

Ex. 2. Find the value of $\frac{452 \times 23}{5371 \times 29}$.

$$\begin{aligned}\log \frac{452 \times 23}{5371 \times 29} &= \log 452 + \log 23 - \log 5371 - \log 29 \\ &= \log 452 + \log 23 + \text{colog } 5371 + \text{colog } 29 \\ \log 452 &= 2.6551 \\ \log 23 &= 1.3617 \\ \text{colog } 5371 &= 6.2699 - 10 \\ \text{colog } 29 &= 8.5376 - 10 \\ \log 0.066728+ &= 8.8243 - 10\end{aligned}$$

Therefore $\frac{452 \times 23}{5371 \times 29} = 0.066728+.$

Ex. 3. Find $\log 50^{\frac{2}{3}}$.

$$\begin{aligned}\log 50^{\frac{2}{3}} &= \frac{2}{3} \log 50 \\ \log 50 &= 1.6990 \\ \frac{2}{3} \log 50 &= \frac{2}{3} \text{ of } 1.6990 = 1.2742 \\ 1.2742 &= \log 18.8 \\ \therefore 50^{\frac{2}{3}} &= 18.8.\end{aligned}$$

EXERCISE 81

Find the value of:

1. $(5 \times 4 + 7)^{\frac{1}{2}}$
2. $\frac{1}{225}$
3. $\sqrt[3]{\frac{23 \times 30}{72}}$
4. $\frac{3.14 \times 56.7}{29}$
5. $(0.625)^{\frac{1}{16}}$
6. $0.0625 \div 0.25$
7. $\frac{31 \times 47 \times 53}{29 \times 43 \times 50}$
8. $\sqrt{\frac{621 \times 4325}{729}}$
9. $\sqrt{\pi \times 10.16}$
10. $\pi^2; \frac{1}{\pi}$

EXERCISES FOR REVIEW

In connection with each exercise the student should review all principles involved. The following list will then furnish a complete review of the book.

1. What are the various names given to the symbol 0?
2. Read the numbers 200, 0.02; 100.045, 0.145.
3. Solve $4672 - 2134 + 7635 + 2377 - 8432$ by adding the proper arithmetical complements and subtracting the proper powers of 10.
4. Multiply 5280 by 25; by $16\frac{2}{3}$.
5. Multiply 1760 by 9; by 11; by 81; by 16.
6. Multiply 4763 by 998.
7. Multiply 4634 by 4168.
8. Multiply 746 by 18.
9. Show that to multiply a number by 1.5 is the same as to add $\frac{1}{2}$ of the number to the multiplicand.
10. Show that to divide a number by $112\frac{1}{2}$ is the same as to move the decimal point two places to the left and subtract $\frac{1}{2}$ of the number.
11. Form a table of multiples of the multiplier and multiply (a) 7461, (b) 3465, (c) 761, (d) 98723, (e) 1846, each by 3762. Also find each product by using logarithms.
12. Form a table of multiples of the divisor and divide (a) 7346, (b) 5280, (c) 8976, (d) 4284, each by 361. Also find each quotient by using logarithms.

13. Show that every number divisible by 4 is the sum of two consecutive odd numbers.

14. Show that the sum and difference of two odd numbers are always even.

15. Prove that the difference between a number and the number formed by writing its digits in reverse order is divisible by 9.

16. Perform the following operations and check by casting out the 9's: 86942×763 ; $46342 \div 216$; 842×21.34 ; $987.4 \div 3.1416$.*

17. Find the quotient of 764321 divided by 2136 correct to four significant figures.

18. Find the quotient of 76.421 divided by 3.1416 correct to 0.01.

19. Multiply 5276 by $12\frac{1}{2}$ and divide the result by $33\frac{1}{3}$.

20. Prove that a number is divisible by 4 if the units' digit minus twice the tens' digit is divisible by 4.

21. When it is 10 P. M. Sunday, Feb. 15, at Greenwich, what time and date is it at 165° W.?

22. Suppose a transport returns troops from Manila starting July 4, reaching San Francisco 35 da. later; what is the date?

23. 27 is composed of 16 and 11; write all of the other two numbers that make up 27.

24. Reduce 43132_5 to the decimal scale.

25. What methods did the ancient Babylonians, Egyptians, Greeks and Romans adopt to represent numbers? Were these characters ever employed as instruments of calculation?

* Perform also by logarithms.

26. From what source was the decimal system of notation with its 9 digits derived?

27. Explain clearly the difference between the intrinsic value and the local value of the 9 digits.

28. In the decimal scale explain why the number of characters used cannot be more nor less than 10.

29. What is the difference between the sum of 4623, 256, 145231, 7649, and a million?

30. Find the excess of 864213 over 634795 by means of arithmetical complements.

31. Multiply 37635 by 648, using but two partial products.

32. Prove that any number composed of three consecutive figures is divisible by 3.

33. Find the sum and difference of 6523 and 5436 in the scale of 8.

34. Multiply 529_t by 1903 in the scale of 12.

35. Divide 4234 by 213 in the scale of 5.

36. What weights must be selected out of 1, 3, 9, 27, 81, etc., pounds to weigh 1907 lb.?

37. A carriage wheel revolves 2 times in going 25 ft.; how many times will it revolve in going a mile?

38. How much will it cost to build a cement walk 6 ft. wide around a block 500 ft. square at $10\frac{1}{2}$ ct. per square foot?

39. If a tight board fence 6 ft. high is built around the same block 2 ft. inside of the walk, how will its area compare with that of the walk?

40. What must be the depth of a cistern 6 ft. in diameter which shall contain 600 gal., if a gallon of water weighs 10 lb. and a cubic foot of water weighs 1000 oz.?

41. If the pressure of the atmosphere at the surface of the earth, when the barometer stands at 30 in., is about 15 lb. to the square inch, what is the pressure on the human body if its surface is 16 sq. ft.? What would be the difference in pressure if the barometer stood at 29 in.?

42. How many grains of gold are there in 6 lb. 4 oz. 5 pwt.?

43. If employed 6 da. in the week and 8 hr. daily, how many weeks would it take to count \$50000000 at the rate of \$100 a minute?

44. If sound travels at the rate of 1100 ft. per second, and the report of a gun is heard 10 sec. after the appearance of the smoke, how far distant is the observer?

45. What number between 300 and 400 is exactly divisible by 2, 3, 4, 5?

46. If 4 cu. in. of iron weigh a pound, find the weight of a rectangular vessel an inch and a half thick without a top, the vessel being $10\frac{1}{2}$ ft. by $8\frac{1}{2}$ ft. by $5\frac{1}{4}$ ft. outside measure.

47. A cubic foot of copper weighs $556\frac{1}{4}$ lb., and can be drawn into a wire 1 mi. 125 rd. long. Find the weight of copper necessary for a wire 60 mi. long and also the area of a cross section of the wire.

48. How long is an iron bar containing a cubic foot of iron if its dimensions are $\frac{3}{4}$ of an inch by $\frac{1}{2}$ of an inch?

49. If a cubic foot of water weighs 1000 oz., find the number of grains in a cubic inch.

50. Explain whether 0.023 or 0.024 is more nearly equal to 0.02349 and state in words the error in excess or defect in each case.

51. Divide 0.34827 by 0.23 correct to 0.01.

52. Multiply 3.1459 by 16.325 correct to 0.1.

53. If the meter is 39.3708 in., what part of a meter is a yard?

54. If the average length of a degree of latitude is 365000 ft., find the length of a meter in feet and inches.

55. If water expands 10% when it freezes, how much does ice contract when it turns into water?

56. Find the discount of \$1000 for 90 da. at 6%. Show that the interest on this discount for the same time is equal to the difference between the interest and the discount of \$1000.

57. Show that the interest on the discount of \$1000 for one year at 6% is the same as the discount on the interest at the same rate for the same time.

58. If a person saves \$300 a year, and invests his savings at 4% compound interest for 10 yr., what amount does he accumulate?

59. Which is the better investment, bonds bought at 112 yielding 6% interest, or stocks bought at 85 yielding 4% dividends?

60. A person owns 302 \$10 shares of Wolverine Portland Cement Stock, paying a semiannual dividend of 5%; 20 shares of bank stock of \$100 each, paying a semiannual dividend of $2\frac{1}{2}$ %; 30 Mexican Plantation Bonds of \$300 each, paying 7% interest. What is his total annual income from these sources?

61. A merchant adds $33\frac{1}{3}$ % to the cost price of his goods, and gives his customers a discount of 10%; what profit does he make?

62. If a ship sails from San Francisco Oct. 15 and reaches Japan after 20 da., what is the date of her arrival?

63. When it is 2 P.M. Sunday, Feb. 15, at Greenwich, what time and date is it at longitude 165° W.?

64. The Canadian Pacific Railway uses twenty-four-hour clocks (hours from noon to midnight are 12 to 24 o'clock) at Port Arthur and west. When it is 20 o'clock, standard time, at Winnipeg, what time is it at Toronto?

65. A street 40 ft. wide is to be paved for a distance of 1680 ft. If it costs 32 ct. a cubic yard for excavating to a depth of 2 ft., 4 ct. a square yard for sand cushion, \$1.17 a square yard for crushed stone filling, and $48\frac{3}{4}$ ct. a square yard for concrete, what is the cost of the paving?

66. Dec. 28, 1886, Mr. Harvey insured his life for \$3000 on the fifteen-payment life plan, paying a quarterly (*i.e.* four times a year) premium of \$44.10. Instead of continuing the insurance at the end of the 15 yr., he accepts a cash settlement of \$2942.20. Allowing \$15 a year per \$1000 for protection afforded, what rate of interest has his money earned?

67. In 1903 Michigan levied a tax of \$397525 for the support of the State University at the rate of $\frac{1}{4}$ of a mill. What was the valuation of the state property?

68. How many tons of coal will a bin 10 ft. by $6\frac{1}{2}$ ft. by $7\frac{2}{3}$ ft. hold if one ton occupies 36 cu. ft.?

69. Simplify $\frac{2}{3}$ of $\frac{3}{5} + 2\frac{3}{7} + 5\frac{1}{2} \times \frac{9}{17}$.

70. Find the least fraction that added to $\frac{2}{7}$, $\frac{8}{21}$ and $\frac{8}{35}$ will make the result an integer.

71. Simplify $\frac{4.561}{0.015} \times \frac{0.0075}{21.05}$.

72. A person's income is \$2500 a year. He spends on an average \$27.75 a week. If he deposits his savings in a bank every 3 mo., how much will he accumulate in 10 yr. if the bank pays 3% compound interest?

73. How many miles are there in 10000 ft. and 1000000 in.?

74. Use short methods in finding the product of 14×76 , 369×81 , 4728×998 , 85×85 , 67×73 .

75. Find by factors the square root of 44100, 1352, 225. Find the square root of these numbers by logarithms.

76. The distance between two places on a map is 207^{mm}. What is the distance in kilometers if the scale of the map is 1 to 10000?

77. A copper wire 2 yd. 1.23 ft. long is cut into pieces 0.022 of a foot long. How many pieces will there be, and what length will be left over?

78. How many rolls of paper 20 in. wide and 12 yd. long will be required to paper a room 16 ft. long, 12 ft. wide, and 9 ft. high, allowing 96 sq. ft. for windows and doors?

79. Find the specific gravity of a substance that weighs 12^g in air and 7^g in water.

80. A pound Troy is what per cent of a pound avoirdupois?

81. What are the proceeds of a note for \$1250 at 5%, dated Oct. 17, 1905, at 3 mo., and discounted Dec. 1 at 6%?

82. If a liter of air weighs 1.29^g, find the weight of air in a room 40 ft. by 30 ft. by 12 ft.

83. If sound travels at the rate of 1090 ft. per second, how far distant is a thundercloud when the sound of the thunder follows the flash of lightning after 6 sec.?

84. A merchant sold some goods for \$125 and took in payment a 90-da. note at 5%, dated July 10, 1905. Aug. 5 he discounted the note at the bank at 6%. What were the proceeds of the note?

85. Twenty-five loads of gravel are spread uniformly over a path 200 ft. long and 5 ft. wide. What is the depth of the gravel, a load being 1 cu. yd.?

86. If a half of a liter of a given substance weighs 1500g, what is the specific gravity of the substance?

87. Find the exact interest on \$500 from July 3 to Sept. 10 at 6%.

88. A wholesale dealer sold goods at a discount of 25%, 10% and 3% for cash. He received in payment \$3269.75. What was the list price of the goods?

89. When U. S. 3's can be bought at 108 (brokerage $\frac{1}{8}$), how many bonds can be bought for \$4325?

90. The nearest fixed star is estimated to be 23000000-000000 mi. distant. How many years does it take light to travel this distance at the rate of 186000 mi. a second?

91. On a note for \$5000, dated Jan. 4, 1904, due in 1 yr. with interest at 6%, payments of \$100 had been made on the 4th of each month for 11 mo. in succession. What amount was due Jan. 4, 1905?

92. What must be the face of a note at 90 da. so that the borrower shall receive \$1000, the discount being at the rate of 7% per annum?

93. A note for \$1000, due in 1 yr. at 5%, has an indorsement of \$250 made 5 mo. after date. What is the amount due at the end of the year?

94. A note for \$500, dated March 1, 1903, and payable 2 yr. from date, with interest at 6% per annum, has on it the following indorsements: April 1, 1903, \$50; June 1, 1903, \$50; Sept. 1, 1903, \$20; and May 1, 1904, \$50. What amount is due March 1, 1905?

95. A note for \$2000, dated May 15, 1903, at 5% per annum, has the following indorsements: July 1, 1903, \$60; Aug. 1, 1903, \$10; Oct. 1, 1903, \$20; Jan. 2, 1904, \$100; May 15, 1904, \$100; Sept. 1, 1904, \$20; Nov. 1, 1904, \$20; May 15, 1905, \$200. What amount is due Jan. 2, 1906?

96. If bank stock pays a 7% annual dividend, at what price must it be bought to yield a 5% income on the investment?

97. A traveler bought in New York a bill of exchange on London for £500, exchange being at 4.87. How much did he pay the banker?

98. The number of thousands of people who emigrated annually from Ireland between and including 1876 and 1885 were as follows: 37.5, 38.5, 41.1, 47, 95.5, 78.4, 89.1, 108.7, 75.8, 62. Illustrate graphically.

99. The annual premiums charged by one of the leading life insurance companies at certain ages to insure the payment of \$1000 at death are as follows:

Age	21	24	27	30	35	40	45	50
Premium	\$19.53	\$20.86	\$22.40	\$24.18	\$27.88	\$32.76	\$39.36	\$48.39

Illustrate graphically and determine the probable premiums at ages 25, 33, and 48.

NEW YORK STATE REGENTS' EXAMINATIONS

The following exercises are taken from the Regents' examination questions in advanced arithmetic for the state of New York:

1. Columbus discovered America Oct. 12, 1492. Explain why we celebrated the 400th anniversary Oct. 23, 1892.
2. Find the prime factors of each of the following numbers: 42, 48, 126, 144. Indicate the combination of factors necessary to produce (a) the greatest common divisor of these numbers, (b) their least common multiple.
3. Find the number of square yards in the four walls and ceiling of a room $16\frac{1}{2}$ ft. long, $13\frac{1}{2}$ ft. wide, and 9 ft. high, making no allowance for openings.
4. Make a receipted bill of the following: William Stone buys this day, of Flagg Brothers, 2 bbl. of flour at \$5.50, 20 lb. sugar at $5\frac{1}{2}$ ct., 4 lb. coffee at 35 ct., 5 lb. butter at 28 ct., 2 bu. potatoes at 45 ct.
5. Simplify $\frac{1.75 \times 0.5 + 325 - 0.33\frac{1}{3} \times 21}{0.25 + 0.049 + 0.014}$ and express the result both as a common fraction and as a decimal fraction.
6. A man walks $8\frac{3}{4}$ mi. in 2 hr. 20 min. How long will it take him to walk $11\frac{1}{3}$ mi.? (Solve both by analysis and by proportion.)
7. How many liters of water will be contained in a vessel whose base is 1^m square and whose depth is 6^{dm} ?
8. A merchant sold goods for \$1225; half he sold at an advance of 25% on the cost, two fifths at an advance of $12\frac{1}{2}$ % and the remainder at $\frac{1}{2}$ the cost. How much did he pay for the goods?

9. Two successive discounts of 15% and 10% reduced a bill to \$489.60. What was the original bill?
10. Find the proceeds of a note for \$500, payable in 90 da., with interest at 6%, if discounted at a bank at 6%, 40 da. after date.
11. A house and lot cost \$5000; the insurance is \$25, taxes are \$50 and repairs \$75 annually. What rent must be received in order to realize 6% on the investment?
12. At what price must 5% bonds be bought so as to realize $7\frac{1}{2}$ % on the investment?
13. Find the square root of 243.121 correct to three decimal places.
14. Three families, consisting of 3, 4, and 5 persons respectively, camped out during the summer months, agreeing that the expenses should be divided in the ratio of the number of persons in each family. The expenses amounted to \$606. What number of dollars should each family pay?
15. The diagonal of a square field is 40 rd. How many acres does the field contain?
16. A schoolhouse costing \$9500 is to be built in a district whose property is valued at \$1920000. Find (a) the rate of taxation, (b) the amount of tax to be paid by a man whose property is valued at \$6500.
17. A sight draft on New York was sold in St. Louis for \$3542, exchange being $\frac{3}{4}$ % premium. Required the face of the draft.
18. Which would be the better, to invest \$4356.25 in industrial 4's at 87, brokerage $\frac{1}{8}$, or, with the same sum, to purchase real estate which yields an annual rental of \$300?

19. On a note for \$700, dated Oct. 15, 1898, due in one year, with interest at 5%, the following payments have been made: March 9, 1899, \$300; June 1, 1899, \$250. Find the amount due at maturity.

20. A house worth \$12000 was insured for $\frac{7}{8}$ of its value by three companies; the first took $\frac{1}{8}$ of the risk at $\frac{1}{8}\%$, the second $\frac{1}{8}$ of the risk at $\frac{1}{4}\%$, and the third the remainder at $\frac{3}{8}\%$. What was the whole premium paid?

21. Find the trade discount on a bill of goods amounting at list price to \$360, but sold 30%, 8% and 5% off.

22. (a) $22\frac{1}{2}$ is what per cent of $7\frac{1}{2}$? (b) What per cent of 5 lb. avoirdupois is $7\frac{1}{2}$ oz.? (c) $\frac{3}{11}$ is 225% of what number?

23. The specific gravity of copper is 8.9, of silver 10.5, and in an alloy of these metals the weight of the copper is to the weight of the silver as 5:6. Find the ratio of the bulk of copper in the alloy to that of the silver.

24. How many kilograms of water are required to fill a tank 2^m deep whose base is a regular hexagon 0.4^m on a side?

25. A horse costs three times as much as a buggy, and the harness and robes cost one half as much as the horse. If the total cost was \$330, what was the cost of each? Write an analysis.

26. Reduce the couplet $9\frac{3}{4} : 32\frac{1}{12}$ to the integral form in lowest terms.

27. What is the height of a wall which is $14\frac{1}{2}$ yd. in length and $\frac{7}{10}$ of a yard in thickness, and which cost \$406, it having been paid for at the rate of \$10 per cubic yard?

28. Find the cost, at \$15 per M, of 75 pieces of lumber each 14 ft. by 16 in. by $1\frac{3}{4}$ in.

29. Find the prime factors of 18902.

30. The diameters of the wheels of three bicycles are 24 in., 32 in. and 34 in. respectively. Each has a ribbon tied to the top of the wheel. How far must the bicycles go that the ribbons may be again in the same relative positions?

31. If a boy buys peaches at the rate of 5 for 2 ct., and sells them at the rate of 4 for 3 ct., how many must he buy and sell to make a profit of \$4.20?

32. Give a method of (a) proving addition; (b) subtraction; (c) multiplication; (d) division.

33. Express by signs of per cent, by a decimal, and by a common fraction in its lowest terms, each of the following: (a) $\frac{3}{16}$ per cent; (b) $4\frac{3}{4}\%$; (c) five sixty-fourths; (d) three thousand one hundred fifteen thousandths.

34. Write a number that shall be at the same time simple, composite, abstract and even. State why it fills each of these requirements.

35. Add together 15262986957 and 3879, and multiply the 19th part of the sum by 76.

36. In trying numbers for factors, why is it unnecessary to try one larger than the square root of the number?

37. Find the cost, at 25 ct. a rod, of building a fence round a square 10-acre field.

38. How many cords of wood can be stored in a shed 16 ft. long, 12 ft. wide and 6 ft. high?

39. Find the sum of $1\frac{1}{8}$, $\frac{2}{3} \times 1\frac{1}{2}$, 3, $\frac{7}{16}$. Express the result as a decimal.

40. If I sell $\frac{2}{3}$ of a farm for what $\frac{1}{2}$ of it cost, what is my per cent of gain?
41. I sell goods at 15% below the market price and still make a profit of 10%. What per cent above cost was the market price?
42. How was the principal unit of the metric system determined? Explain the relation between this unit and the metric units of capacity and weights.
43. Find the cube root of 4.080659192.
44. Prove that the product of any three consecutive numbers is divisible by 6 or by 24. Determine when it is divisible by 6; when it is divisible by 24.
45. The diameters of four spheres are 3.75, 5, 6.25 and 7.5. Prove that the volume of one of them is equal to the volume of the remaining three.
46. A merchant buys goods to the amount of \$4000; in order to pay for them he gets his note for 60 da. discounted at a bank. If the face of the note is \$4033.61, what is the rate of discount?
47. Prove that the exact interest of any sum for a given number of days is equal to the interest of the same sum for the same number of days (as usually computed) diminished by $\frac{1}{73}$ of itself.
48. A sells a certain amount of 5% stock at 86 and invests in 6% stock at 103; by so doing his income is changed \$1. What amount of stock did he sell? Was his income increased or diminished?
49. Divide $\frac{3}{4}$ by $\frac{5}{7}$ and demonstrate the correctness of the work.

50. Multiply 42.35 by 3.14159, using the contracted method and finding the result correct to two decimal places. Prove the work by division, using the contracted method.
51. A man borrows \$4500, and agrees to pay principal and interest in four equal annual installments. If the rate of interest is 6%, what will be the amount of each annual payment?
52. When it is Monday, 7 A.M., at San Francisco, longitude $122^{\circ} 24' 15''$ W., what day and time of day is it at Berlin, longitude $13^{\circ} 23' 55''$ E.?
53. When exchange is at 5.18, find the gain on 100^m of silk bought in Paris at 2 francs a meter and sold in New York at 89 ct. a yard, the duty being 6% ad valorem.
54. Find the face of a sight draft that can be bought for \$585.80 when exchange is at a premium of $\frac{1}{2}\%$.
55. Divide 0.8487432 by 0.075637 and multiply the quotient by 0.835642. Find the result correct to three decimal places, using the contracted methods of division and multiplication of decimals.
56. Express in words each of the following: 600.035, 0.635, $600\frac{30}{10000}$, $\frac{630}{10000}$, $\frac{635}{10000}$.
57. A body on the surface of the earth weighs 27 lb. Assuming that the radius of the earth is 4000 mi., find the weight of the same body 2000 mi. above the surface. (The weight of a body above the surface of the earth varies inversely as the square of the distance from the center of the earth.)
58. Washington is $77^{\circ} 3'$ W. longitude and Pekin $116^{\circ} 29'$ E. longitude. When it is 9.30 P.M., Tuesday, Dec. 31, 1901, at Washington, what is the time of the day, the day of the week, and the date at Pekin?

59. Find the exact interest on \$590 from Sept. 18, 1893, to March 1, 1894, at $4\frac{1}{2}\%$.

60. Is the merchants' rule or the United States rule for computing partial payments more favorable to the debtor? Give reasons.

61. A locomotive runs $\frac{3}{4}$ of a mile in $\frac{1}{4}$ of a minute. At what rate an hour does it run? (Give analysis in full.)

62. The edges of a rectangular parallelepiped are in the proportion of 3, 4 and 6; its volume is 720 cu. in. Find its entire surface.

63. A note for \$250, due in 1 yr., with interest at 6%, is dated Jan. 1, 1892. What is the true value of this note Oct. 1, 1892?

64. At 10 A.M. Jan. 5 a watch is 5 min. too slow; at 2 P.M. of Jan. 9 it is 3 min. 20 sec. too fast. When did it mark correct time?

65. A gallon contains 231 cu. in.; a cubic foot of water weighs 62.5 lb.; mercury is 13.5 times as heavy as water. How many gallons of mercury will weigh a ton?

66. Find the face of a note that will yield \$861.44 proceeds when discounted for 90 da. at 6%.

67. A merchant buys goods listed at \$2500, getting successive trade discounts of 20, 10 and 5; he sells his goods at 20% above the cost price, taking in payment a note at 60 da. without interest; he then gets the note discounted at 6% and pays his bill. Find his entire gain.

68. A person deposits \$100 a year in a savings bank that pays 4% interest, compounded annually. How much money stands to his credit immediately after the fifth deposit?

69. Change 200332 in the quinary scale to an equivalent number in the decimal scale, and prove the work.

70. A New York merchant remitted to London through his broker £12000 18s. 9d. Find the cost of the draft if exchange is at $4.89\frac{1}{4}$ and brokerage is $\frac{1}{4}\%$.

71. In extracting the cube root state and explain the process of (a) separating into periods, (b) forming the trial divisor, (c) completing the divisor.

72. A merchant buys goods at a list price of \$800, getting discounts of 10, 20 and 5 with 60 da. credit, or a further discount of 5% for cash. How much will he gain by borrowing at 6% to pay the bill?

73. At a certain election 510 votes were cast for two candidates; $\frac{2}{3}$ of those cast for one equaled $\frac{3}{4}$ of those cast for the other. How many votes were cast for each candidate?

74. If the cost of an article had been 8% less, the gain would have been 10% more. What was the per cent gain?

75. Prove that the excess of 9's in the product of two numbers is equal to the excess in the product of the excesses in the two factors.

76. Derive a rule for marking goods so that a given reduction may be made from the marked price and a given profit still made on the cost.

77. The greatest common divisor and the least common multiple of two numbers between 100 and 200 are respectively 6 and 3150. Find the numbers.

78. How much will the product of two numbers be increased by increasing each of the numbers by 1? Give proof.

79. The longer sides of an oblong rectangle are 15 ft. and the diagonal is 20 ft. Find its area.

80. Find the fourth term of the following proportion and demonstrate the principle on which the operation is based: $8 : 12 = 10 : x$.

81. Demonstrate the following: If the greater of two numbers is divided by the less, and the less is divided by the remainder, and this process is continued till there is no remainder, the last divisor will be the greatest common divisor.

82. Find in inches to two places of decimals the diagonal of a cube whose volume is 9 cu. ft.

83. Compare the standard units of money of the United States, England, France, and Germany as to relative value. Find the value of \$100 in each of the other units.

84. A dealer sent a margin of \$1500 to his broker, April 16, 1905, and ordered him to buy 100 shares of American Sugar stock. The broker filled the order at $131\frac{1}{8}$ and sold the stock May 1 at $126\frac{1}{2}$, charging $\frac{1}{8}\%$ brokerage each way and 6% interest. How much money should be returned to the dealer?

85. A four months' note for \$584, without interest, is discounted at a bank at 5% on the day of its issue. Find the proceeds of the note.

86. What is the difference between a discount of 10% and two successive discounts of 5% each on a bill of \$832?

87. If I buy cloth at \$1.20 a yard, how must I sell it so as to gain 25%?

88. Find the cost of paving a walk 140^{cm} wide and $\frac{3}{8}$ of a kilometer long at \$1.25 a square meter.

89. Indicate the factors which, multiplied together, equal the square root of 441.

90. A newsboy buys 144 daily papers at 20 ct. a dozen, and sells them at 3 ct. each. At the end of 6 da. he has 18 papers on hand. How much has he made during the week?

91. The diameters of two concentric circles are 20 ft. and 30 ft. Find the area of the ring.

92. What yearly income will \$2267.50 produce when invested in U. S. 4's at $113\frac{1}{4}$, brokerage $\frac{1}{8}\%$?

93. Find the amount of \$486.50 for 1 yr. 5 mo. and 17 da. at $5\frac{1}{2}\%$ simple interest.

94. I buy stocks at 4% discount and sell at 4% premium; what per cent profit do I make on the investment?

95. A merchant buys goods to the amount of \$1575 on 9 months' credit; he sells them for \$1800 cash. Money being worth 6%, how much does he gain?

96. Find the cost, at 60 ct. a yard, of carpeting a room 16 ft. 4 in. wide and 21 ft. 6 in. long with carpet 27 in. wide, if the strips of carpet run lengthwise.

97. Find the cost at 45 ct. a roll of papering the walls of a room $16\frac{1}{2}$ ft. long, 15 ft. wide, and 12 ft. high, making no allowance for openings.

98. Find the cost of plastering the four walls and the ceiling of a room 15 ft. long, 12 ft. wide and 9 ft. high at 15 ct. a sq. yd., allowing 6 sq. yd. for openings.

