+1/3) = 7
46. 8×(1 -1/4) = 6
47. 40/8×1 = 5
48. 3.5×6.00+3×2.00 = 27
49. 70/(1 -2/9) = 90
50. 84/(1 -1/7) = 98
51. 99×(1 -4/9) = 55
52. 5280×(1 -4/5) = 1056
53. 25×(1 -4/5) = 5
54. (a) π (b) 0.25π
55. $2\times(10^2)/25 = 8$
56. 5/1×5 = 25
57. 600×3×20/100 = 360
58. (a) $2^2 = 4$
    (b) $0.2^2 = 0.04$
    (c) $20^2 = 400$
59. 20/5×3 = 12
60. 6×2 - (2) = 10
61. Only 4 different letters: M, I, S, and P.
    5 colors to apply on 4 letters:
    5×4×3×2 = 120

62. $10001x = 10000x + x$
x must be a 4-digit number.

63. X = 6

		6
		6
+	9	9
1	1	1

64. BHD = 284

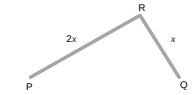
ABD	124	A=1
AHD	184	D=4
DAD	414	
HAB	812	H=8 B=2
BHD	284	

65. 537

	1	3	2
+	4	0	5
	5	3	7

	5	3	7
	3	0	1
+	2	4	5
	5	4	6

66. 4×0.6 = 2.4 min
avg speed = $\frac{tot\ distance}{tot\ time} = \frac{1+1}{\frac{4}{60}+\frac{2.4}{60}} = \frac{120}{6.4} = \frac{150}{8} = \frac{75}{4}$
= 18.75 mph

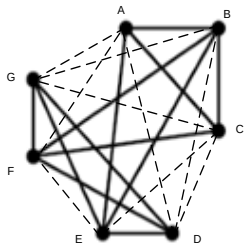
67. 

Time needed by starting P:
$\frac{2x}{3} + \frac{x}{5}$
Time needed by starting Q:
$\frac{2x}{5} + \frac{x}{3}$
The difference of time
$(\frac{1}{3} - \frac{1}{5})x = \frac{2}{3}$
$\frac{2x}{15} = \frac{2}{3}$
$2x = 10$
$3x = 15$

68. A
One dimensional direction, either going forward or backward.
Only B B R B B R can be differentiated for the direction.
If B B R is going forward, then R B B is going backward.

69. B + C = B ⇒ C = 0
A+B+A = BC ⇒ B = 2 (≠ 1, why?)
9 + 2 + 9 = 20
A = 9

70. 9 roads listed below.
AD, AF, AG
BD, BG,
CD, CE, CG
EF



Answer Key

1. .0024
2. .0021
3. .015
4. .0012
5. .021
6. .15
7. .0015
8. .021
9. .018
10. .0018
11. .12
12. .024
13. .24
14. .012
15. .024
16. .18
17. .012
18. .21
19. .018
20. .015
21. 64
22. 256
23. 125
24. 625
25. 100
26. 1000
27. 10000
28. 400
29. 8000
30. 160000
31. $\begin{array}{r} \frac{9}{12} \\ +\ \frac{2}{12} \\ \hline \end{array} = \frac{11}{12} = 11/12$
32. $\begin{array}{r} \frac{2}{12} \\ +\ \frac{3}{12} \\ \hline \end{array} = \frac{5}{12} = 5\ 5/12$
33. $\begin{array}{r} 2\ \frac{15}{24} \\ -\ \frac{8}{24} \\ \hline \end{array} = \frac{7}{24} = 1\ 7/24$
34. $\begin{array}{r} 4\frac{15}{20} \\ -\ 1\frac{6}{20} \\ \hline \end{array} = 3\frac{9}{20} = 3\ 9/20$
35. $21\frac{5}{12} - 11\frac{2}{3} = 9\frac{9}{12} = 9\frac{3}{4} = 9\ ¾$
36. $\begin{array}{r} \frac{9}{12} \\ +\ \frac{10}{12} \\ \hline \end{array} = \frac{19}{12} = 1\frac{7}{12} = 1\ 7/12$
37. $\begin{array}{r} \frac{13}{24} \\ -\ \frac{9}{24} \\ \hline \end{array} = \frac{4}{24} = \frac{1}{6} = 1/6$
38. $\begin{array}{r} \frac{3}{35} \\ +\ \frac{7}{35} \\ \hline \end{array} = \frac{10}{35} = \frac{2}{7} = 2/7$
39. $\begin{array}{r} \frac{9}{24} \\ -\ \frac{4}{24} \\ \hline \end{array} = \frac{5}{24} = 5/24$
40. $\begin{array}{r} 1\frac{28}{24} \\ -\ \frac{5}{24} \\ \hline \end{array} = 1\frac{23}{24} = 1\ 23/24$
41. $\begin{array}{r} \frac{21}{48} \\ -\ \frac{16}{48} \\ \hline \end{array} = \frac{5}{48} = 5/48$
42. $\begin{array}{r} \frac{12}{16} \\ +\ \frac{5}{16} \\ \hline \end{array} = 1\frac{1}{16} = 1\ 1/16$
43. $\begin{array}{r} \frac{4}{30} \\ +\ \frac{1}{30} \\ \hline \end{array} = \frac{5}{30} = \frac{1}{6} = ⅙$
44. $\begin{array}{r} 5\frac{16}{30} \\ -\ 5\frac{5}{30} \\ \hline \end{array} = \frac{11}{30} = 11/30$
45. $2\frac{3}{5} - 1\frac{2}{3} = \frac{14}{15} = 14/15$
46. $\begin{array}{r} \frac{9}{12} \\ +\ \frac{2}{12} \\ \hline \end{array} = \frac{11}{12} = 11/12$
47. $\begin{array}{r} \frac{2}{25} \\ +\ \frac{10}{25} \\ \hline \end{array} = \frac{12}{25} = 12/25$
48. 44
49. 45
50. 115
51. 2/5
52. 3/14
53. 4/27
54. 5/42
55. 6/17

56. 7/58
57. 8/33
58. 9/64
59. 9/17
60. 7/6
61. 16+ (12-8)×(7- 3) = 32
62. 30×(1 -2/3) = 10
63. 90×(1 -5/9) = 40
64. 12×(2+3/4) = 33
65. 52/(9-5)×5 = 65
66. 5280×(1 -1/4) = 3960
67. $\frac{1}{4} \times 16 \times 6 = 24$ ounces
68. (a) 10π (b) 25π
69. (a) (7+3)/2 = 5
    (b) 6×(7+3)/2 = 30
70. 3×6/(3/4) = 24
71. $2\times(16^2)/16 = 32$
72. $2\times(12^2)/24 = 12$
73. $2\times(24^2)/36 = 32$
74. $2\times(18^2)/54 = 12$
75. (a) $(-3)^2 = 9$
    (b) $30^2 = 900$
    (c) $0.3^2 = 0.09$
76. 14/2×5 = 35
77. (a) 13×12 = 156
    (b) 9×17 = 153
    (c) 50/25 = 2
78. 21/7×5 = 15
79. (2×60+ 3×40)/5 = 48
80. -3×2 - (-5) = -1
81. Black: 9.5×2 = 19
    Gray: 11 ×1 = 11
    19 + 11 = 30
82. 5×2×10 = 100
    5×10÷2×3 = 75
    100 + 75 = <u>175</u>
83. Five different sizes
    1×1, 2×2, 3×3, 4×4, 5×5
84. 27 of them

1×1	13
2×2	4
3×3	5
4×4	4
5×5	1
Total	**27**

85. 2, 3, and 6