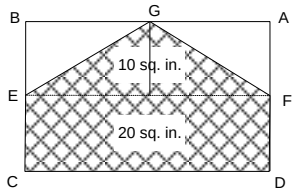
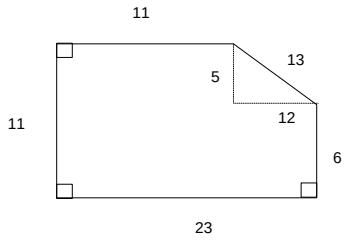
Answer Key

1. 16/81
2. 1
3. 0.09
4. $\frac{2}{3}$ = 2/3
5. .005
6. 3000
7. 6
8. $x = 4$
9. $\frac{1}{4}$ = 1/4
10. 2
11. $4^5 \div 2^7 = 2^{10} \div 2^7 = 2^3$
    $\square = 3$
12. 3
13. A
14. H(-6, -6)
15. 600×0.6 = $360
16. 2,400,000÷3,000,000 = $0.80
17. 20% : 80% = 1 : 4 = 25 : 100
    Saved: $25
18. D
    20 + ½(40) = 30



19. The area = $\frac{1}{2}$×12×16
    = 96 = $\frac{1}{2}$×h×20
    h = 9.6 cm
20. Let x be the number of students.
    $3x + 5 = 4x - 21$
    $x = 26$
21. $\frac{16}{81}$ = 16/81
22. -125
23. -16
24. 0.02×16% = 0.32%
25. 12
26. $18^2 = 324$
    $20^2 = 400$
    $22^2 = 484$
    $24^2 = 576$
    Ans = 4 perfect squares
27. $5(x - 2) = 4(x + 6)$
    $5x - 10 = 4x + 24$
    $x = 34$
28. Multiply both sides by 28
    $12y + 14 = 7y$
    $5y = -14$
    $y = -14/5 = -2.8$
29. 0.4×15 = 6
    6 + 10 = 16
    $\frac{16}{25}$ = 64%
30. 12÷5 = 2.4 hr = 2 hr & 24 min
    Note that 0.4 hr = 0.4×60 = 24 min)
31. 875
32. 4×40 = 160 mi
33. 8 feet = $\frac{8}{3}$yards
    15 feet = 5 yards
    $\frac{8}{3} \times 5 = \frac{40}{3}$ (sq. yards)
    $14.4 \times \frac{40}{3} = 4.8 \times 40 = \$192$
34. 16π - 4π = 12π = 12 pi
35. the length of the slant side = 13 (= $\sqrt{5^2 + 12^2}$)
    11 + 11 + 23 + 6 + **13** = 64



36. 12
37. 2 hr 40 min = 2⅔ hr
    2⅔×360 = 720 + 240 = 960 miles
38. C
39. 6×12 = **9** ×8
    Ans = 8 (men)
40. 36×8 + 24×9 = 504
    504÷224 = 2.25 = 2¼ = 2 1/4 gal
41. 10
42. 25
43. $y = 2$
44. -1.5×-8×-.02= -0.24
45. 400
46. Let x be the measure of the width. Then, the length is $2x + 5$. Thus, the perimeter is $2[x + (2x+5)] = 100$

$6x + 10 = 100$
$6x = 90$
$x = 15$
The length is 35. The area is 15×35 = 525 sq. inches.

47. speed = $\frac{\#rounds}{time}$
A's speed is 9/8 = 27/24
B's speed is 7/6 = 28/24
Ans = 27 min (for a) & 28 min (for b)

48. 3.75÷30% = 3.75÷0.3 = $12.50

49. -64

50. 4 + (2 - (-7 + 6)) = 7
7×3 = 21

51. x = { 1, 3, 5 }

52. 23 + 32 = 55
85 - 55 = 30
One more 32¢ will be the least,
so a total of 2×32 + 23 = 87¢

53. What is the total distance?
72 + 32 = 104 (mi)
What is the total time?
$\frac{72}{12}+\frac{32}{8}=10$
What is the average speed?
$\frac{104}{10}$= 10.4 (mph)

54. 104 + 1 = 105
105÷3 = 35
2×35 – 1 = 69

55. Let x and $2x + 15$ be complementary.
$x + 2x + 15 = 90$
$3x = 75$
$x = 25$

56. $45\times3\frac{1}{3}$ = 135 + 15 = 150 mi

57. 90÷45 = 2
4.5÷45 = 0.1 = 6 min
Ans = 2 hours & 6 min

58. A

59. C

60. C
$11^2 = 121$
$31^2 = 961$
$32^2 = 1024$

61. 1.0987

62. 9×6 - 4×2
= 54 – 8
= <u>46</u>

63. January 2 at 9:31am

64. 100÷4×500 = <u>12500</u> sheets

65. 12

66. 9

67. 2

68. 4

69. Carlos, Diana

70. 171

71. 11 + 29 = 40 (perimeter)
40÷4 = 10
10^2 = <u>100</u>

72. 2(012) 6 numbers
1(022) 3 numbers
tot = <u>9 numbers</u>

73. 250×0.8 = 200 (red)
250×0.2 = 50 (blue)
50×3 = 150 (red must stay)
200 – 150 = <u>50</u>

74. 2×(8.6+6.4) = <u>30</u>

75. Let $x + 2$ be # of chests.
$9x = 6(x + 2) + 3$
$3x = 2x + 4 + 1$
$x = 5$
$9x$ = <u>45</u>

76. 6 faces, so 6×2 = 12 (x's)
4 spatial diagonals (y's)
12 + 4 = <u>16</u>

77. 10×4×3 = 120
20 + 19 + 18 + 17 + 16 + 15 = 105
105 + 14 = 119
The nearest number is <u>7 hours</u>. Not 8 hours.

78. LCM(5, 4) = 20
$20\times\frac{2}{5}$ = 8
$20\times\frac{3}{4}$ = 15
8 + 15 – 20 = <u>3</u>

79. $(1+\frac{1}{4}) : (1+\frac{1}{2})$ = 1.25 : 1.5 = <u>5 : 6</u>

80. {123} and {234} are multiple of 3.
{124} and {134} are not.
So, the probability is $\frac{1}{2}$ or 50%.

Answer Key

1. $\frac{3}{4}\times144 = 108$
2. 1.44
3. 0.2
4. $\frac{24}{35} = 24/35$
5. .49
6. 1 3/7
7. $\frac{8}{3}\times\frac{15}{4} = 10$
8. 2
9. $\frac{1}{3}(n - \frac{2}{3}) = -2$
   $n - \frac{2}{3} = -6$
   $n = -5\frac{1}{3} = -5\ 1/3$
10. $5(x + 3) = 30$
    $x + 3 = 6$
    $x = 3$
11. $\frac{1}{4} = 1/4$
12. $7 + \mathbf{2}=9$
    $9 + \mathbf{6}=15$
    $15 + \mathbf{2}=17$
    $17 + \mathbf{6}=23$
    $23 + \mathbf{2}=25$
13. $5 - 3\frac{4}{5} = 1\frac{1}{5} = 1\ 1/5$
14. $9^4 \times 3^3 = 3^{\mathbf{11}}$
    $\square = 11$
15. 90°
16. C
17. I(3, -4.5)
18. 12
19. 30 ft
20. $2\times(1.5+2.7) = 8.4$
21. 0.0016
22. 16
23. 3
24. 6
25. $(20\times0.35)^2 = 7^2 = 49$
26. 122.5
27. Multiply both sides by 20:
    $.2(x - 1) - \frac{1}{4}x = 1$
    $4(x - 1) - 5x = 20$
    $-x = 24$
    $x = -24$
28. Multiply both sides by 6, we have
    $3(x - 1) + 2(x + 1) = 6$
    $3x - 3 + 2x + 2 = 6$
    $5x = 7$
    $x = 1.4$
29. $1 - \frac{1}{8} - \frac{1}{4} - \frac{1}{3} = \frac{7}{24} = 7/24$
30. $4\times4\times4 = 64$ pieces
    $64\times\frac{1}{4} = 16$ ft
31. $\frac{\text{increase}}{\text{original price}} = 40/200 = 0.2 = 20\%$
32. B
33. In an hour,
    Ann finishes 100 pages, and
    Ben finishes 120 pages.
    120 - 100 = 20 pg per hour
    $100\div20 = 5$ hours
34. 2250 - 1250 = 1000
    $1000\div1250 = 0.8 = 80\%$
35. The difference of the two bases = 12
    The height is 16.
    The area = $\frac{1}{2}(16)(4 + 16) = 160$
36. $2\times18 = 36$ (diameter of the outer circle)
    $\frac{1}{4}\times(36\times3.14) = 28.26$ m
    $2\times8 = 16$ (diameter of the inner circle)
    $\frac{1}{4}\times(16\times3.14) = 12.56$ m
    28.26 + 12.56 + 20 = 60.82 m
    Don't forget the two radii☺.)
37. $\frac{3}{4}\times(1 - \frac{2}{3}) = \frac{1}{4} = 1/4$
38. The full circle has an area of 64π. The sector is $\frac{40}{64}$ $= \frac{5}{8}$ of the circle, so
    $360\times\frac{5}{8} = 225°$
39. $14^2 = 196$
    $15^2 = 225$
    $16^2 = 256$
    $17^2 = 289$
    $18^2 = 324$
    Ans = 3 perfect squares.
40. B
    Method I)
    183 - 184 = -1
    183 - 178 = 5
    183 - 191 = -8
    183 - 167 = 16
    $\frac{1}{4}(-1 + 5 - 8 + 16) = \frac{1}{4}(12) = 3$ lb (above)

    Method II)
    The average weight of the backfielders:
    $= \frac{1}{4}(184 + 178 + 191 + 167)$
    = 180
    183 - 180 = 3 (lb) above the average
41. -0.2

42. 144

43. $10.2 + 1.8 - 2\frac{1}{4} = 9\frac{3}{4} = 9\ 3/4$

44. $17 \div 250 = 0.068 = 6.8\%$

45. $8^{\square} = 2^9 \times 4^9 = (2\times4)^9 = 8^9$

46. 1

47. -5

48. $26 \div 2 = 13$
$(13 - 3) \div 2 = 5$
$5 + 3 = 8$
$5 \times 8 = 40$

49. In each hour,
Alex : $\frac{1}{6}$
Brian: $\frac{1}{9}$
Charlie: $\frac{1}{18}$
By working together in an hour, they will accomplish
$\frac{1}{6} + \frac{1}{9} + \frac{1}{18} = \frac{1}{3}$
So, they need $1/\frac{1}{3} = 3$ hours

50. $26 - 2 = 24$
$24 \div 2 = 12$ (Eden)
$12 + 2 = 14$ (Daryl's)

51. Method I)
6 units of grape can produce 1 unit of raisin.
$5\times6 = 30$ kg

	Pulp	Water
Grape	0.1	0.9
Raisin	0.6	0.4

Method II)
1 - 40% = 0.6 (totally dehydrated)
$5\times0.6 = 3$ kg (pure raisins without water)
$\square\times0.1 = 3$
$\square = 3\div0.1 = 30$ kg (fresh grapes)

52. $(5 - 2)\times180° = 540°$
$540°\div5 = 108$
$180\div3\times2 = 72°$

53. $84\div(5+7+9) = 4$
$5\times4 = 20$
$7\times4 = 28$
$9\times4 = 36$
Ans = 20 (K) & 28 (J) & 36 (N)

54. $40\times5 = 200$
$200 - 140 = 60$
$5 - 3 = 2$
$60\div2 = 30$ (cars)
$30\times3 = 90$ students (by car)

55. $36\div2 = 18$
$18 - 6 = 12$
$6\times12 = 72$ in^2

56. $\frac{1}{6}\times\frac{5}{6}\times2 = \frac{5}{18} = 5/18$

57. $\frac{1}{2}(60)(30) = 900$ in^2

58. D
$AB = 30\sqrt{2}$, so the perimeter = $60 + 60\sqrt{2} = 60(1 + \sqrt{2})$ in

59. A

60. A

61. A
$1920

62. E
$0.8\times120 = 96$
$96 - 6 = 90$
$90\times1.08 = \$97.20$

63. E
$1.1^2 = 1.21$
$1.1^3 = 1.331$
$1.1^4 = 1.4641$

64. D
multiplying by $\frac{5}{4}$

65. A
8

66. D
10,000,000,000

67. D
$882

68. C
$\frac{243}{1024}$

69. B
$1.07

70. C
$7^1 =_2 7$
$7^2 =_2 49$
$7^3 =_2 43$
$7^4 =_2 01$
$7^{2011} =_2 43$
Note: $=_2$ means two end digits.

71. Dana
Dana is seated #2.

4	3	2	1
A	B	D	C

72. 125

73. $\frac{1}{80}$
8 possible digits to be the first digit.
10 possible digits to be the last digit.
$\frac{1}{8}\times\frac{1}{10} = \frac{1}{80}$

74. 240

75. 7

76. 14

77. 49

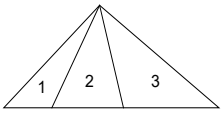
78. 7.2

79. 80

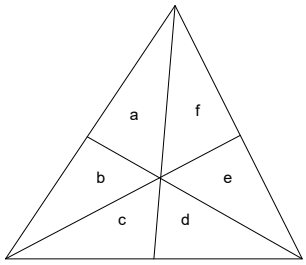
Answer Key

1. $(\frac{1}{2})^2 - (\frac{1}{3})^3 = \frac{1}{4} - \frac{1}{27} = \frac{23}{108}$ = 23/108
2. 1 9/16
3. 0.9
4. 28/25
5. 12.5
6. $1\frac{2}{3} \times 60$ = 100 min
7. 3
8. -2
9. $t = 6$
10. 9
11. $\frac{1}{2}$ = 1/2
12. 91=7×13
    Ans = 7 & 13
13. 5×12 = 60
    $\frac{1}{3} \times 12 = 4$
    60 + 4 = 64
14. 80×70% = 80×.7 = $56
15. 5×12 ÷ 6 = 10 pieces of tile
    6×12÷6 = 12
    10×12 = 120 pieces
16. Let's split 12 into 3 parts: 2 for the tens digit, and 1 for the ones digit. So, tens digit is 8 and ones digit is 4.
    Ans = 84
17. F(6, 4)
18. -1.25
19. $\frac{1}{2}x - \frac{1}{3}x = 6$
    $\frac{1}{6}x = 6$
    $x = 36$
20. 180÷250= 72%
21. -⅛ = -1/8
22. 5
23. -32
24. $\frac{11}{5} \div \frac{11}{2} = \frac{11}{5} \times \frac{2}{11} = \frac{2}{5}$ = 2/5
25. 6
26. 314
27. $\frac{1}{2}x + \frac{2}{3}x = 14$
    $6(\frac{1}{2}x + \frac{2}{3}x) = 6 \times 14$
    $3x + 4x = 84$
    $7x = 84$
    $x = 12$
28. Multiply both sides by 12:
    $4(2x+3) = 3(x+6)$
    $4x+12 = 3x+18$
    $x = 6$
29. $12.8 \times \frac{375}{1000}$ = 4.8 lb
30. 123.45
31. $\frac{5000-4000}{4000}$ = ¼ = 25%
32. 6×12 = 8×9
    12 - 9 = 3 (hr) saved
33. $15 - 2x \le 41$
34. $60 - 6x \le 132$
35. 3×2×8 = 48
36. 144 + 180 = 324
    $324 = 18^2$
    4×18 = 72 in
37. 210 - 190 = 20
    20÷(¼ - ⅕) = 400
    400×⅕ = 80
    210 + 80 = 290
38. 1 - ⅛ = $\frac{7}{8}$
    $175 \div \frac{7}{8}$ = 200
39. 17÷250=0.068 = 6.8%
    1 – 6.8% = 93.2%
40. 48 - 3 = 45
    45 ÷ 1¼ = 36 books
41. 1½ = 1 1/2
42. $\frac{1}{64}$ = 1/64
43. $3n - 1 = 4$
    $n = 1\frac{2}{3}$ = 1 2/3
44. $8^2 \times 2^3 = 4^{3+2} = 4^5$
    □ = 5
45. B
46. D
47. A
    diameter = $\sqrt{6^2 + 8^2}$ = 10 cm
    radius = 5 cm
    area of the shaded region = 25π - 48 (cm²)
48. 120°
49. 15% : 25% = 3 : 5 = 360:**600**
    Ans = 600
50. After Monday he got $\frac{3}{4}$ left, and he spent $\frac{2}{3}$ of it, so he has $\frac{1}{3}$ of $\frac{3}{4}$ left.
    Ans = $\frac{1}{3}(\frac{3}{4}) = \frac{1}{4}$ = 1/4
51. C
    There are
    3 smaller sized triangles: (1), (2), (3)
    2 medium sized triangles: (12), (23)

1 large sized triangle: (123)
1 + 2 + 3 = 6
Note: (13) is not a triangle.



52. D
From smallest to the largest:
6: a, b, c, d, e, f
3: ab, cd, ef
6: abc, bcd, cde, def, efa, fab
1: abcdef
total: 16



53. C
$1 + 2^2 + 3^2 = 14$

54. B
#(the smallest size triangles) = 9
#(the medium size triangles) = 3
#(the largest size triangle) = 1
9 + 3 + 1 = 13

55. $20 + \frac{1}{3}x = 2x$
$20 = \frac{5}{3}x$
$x = 12$

56. 0.01

57. ½(5)(4) = 10

58. D
$\frac{3}{8} - \frac{1}{4} = \frac{1}{8}$
$\frac{1}{4} - \frac{3}{16} = \frac{1}{16}$
$\frac{3}{16} - \frac{1}{4} = \frac{1}{32}$
$\frac{1}{4} - \frac{15}{64} = \frac{1}{64}$

59. A: 36 = 6×6; 4×6 = 24
B: 24 - 12 = 12; 12÷4 = 3; 3×3 = 9 in^2

60. 11×1.1×11 = \$133.10

61. $\frac{2}{3}$

62. 8

63. 3

64. 34

65. 63

66. 7 and 8
OB = 5
area of quarter circle = $\frac{1}{4}(25\pi) = 6.25\pi$
a) area of the shaded region = $\boxed{6.25\pi - 12}$
b) $\boxed{7 \text{ and } 8}$

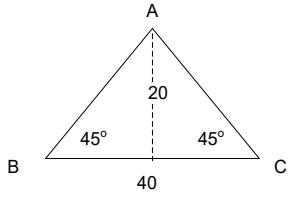
67. 162

68. 71

69. 27
57,064 - 56,200 = 864
The number of gas actually consumed is
12+20 = 32
Note: 6 gal of gas is to fill the tank.
864÷32 = $\boxed{27}$

Answer Key

1. $\frac{1}{8}$ = 1/8
2. 1
3. $\frac{9}{14}$ = 9/14
4. $\frac{5}{3} \div 1\frac{2}{3}$=1
5. 0.0009
6. $4\frac{1}{3}$ = 4 1/3
7. $12\frac{5}{6}$ = 12 5/6
8. 214
9. 9.5
10. $4\frac{1}{4} - 3\frac{1}{3} = 1\frac{1}{4} - \frac{1}{3} = \frac{15-4}{12} = \frac{11}{12}$ = 11/12
11. $\begin{array}{r} \frac{5}{18} \\ +\ \frac{2}{3} \\ \hline \frac{17}{18} \end{array}$ = 17/18
12. $x^5 = \sqrt{x^{10}}$, a = 10
13. -71
14. 3.60÷12=0.3
    2.40÷6= 0.4
    0.4 - 0.3 = $0.10
15. GCF(84, 96) = 12
    84÷12)×(96÷12) = 7×8 = 56 pieces
16. A
    900÷300×20 =60 (gallons)
17. B
    600÷60 = 10
18. G(-6, 6)
19. 1440
20. 30×0.7 = 21
21. -0.008
22. π - 3 + 4 - π = 1
23. -.027
24. 2⅔ + 3¾ - $5\frac{1}{10}$
    = 2 + 3 - 5 + ⅔ + ¾ - $\frac{1}{10}$
    = ⅔ + ¾ - $\frac{1}{10}$
    = $1\frac{19}{60}$ = 1 19/60
25. 200
26. 26×40 = 1040 (miles)
    26 - 6 = 20
    1040÷20 = 52 miles per hour
    52 - 40 = 12 mph faster
27. 180÷3 = 60 mi
28. 60×4 = 240 mi
29. $\frac{66}{360}$ ×60²π = 660π = 660 pi
30. 30×2 + 5×2 + 4(15 - 5)
    = 60 + 10 + 40
    = 110
31. 2×28 = 56
32. 1.44
33. 12×20% = 12×0.2 = 2.40 (increase)
    12 + 2.40 = $14.40
34. 6×6 = 8×**4.5**
    Ans = 4.5 hr
35. 24
36. 1
37. .8×0.9 = 0.72 (left to pay)
    1 - 0.72 = 0.28 = 28%
38. 4 + 6 = 10 (base)
    6 + 10 = 16
    24÷(16÷2) = 3 (height)
    AB = 5
    The perimeter:
    10 + 3 + 6 + 5 = 24 cm
39. 100÷2 = 50
    50 - 5 = 45
    45÷(1 + 2) = 15
    width = 15
    length = 5 + 2×15 = 35
    15×35 = 525 in²
40. $\frac{4\times3}{10\times9} = \frac{2}{5\times3} = \frac{2}{15}$ = 2/15
41. 4.50 - 3.25 = 1.25
    2×1.25 = 2.50
    3.25 - 2.50 = 0.75
    2×0.75 = 1.50
42. The height from A to BC is 20.
    Area: ½(20)(40) = 400



43. $\frac{3}{2}\times\frac{7}{3}\times\frac{22}{7}$ = 11
44. .2³ = 0.008
45. $\frac{-27}{8}$ = -27/8
46. x = -8
47. 32

48. $2^6\times(2^2)^3 = 2^{12}$
$\square = 3$

49. $4(10+20+30) = 240$ cm

50. $42 - 30 = 12$
$60 - 42 = 18$
12:18 = 2:3
Ans = 6 (L of 30%) & 4 (L of 60%)

51. D
$y = -x + 6$

52. A

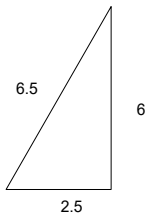
53. B
$98 = 4\times12 + 5\times10$
4 + 5 = 9 pieces

54. $(3^x)^3 = (3^3)^x = 64 = 4^3$
$3^x = 4$

55. 2 oranges = 3 pears
72 oranges = 108 pears
3 apples = 4 pears
108 pears = 81 apples

56. Let x = the investment at 8%. Therefore, we have
$4000\times0.06 + .08x = 520$
$.08x = 280$
$x = 3500$

57. 6.5 : 2.5 : $\square$
= 13 : 5 : 12
$\square$ = 6 ft



58. B
$3(36\pi) + 144 = 108\pi + 144$

59. $120\times1.25 = 150$

60. Their combined speed is 65 + 72 = 137 mph.
$822 \div 137 = 6$ (hrs)

61. 64π

62. 7 teams

# teams	# games
2	1
3	3
4	3+3 = 6
5	6+4 = 10
6	10 + 5 = 15
7	15 + 6 = 21

63. GCD(143, 187) = 11
Each pencil cost 11¢ or 1¢ but ruled out.
$187\div11 = 17$
$143\div11 = 13$
17 – 13 = 4 more pencils

64. 48

65. 80%

66. $\frac{2}{7}$

67. 

68. 36

69. 4

70. 35°

71. 33

72. 24,000

73. 15

74. 32 : 17

75. 33⅓ %

76. 1000

77. 320

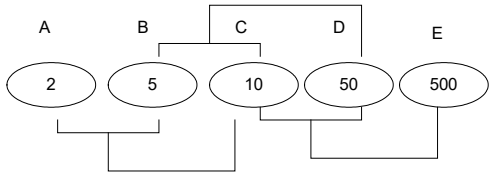
78. 4

79. 240

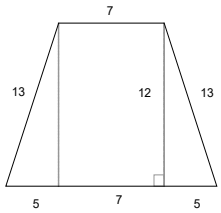
80. 70

Answer Key

1. 0.0004
2. 36
3. 110
4. .098
5. 0.089
6. $\frac{14}{3}$ = 14/3
7. $2^9 = 8^3$
8. -4
9. $x = 9$
10. $\frac{7}{10}$ = 7/10
11. $\begin{array}{r} 30\frac{1}{15} \\ 10\frac{5}{15} \\ +\ 20\frac{9}{15} \\ \hline 60\frac{15}{15}=61 \end{array}$ = 61
12. x^{12}
    □ = 12
13. 54×2 = 108
    $54\times\frac{1}{9}$ = 6
    108 + 6 = 114
14. 6×5÷2 = 15 chords
15. 60×5% = 60×0.05 = 3
    60+ 3 = $63.00
16. $\frac{1}{2}\times6\times8$ = 24
17. ΔABC = 30 = $\frac{1}{2}\times BH\times AC = \frac{1}{2}\times BH\times13$
    BH = $\frac{60}{13}$ = 60/13
18. 63.75÷5 = $12.75
19. 19
20. 567 (cards)
    See the following figure.



    2+5+10+50+500 = 567
21. 14.4
22. 2x - 3 = 12
    2x = 15
    x = 7.5
23. -2(x - 3) = 4(3x + 1)
    -x + 3 = 2(3x + 1)
    -x + 3 = 6x + 2
    7x = 1
    x = ⅐ = 1/7
24. A:B = 4:3
    A^2:B^2 = 16:9
25. ½(7+17)×12 = 144
26. 17 + 13 + 7 + 13 = 50



27. 36 min = 0.6 hr
    $\frac{24(\text{miles})}{0.6(\text{hour})}$= 40 miles per hour
28. x = 12
29. 0, -⅕
    Ans = 0 & -1/5
30. The area of the larger circle \ the area of the smaller circle
    = $12^2\pi$ - $10^2\pi$
    = 44 π
31. x = 60
32. 3.9 + 4.6 = $8.50
33. $\frac{87}{96}=\frac{29}{32}$
    $160\times\frac{29}{32}$= 145
34. The total parts is 2+3+5 = 10, thus each part account for 180÷10 = 18. Ans = 90°.
35. 1 - ⅛ = $\frac{7}{8}$ = 7/8
36. ½×½ = ¼
    1 - ¼ = ¾ = 3/4
37. Let x be the number of calories for Breakfast meal.
    Lunch meal: 200 + x
    Dinner meal: 3x
    Thus, we have
    x + (x + 200) + 3x ≤ 1200
    5x + 200 ≤ 1200
    5x ≤ 1000
    x ≤ 200
    Dinner: 3x = 600
38. 60
39. 6

40. 21÷2 = 10.5
10.5 - 8.5 = 2 (width)
2×8.5 = 17 sq. ft

41. $\frac{\frac{3}{4}}{\frac{15}{8}} = \frac{3}{4} \times \frac{8}{15} = \frac{2}{5} = 2/5$

42. 64

43. 49

44. 2700

45. y = $\frac{13}{2}$ = 6.5 (in decimal)

46. D

47. 30×1.3 = $39.00

48. B

$$\frac{\text{distance}}{\text{time}} = \frac{2 \times 12}{s + 12} = \frac{24}{s + 12}$$

49. $x = 6$

50. D
$3(n + 6)(n - 3)$

51. $a:b:c$ = 15:10:6
Let's assume
$a = 15k$, $b = 10k$, $c = 6k$.
$a + c = 21k = 105$
$k = 5$
Thus, $b = 10k = 50$

52. A
$3y = 2x - 8$
$6y + 4$
$= 4x - 16 + 5$
$= 4x - 11$

53. The other leg AC = 8 by Pythagorean theorem.
Thus, the area of the triangle is ½(6×8) = 24. On the other hand, the area of the triangle is also ½(10)(AH) = 24. Therefore, the height AH = 4.8

54. 37.5%×$\frac{1}{3}$ = 12.5%
24×12.5% = 24×$\frac{1}{8}$ = 3

55. 40 + 15 = 55 hours
660÷55 = $12 (per regular hour)
12×30 = $360

56. 24×$3\frac{1}{8}$
72 + 3 = 75

57. B
196 = 14^2
14÷2 = 7 (radius)
$7^2\pi = 49\pi$ (area of a full circle)
4 $\frac{3}{4}$-circles = 4×$\frac{3}{4}$(49π) = 147π
Shaded area = $196 + 147\pi$

58. Since there is a 20% increase, it becomes 1.2 times
60×1.2 = 72
After 5% tax
72×1.05 = $75.60

59. r + c = 5
r – c = 2
r = 3.5
c = 1.5
Ans = 3.5 (rowing speed) & 1.5 (current speed)

60. AC = 8
½(6×8) = 24
½(10)(AH) = 24
AH = 4.8

61. 0.5×0.8 = 0.4
0.4 = 1 - 0.6
It is 60% off.

62. 6 : π

63. 5

64. 51

65. 84

66. 1400

67. 240 – 3 = 237
237÷3 = $79

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

69. ½

70. 12 or more

71. 0.110

72. 11

73. 50°

74. $\frac{22}{45}$

75. square

76. 30%

77. 0

78. 10^4×60×60 = 36 million

79. 36

80. 11

Answer Key

1. -0.008
2. 27
3. 120
4. .0125
5. 0.0144
6. 4
7. -42
8. -10
9. $x = \frac{20}{3} = 20/3$
10. 640
11. $\frac{-\frac{21}{30}-\frac{5}{30}}{\frac{16}{30}-\frac{8}{15}} = 8/15$
12. 0.027
13. $5^8 = (5^2)^4 = 25^4$
    $\square = 4$
14. 400×60% = \$240.00
15. 400 - 240 = \$160.00
16. 2,000×0.95 = 1,900
    1,900×0.03 = \$57.00
17. 60÷1.2 = 50
18. $\frac{1}{2}(8 + 16)\times h = 12\times h = x^2$
    $h = 3$
    $x = 6$
    4×6 = 24
19. $3\frac{11}{12} = 3\ 11/12$
20. (120 - 96)÷120 = .2 = 20%
21. 2¼
22. $9\frac{7}{48} = 9\ 7/48$
23. 5
24. -.49
25. $\frac{8}{3} \div \frac{16}{5} \div \frac{5}{3} = \frac{8}{3} \times \frac{5}{16} \times \frac{3}{5}$
    $= 1/2$
26. $3^6 \div 9^2 = 3^6 \div 3^4 = 3^2$
    $\square = 2$
27. $\frac{3}{8} = 0.375 = 37.5\%$
28. $x + ¼ = 2x - 4$
    $x = 4¼ = 4\ 1/4$
29. $4(x - 1) + 5(x + 2) = 3(x - 8)$
    $4x - 4 + 5x + 10 = 3x - 24$
    $9x + 6 = 3x - 24$
    $6x = -30$
    $x = -5$
30. $3x = 20 - 2$
    $3x = 18$
    $x = 6$
31. The area is 5×12/2=30. There are 4 such right triangles. The area is 30×4 = 120.
32. The figure is a rhombus. Each side has a length of 13. Thus, the perimeter is 13×4 = 52.
33. ∠BAD + ∠ADC = 180°
    ½(∠BAD + ∠ADC) = 90°
    180 - 90 = 90
34. $x = 20$
35. 60÷360 = **⅙**
    ⅙×$6^2\pi = 6\pi$ cm²
36. $x = 58°$ (corresponding angle)
    $y = 70°$
37. (36÷2)×0.35
    = 18×0.35
    = 9×0.7
    = \$6.30
38. 1000×½ = 500
    1000×¼ = 250
    1000 - 500 - 250 = \$250
39. $720\times\frac{3}{8} = 270$
    270×⅙ = 45
40. $13 - 2x = 8$
    $\Rightarrow 2x = 5$
    $\Rightarrow x = 2½$
41. $\frac{7}{5} \div \frac{21}{10} = \frac{7}{5} \times \frac{10}{21} = \frac{2}{3} = 2/3$
42. -5
43. $2\times(-3)\times(-4)\times\frac{1}{8} = 3$
44. 3^{12}
45. 3^5
46. 3^{64}
47. C
48. 26
49. $\frac{30}{120} = \frac{1}{4} = 25\%$
50. 180÷1.5 = \$120
51. C
    The new distance becomes 24, the new speed becomes s+10. So, the new speed = $\frac{\text{distance}}{\text{travel time}}$ $= \frac{24}{s+10}$.

52. C
$2(x + 2)(x - 4)$
$= 2x^2 - 4x - 16$

53. A

54. The intercept form is
$\frac{x}{-8} + \frac{y}{12} = 1$
X-intercept = -8 and Y-intercept = 12.
The area described = ½×8×12= 48

55. $\frac{1}{16} = 1/16$

56. ½(12)(10) = 60

57. 1 - 24% - 13% - 41% = 22%

58. 2×30 = 60
60×2 = 120 miles (round-trip distance)
total time: 2+3 = 5 hours

Average Speed
$= \frac{total\ distance}{total\ time}$
$= \frac{120}{5} = 24$ mph

59. 66÷1.2 = $55

60. B
$R = ½\pi$
$\pi R^2 = \frac{1}{4}\pi^3$

61. 4

62. 2.5

63. 10

64. $P - Q$

65. 33

66. 20

67. 826

68. $995

69. A
Let N = abcabc
Odd digits sum: a+c+b
Even digits sum: b + a + c
So, the difference of the two sums is 0, divisible by 11. Thus, N is a multiple of 11.

70. D

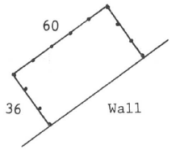
71. March

72. 85

73. 1991

74. 2

75. 36÷12 = 3
60÷12 = 5
3 + 6 + 3 = 12



76. 3

77. 132

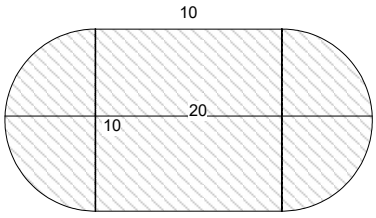
78. 42

79. 68

80. 13

Answer Key

1. $0.07^2 = 0.0049$
2. 54
3. $\frac{7}{8} = 7/8$
4. 1 35/36
5. 12.5
6. 0.008
7. $1.1 + 1.3 - 0.4 \times 0.3 = 2.28$
8. $(2\times3)\times(3\times4)\times(4\times5) = 6\times12\times20$
   $\square = 20$
9. -7
10. $x = -6$
11. $(\frac{1}{2}\times\frac{2}{3}\times\frac{3}{4}\times\frac{4}{5}\times\frac{5}{6})^2 = (\frac{1}{6})^2 = \frac{1}{36} = 1/36$
12. 9
13. 5
14. 16
15. 2,000×0.8 = 1,600
    1,600×0.05 = $80.00
16. 60×20% = 60×0.2 = 12
    60 - 12 = $48.00
17. C
    1 - 20% = 0.8
    2nd time: 0.8×0.8 = 0.64
    3rd time: 0.8×0.64 = 0.512
    4th time: 0.8×0.512 = 0.4096
18. 20 yd



19. 420×.3 = $126.00
20. 80×80% = 80×.8 = $64.00
21. ½×4 = 2
22. $\frac{29\frac{28}{24}}{-\ 28\frac{15}{24}}{1\frac{13}{24}} = 1\frac{13}{24}$ = 1 13/24
23. 8
24. $\frac{8}{3}\times\frac{25}{12}\times\frac{21}{10}$
    $= \frac{2}{3}\times\frac{25}{3}\times\frac{21}{10}$
    $= \frac{2}{1}\times\frac{25}{3}\times\frac{7}{10}$
    $= \frac{1}{1}\times\frac{5}{3}\times\frac{7}{1}$
    $= \frac{35}{3}$ or 11⅔ = 11 2/3
25. 5
26. 0.5^3
    = 0.125
    = 12.5%
27. $4(x - 1) + 5(x + 2) = 3(x - 8)$
    $4x - 4 + 5x + 10 = 3x - 24$
    $9x + 6 = 3x - 24$
    $6x = -30$
    $x = -5$
28. $x = -2$
29. $3x - 4 = 20$
    $3x = 24$
    $x = 8$
30. 4 possible arrangements
    DA**C**BE
    DA**C**EB
    BE**C**AD
    EB**C**AD
31. BD = 25
    AH×25 = 15×20
    AH = 12
32. 60×3⅓ = 180 + 20 = 200
33. $\frac{165}{60} = \frac{11}{4}$ = 2¾ hrs = 2 hr & 45 min
34. 1×5 = 5
    5 + 2 = $7.00
35. 1 - ⅔ = ⅓ left
    ½×⅓ = ⅙ = 1/6
36. ½(6)(*x*) = 24
    $x = 8$
37. 12 - 8 = 4
    4×8 = 32
38. (9, 0)
39. (12, 0)
40. D
    $r = 4$
    area = 16π
    shade area = 64 - 16π.
41. $\frac{1}{10} = 1/10$
42. $(0.2)^{-3} = (\frac{1}{5})^{-3} = 5^3 = 125$
43. -32
44. $2\sqrt{3\times5}\times2\sqrt{3\times7}\sqrt{5\times7}$ = 4×3×5×7 = 420

45. $y = 2$

46. 420×75% = \$315

47. 17

48. C

49. Method I)
80×0.8×0.85 = \$54.40

Method II)
80×0.2 = 16
80 - 16 = 64
64×0.15 = 9.6
64 - 9.6 = \$54.40

50. 48 = □×75%
$48\times\frac{4}{3} = 64$

51. C

52. $2x + 3y = 0$
Ans = 2 & 3

53. C
$\text{Speed}_{\text{orginal}} = \frac{70}{2\frac{1}{2}} = 28$ mph
$\text{Speed}_{\text{new}} = \frac{70}{2\frac{1}{2}-\frac{3}{4}}=\frac{70}{1\frac{1}{2}+\frac{1}{4}}=\frac{70}{\frac{7}{4}}=40$ mph
40 – 28 = 12 mph faster

54. $n = 1$, 6 + 2 = 8
$n = 2$, 8 + 2 = 10
$n = 3$, 10 + 2 = 12
$n = 100$, 6 + 200 = 206

55. D

56. \$950×60%=\$570 (saving)

57. 520 is 65% of the price of the new stereo.
520÷65% = 800
520×2 - 800 = \$240 left

58. 8×6 = 10×4.8
height = 4.8

59. B
$AC^2 + BC^2 = AB^2$
$8^2 + 6^2 = 10^2$
AB = 10
radius = 5
area of the semicircle = $\frac{1}{2}(5^2\pi) = 12.5\pi$
The area of the shaded part
$= 12.5\pi - 24$

60. -150

61. 7

62. 2000

63. mean < median < mode

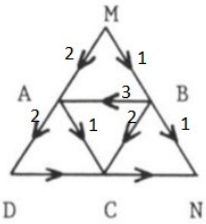
64. 4×95 = 380
97 + 91 = 188
380 – 100 – 188 = 92

65. 48

66. $\frac{4}{7}$

67. $n - 2 = 11, 13, 17, 19$
$n = 13, 15, 19, 21$
15 and 21 are the desired numbers.

68. 6 different routes: 11, 12, 131, 132, 21, 22



69. Let x min per mile be the speed in the first day.
So, the distance travelled in an hour, or the speed in mph,
$= \frac{1}{\frac{x}{60}} = \frac{60}{x}$
The next 3 days, the distances travelled in an hour
$= \frac{60}{x+5}, \frac{60}{x+10}$, and $\frac{60}{x+15}$
To be integer miles in all distances,
60 is a common multiple of x, $x + 5$, $x + 10$, and $x + 15$.
$x = 5$ is one, and the only solution.
So, the total distance of the 4 trips is
12 + 6 +4 + 3 = 25

70. 397

71. 23

72. 222,222,222,223

73. 25

74. 32

75. 36

76. 1

77. .088 m²

78. 8671

79. 7 – 1 – 3 = 3

80. 3

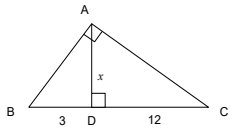
Answer Key

1. -0.027
2. 1
3. 4/3 = 1 1/3
4. .007
5. 0.00032
6. 25/36
7. 132
8. 3.14 × .03 = .0942
9. $2(x - 1) + 3(x + 1) = 6$
   $5x + 1 = 6$
   $x = 1$
10. $(1+\frac{1}{2})(1+\frac{1}{3})(1+\frac{1}{4})(1+\frac{1}{5})(1+\frac{1}{6}) = \frac{3}{2}\times\frac{4}{3}\times\frac{5}{4}\times\frac{6}{5}\times\frac{7}{6} = \frac{7}{2} =$ 7/2
11. 8
12. 0.0025
13. 12
14. $7\frac{7}{10}$ = 7 7/10
15. 80×70% = 80×0.7 = $56
16. $25^2 = \underline{20}^2 + 15^2$
    Ans = 20
17. $\frac{1}{2}(12)$ = 6 in
18. 20×1.5 = 30
    12×30 = $360
19. 22×14×12/231 = 16
    Note 231 = 11×21
20. 273÷3 = 91
    91÷7 = 13
    273 = 3×7×13
    Ans = { 3, 7, 13 }
21. 1/8
22. 4
23. 0.09
24. $2^{12} = 4^6$
    $8^2 = 4^3$
    6 - 3 = 3
25. $4^2 \times 2^3 = 2^4 \times 2^3 = 2^7$
    Ans = 7
26. -49
27. $100 - 4(2.5)^2\pi = 100 - 25\pi$
28. ½(3×4) = 6
29. 49 - 4×6 = 25
30. The unit price is $\frac{19}{3}$ per apple. Thus, the number of apples you can purchase with \$1.52=152¢ is $\frac{152}{\frac{19}{3}} = \frac{152\times3}{19}$ = 24 apples.
31. 6÷0.03 = 200
32. $100 - 3(x - y) = 100 - 3\times7 = 100 - 21 = 79$
33. 20%:80% = 1:4
    100×¼ = \$25
34. 390÷6.5 = 60 mph
35. 390÷65 = 6 (hours)
36. 3:4
37. 3,800 ÷ 20 = 190 sec
38. 12×3 = 36
    10×2 = 20
    36 - 20 = 16
39. 80÷2 = 40
    40÷4 = 10 (width)
    40 - 10 = 30 (length)
    10×30 = 300 cm²
40. Let x = the number students enrolled last year. So, we have
    $1.2x = 660$
    $x = 550$
41. 1/10
42. 35%×30%×80
    = 35%×40×2×30%
    = 14×60%
    = 8.4
43. $1\frac{1}{5}$ = 1 1/5
44. $(x - 3.6)^2 = 6^2$
    $x = 3.6 \pm 6$ = -2.4 & 9.6
45. $25^3 = (5^2)^3 = (5^3)^2 = 125^2$
    □ = 2
46. D
    $9(x-4)(x-6)$
47. A : B = 9 : 12
    B: C = 12 : 14
    A: C = 9:14
48. A
    $10/30 = \frac{1}{3} < 15/40 = \frac{3}{8}$
49. 3×3 + 2 = 11
    11÷7 = 1R4
    R = 4
50. 1 – 25% = 75% = $\frac{3}{4}$
    $39\div\frac{3}{4}$ = \$52
51. Ans = 12 (x-int) & 9 (y-int)

52. Area = ½×9×12 = 54

53. 3×8'4" = 25
25×$8\frac{1}{3}$ = $208\frac{1}{3}$ sq ft = 209 sq ft

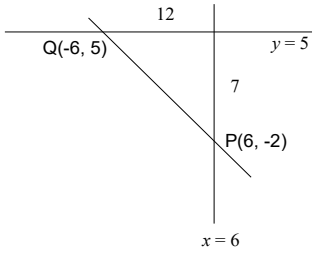
54. Let x = AD.
Since ΔADB ≈ ΔCDA,
$\frac{AD}{BD} = \frac{CD}{AD}$,
$\frac{x}{3} = \frac{12}{x}$,
$x^2 = 36$,
$x = 6$
area(ΔABC) = ½(15×6) = 45



55. 50

56. B

57. ½(7×12) = 42

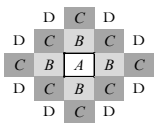


58. $y = -\frac{7}{12}x + b$
$-2 = -3.5 + b$
$b = 1.5$
$y = \frac{-7}{12}x + 1.5$
$y = \frac{-7}{12}\times 12 + 1.5 = \mathbf{-5.5}$
$8.5 = -\frac{-7}{12}\times(\mathbf{-12}) + 1.5$
½(24)(14) = 168

59. $a = 10$, $b = 6$
$a + b = 16$

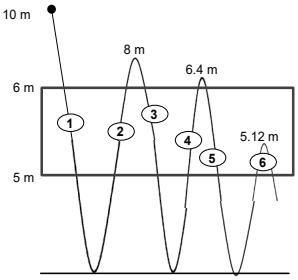
60. 180 ÷ (3 + 4 + 5) = 15
the largest measure is 5×15 = 75
the least measure is 3×15 = 45
the difference is 75 - 45 = 30

61. A→B→C→D
1×4×3×2 = 24



62. D
LCM(4, 5, 6) = 60
60 + 1 = 61

63. $\frac{4}{5}$ = 0.8
10×0.8
10×0.8^2 = 6.4
10×0.8^3 = 5.12
10×0.8^4 = 4.096
6 times as



64. 77

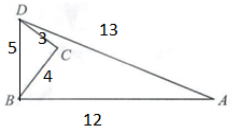
65. $4\times\frac{3}{4} + \frac{1}{2}\times10 = 3 + 5 =$ 8 mi

66. 48 = 10×5 – 1×2
= 12×5 - 6×2
a) 11 (#answered), 10 (#right), 9 (#unanswered)
b) 18 (#answered), 12 (#right), 2 (#unanswered)

67. D
LCM(3, 4, 5, 6) = 60
60 + 2 = 62

68. 500

69. ½(5×12 - 3×4)
= 24



70. 6 numbers: {3, 4, 5, 6, 7, 8}

71. Let x, y, z be the number of red, green and blue marbles.
$y + z = 16$
$x + z = 18$
$x + y = 14$
$x + y + z = 24$

72. 4

73. $\frac{336}{28\times24} = \frac{24}{2\times24}$ = 0.5 inch per hour

74. .426

75. 200

76. $\frac{7}{10}$

77. 10^2 = 100 (area of each face)
300÷6 = 50 (paint on each face)
100 – 50 = 50 (white on each face)

78. 53×59 = 3127

79. 5

80. 21