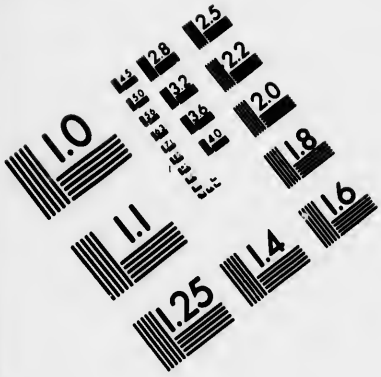

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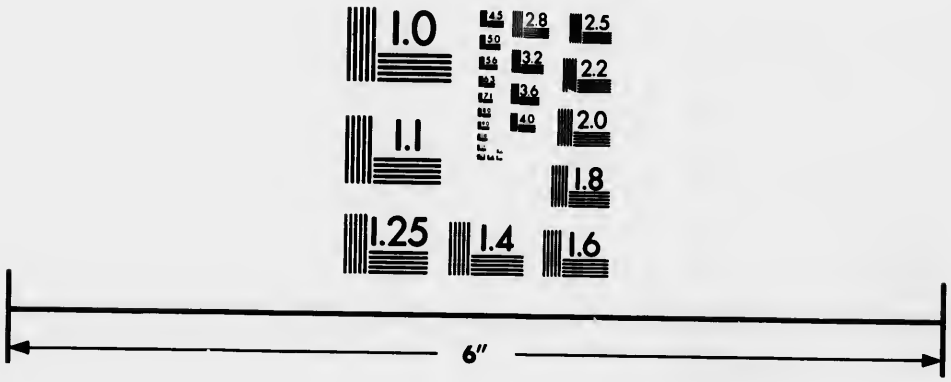

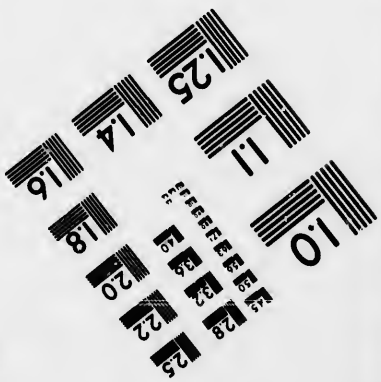

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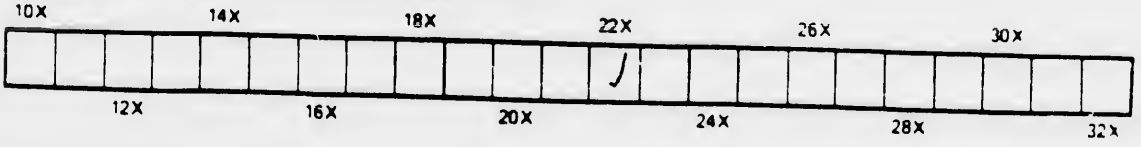

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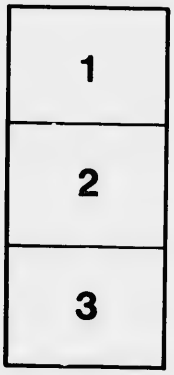

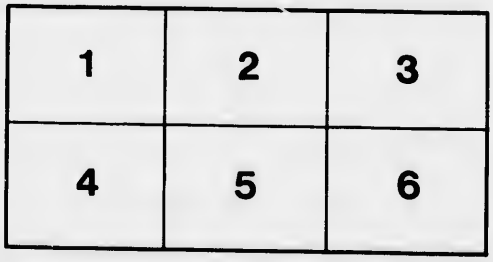

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TENTH EDITION.

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PREFACE.

This little book of Problems consists mainly of selections from standard authors, and contributions from teachers in various parts of the Province. Over four hundred are selected from papers sent in to the *Canada School Journal* in answer to the offer by that periodical of valuable prizes for original or well-chosen problems. Of the rest, some are kindly contributed by friends of the Editors, the balance being either original or selected from recent and valuable works on Arithmetic.

As stated on the title-page, the problems are intended for candidates preparing for the Entrance Examination to our High Schools and Collegiate Institutes. At the request of the publishers, the Editors have prepared a KEY, containing answers to the simpler questions and solutions of the more difficult.

THE EDITORS.

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EXERCISES IN ARITHMETIC.

I.

1. State the number of

(1) Yards in a mile.
(2) Grains in a pound, avoirdupois.
(3) Grains in a pound, troy.
(4) Grains in an oz., troy.
(5) Grains in an oz., avoirdupois.
(6) Square yards in an acre.
(7) Acres in a square mile.
(8) Cubic feet in a cord.
(9) Pounds in a gallon of water.
(10) Mills in a dollar.

2. How can you tell without actually dividing when a number is exactly divisible by 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 15 or 25?

3. Form mentally the square of 15, 25, 45, 75, 125. Also of 95, 995, 9995, 99995.

4. Divide 680748617 by 231, using 3 factors of the divisor, and find the complete remainder.

5. One hundred cent pieces weigh a pound, avoirdupois, what is the value of one ton of cent pieces?

6. How many miles would a ton of cent pieces reach when placed side by side, if a cent piece measures one inch across?

7. Thirty-five times a man's weight is greater than thirty times his weight by 885 pounds, find his weight.

8. How many newspapers at 5 cents each must a news boy sell in order to gain $30, his profit being one-tenth of the selling price?

9. A field 40 rods wide contains 12 acres, find its length.

10. A boy has $1.34, how many books at 12½ cents each can he buy and have 9 cents left?

II.

1. If a 5 cent piece weighs 18 grains, how many 10 cent pieces will weigh 9 pounds, avoirdupois?

2. A farmer goes to the city to make some purchases taking with him $28 in silver. How many ounces, troy, will he have to carry?

3. A bar of iron weighing 22 pounds 8 ounces is made into 15 equal bolts worth 2 cents a pound, find the value of 7 bolts.

4. A grocer sold 12 pounds of tea at 35 cents, 9 pounds of coffee at 25 cents, and $2.50 worth of sugar. The purchaser hands him a ten dollar bank note, how much change should be returned?

5. What is the least sum of money which when divided equally among 20, 25, 36 or 48 persons leaves 50 cents over in each case?

6. Explain how it is that there are 146097 days in every 400 consecutive years.

7. If school opens on the 7th. of January and closes on the first Friday in July, how many teaching days are there in the first half of 1886, Good Friday and the Queen's Birthday being holidays?

8. A 3 cent postage stamp is three-fourths of an inch wide and an inch long, what will it cost to cover an envelope 3 inches wide and 5¼ inches long with 3 cent stamps?

9. A farmer mixes 20 bushels of oats, worth 30 cents a bushel, with 30 bushels of peas, worth 60 cents a bushel, find the value of 29 bushels of the mixture.

10. Using my walking-stick as the unit of length I measure the width of the street and find the measure to be 30. I then go home and find the length of my walking-stick, from which I calculate the width of the street to be 77½ feet, how long is the walking-stick?

III.

1. How many cords are there in a pile of 4 ft. wood 7 ft. high and 4 rods long?

2. How many minutes are there from Friday noon to the middle of the following week?

3. Seven times one number is equal to eleven times another, and the sum of these products is 462, what are the numbers?

4. A table is 27 inches wide, and 37 inches long, how many one cent pieces may be placed on it without overlapping?

5. If the table (in the previous question) were to shrink three-fourths of an inch in length and the same in breadth, would any of the cent pieces fall off?

6. Five slate pencils can be bought for two cents, two drawing-books for nineteen cents, and three oranges for ten cents. A boy goes to town with a dollar in his pocket and buys four drawing-books, half a dozen oranges, ten three-cent stamps, and eight post cards, how many pencils can he buy with what he has left?

7. A farmer raised in one field 28 bush. 3 pks. of potatoes, in another 76 bush. 1 pk., and in the third 25 bush. 1 pk. He sold 97 bush. 3 pks. and put the remainder in his cellar in barrels, each of which held 2 bush. 2 pks., how many barrels did he require?

8. A floor is 15 ft. wide and 18 ft. 4 in. long, what will it cost to cover it with oil cloth at 72 cents a square yard?

9. In a certain school there are 95 pupils on Monday, 87 on Tuesday, 103 on Wednesday, and on Thursday there are 4 more than on Friday. The attendance for the whole week is the same as though 93 had been present every day, what is the attendance on Friday?

10. Find the least number which when 17 is added to it will contain 5, 7, 9 and 11 without a remainder.

IV.

1. Find the greatest divisor of 1693 and 959 that will leave remainders 13 and 7 respectively.

2. A boy can do a piece of work in 12 days and his father in 6 days. If both work at it together how long will it take to do the work?

3. Find the cost of plastering the walls and ceiling of a room 18 ft. long, 15 ft. wide, and 9 ft. high, at seven cents a square yard for each coat, two coats being put on the ceiling and three on the walls.

4. By how many grains is an ounce troy, heavier than an ounce, avoirdupois?

5. How many acres are there in a road 4 rods wide and a mile and a quarter long?

6. A cubic foot of water weighs 1,000 ounces, how many gallons are there in it?

7. If a tract of land is half a mile wide and a mile and quarter long, how many acres does it contain?

8. Lucy goes to town with just money enough to buy apples at 3 cents each, spools at 4 cents, oranges at 5 cents or books at 8 cents each, how much at least has she?

9. A telegraph line, measuring from the first pole to the last one, is 27 miles, 5 fur., 187 yards long; the poles are 99 yards apart, how many are there?

10. A room is 25 ft. wide and 9 yards long, what will it cost to carpet it with tapestry 27 in. wide, at $1.25 a yard?

V.

1. What will it cost to excavate a cellar 18 ft. long, 24 ft. wide, and 6 ft. deep, at 20 cents a yard?

2. Whether will it cost more to cover a floor with carpet 27 in. wide, at 80 cents a yard, or with carpet a yard wide, at $1.07 a yard?

3. If a roll of paper is 18 in. wide and 8 yards in length and costs 25 cents, what will it cost to paper a room 16 ft. long, 14 ft. wide and 12 ft. high if windows and doors take up one-fourth of the wall space?

4. When Capt. John Hull's daughter was married her husband received with her her weight in silver coin. If she weighed 150 pounds, and a silver (U. S.) dollar weighs 412½ grains, how much did her dowry amount to?

5. A boy in school breathes once every three seconds, and when out playing at recess, once every two seconds, how many breaths will he take between 9 o'clock and 12 o'clock if he has 20 minutes recess?

6. A horse, buggy and harness cost $159; the horse and buggy cost $141, and the horse and harness $117. Find the cost of each.

7. A druggist buys quinine at $5 an ounce, apoth. weight, and sells it at $5 an ounce avoir., how much does he get for what cost him $35.

8. My walking-stick, which is more than half a yard long, will exactly measure either the length or the breadth of a room 16 ft. 11 in. wide and 26 ft. 7 in. long, how long is the walking-stick?

9. There are four poor families in a neighborhood; in the first there are 3 children, in the second 5, in the third 7, and in the fourth 9. Mr. Goodman intends to visit one of them and distribute some money among the children, giving the same number of cents to each child. As he is not sure on setting out which family he will visit he provides himself with such a sum of money (under $5) as will enable him to make the distribution in either case, how much does he take with him?

10. Mr. Goodman makes his visit but finds that he cannot distribute the money as he had intended, in consequence of having nothing of less value than a 5-cent piece; which family did he visit?

VI.

1. A coal dealer bought a quantity of coal at $6 a ton, and sold it for 48 cents a cwt., gaining thereby $43.20. How many tons did he buy?

2. The price of butter per pound is just double the price of eggs per dozen, and it costs $3.78 to buy 14 doz. eggs and 14 lbs. of butter. Find the selling price of each.

3. It costs 20 cents a line to insert an advertisement in a newspaper for the first time, 5 cents a line for each of ten subsequent insertions, and $2\frac{1}{2}$ cents a line afterwards. If a person is charged $6.80 for a space of six lines, how often should his advertisement have appeared?

4. £100 are worth $486.65. Find whether an English shilling is worth more or less than 24 cents.

5. If a railway train goes 45 miles per hour, how many yards will it go in a second?

6. A person travelled a distance of 115 miles making the trip in 6 days. He averaged 21 miles 85 yards a day for the first four days; on the fifth he drove 18 miles all but 600 yards. How far was he from his destination on the morning of the sixth day?

7. What will it cost to carpet a floor 36 feet 6 inches long and 30 feet wide, with carpeting 27 inches wide, at $1.50 a yard, if the stripes run lengthwise and the matching of the pattern requires 6 inches to be turned under at one end?

8. Two men offer to dig a cellar 24 feet long, 18 feet 6 inches wide and 9 feet deep. One will do it at a cent and a quarter per cubic foot, and the other at 30 cents per cubic yard. Which is the better offer, and what will be the difference in the cost?

9. I bought 60 pairs of boots for $135. What must be the selling price per pair in order to gain 60 cents on each pair of boots?

10. The bottom of each runner of a sleigh is 10 feet long and 2 inches wide. If the sleigh weighs 400 lbs. and is loaded with 40 bushels of wheat, what will be the pressure per square inch on the snow beneath the runner?

VII.

1. A man wishes to build a cart that will hold 3 cord-feet. The cart is to be 3 feet high, and 4 feet long. How wide must it be?

2. What will it cost to plaster the walls and ceilings of a room 38 feet, 6 inches long, 24 feet wide, and 18 feet high, at 32 cents a square yard, allowing 972 square feet for doors, windows and baseboards?

3. Find the cost of 16 sticks of timber each 10 feet long, 11 inches wide and 3 inches thick, at $16 a thousand feet.

4. A man has 6 acres, 2 roods, 10 perches, and 12½ yards of land. He wishes to divide it into lots of 10 perches 5½ yards. How many lots will he have?

5. Find the difference between the cost of fencing a field 40 yards long, and 30 yards wide, at 60 cents a foot, and building a walk 3 feet wide round it (on the outside,) at 20 cents a square foot.

6. A grocer mixes 20 lbs. of tea worth 60 cents a pound, 30 lbs. worth 40 cents, and 50 lbs worth 25 cents. What is the mixture worth a pound?

7. *A* builds 35 rods of fence in a day; *B* builds 40, and *C* 45. Find the length of the fence that each man would just finish in a whole number of days.

8. A drover bought a number of oxen at $60 each, and twice as many cows at $45 each, paying altogether $1500. How many cows did he buy?

9. The ten dollar gold piece weighs 258 grains. What weight in pounds will a person have to carry who gets $1000 in gold?

10. The United States silver dollar weighs 412½ grains, and the Canadian 5 cent piece weighs 18 grains. How many dollars of Canadian silver are worth as much as $96 United States silver?

VIII.

1. Two men use their walking-sticks to ascertain the distance (which is evidently less than 100 feet) between two trees. The one stick is 29 inches and the other 31 inches in length, and each measure the distance exactly. How far are the trees apart?

2. If in the previous question the trees were known to be more than 100 feet and less than 200 feet apart, what would be the exact distance between them?

3. £15 English money are worth $73 of our money. A person who intends to spend a few months in England goes to a broker with $1,465 to get English money for it. How much will he get if the broker charges him $5 for making the exchange?

4. Johnny White ran away from home one morning at 9 o'clock, and kept going at the rate of 3 miles an hour. At 11 o'clock his father missed him, and started after him at the rate of 4 miles an hour. At what time was Johnny overtaken, and how far had he gone?

5. A picture, frame and all, measures $23\frac{1}{2}$ by $29\frac{1}{2}$ inches, the frame is an inch and a half wide all round. How many square inches are there in the picture itself?

6. I have a ton of coal on hand and start my coal stove at noon on the 27th of October. If the stove burns 34 lbs. of coal a day, on what day will the fire go out if I get no more coal?

7. Fanny has a little clock that ticks twice a second. How many times will it tick in the month of March?

8. An oarsman rows a mile in 5 minutes, and takes 32 strokes a minute. How far does he send his boat at each stroke of the oar?

9. The space occupied by 4 gallons is 1,109 cubic inches. How many gallons will it take to fill a swimming bath 92 feet 5 inches long, 75 feet wide, and 5 feet 6 inches deep?

10. How many tons, cwt., &c., will the water in the previous question weigh?

IX.

1. Find the L. C. M. of 7, 17, 35, 51.

2. A hotel keeper bought a load of 50 bushels of oats at 65 cents a bushel, and sold them out at 25 cents a peck. How much did he make on the load?

3. Forty apples are to be divided among James, Edward, and Frank, in such a way that Frank may have 5 more than James, and James 7 more than Edward. How many will Frank get?

4. A sum of money amounting to $55 is to be divided between Charley and Henry, and Charley is to have $2, for every $3 that Henry gets. How much will Henry receive?

5. A yard 31 ft. 5 in. long, and 26 ft. 11 in. wide, is to be laid with paving-stones, 2 ft. 5 in. by 1 ft. 7 in. What will be the cost of doing the work at 65 cents a stone?

6. If 40 lbs. troy of gold are coined into 1869 sovereigns, how many grains should a half sovereign weigh?

7. A gold dollar weighs 25 grains and a grain of gold is worth 18 times as much as a grain of silver. What is the actual value of a silver 25 cent piece which weighs 90 grains?

8. If the pasture of one cow for one month be taken as the unit, what number will represent the pasture of 4 cows for 8 months? 6 cows for 6 months? 8 cows for 5 months?

9. Divide $54 among *A*, *B* and *C* in such a way that if *A* has $8, *B* shall have $9, and *C* $10.

10. *A*, *B* and *C*, rent a pasture for which they pay $54. *A* puts in 4 cows for 8 months, *B* 6 cows for 6 months, and *C* 8 cows for 5 months. How should they arrange to pay the rent?

X

1. If the unit of length is one yard what will be the measure of a line 30 feet long?

2. A rod 10 feet long is found to measure 120. What is the unit of length used to measure it?

3. If 100 gallons of milk weigh as much as 103 gallons of water; find the weight in grains, of a pint of milk.

4. How long will it take the pupils in your school-room

to breathe all the air in it if each one breathes 15 times a minute, and consumes 30 cubic inches at each breath?

5. A farmer paid for a cow and a sheep with the price of 2 tons 8 cwt. of hay at 60 cents a cwt. The cow cost seven times as much as the sheep. Find the price of each.

6. How far will a ploughman travel in ploughing a 10 acre field whose length is 220 yards if the furrow is 9 in. wide?

7. After a heavy rain followed by a severe frost, an acre of ground was found to be covered with ice an inch thick. Find its weight in tons and pounds, if 11 cubic inches of ice make 10 cubic inches of water and a cubic foot of water weighs $62\frac{1}{2}$ lbs.

8. A gas jet which burns 2 feet of gas per hour is kept lighted 3 hours a day from the 23rd of October, until the 27th of February, inclusive. What will be the amount of the gas bill at $2 a thousand feet?

9. What tax should a person pay on a salary of $900 at 18 mills on the dollar, $400 being exempt from taxation?

10. In Canadian silver coins 37 grains in every 40 are pure silver. How many grains of pure silver will be required in coining $100 silver money, if the 25 cent piece weighs 90 grains?

XI.

1. Find the value of £17 2s. 9d. $\div 11\frac{5}{12}$ + £1 16s. 9d. + $\frac{88}{909}$.

2. What part of half-a-crown is $\frac{1}{7}$ of $\frac{2\frac{1}{4} - \frac{2}{3} \text{ of } 1\frac{5}{6}}{\frac{1}{2} \times 3\frac{1}{3} + 1\frac{3}{38}}$ of $\frac{2}{11}$ of a guinea?

3. What is the value of $\frac{1}{11}$ of $\frac{1}{12}$ of a vessel, if a person who owns $\frac{2}{11}$ of it sells $\frac{1}{5}$ of $\frac{7}{8}$ of his share for £350?

4. What number is that from which if there be taken $\frac{2}{3}$ of $\frac{3}{8}$, and to the remainder $\frac{8}{15}$ of $\frac{5}{18}$ be added, the sum will be 18?

5. Find the sum of ·125 of 383, and ·375 of 13s. 4d.

6. Add together $\frac{15\frac{3}{5}}{7\frac{1}{8}}$ of £140 10s. 6d. and $\frac{3}{5}$ of 4s. 2d.

7. Find the least fraction which, when added to the sum of $\frac{3}{7}$, $\frac{7}{8}$, and $\frac{5}{12}$, will make the result a whole number.

8. Find the difference between $\frac{2}{3}$ of 12s. 6d. and $\frac{3}{5}$ of 14s. 4d. ; and reduce the result to the decimal of 4s. 6d.

9. Add together 1·025 of a minute and ·0625 of an hour, and give the answer in seconds.

10. Subtract 6·42 of a furlong from 3·64 of a mile, and give the answer in yards, and the decimal fraction of a yard.

XII.

1. Reduce to its simplest form :—

$$\frac{1}{10} - \frac{\cdot 4 \times \cdot 0005 + \cdot 002 \times \cdot 012}{\cdot 0009}$$

2. In a cricket match, one side of 11 men made a certain number of runs, one player obtained ·25 of the number, each of the three others, each of two others ·0625, and the rest 39 amongst them, find the whole number of runs.

3. A rent is £540, one-third of which is to be paid in money, one-third in wheat, and the rest in barley. If wheat be at 48s. per quarter, and barley at 30s., how many bushels of each must be paid ?

4. What fraction of half-a-crown is the difference between $\frac{3}{8}$ of a shilling and $\frac{5}{16}$ of a guinea ?

5. A master of a Russian ship worth $25,000 is himself owner of $\frac{3}{8}$ of $\frac{1}{4}$ of $\frac{2}{3}$ of her. He sells her in a neutral port for $\frac{5}{6}$ of her value. What is his own share ?

6. Two chests of tea of the same size and quality are consigned to *A*, *B*, *C*, *A* at first was to have $\frac{1}{2}$ of a chest, *B* $\frac{5}{8}$, and *C* the rest. But *A* and *B* purchase $\frac{3}{11}$, $\frac{2}{11}$ of *C*'s share respectively. How much will each have ? Show how to make the division with only breaking open one chest.

7. A brewer divided $2\frac{1}{2}$ barrels of beer, so that the smaller quantity contained $\frac{2}{3}$ as much as the other; how many pints did each contain?

8. *A* and *B* have 18s. and 12s. respectively; and if *A* gives *B* $\frac{2\frac{3}{5}}{4\frac{1}{2}}$ of the difference of $\frac{2\frac{1}{2}\frac{2}{3}}{13\frac{6}{13}}$ of their respective sums, and $\frac{1}{3\frac{1}{2}}$ of $\frac{8}{9}$ of *A*'s present sum be added to $2\frac{1}{2}$ of half of *B*'s; *C*'s will be $\frac{3}{4}$ of this sum; what is the value of $\frac{3}{4}$ of it?

9. A person performs $\frac{5}{8}$ of a piece of work in 11 days; he then receives the assistance of another person, and the two finish it in four days; in what time could each do the work by himself?

10. I buy a set of watches at 50s. each; I sell them again at a profit of $\frac{1}{10}$ the prime cost; but in the consequence of ready payment I throw of $\frac{1}{20}$ of the purchase money. What gain do I make on the prime cost of each watch, and also on each £100 of my outlay?

XIII.

1. A man owned $\frac{3}{5}$ of a boat, and sold $\frac{1}{4}$ of $\frac{3}{5}$ of his share for $2400. At that rate, what was the whole worth of it?

2. If $\frac{3}{5}$ of a barrel of flour costs $5, how much will 2 bags of flour cost, one containing $\frac{3}{4}$ of a barrel, and the other $\frac{5}{6}$ of a barrel?

3. Bought $\frac{3}{4}$ of $\frac{5}{6}$ of $5\frac{1}{2}$ yards of broad cloth at the rate of $3.50 per yard. Required the cost of it.

4. What will be the cost of $7\frac{1}{2}$ yards of muslin at $12\frac{1}{2}$ cents per yard, and $12\frac{1}{2}$ yards gingham, at $18\frac{3}{4}$ cents per yard?

5. I purchased 7 loads of coal, each containing $15\frac{3}{4}$ bushels, at $12\frac{1}{2}$ cents per bushel. Required the cost.

6. *A* owns $\frac{5}{8}$ of a vessel, and sells $\frac{2}{3}$ of his share to *B* for $45000. What part of the vessel has he left, and what is it worth at that rate?

7. I have \$1000 and wish to lay out \$346$\frac{5}{8}$ of it in sugar at 8$\frac{1}{2}$ cents per pound, and the remainder in coffee, at 11$\frac{3}{4}$ cents per pound. How many pounds of coffee do I buy?

8. A merchant directed his agent to lay out $\frac{5}{8}$ of \$2354 in wheat at 87$\frac{1}{2}$ cents per bushel; $\frac{3}{10}$ of it in rye at 56$\frac{1}{4}$ cents per bushel; and the remainder in oats at 31$\frac{1}{4}$ cents per bushel. How many bushels of each did he purchase?

9. A merchant has 33$\frac{7}{10}$ yards of cloth, from which he wishes to cut an equal number of coats, pants, and vests. What number of each can he cut if they contain 3$\frac{3}{4}$, 2$\frac{7}{8}$, and 1$\frac{1}{8}$ yards respectively?

10. A merchant owns $\frac{9}{16}$ of a stock of goods; $\frac{3}{4}$ of the whole stock were destroyed by fire, and $\frac{7}{10}$ of the remainder damaged by water. What part of the whole stock remained uninjured? How much did the merchant lose, provided the uninjured goods are sold at cost for \$5400, and the damaged at half cost?

XIV.

1. If $\frac{3}{7}$ of $\frac{2}{7}$ of a yard cost $\frac{3}{10}$ of a crown, how many francs shall I pay for 3 yards, the franc being reckoned at 10d.?

2. *A* can do $\frac{1}{2}$ a piece of work in 1 hour, *B* can do $\frac{3}{4}$ of the remainder in an hour, and *C* can finish it in 20 minutes; how long would *A*, *B*, and *C* together take to do it?

3. Simplify $\dfrac{3\frac{3}{7}}{1\frac{1}{2} \text{ of } 2\frac{2}{3}} + \dfrac{8\frac{1}{4} \text{ of } 1\frac{9}{7}}{11} - \dfrac{9\frac{3}{4} \text{ of } 1\frac{1}{3}}{4\left(\frac{1}{2}+\frac{1}{1\frac{1}{4}}\right)} + \dfrac{2-\frac{4}{7}}{1-\frac{4}{5}}$

4. If *A* can reap $\frac{4}{5}$ of a field in 2$\frac{2}{3}$ days, and *B* can reap $\frac{5}{8}$ of it in 4$\frac{1}{2}$ days, in what time can *A* and *B* reap the whole field together?

5. 15 men can reap a field in 9 days; when half the work is done 5 men are obliged to leave; in how many days will the remainder finish it?

6. A boy after giving away $\frac{1}{5}$ of his pocket-money to one friend, and $\frac{3}{7}$ of the remainder to another, has 4d. left. How much had he at first?

7. A has an income of ·69 of $\left(\frac{7\frac{3}{4}-3\frac{1}{2}}{7\frac{3}{4}+3\frac{1}{2}} \div \frac{7}{15}\right)$ of B's income. Compare their incomes; and if B after spending £364 per annum has an annual surplus of ·545 of his income, find A's income.

8. Reduce $\frac{2}{7}$ of $\frac{1}{4}$ of a mile to the decimal of $\frac{2}{3}$ of $\frac{3}{4}$ of 8 miles.

9. Suppose 5 candidates are examined for 2 scholarships, and that A obtains $\frac{3}{4}$ of the whole number of marks given; B twice as many as A gets more than C, who obtains 3 times as many as B gets more than D; that D obtains $\frac{1}{2}$ as many as A, B, C together, and E $\frac{1}{2}$ more than the excess of the sum of A, B, and C's marks together over D's. Determine the successful candidate..

10. If the fraction $\frac{1211}{1331}$ be converted into a decimal will it recur or terminate? why? If it recurs what must be the limit to the number of figures in the recurring part?

XV.

1. If $4\frac{2}{3}$ oz. of tea cost $8\frac{3}{4}$s., what will $30\frac{2}{7}$ lbs. cost?

2. The wages of A and B together for $22\frac{1}{2}$ days amount to the same sum as the wages of A alone for $38\frac{1}{7}$ days. For how many days will this sum pay the wages of B alone?

3. If from a thing an eighth part is taken away, and then from the remainder an eighth part, and so on; after how many operations will what is left be less than half the original thing?

4. A can do in 2 days as much work as B in 3 days, and B in 5 days as much work as C in 4 days? What time will C require to finish a piece of work which A can do in 9 days?

5. A certain number of men mow 4 acres of grass in 3 hours, and a certain number of others mow 8 acres in 5 hours; how long will they be in mowing 11 acres, if all work together?

6. *A* has three times as much money as *B*. They play together, and at the end of the first game *B* wins from *A* three-eights of *A*'s money; what fraction of the sum, which *B* now has, must *A* win back in the second game, that they may have exactly equal sums?

7. Find the value of a ton and a third of sugar, when $\frac{3}{16}$ of a ton is worth £65.

8. *A* does $\frac{3}{4}$ of a piece of work in 4 hours, *B* does $\frac{3}{4}$ of what remains in 1 hour, and *C* finishes it in 20 minutes. How long would they have been doing the whole, if they had worked together?

9. Five brothers join in paying a sum of money: the eldest pays a third of it, and the others pay the remainder in equal shares; and thereby each of them pays £84 more than the eldest brother. What is the sum of money?

10. A cistern is fed by a spout which can fill it in 3 hours; how long would it take to fill it, if the cistern has a leak which would empty it in 17 hours?

XVI.

1. Find the value of $\frac{4}{7}$ of £1 multiplied by $6\frac{3}{4}$, and $\frac{3}{8}$ of $\frac{2}{3}$ of £1 divided by $\frac{1}{4}$.

2. *A* met two beggars *B*, and *C*, and having $\frac{3\frac{7}{11}}{4\frac{2}{7}}$ of $\frac{10\frac{5}{9}}{7\frac{1}{2}}$ of $\frac{77}{100}$ of a sovereign in his pocket, gave *B* $\frac{1}{7}$ of $\frac{2}{3}$ of that sum, and *C* $\frac{2}{5}$ of the remainder. What did he receive?

3. Add together $\frac{2}{3}$ of £1 1s., $\frac{1}{7}$ of £1 6s. 4d. and $\frac{1}{5}$ of 3s. 8d., and express their sum as a fraction of 6s. 8d.

4. How much ore must be raised, that on losing $\frac{17}{20}$ in washing, and $\frac{1}{20}$ of the residue in smelting, there may result 506 tons of pure metal?

5. Find the value of $\frac{4}{5}$ of $\frac{1}{7\frac{1}{2}}$ of 3 sq. yards, 6 feet, at $\frac{9}{11}$ of $\frac{1}{5\frac{1}{2}}$ of 4s. 2d. per sq. foot.

6. The $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$ of a number are added together, and the number is diminished by 139, giving 1343 as the difference. What is the number?

7. The adult population of a country is 22,815,210; the adult females are $\frac{5}{11}$ of the whole population, and the adult males are $\frac{10}{11}$ of the adult females. Find the whole population.

8. *A* and *B* have 18s. and 12 s. respectively. If *A* gives *B*, $\frac{2\frac{3}{8}}{13\frac{5}{13}}$ of $\frac{2\frac{1}{2}\frac{3}{2}}{4\frac{3}{4}}$ of twice the difference of their respective sums, and then $\frac{1}{17}$ of $\frac{5}{8}$ of *A*'s present sum be added to $\frac{11}{13}$ of $\frac{1}{2}$ of *B*'s, *C*'s money will be $\frac{3}{4}$ of the result. What is the value of $\frac{7}{9}$ of *C*'s money?

9. *A* was owner of $\frac{5}{17}$ of a privateer, and sold $\frac{8}{11}$ of $\frac{3}{5}$ of his share for £12$\frac{4}{33}$ what was the value of $\frac{1\frac{1}{7}}{5\frac{2}{3}}$ of $\frac{7}{13}$ of the vessel at the same rate?

10. The sea occupies $\frac{11}{14}$ of the surface of the globe. The surface of Asia is $\frac{121}{27}$ of that of Europe, of Africa is $\frac{7}{27}$, of America is $\frac{111}{29}$, and of Oceania is $\frac{9}{17}$; the surface of Africa is 12,006,522 sq. miles. Find the surface of the globe.

XVII.

1. Reduce $\frac{4\frac{2}{3}\frac{1}{5}}{2\frac{5}{6}\frac{1}{3}}$ of £1 to the fraction of a thaler, when $6\frac{2}{3}$ thalers are equal to 20s.

2. If $\frac{3}{5}$ of an estate be worth £220, what is the value of $\frac{8}{11}$ of the same?

3. If $\frac{12}{13}$ of a number exceeds $\frac{5}{6}$ of half the number by $40\frac{1}{3}$, what must the number be?

4. A legacy of £897, 15s. is to be divided among *A*, *B* and *C*, *A* is to receive $\frac{1}{7}$, *B* is to receive $\frac{3}{5}$, and *C*, the remainder. Find what sum *B* will receive, and the fraction of the whole to be paid to *C*.

5. If $\frac{3}{13}$ of a lottery ticket is worth £4 10s., what is the value of $\frac{4}{9}$ of the ticket?

6. There is a number to which 3 is added, and $\frac{1}{10}$ of the result taken; to this 5 is added and $\frac{1}{12}$ of the result taken, giving $1\frac{1}{2}$; what is the number?

7. If $4\frac{5}{7}$ of a sum of money be equal to $\frac{11}{14}$ of £1 11s. $10\frac{1}{2}$d., find what the sum must be.

8. A person left $\frac{7}{18}$ of his property to his eldest son, and $\frac{7}{18}$ of the remainder to his younger son, and the rest to his widow. The eldest son received £514 6s. 8d. more than the younger; how much did the widow receive?

9. A man's debts amount to $\frac{1}{12}$ of his property, but before paying them he loses $\frac{7}{8}$ of his property; afterwards he recovers a portion equal to $\frac{1}{5}$ of what he has left, and then loses $\frac{1}{6}$ of what he has got. Can he pay his debts? What part of his property remains over?

10. *A* had 10s. in his purse, and *B* having paid *A* $2 \times \frac{3\frac{1}{7}}{2\frac{1}{3}}$ of £1 11s. 6d., finds that he has remaining $\frac{1}{24}$ of the sum which *A* now has; what had *B* at first?

XVIII.

1. If from a certain number $\frac{2}{3}$ of it be subtracted, then $\frac{1}{4}$ of the remainder, then $\frac{1}{2}$ of that remainder, and 6 still remain; what is the number?

2. 20 is $\frac{4}{5}$ of $\frac{3}{4}$ of $\frac{2}{3}$ of what number?

3. Express $\frac{1}{24}$ of 1 lb. troy + $\frac{1}{25}$ of 1 lb. avordupois as troy, and as avordupois weights.

4. A person spends $\frac{3}{5}$ of his money for dry goods, $\frac{2}{7}$ of the remainder for groceries, and has $15 left. How much had he at first?

5. Sampson & Reed sold $\frac{4}{9}$ of a lot of wheat to one party, $\frac{3}{5}$ of the remainder to another, and had 93 bushels left. How much had they at first?

6. In a certain school $\frac{5}{11}$ of the scholars are girls, $\frac{4}{7}$ of the boys are over 16 years old, and 6 boys are under 16. How many girls, and how many scholars in all?

7. In a certain school $\frac{11}{12}$ are boys; $\frac{5}{12}$ of the girls are

under 16, and 13 girls are over 16. How many boys and how many girls in the school?

8. The cargo of a ship, worth $45,000, belongs to three partners, A owns $\frac{7}{9}$ of $\frac{3}{5}$ of it, B's share is equal to $3\frac{3}{14}$ of $\frac{2}{3}$ of A's share, and C owns the remainder. What ought each to receive from the sale?

9. A person bequeathed $\frac{5}{12}$ of his property to A, $\frac{1}{4}$ of it to B, $\frac{1}{3}$ to C, $\frac{1}{8}$ to D, and the remainder $550, to E. What was the value of the whole property?

10. When an ounce of gold is worth $19.45, what is the value ·04 of a pound?

XIX.

1. If a cistern lose by leakage 7 gals. 1 pt. in 49 hrs. 40 min., what is its hourly rate of loss?

2. If the circumference of the earth at the equator be 24,900 miles, at what rate per hour is a person there carried round, one whole rotation being made in 23 hrs. 66 min?

3. If a man travel $3\frac{3}{5}$ miles in $7\frac{1}{2}$ minutes, how many miles will he travel in 50 minutes? and how long will he take to travel 50 miles?

4. If A can mow a certain meadow in 4 days, and B in 3 days; how long will it take both?

5. A requires 4 days, B 3 days, and C $4\frac{1}{2}$ days, to do a certain piece of work. How long will it take, all three working together?

6. A cistern can be filled by means of a water-pipe in 30 minutes, and can be emptied by a waste-pipe in 20 minutes. If the cistern be full, and both pipes be opened, in what time would it be emptied?

7. A can mow $\frac{5}{6}$ of a field in 3 days; B can mow $\frac{2}{3}$ of it in 4 days. How long will it take both to mow the field?

8. One pipe can fill a cistern half full in $\frac{3}{4}$ of an hour, and another can fill it three-quarters full in $\frac{1}{2}$ an hour. How long will it take both pipes to fill the cistern?

9. A pipe can fill a cistern one third full in $\frac{1}{4}$ of an hour; a waste-pipe can empty $\frac{1}{4}$ of the cistern in 20 minutes. If both pipes are opened, in what time will the cistern be filled?

10. *A* and *B* can do a piece of work in $2\frac{1}{2}$ days; *A* and *B* in $3\frac{1}{3}$ days; *B* and *C*, in $4\frac{1}{2}$ days. Required the time in which all three, working together, can do the work, and in which each can do it alone.

XX.

1. What length of board 15 in. wide will contain 11 sq. ft. 36 sq. in.?

2. What length of road 44 ft. wide will contain an acre?

3. In rolling a grass plot 24 yds. long and containing 400 sq. yds., how many times must a roller 3 ft. 4 in. wide be drawn over it lengthwise so that the whole may be rolled?

4. How many sods each 2 ft. $3\frac{1}{2}$ in. long, and $8\frac{1}{4}$ in. broad, would be required to turf an acre of ground?

5. Find the expense of glazing four windows, each containing 12 panes, the panes being each a foot long, and 10 in. wide, and the price of the glass 38 cents per square foot.

6. How many yards of carpeting $\frac{3}{4}$ of a yard wide will be required for a floor 26 ft. long, $15\frac{3}{4}$ ft. wide, if the strips run lenthwise? How many if the strips run across the room? How much will be turned under in each case?

7. How many square yards of oil cloth will be required for a hall floor $5\frac{1}{2}$ yds. long, and 10 ft. wide?

8. Find the number of yards of plastering in the walls of a room $21\frac{1}{4}$ ft. long, $16\frac{1}{2}$ ft. wide, and 11 ft. high, if 12 sq. yds. be allowed for doors, windows, and baseboards.

9. Find the cost of papering a room 20 ft. 6 in. long, 17 ft. 4 in. wide, 9 ft. high, with paper 18 in. wide, 8 yards in a roll, at 75 cents a roll; allowing for 2 doors, each 7 ft. high, 3 ft. wide, and for 3 windows, each 5 ft. 6 in. high, and 3 ft. 3 in. wide.

10. A piece of wood 5 ft. long, 1 ft. broad, and 9 in. thick, is cut up into matches $2\frac{1}{2}$ in. long, and $\frac{1}{10}$ of an inch square. How many will there be if allowance be made for waste in cutting?

XXI.

1. Find the interest on \$300 for 3 years at 3 per cent.
2. Find the interest on \$600 for $3\frac{1}{2}$ years at 6 per cent.
3. Find the interest on \$100 for 4 years at $6\frac{1}{2}$ per cent.
4. Find the interest on \$50 for $3\frac{3}{4}$ years at 8 per cent.
5. *A* borrows from *B* \$400 at 6 per cent. interest. How much more than \$400 should *A* pay to *B* at the end of two years?
6. If *C* puts \$25 in the Savings Bank which pays 4 per cent, how much interest will be coming to him at the end of six months?
7. What is the interest on \$100 for ten months at 6 per cent?
8. What interest will be due on \$50 at the end of 8 months at 9 per cent?
9. What sum should be paid for the use of \$150 for 3 months if money is worth 8 per cent. per annum interest?
10. What will it cost me to get the use of \$360 for 5 months if \$100 for a year costs \$12?

XXII.

1. What will \$360 amount to in 3 years at 8 per cent.?
2. A person puts \$40 in the Savings Bank which allows 4 per cent. per annum to depositors. How much can he draw out at the end of 4 years?
3. A young man puts away \$20 a year in the Post Office Savings Bank which pays 4 per cent. How much will he be worth at the end of 3 years?

4. A person leaves a debt of $185 unpaid for 2 years and 3 months. How much will he then owe if he is liable for a charge of 6 per cent. interest?

5. A debt of $700 on which 8 per cent. interest may be charged is left unpaid from the 1st of January till the 1st of October of the same year. How much money will then discharge the debt?

6. Mr. Hardup borrows from a Loan Company as follows:

$360 on the 1st of February at 8 per cent.
$500 " " July " 6 "
$450 " " December 7 "

With what sum can he discharge his indebtedness on the 1st of July of the year following?

7. A person borrows $10 on the first day of every month throughout the year. How much will he be owing on the 31st. of December if he is compelled to pay interest at the rate of 1 per cent. a month?

8. If a payment of $6 be regarded as a fair compensation for the use of $100 for one year, what sum will be required to repay a loan of $1,000 which I have had for 3 months?

9. If $8 will secure the use of $50 for 2 years, how much will be due on every dollar of a debt that has been left unpaid for fifteen months?

10. What will a dollar amount to

In 20 years at 5 per cent.?
In 5 " 20 " ?
In 10 " 10 " ?
In 8 " 12½ " ?

XXIII.

1. If I can secure the use of $100 for 3 years for $18, how much must I pay every year for the use of $7,348?

2. $2,800 borrowed money is returned at the end of 73 days. How much interest should accompany it if money is worth 10 per cent. per annum?

3. What will $1 amount to in 216 days at 5 per cent. per annum?

4. If I have to pay $6 for the use of $200 for 6 months, how much shall I have to pay daily for the use of $6,205?

5. On the 15th of March a retail merchant buys goods to the amount of $3,285. Any money he pays within 30 days will be accepted as cash payment, but for any time over and above the 30 days he must pay at the rate of 1 per cent. for every 2 months. If he pays the amount in full on the 26th of June, how much interest will he be charged?

6. Find the amount of $1 for 3 years 6 months and 20 days at 10 per cent.

7. If money deposited in a Savings Bank brings 4 per cent. a year, and a boy deposits $6 every 6 months for 6 years, how much will there be to his credit at the end of that time?

8. A person borrows $1,000 at 6 per cent. interest. At the end of one year he repays $300; at the end of two years $300. How much shall he have to pay at the end of the third year to free himself from the debt?

9. If money is borrowed at 5 per cent. interest, how long will it be till the interest is as much as the principal?

10. A debt remains unpaid for 12 years and 6 months, and is then discharged by paying double the original debt. What rate per cent. was charged?

XXIV.

1. What fraction is 10 per cent.? 5 per cent.? $12\frac{1}{2}$ per cent.? 7 per cent.?

2. What per cent. is $\frac{1}{8}$, $\frac{2}{50}$, $\frac{1}{10}$, $\frac{1}{3}$?

3. If money is borrowed for 3 years at 5 per cent., what fraction of the sum borrowed will the interest be?

4. If unity represents the sum borrowed what number will represent the interest due at the end of 2 years 7 months, at 7 per cent. per annum?

5. Find the interest on $1 for 3 years, 8 months, and 15 days, at 8 per cent. per annum, giving your answer as a fraction of a dollar.

6. To what fraction of itself will a sum of money amount in 3 years and 4 months, at 6 per cent interest?

7. What will a guinea amount to in 1 year, 10 months, and 20 days, at 10 per cent.?

8. What will be the amount of one for 2 years, and 219 days, at 3 per cent. interest?

9. By what fraction must you multiply $1000 in order to find what it will amount to in 4 years, 9 months, and 12 days, at 6 per cent. interest, and what will the amount be?

10. Find in this way the amount of $9 for 1 year, 11 months, and 5 days, at 8 per cent.

XXV.

1. When must the following note be paid?

HAMILTON, March 3, 1886.

Fifteen days after date I promise to pay *A. B.*, or order, the sum of $300, value received.

C. D.

2. If the above note had been drawn for 1 month instead of 15 days, when would it have been due?

3. When must notes dated and drawn as follows be paid?

1. February 2, at 1 month.
2. January 30, " 1 "
3. " 29, " 1 "

4. When may payment be demanded of the following notes?

1. December 31, at 2 months.
2. October 23, at 60 days.
3. February 21, 1888 at 90 days.

5. A note is drawn for 30 days and legally payable on the 2nd of July. What two dates may it bear?

6. A note dated September 22, is legally payable December 26, in what three ways may the time be mentioned in it?

7. When is the following note due, and how much must there be paid to take it up?

TORONTO, March 19, 1885.

Eleven months after date, for value received, I promise to pay John Smith, or order, the sum of $400 with interest, at the rate of 9 per cent. per annum.

W. JAMES.

8. Goods are bought to the value of $1825, and a note nominally due in 87 days is given in payment. If money is worth 8 per cent. what sum should appear on the note?

9. The sum of $1000 is borrowed on the 27th of June: draw a note to secure the payment of principal and interest on the 20th November, money being worth 7½ per cent interest.

10. A note for $378.90, on which one half of one per cent. a month is to be charged, if not paid when due, becomes legally payable on the 9th November; how much will be required to discharge the note on the 24th of the following August?

XXVI.

1. If *A* is $\frac{5}{6}$ of *B*, what fraction is *B* of *A*?

2. If $500 amount to $700 in a certain time and at a certain rate per cent., what fraction is the principal of the amount?

3. If a sum of money bears interest for 5 years at 6 per cent., what fraction of the principal is the amount? What fraction of the amount is the principal?

4. If money is borrowed for 10 years at 5 per cent., what fraction must the amount be multiplied by to get the principal? If the amount is $150, what is the principal?

5. A sum of money was loaned for 5 years at 8 per cent. and amounted to $70, by what fraction must the $70

be multiplied in order to find the sum lent? What was the sum?

6. What sum will amount to $1,200 in 4 years at 5 per cent.?

7. If it requires $12.10 to discharge a debt contracted 3 years ago; find what the debt was at first; money being worth 7 per cent.

8. What will $1 amount to in 1 year and 73 days at 7½ per cent? What sum will amount to $1 under the same circumstances?

9. What fraction of £1 will amount to £1 in 2 years and 219 days at 5 per cent?

10. What sum will amount to $610 in 2 years 9 months at 8 per cent?

XXVII.

1. A person borrows money for 3½ years at 8 per cent., and repays principal and interest with $320. How much did he borrow?

2. What sum borrowed on the 25th of May can be repaid by $738.40 on the 23rd of July, if money brings 7 per cent. interest?

3. In 2½ years I shall have to pay off a mortgage which by that time will amount to $550. How much money put in the Savings Bank, at 4 per cent, now will enable me to discharge the mortgage when due?

4. On the 10th day of July I purchase goods to a certain amount, for which I have the option either to pay cash or to give my note for such an amount as will include interest at the rate of 6 per cent. per annum. The note is for $640 which must be paid on the 3rd of December. Find the cash price of the goods.

5. A person borrows money for two years. For the first year he pays 10 per cent., and for the second year 11 per cent. At the end of the time he pays back $1210. How much does he borrow?

6. To what fraction of itself will a sum of money amount in 5 years under the following arrangement:—During the first year the rate of interest is to be 5 per cent., during the second 5¼ per cent., and so on, increasing by ¼ per cent. each year?

7. A person, who had deposited money in a Savings Bank under the above conditions, returned after an absence of 6 years and drew out $214. How much must he have put in?

8. What sum will amount to $36.10 in 3 years 4 months and 20 days at 6 per cent?

9. What sum will amount to 1,087 guineas in 2 years 7 months and 5 days at 8 per cent?

10. What fraction of a dollar will amount to $1 in 4 years 10 months and 25 days at 7 per cent?

XXVIII.

1. If I pay $30 for the use of $100 for 6 years; what should I pay for the use of $50 for 1 year?

2. What rate per cent. per annum is paid when the use of $600 for 7 years is worth $168?

3. What is money worth when I have to pay $63 for $360 which I had borrowed for 3 years and 6 months?

4. I borrowed from a banker $730 on the 16th. of July, and on the 30th of August repaid him in full with $739.90. What rate per cent. per annum did he charge me?

5. What is money worth if $50 amounts to $54 in 292 days?

6. In how many years will $560 amount to $756 at 7 per cent. interest?

7. When money was worth 6 per cent. I had to pay $19.14 for the use of $365. How many days had I it?

8. In what time will a sum of money double itself at 6 per cent.. 8⅓ per cent., 12½ per cent.?

9. In how many days will a dollar amount to $1.13 at 5 per cent?

10. In how many years will a dollar amount to $3 at 6 per cent?

XXIX.

1. A farmer mortgages his farm for 10 years for $3,000 at 6 per cent. per annum, payable half-yearly. What will each payment of interest amount to, and how much interest will he have paid at the end of the 10 years?

2. What sum will amount to $1,325.50 in 3 years, 7 months, and 12 days at 9 per cent.?

3. The interest on a sum of money for 1 year 223 days at 7 per cent is $246.96. What is the sum?

4. At what rate per cent. will $80 amount to $91.70 in 2 years 3 months?

5. On the 10th of May $730 was lent at 5 per cent. In what time had the interest amounted to $8.20?

6. To what fraction of itself will a sum of money amount in 6 years 7 months 18 days at $7\frac{1}{2}$ per cent?

7. At what rate per cent. will the principal amount to $1\frac{7}{8}$ of itself in 2 years 8 months?

8. What fraction is the principal of the amount when the time is 156 days, and the rate 7 per cent?

9. If in finding the interest on $100 for 20 days at 6 per cent, we call 20 days $\frac{2}{3}$ of a month, will the result obtained be too great or too small, and by how much?

10. "To find the interest on $100 for any number of months at 6 per cent. divide the number of months by 2, and the quotient will be the interest in dollars." Explain this rule.

XXX.

1. *A* offers for a house $2180 payable at the end of 3 years, *B* offers $455 cash, and $455 at the end of each year for three years, *C* offers $1600 cash. Which of these is the best offer money being worth $8\frac{1}{2}$ per cent?

2. If I borrow $1000 for 3 years at 10 per cent. with the understanding that the interest due at the end of each year shall form part of the principal for the next year, how much shall I have to pay at the end of 3 years?

3. A note is drawn promising to pay $1000 in 62 days with interest at 7 per cent. How much interest is payable when the note is due?

4. A note is drawn promising to pay a certain sum in 70 days, with interest at 7½ per cent. The note is discharged when legally due by paying the sum named, and $6 for interest. What sum was named in the note?

5. In what time will the interest on a sum of money be equal to the principal at 5 per cent?

6. A person borrows a sum of money for 2 years, and has to pay 10 cents interest for every dollar he borrowed. What rate per cent. was he paying?

7. If the use of $1000 for 2½ years costs me $162.50, how many cents interest am I paying every year on each dollar borrowed?

8. At what rate per cent. will $1500 amount to $1891 in 3 years, 3 months, and 3 days?

9. *A* borrows $3205 on the 3rd of May, and on the 15th July, the interest due is $96.15. At what rate did he borrow?

10. "To find the interest on $1000 for any number of days at 6 per cent., divide the number of days by 6, and the quotient will be the interest in dollars." Explain this rule. Is it strictly correct?

XXXI.

1. The population of a town in 1870 was 12,275, and it increased 8 per cent. in the next ten years. Find the population in 1880.

2. How much metal will be obtained from 356 tons of ore, if the metal be 7 per cent. of the ore?

3. If gunpowder contains 75 per cent. of saltpetre, 10 per cent. of sulphur, 15 per cent. of charcoal, how much of each is there in a ton of powder?

4. If $3\frac{3}{4}$ tons of sulphur are required to make $31\frac{1}{4}$ tons of gunpowder, what is the per cent. of sulphur in gunpowder?

5. Tea at 60 cents, 86 cents, and 96 cents a pound are mixed in equal quantities, and sold at 90 cents a pound. Find the gain per cent.

6. By selling goods for $1,173.92, a merchant gains $153.12. Find the gain per cent. on cost.

7. What was the cost when $17\frac{1}{2}$ per cent. was gained by selling goods for $253.80?

8. A wine merchant mixes 24 gallons, at $7 a gallon, with 18 gallons, at $5 a gallon, and sells the whole at $7 gallon. What does he gain per cent.?

9. By selling a horse for $200 a dealer loses 12 per cent. What could he have gained or lost per cent. by selling at $250?

10. If by selling goods for $12\frac{1}{2}$ per cent. profit, a merchant clears $800, what was the cost of the goods, and for how much were they sold?

XXXII.

1. A spirit merchant buys 75 gallons at $3.25 a gallon, and drawing off 10 gallons, sells the remainder so as to gain 5 per cent. on the whole. What is the selling price per gallon?

2. A tradesman marks an article $5, but takes off 50 per cent. for cash. If his profit is 14 per cent. what was the cost of the article?

3. What would a dishonest dealer gain per cent. by using a false weight of 15 ounces instead of a pound?

4. A tradesman in selling goods, deducts from the marked price 5 per cent. for cash. What is the marked price of some goods for which he receives $7.12\frac{1}{2}$?

5. A dishonest dealer gains 12 per cent. by using false weights. What is the real weight of his pound?

6. The lead ore from a certain mine yields 60 per cent. of metal, and of the metal $\frac{3}{4}$ of 1 per cent. is silver. How much silver and lead will be obtained from 1,200 tons of ore?

7. What per cent. above cost must a man mark his goods in order that he may take off 20 per cent. from the marked price, and still make 20 per cent. on the cost?

8. How many per cent. above cost must a man mark his goods in order that he may take off 15 per cent. from the marked price, and still make a profit of 15 per cent.?

9. By selling a carriage for $117, a carriage-maker lost 10 per cent. of the cost. What ought he to have sold it for to make 10 per cent.?

10. 7 pounds of a certain article lost 3 ounces in weight by drying. What per cent. of the original weight is water?

XXXIII.

1. A dealer purchased a quantity of oysters, fish and clams, and paid for the entire quantity $59.40. The cost of the clams was 65 per cent. of that of the oysters, and the cost of the fish 20 per cent. of that of the oysters and clams together. Find the cost of each.

2. If 50 per cent. be added to a number the sum will be 270. What is the number?

3. A partner drew out 30 per cent. of his interest in a manufacturing firm, and had $2,100 remaining to his credit. What was his interest in the firm?

4. A lady spent $280 for clothes and jewelry. She paid 20 per cent. more for jewelry than clothes. How much did she expend on each?

5. The number of votes cast for the election of a senator in a legislature was 120, and the successful candidate received a majority of 30 per cent. of the total votes cast. How many votes did he receive?

6. In the manufacture of cloth 680 pounds of cotton and wool were mixed together. If 140 per cent. more cotton than wool was used, how many pounds of wool did the mixture contain?

7. A dairyman paid $30 for eggs, $40 for butter, and $20 for cheese. He made 20 per cent. profit on the eggs, 35 per cent. on the butter, but sold the cheese at 80 per cent. of its cost. What was the gain or loss?

8. What is the gain on 360 yards of cloth, bought at 3s. 4d. per yard, and sold at a profit of 75 per cent.?

9. Purchased 60 gallons refined petroleum at $7\frac{1}{2}$ cents per gallon. Sold 40 gallons at $9\frac{3}{8}$ cents per gallon, and the remainder at $8\frac{1}{4}$ cents per gallon. What was the gain per cent?

10. Corn purchased at $45\frac{5}{8}$ cents per bushel was sold for $54\frac{3}{4}$ cents per bushel. What was the rate per cent. of gain?

XXXIV.

1. A stock of goods cost $300, and freight 5 per cent. additional. If 40 per cent. of the goods be sold at a profit of 27 per cent. and the remainder at 25 per cent., what is the gain?

2. Bought an invoice of fruits for $340. Sold 75 per cent. of the invoice at $66\frac{2}{3}$ per cent. of the entire cost, and the remainder at 25 per cent. gain. What was the net loss?

3. The retail price of a book sold by agents is $5 per copy. If the agents are allowed a discount of 40 per cent. what per cent. do they gain upon their investments?

4. An excavator contracted to dig a cellar at 30 cents per cubic yard. He paid his laborers 24 cents per cubic yard. What per cent. does the excavator gain?

5. A grain dealer sold 240 bushels December wheat, costing $1.14 per bushel, at $99\frac{3}{4}$ cents per bushel. What was his per cent. of loss?

6. A dry goods merchant's stock is valued at $89,640,

35 per cent. of which are imported goods. What is the value of the imported goods?

7. Paid an attorney $18.16 for collecting a bill of $27.64. What rate per cent. did he charge for his services?

8. A bankrupt can pay $1,300 which is $\frac{1}{3}$ of his indebtedness. How much can he pay on the dollar?

9. A farmer after losing $\frac{3}{4}$ of 16 per cent. of his flock of sheep, had 264 remaining. How many sheep did the farmer own?

10. The population of a certain city decreased in 1876, 10 per cent., and in 1877, 6 per cent. On January 1st 1878, the number of inhabitants was 55,413. What was the population in 1876?

XXXV.

1. By selling an article for $5 less than the value I lose $12\frac{1}{2}$ per cent. Had I sold it for $8, what per cent. would I have gained?

2. A merchant marks his goods at an advance of 40 per cent. on cost, and allows a customer a reduction of 15 per cent. from his bill. Find the amount of that bill, if the merchant makes a profit of $38 on the transaction.

3. A 36-gallon keg is $\frac{2}{3}$ full of vinegar, $\frac{3}{4}$ pure. 10 per cent. is drawn out, and the keg filled with water. What is the percentage of its purity now?

4. A city pays its tax-collector 5 per cent. on all taxes collected, what must be the amount of taxes levied to realize $95,000?

5. A bookseller marks his books at a profit of 50 per cent., but allows pupils a discount of 10 per cent., what profit does the bookseller make?

6. If eggs are bought at 15 cents a dozen, and sold at $1\frac{1}{2}$ each, how much is gained per cent.?

7. A grocer sells ten pounds of butter for what eight pounds cost him. What is his gain per cent.?

8. In a mixture of wine and water the water is 20 per cent of the wine, and when 25 gallons of water are added the water is 40 per cent. of the wine. Find the original quantities of each.

9. A boy buys newspapers at 25 cents a dozen, and sells them at 3 cents a piece, what rate of profit does he mak ? ?

10. By selling cloth at $1.50 a yard, I gain 20 per cent. What is my gain on a sale amounting to $40 ?

XXXVI.

1. A forest contains 120,000 cords of wood; how much will it contain in five years, if the annual increase is $3\frac{1}{4}$ per cent. ?

2. A dealer bought a horse expecting to sell it again at a price that would have given him 10 per cent. profit on his purchase; but he had to sell it for $50 less than he expected, and he then found that he had lost 15 per cent. or what the horse cost him. What did he pay for the horse ?

3. Coffee is bought at 25 cents a pound, and chicory at 10 cents a pound; in what proportion must they be mixed that 10 per cent. may be gained by selling the mixture at 15 cents a pound ?

4. A person spends $\frac{1}{3}$ of his income, saves $\frac{1}{4}$, and pays 5 per cent. on the whole as interest at $7\frac{1}{2}$ per cent. on his debt, and then has $150 remaining. What was the amount of his debt ?

5. A man spends $25 in buying two kinds of silk at $\$1.12\frac{1}{2}$, and $1 a yard; if by selling it all at $\$1.08\frac{1}{3}$ per yard he gains 2 per cent., how much did he buy ?

6. A merchant buys goods at a discount of 30 per cent. from the list price, and sells at 20 per cent. from the list price. What per cent. does he gain ?

7. A merchant sells goods at 20 per cent. profit, and takes eggs at market value in payment. If two eggs in each dozen are bad, what per cent. does he gain ?

8. *A* has $33\frac{1}{3}$ per cent. less money than *B*; how much per cent. has *B* more than *A*?

9. A merchant sells his goods at a profit of 20 per cent. What amount of goods must he sell to gain $3,000?

10. A man both in buying and selling cheats 10 per cent. by means of false scales. Find his fraudulent gain per cent. on goods bought and sold.

XXXVII.

1. A horse was bought for £34 and sold for £27 12s 6d. What was the loss per cent?

2. By selling an article for 3s. 9d. a person loses 5 per cent? At what price must he sell it to gain $4\frac{1}{2}$ per cent.?

3. The cost of a 38-gallon cask of wine was £25, and 8 gallons are lost by leakage. At what price per gallon must the remainder be sold to realize 10 per cent. on the outlay?

4. A person having bought goods for £40, sells half of them at a gain of 15 per cent. For how much must he sell the remainder so as to gain 20 per cent. on the whole?

5. If a tradesman gains 4s. $10\frac{1}{2}$d. on an article which he sells for 10s. 3d., what is his gain per cent.?

6. If 100 lbs. of tea be bought at 2s. 2d. a pound and sold at 2s. 6d., and 100 lbs. of sugar be bought at $4\frac{1}{2}$d a pound and sold at $5\frac{1}{2}$d. What profit per cent. will be realized on the outlay?

7. A stationer sold quills at 11s. a thousand, clearing three eights of the money; what would be clear by selling them at 13s. 6d. a thousand?

8. A bankrupt stock was sold for £520 10s. at a loss of 17 per cent. on the cost price; had the stock been sold in the ordinary course of trade it would have realized a profit of 20 per cent. How much was it sold under the trade price?

9. A farmer sold 250 bushels of wheat at 6s. 8d. a bushel at a loss of $7\frac{1}{2}$ per cent; afterwards he sold 150 more at a

gain of 12½ per cent. What is his profit on the latter transaction, and how much does he gain on the whole?

10. If eggs be bought at 21 for a shilling, how many must be sold for a guinea to give a profit of 12½ per cent.?

XXXVIII.

1. *A* bought goods to the value of £345 15s., and sold them to *B* at a gain of 15 per cent. on his outlay, and *B* sold them to *C* at a loss of 15 per cent. on his outlay; how much did *C* give for them?

2. *A* sells goods to *B* at a gain of 22½ per cent., and *B* sells the same goods to *C* at a gain of 7½ per cent. *C* gave £263 7s. 6d. for the goods, how much did *A* give for them?

3. A deduction is made for a debt of £1373 6s. 8d., and £1308 2s. is accepted in discharge of it. At what rate per cent. is the deduction made?

4. If a tradesman's pound weight is 13 drams too light, find his gain per cent. from this source alone.

5. If a debt after a deduction of 3 per cent. becomes £210 3s. 4d., what would it have become if a deduction of 4 per cent. had been made?

6. A person buys a farm of 150 acres for £4624, and after repairing the buildings lets it at 30s. an acre, thereby getting a return of 4½ per cent. for his money; how much did he expend on repairs?

7. A builder buys half an acre of land at 15s. 9d. a square yard, and builds a house upon it at a further cost of £2094 5s. What rent per annum must he obtain to realize 9 per cent. on his outlay?

8. After deducting a charge of 10 per cent. on a certain sum and, then a charge of 12½ per cent. on the remainder, the result is £787 10s. Required the original sum.

9. After deducting 2 per cent. for income-tax, and 4 per cent. of the remainder for collection, the value of a rental is £490. What is the value of the rental before deduction?

10. A man bought a horse and cow. The cow cost $\frac{1}{3}$ as much as the horse. He gained 10 per cent. on the cost of the cow, and 20 per cent. on the cost of the horse; what was his average gain per cent.?

XXXIX.

1. If 100 lbs. of tea be bought at 4s. 4d. and sold at 5s., and 100 lbs. of sugar brought at 6d. and sold at 7d., what profit per cent, will be realized on the whole outlay?

2. A person buys five-sixths of a property, which afterwards rises in value 20 per cent. He then sells two thirds of his share for £160. What was the property originally worth?

3. A publisher sells books to a bookseller at 10 per cent. profit; the bookseller sells to his customers at 25 per cent. profit. How much per cent. more than prime cost does the purchaser of the books pay?

4. A person on selling apples at 3 for a penny gains 5 per cent; show that he will lose £24 8s. per cent. if he sells them at 25 for 6d.

5. If I buy cheese at 3 guineas a cwt., and sell it again at 10½d. per pound, what is the gain per cent. supposing the loss in weight on each cwt. to be 4 lbs.?

6. An inn-keeper buys port at the rate of £90 per pipe, and retails it at the rate of £3 per dozen, each bottle containing 1½ pints; what is his profit per cent.?

7. A bankrupt's stock was sold for £510 at a loss of 15 per cent. on the cost price. Had it been sold in the ordinary course of business it would have realized a profit of 18 per cent. How much was it sold below trade price?

8. What is the difference between a loss of 5 per cent. on the prime cost and on the selling price of an article which was sold for £50?

9. A tea-dealer mixes together 3 lbs. of tea at 5s., 4 lbs. at 6s., and 5 lbs. at 7s., and sells the mixture at 6s. 9¼d. per pound. How much per cent. does he gain by the transaction?

10. A merchant sold goods for £75 and lost 10 per cent., whereas he should have gained 30 per cent. How much were they sold under their proper value?

XL.

1. The rate of freight on 26,000 lbs. of hardware was 60 cents per 100 lbs. It was adjusted between a railroad company and a steamboat company. If the latter received 20 per cent. of the rate what were the charges by rail?

2. A merchant's annual receipts amounted to $45,672, and his disbursements $26,686.80. What per cent. of his receipts were his disbursements?

3. The bread made from 392 lbs. of flour, weighs 529.2 lbs. What per cent. more does the bread weigh?

4. A bank possessing a paid up capital of $125,000, divides among its stock-holders $3,750. What is the per cent. of dividend declared?

5. An inventor owned 32½ per cent. of a patent right, and sold 20 per cent. of his share for $650. What was the value of the patent right?

6. A merchant sold an invoice of damaged goods at 20 per cent. below the first cost. The charges for freight and insurance were 5 per cent. How much did he pay for freight and insurance if the sales were $840?

7. A gentleman dying divided his property between his wife, son and daughter. He bequeathed his wife 40 per cent. and then had $18,600. The daughter received 25 per cent. of the property and the son the remainder. How much did each receive?

8. A coal merchant sold 40 per cent. of ⅔ of his interest for $4,800 cash, and for the balance of his entire interest he received a note payable in four months. What was the face of the note?

9. Bought an invoice of goods upon condition that if I paid 40 per cent. cash, I would be allowed 40 per cent. discount. I accepted the terms and paid $50. What is the balance due?

10. A capitalist invested $1,500 in city bonds, paying 6 per cent. which sum was ⅜ of 20 per cent. of his capital What is the amount of his capital?

XLI.

1. The difference between the numbers representing the weight of a bale of goods in pounds troy, and pounds avoirdupois is 62. Find the weight in pounds avoirdupois.

2. A man bought a horse in the United States, and paid $20 duty for bringing him into Canada, where he sold him at a loss of $13. If he had paid no duty he would have gained 7 per cent. at the same selling price. Find cost price.

3. Divide $111 among *A*, *B* and *C*, so that *A* may have $1 less than *B*, and twice as much as *C*.

4. Water expands 10 per cent. when it turns to ice. How much per cent. does ice contract when it turns to water?

5. *A* and *B* have equal sums of money, *A* gains $250, *B* looses $95, and then *A* has twice as much as *B*. How much had each at first?

6. In a division the majority was 102, which was $\frac{2}{13}$ of the whole number of votes, how many voted on each side?

7. A boat starts from Toronto to Hamilton at the rate of 14 miles per hour, at the same time that another boat leaves Hamilton for Toronto at the rate of 3 miles in 15 minutes; find the distance from Toronto to Hamilton if the boats meet in an hour and a half after starting.

8. How many piles of wood 12 ft. long, 4 ft. wide, and 4 ft. high, can be made out of a pile 48ft. long, 16 ft. wide, and 6 ft. high?

9. A man's age is double his son's age, and half his father's age, and the sum of their ages is 140 years. Find the age of the grandfather.

10. John spent $\frac{8}{13}$ of his money and had $2.50 left. How much money had he at first?

XLII.

1. John gave William 40 cents. then William gave John 64 cents. William has now $\frac{12}{13}$ of what he had at first, and John has half as much again as he had at first. How much have the two?

2. A telegraph pole is 22 ft. long, and the part in the ground is $\frac{2}{11}$ of the whole length. How far is the top of pole from the ground?

3. One-eleventh of a farm is worth $19.80 more than $\frac{1}{12}$ of it. Find the value of $\frac{2}{3}$ of the farm.

4. A farmer sold 80 bus. of oats at 66⅔ cents a bushel, and 5 cords of wood at $4.62½ a cord. He received in payment 64 lbs. sugar at 11¼ cents per pound, 25 lbs. of tea, at 87½ cents per pound, and the remainder in money; how much money did he receive?

5. Albert Edward, Prince of Wales, was born Nov. 9th 1841, and married March 10th, 1863. His eldest son was born January 8th, 1864. What is the difference between the age of the Prince of Wales at the time of his marriage and the age of his son April 24th, 1885?

6. Find the cost of papering a room 30 ft. long, 24 ft. wide, 18 ft. high with paper 18 inches wide, 8 yards in a roll at $1.25 a roll. In the room are 3 doors each 7 ft. high, 3 ft. wide, and 4 windows each 5 ft. high, and 3 ft. wide.

7. A shed 12 ft. long, 5 ft. wide, 4 ft. high is full of wood, and another 6 ft. long, 4 ft. wide, and 4 ft. high is ¾ full. What is the value of the wood in the two sheds at $6 a cord?

8. If a ton of coal occupy 40 cubic feet of space, what would be the expense of filling a bin 16 ft. long, 6 ft. wide, and 4 ft. deep, at $5 a ton?

9. What is the cost of painting both sides of a fence 4 ft. high, enclosing a field 20 rds. long, and 90 ft. wide, at 27 cents a square yard?

10. An engine running at the rate of 48 miles an hour, runs 6⅔ per cent. faster than usual; what is the usual speed?

XLIII.

1. George and Charles have each a bicycle which they are willing to sell for $30. George will make 20 per cent., but Charles will loose 20 per cent. by the sale. What was the cost of each?

2. A man bought a span of horses and a carriage for $800, and sold them for $1000. What was his gain per cent?

3. In a school of 45 pupils there are 5 scholars absent, in another school of 40 pupils there are 4 pupils absent. Which school has the better per cent. of attendance, and what is the difference in per cent?

4. A merchant sent to an agent $3895 to invest in tea, at 76 cents a pound, after deducting his commission of $2\frac{1}{2}$ per cent., how many pounds of tea did he buy?

5. A store rents for $75 a month, the taxes and the expenses are $180 a year, and the owner has 5 per cent. clear profit on the money he paid for the store. What did he pay for it?

6. A fishing craft insured for $10,000 at $2\frac{1}{4}$ per cent. was totally wrecked. How much of the loss was covered?

7. A person insured his house for $\frac{4}{5}$ of its value at 80 cents per $100, paying a premium of $64.60. What was the value of the house?

8. George Winslow loaned to a friend a sum of money at 7 per cent. interest, at the end of 18 months the friend paid his debt, principal and interest, in all $1657.50. How much more than the sum borrowed did he return?

9. A piece of land is divided among four brothers, the eldest receiving $\frac{1}{3}$ of the whole and the others dividing the remainder equally among them; the eldest received 90 acres more than each of the others. If the land is worth $30 an acre, find the value of each one's share.

10. A piece of cord 143 ft. long, is cut into 2 pieces such that $\frac{5}{9}$ of the shorter is equal to $\frac{7}{16}$ of the longer. Find the length of each piece.

XLIV.

1. Bought $\frac{2}{3}$ of $8\frac{3}{4}$ cords of wood for $\frac{1}{4}$ of $\frac{1}{2}$ of $60; find the value of $4\frac{1}{2}$ cords at the same rate.

2. If $1\frac{1}{5}$ bush. wheat be worth $1\frac{1}{2}$ bush. barley, and barley be worth $\frac{2}{3}$ per bushel. How many bushels of wheat will $22.50 buy?

3. A man lost $\frac{1}{7}$ of his capital in a certain speculation, after which he gained $550, he then had $6°85; how much did he lose?

4. *A* sold 400 bush. wheat at $1.50 per bushel; oats and barley to the amount of $750. With the proceeds he bought 90 sheep at $4 each, one yoke of oxen for $90 and 25 acres of land. What was the land valued at per acre?

5. *A* has $320, *B* has $558 and *C* $744, with which they agree to buy horses at the highest price per head, which will allow each man to invest all his money. How many can each man buy?

6. What is the least sum of money for which I can buy sheep at $5 each, cows at $25 each, oxen at $45 each, or horses at $72 each?

7. Find the total value of 3720 lbs. hay at $14.50 per ton, 720 lbs. wheat at $1.10 per bushel, and 357 lbs. oats at 40 cents per bushel.

8. In a battle 8 per cent. of the army were slain, and 10 per cent. of the remainder mortally wounded; the difference between killed and wounded was 915. How many were there in the army?

9. Mr. Smith bought a horse for $125, and sold it for $145; find his gain per cent.

10. If 5·75 yds. of cloth be worth $2.0125, find the value of 1 yd.

XLV.

1. From 1 take one-millionth, multiply the difference by 763 ten-thousandths, and to the product add the sum of 195 ten-millionths, 4306 billionths, and 79 thousandths.

2. A boy hired with a farmer for 40 weeks for $40, and a suit of clothes, at the end of 24 weeks he gave up his situation and received $18 and the suit. Find the value of the suit.

3. Find the value of 4 bush. 1 pk. 1 pt. of currants at $12\frac{1}{2}$ cents per qt.

4. A farmer wishes to put 341 bush. 1 pk. of wheat into bags, each containing 1 bush. 3 pks. How many bags will be required?

5. A merchant buys a number of barrels of choice apples for $3000; he sets aside 40 barrels for use of his own family, and for $\frac{3}{8}$ of the remainder he receives $1794 which was $138 more than their cost. How many barrels did he buy?

6. A manufacturer carried on his business for three years; the first year he gained $\frac{2}{5}$ of his capital; the second year he lost $\frac{1}{3}$ of what he had at the end of the first year, during the third year he gained $\frac{1}{3}$ of what he had at the end of the second year. Find his total gain for the three years if he now has $16000.

7. What is the value of a farm 150 rods long, and 94.75 rods wide, at $40 per acre?

8. If 32 eggs be sold for 40 cents, and the gain at this rate be $\frac{2}{13}$ of the cost, find the cost price per dozen.

9. Find the difference between the simple and compound interest on $800 for 4 years at $4\frac{1}{2}$ per cent. per annum.

10. *A* can do a piece of work in 10 days, *B* in 15 days, and *C* in 20 days, *A* works at it for 3 days, *B* then joins him and they work together for $1\frac{1}{2}$ days; if *C* joins them then, in what time will the three together finish it?

XLVI.

1. A merchant has cloth marked at $2.60, what did it cost him per yard, if at this price he can give a discount of 20 per cent., and still make a profit of $33\frac{1}{3}$ per cent.?

2. A merchant invested $\cdot 2\dot{7}$ of his profits for a year in bank stock, and $\cdot \dot{9}23076\dot{9}$ of the remainder in real estate, and then had $100 left. Find his profits.

3. The average attendance at a rural school for the five school days of a certain week was 23, the attendance on Monday was 20, on Tuesday 22, on Wednesday 20, and on Thursday 28. What was the attendance on Friday?

4. 589 articles at 26 cents each = ——
38 " — cents " = $ 5.32
1426 " " cents " = ——
79 " " cents " = $15.01

The whole lot was worth $301.81. Find from what is given the price of each of the 38, of the 1426, and of the 79 articles.

5. Express (*a*) 26 tons, 18 cwt., 79 lbs., 96 oz. of coal in lbs.
(*b*) 34 rods, 5 yds., 36 ft., 36 in. of wire in yards.
(*c*) 17 weeks, 4 days, 48 hours, 2880 minutes in days.

6. Thirteen loads of gravel are required for 7 rods of road, 4 loads measure a cord; the price per cord of gravel is 18 cents; how many miles, rods, yards, etc. can be gravelled with $28 worth of gravel?

7. How many times will the seconds hand of a watch go round in 12 weeks, 3 hours, 15 minutes?

8. A dealer bought 120 geese at 3 for $2, and sold them at 15 for $17, Find his gain.

9. Find the cost of fencing a school ground 10 rods wide, and 16 rods long, with a board fence 4 boards high and a scantling on top, each board being 6 in. wide, and 1 in. thick, and the scantling 2½ in. by 4 in., lumber costing $10 per thousand feet. The posts for the fence are 6 ft. apart and cost 4 cents each, and the cost of labor is $20.

10. A degree of latitude is 69 miles 53 rods 2½ ft. long. Supposing Potosi 20 deg. S. Latitude, and a point in Anticosti 50 deg. N. Latitude, how far apart in miles, etc., is one from the other?

XLVII.

1. A man divided 384⅝ acres between his two sons, giving one 22 acres, 1 rood 20 per. more than the other. Find the share of each.

2. Water which weighs 1000 oz. to the cubic foot, expands $\frac{1}{10}$ in freezing. How many tons of ice can be packed in a building 40 ft long, 30 ft. wide, and 22 ft. high?

3. Find the cost of feeding 5 horses for 15 weeks, if each horse eats 5 quarts of oats, and 6 lbs. of hay 3 times a day, hay costing $12.50 a ton, and oats 32 cents a bushel.

4. Divide $500 among 3 persons in such a manner that the share of the second may be half as great again as the first, and the third half as great again as the second.

5. A speculator sold 24 town lots at $250 each. On one half of these he gained 25 per cent. of cost, and on the other half he lost 25 per cent. of cost. Find the gain or loss on the whole transaction.

6. Supposing the cargo of a vessel to be worth $10000 and $\frac{3}{5}$ of $\frac{5}{7}$ of $\frac{7}{10}$ of the value of the vessel to be equal to $\frac{1}{8}$ of $1\frac{1}{2}$ of the value of the cargo; what is the value of the ship and cargo?

7. Two pipes *A*, and *B*, can fill a cistern in 36 and 48 minutes respectively, and another, *C*, can empty it in 54 minutes. If the cistern be empty and all the pipes be open for 12 minutes and *A* is then shut off, in what time will the cistern be full?

8. The English shilling is equal to $24\frac{1}{3}$ cents in Canadian money, how much must a Canadian merchant remit to Sheffield for 12 doz. pen knives at 1s. $6\frac{1}{2}$d. a knife, 16 doz. knives and forks at 15s. $9\frac{3}{4}$d. a doz., and 13 doz. razors at 2s. $8\frac{1}{4}$d. a razor?

9. A roller is 10 ft. long, and 12 ft. in circumference, how many times will it turn in rolling a field of 9 acres?

10. A farmer had 150 acres of land which he could have sold at one time at $100 an acre, thereby gaining $3900, but after keeping it for a time he sold it at a loss of $2250. How much did the land cost an acre, and for how much per acre did he sell it?

XLVIII.

1. A man after paying an income tax of $7\frac{1}{2}$ mills on the dollar and spending $1.37\frac{1}{2}$ a day is able to save $243.50 a year. Find his gross income.

2. In my library there are 63 volumes, $\frac{1}{3}$ of the books being on history, $\frac{1}{7}$ of remainder on philosophy, and $\frac{1}{2}$ of

what still remains poetry. How long will it take me to read the rest if each volume has 276 pages, and each page had 150 words, allowing me 5 minutes for every 138 words and 1 hour every day for reading?

3. What will it cost to plaster a room 14 ft. long, 11 ft. wide and 10 ft. high if there are two doors 3 ft. by 8 ft., and three windows 3 ft. by 6 ft., when it costs 18 cents to plaster one square yard?

4. Make a bill of 372 eggs at 14 cents per dozen, 24 cows at $34 each each, 126 ducks at 67 cents a pair, 10,234 lbs. oats at 35 cents per bushel, 15 geese at 49 cents each, 15 sheep at $4.25 each, and 27 pigs at $3.75 each.

5. A rectangular field 84 ft. long and 79 ft. wide has a walk 8 ft. wide all round it and two of equal width through its centre, one from side to side, the other from end to end. What will it cost to gravel those walks at 2 cents a square foot and sod the rest at 27 cents a square yard?

6. My cistern is 7 ft, long, 5 ft. wide, and 6 ft. deep. It is filled with ice. If water in freezing expands $\frac{1}{9}$, how many gallons of water can I put into the cistern when the ice melts?

7. On a load of grain there are two bushels of wheat for one of rye. The load weighs 1,760 lbs. If rye be worth 75 cents per bushel, and wheat $1 per bushel, how many barrels of flour at $5.50 each should be given for the load?

8. The circumference of the fore wheel of a bicycle is $4\frac{1}{2}$ times that of the hind wheel, which turns 30 times in going 100 ft. What part of a mile will the bicycle have gone over when the two are exactly in the same position for the fourth time after starting?

9. How many yards of cloth at 3.37\frac{1}{2}$ per yard should be given for a pile of wood 64 ft. long, 18 ft. wide, $7\frac{1}{2}$ ft. high, when wood is worth $4 per cord?

10. Find the cost of carpeting a room 16 ft. long and 12 ft. 6 inches wide with 30-inch carpet worth $1.17 per yard.

XLIX.

1. The sides of a triangular field are respectively 27 ft., 33 ft., and 54 ft. long. What is the greatest distance apart—in feet—that I can set trees round it so as to have them equidistant from each other, and how many trees will it take?

2. If 100 horses cost ·93125 of $16,000, find the value of 17 horses.

3. How many thousand square feet of boards will it take to put a fence 8 ft. high round a 10 acre field 242 yards long?

4. Bought 1 cwt. of snuff at the rate of 45 cents per ounce, and sold it by troy weight at the rate of 50 cents. Did I gain or lose and how much?

5. *A* can split $\frac{1}{3}$ of a cord of wood in an hour, *B* can do $\frac{1}{4}$ of remainder in an hour, and *C* can finish it in 1 hour and 20 minutes. In what time would *A*, *B* and *C* together do it?

6. How many bushels of oats at $1 per cwt. should be given for 1,120 lbs. rye at 68 cents per bushel?

7. A piece of cloth is 41·06328 inches square. Into how many strips ·0438 of an inch wide can I cut it, and how wide is the piece that is left?

8. John and James undertake to saw a pile of wood for $1.75. They work together for $4\frac{1}{2}$ hours. John then leaves, and James then finishes the pile in $3\frac{1}{3}$ hours. How much should each get?

9. The books of a certain library average 175 pages each; $\frac{1}{7}$ of the library was stolen, $\frac{1}{3}$ of the remainder was burned, and $\frac{1}{5}$ of what still remains is damaged by water. What is the remainder of the library worth at the rate of 100 pages for 50 cents if the library had 560 volumes at first?

10. How many barrels of fish at $10.50 per barrel should be given for a pile of wood 64 ft. long, 36 ft. wide, $7\frac{1}{2}$ ft. high, when wood is worth $3.50 per cord?

I.

1. John sold his knife for 36 cents, which was $\frac{9}{10}$ of what he paid for it. If he had sold it so as to gain $\frac{1}{3}$ of what it cost him, how much more would he have got for it?

2. A man who bought 2 tons, 6 cwt. 1 gr. 15 lbs. of hay at $20 a ton sold it for $45. Did he gain or lose and how much?

3. A barrel of sugar weighing 140 lbs. was bought for $14, and after it had lost $\frac{1}{7}$ in weight by drying was sold at 15 cents per pound. Find the gain per pound on the original weight.

4. In a school there are 546 pupils. There are $\frac{1}{5}$ as as many boys as girls. How many more girls than boys are there?

5. Jane and Annie who have been out picking blackberries are on their way home each with her pail full. when they are met by a man to whom they sell all their berries for $1.35. Annie's pail held $5\frac{1}{2}$ qts. and Jane's held 8 qts. How much of the money should each get?

6. Reduce 4 yds. 2 ft. 9 in. to the decimal of a mile?

7. Simplify

$$\frac{5\frac{3}{7} \text{ of } 4\frac{3}{3} \quad 7\frac{1}{5} - 6\frac{9}{10}}{4\frac{3}{4} \text{ of } 5\frac{3}{5} \times 3\frac{1}{2} \times \frac{3}{5}} \text{ of } \frac{1}{2} \div \frac{87}{244}$$

$$\frac{2\frac{1}{3} \times 3\frac{1}{2} \quad 9\frac{1}{3} - 7\frac{1}{3}}{3\frac{1}{4} \div 22\frac{3}{7} \times 127\frac{7}{9} \text{ of } 8\frac{11}{161}}$$

8. Find the value at $4.80 per cord of a pile of wood 85 ft. long, 8 ft. wide and 9 ft. high.

9. Find the cost at $13.75 per ton of a load of hay weighing 4,507 lbs; the weight of the wagon being 1,347 lbs.

10. What is the time of day if $\frac{3}{7}$ of the time from noon till now equals the time past 4 p.m.?

II.

1. Three times the sum of two numbers is 312, and half their sum multiplied by quarter their difference is 104. Find them.

2. A man desires to make a close board fence around his garden, which is 120 ft. long and 60 ft. wide, and the fence is to be 4 ft. high. He has his choice of two kinds of boards; one 12 ft. long, 1 ft. broad, and costing 10 cents each; the other 16 ft. long, 1 ft. broad, and costing 12 cents each. Which kind had he better buy, and how much will he save on his fence by taking the cheaper kind?

3. A locomotive burns 2,000 lbs. of coal while going 75 miles, and moves forward 10 yards every time the driving wheel turns round. How many times does this driving wheel revolve for every pound of coal burned?

4. On a certain book-shelf I can put 12 volumes, each 3 inches across; but I want to put on it a certain number of these 3-inch volumes, twice as many 2-inch ones, and as many 1-inch volumes as there are 2-inch ones. According to this arrangement how many books can I put on the shelf?

5. A man had such a number of gold coins, that he could divide them into groups of 4, 5 or 6 each. If half of them were $5 pieces, and half of them $10 pieces, how much money had he?

6. For every $4\frac{2}{3}$ yds. in the diameter there are $14\frac{2}{3}$ yds. in the circumference. Find how much it will cost at 10 cents a yard to fence a circular plot, whose circumference exceeds its diameter by 60 yds.

7. The account of a bankrupt's estate was as follows:—Stock valued at $3,500, sold at $62\frac{1}{2}$ cents on the dollar; book debts amounting to $1,750, sold at 55 cents on the dollar; notes and other securities amounting to $680, realized 80 cents on the dollar; expenses of winding up the estate 2 per cent. of the sum realized from it. Liabilities were, to *A* $2,350, to *B* $725, to *C* $1,300, to *D* $1,365, to *E* $724.50. How much did the creditors receive on the dollar?

8. Given that 3 oxen eat as much as 5 horses, and 2 horses eat as much as 7 sheep; and that 5 tons of hay will feed 6 oxen, 5 horses and 56 sheep for 5 weeks; find how many sheep must be put in with 7 horses to eat 3 tons of hay in 3 weeks.

9. *A* and *B* bought the apples in a barrel for \$2.25. *B* paid 75 cents and *A* paid the rest. It cost *B* 25 cents to get the apples home, and he kept the barrel, which was valued at 15 cents. If each got an equal share of the apples, who was owing the other and how much?

10. On a collection plate were a number of 25 cent pieces, 4 times as many 10 cent pieces, and 12 times as many 5 cent pieces. If each coin had been a quarter of a dollar the collection would have been greater than it was by \$36. How many coins were there of each kind?

LII.

1. Simplify $\dfrac{2\frac{3}{4}+4\frac{9}{10}-2\frac{17}{50}}{\frac{1}{13}(1+5\frac{1}{2})+\frac{5}{6}\text{ of }\frac{1}{27}\text{ of }(7-2\frac{3}{5})-\frac{1}{3}}$

2. How many cents must be added to

$$\frac{\cdot 0025 + \cdot 375}{25 \times \cdot 075} \text{ of } \$0.50$$

to make it equal to \$1.00?

3. Divide £12. 16s. 8d. between two persons, giving to one two-thirds as much again as the other.

4. A land owner has three estates containing 2,457 acres, 2,912 acres and 3,913 acres, respectively. He divides his estates into farms as large as possible, all containing the same number of acres. Find how many farms he will have and the size of each.

5. Three merchants invest \$6,000, paying in the proportion of 6, 5 and 4. One year's profits amount to \$750. Find each man's share and the rate per cent. for which he receives interest, and also the value of his capital.

6. The prime cost of a 60-gallon cask of wine is \$75.00. 5 gallons are lost by leakage, and 30 gallons are sold for \$2.00 per gallon. At what price must the remainder be sold per gallon to gain 50 per cent. on the whole cost?

7. By selling a horse for \$140 I lose 30 per cent. For how much must I sell him to gain 5 per cent?

8. By selling two houses for \$800 each I lose on one 25 per cent, and gain on the other 25 per cent. of the cost price. Find the gain or loss on the transaction.

9. An imported organ which bears the duty of 25 per cent. is sold at a loss of 8 per cent. Had it been sold for $20 more there would have been a gain of 2 per cent. For how much was the organ invoiced?

10. What must be the marked price of a piece of goods which cost $6.00, that the merchant may throw off 20 per cent., and still make 25 per cent.?

LIII.

1. A dealer mixes teas worth 50 cents and 37 cents per pound, respectively, in the proportion of 8 lbs. of the former to 5 lbs. of the latter, and sells the mixture at the rate of 45 cents per pound. He uses for a pound weight one which weighs only 15·75. How much does he gain on every cwt. he sells?

2. Gold is worth 4 guineas an ounce. Find the value of a gold ornament weighing 6 ounces, of which 18 out of every 24 parts are pure gold, allowing 3s. per ounce as the value of the alloy, and $33\frac{1}{3}$ per cent. on the whole cost for workmanship.

3. Trees are to be planted around a rectangular field containing 15 acres, one of whose sides measures 10 chains. How many will be required if they are set 11 ft. apart?

4. 4 men, 5 women, 6 boys or 8 girls can do a piece of work in 47 days. How long will it take 2 men, 4 women, 5 boys, and 8 girls to do it, all working together?

5. *A* and *B* can do a piece of work in 8 days, *B* and *C* in 10 days, and *A*, *B* and *C* in 6 days. If $240 be paid for the work, find how much each man earns.

6. A railroad runs through an estate for 18 miles, occupying a space 33 yards wide, valued at $5.67 per acre. The owner in exchange receive a square field worth 7d. sterling per pole. How many acres must it contain?

7. A rectangular plot of land is 160 ft. × 120 ft. It has a ditch around the outside and two others intersecting at right angles in the middle of the plot. If the ditches are 5 ft. wide, and 2 ft. $2\frac{3}{4}$ in. in depth, and cost 54 cents per cubic yard, find the cost of digging them.

8. The fore wheel of a carriage is 12 ft. in circumference, and makes 2,200 revolutions more than the hind wheel in 15 miles. Find the circumference of the hind wheel.

9. A block of ice measures 4 ft. by 3 ft. by 2 ft. 1 in. How many gallons of water does it contain, if water expand $\frac{1}{9}$ in freezing, and one gallon equals $277\frac{1}{7}$ cubic inches?

10. If the import duties on brandy amount to 50 per cent. of the invoice price, and 75 cents a gallon; and if an importer has to pay $225 for duties on 120 gals., find the invoice price per gal.

LIV.

1. James has 6 ac. 2 rds. 10 per. $12\frac{1}{2}$ sq. yds. of land, and wishes to divide it in lots of 10 sq. per. $5\frac{1}{2}$ sq. yds. How many lots will there be?

2. I pay $100 for a carpet $\frac{3}{4}$ yds. wide, and it just covers a room 30 ft. long by 27 ft. wide. Find the length of the carpet and the price per yard.

3. How many bottles of wine and beer, respectively, will a merchant have that bottles 2 hhds. of each into bottles, (holding 1 qt. 1 pt.) and what fraction is the number of bottles of beer of the number of bottles of wine?

4. A person mixes 20 gals. of water with 40 gals. of syrup at $3 a gallon, with 30 gals. at $3.50 a gallon. At what price per gallon must he sell the mixture to gain $45 on the whole? Also find his gain per cent.

5. Find the value of
$\frac{7}{10}$ of $\frac{5}{21}$ of a mile $+$ $\frac{2}{5}$ of $\frac{7}{12}$ of $\frac{2\frac{1}{4}}{4\frac{1}{2}}$ of 3 fur. $-$ $\frac{1}{8}$ of $3\frac{1}{3}$ of 2 ft. 3 in.

6. What part of $\frac{4\frac{1}{2}}{4\frac{2}{3}}$ of $\frac{4\frac{1}{4}}{4\frac{1}{8}}$ of 34 acres is the fortieth part of 20 perches?

7. The interest on 50\frac{1}{2}$ for 4 years at 8 per cent. per annum is what part of $1,000?

8. A man lends a sum of money for 4 years at 6 per cent. per annum, and another sum for 4 years at 8 per

cent. per annum. At the end of 4 years they amount together to $1,288. The first sum amounts to $496. Find the principal in each case.

9. A man mixes 20 lbs. of tea at 50 cents a pound with 10 lbs. at 30 cents a pound. Find his gain or loss per cent. :— (1) When he sells the mixture at 60 cents a pound. (2) When he sells the mixture at 35 cents a pound.

10. If $\cdot 7$ of an orange be equal in price to $\cdot 7$ of a lemon; find the number of oranges that must be given for 27 lemons.

LV.

1. Find the times between 9 and 10 that the hands of a clock are, (1) 7 minutes apart; (2) 40 seconds apart.

2. How many pounds, &c., will 1,000 yards of wire cost at 3 cents a foot; the shilling being worth $24\frac{1}{3}$ cents?

3. *A* and *B* cut 100 rails in 4 days; *B* and *C* in 5 days; and *A*, *B* and *C* in 2 days. In what time will each cut $3\frac{1}{2}$ times this amount of rails?

4. I sell 3 horses for $2,000 each. On the first I gain 50 per cent., on the second I lose 20 per cent., and on the third I make a profit of $50. Find the cost price of each, also whole gain or loss per cent.

5. Two men agree to build a walk; the first builds 20 rods $\frac{1}{2}$ of which is $\frac{4}{5}$ of what the second builds. How many rods does the second build, and what is the length of the walk?

6. *A* builds 30 rods of a fence in a day, *B* builds 40 rods, and *C* builds 45 rods. Find the least number of rods that will furnish an exact number of days' labor for each and leave 6 rods as remainder.

7. Bought eggs at the rate of 5 for 2 cents. How many must be sold for 14 cents to gain 40 per cent.?

8. A tank is 8 ft. long, 5 ft. 4 in. wide, and 4 ft. 6 in. deep. Find the number of gallons it contains, having given that 1 cubic foot of water weighs 1,000 oz., and that a pint weighs $1\frac{1}{4}$ lbs.

9. How long will it take a train 20 rods long, and going at the rate of 15 miles an hour, to cross a bridge 15 rods long?

10. Bought a Jersey cow in England for £18 10s. 6d. Paid for passage to Canada £2 16s., where I sold her for $140. Find my gain in Canadian currency.

LVI.

1. *A* can do a piece of work in a $\frac{1}{4}$ of a day; *B* can do it in $\frac{1}{5}$ of a day, and *C* can do it in $\frac{1}{6}$ of a day. How long will it take all working together to do it?

2. Sold two horses for $150 each; on one I gained 20 per cent, and on the other I lost 20 per cent. (1) Find my gain or loss on both. (2) Find my gain or loss per cent. on both.

3. A dealer in Brampton expends $200 in Scranton coal. He pays $4.50 per long ton for the coal in Scranton. The freight from Scranton to Brampton is 50 cents a long ton. He sells it in Brampton at $6.50 a short ton. Find his total gain?

4. If a merchant sells tea at 66 cents a pound, and gains 20 per cent, what per cent. will he gain, if he sells at 77 cents a pound?

5. How many pounds of tea at 70 cents a pound must I mix with 50 lbs. at $1 a pound in order to sell the mixture at 80 cents a pound without loss?

6. Divide $840 among *A*, *B* and *C*, so that *B* may have $100 less than *A*, and $40 more than *C*.

7. The diameter of the driving wheel of an engine is 7 feet. How often will it revolve going 2 miles?

8. Telegraph poles are placed 8 rods apart, and a train passes one every $4\frac{1}{2}$ seconds. How many miles an hour is the train going?

9. A farmer sold 100 geese and turkeys, receiving for the geese 75 cents each, and for the turkeys $1.25 each, and for the whole $104. Find the number of each?

10. A publisher printed an edition of 1,000 copies of a 12mo. book of 336 pages. How much paper did he use, allowing 1 quire to each ream for waste?

LVII.

1. How many bricks, $8\frac{1}{2}$ in. by $4\frac{1}{8}$ in. by $2\frac{3}{8}$ in., are contained in a cubic foot of wall $12\frac{3}{4}$ in. wide, laid in courses of mortar $\frac{1}{4}$ of an inch thick?

2. How much time will a person gain in 40 years, by rising 25 minutes earlier and retiring 25 minutes later every day, counting 9 leap years in the time?

3. A street 650 ft. long, and 12 ft. wide, averages 4·5 ft. below grade. Find the cost of filling it in at 42 cents a cubic yard.

4. Bought cloth at \$3.60 a yard. At what price must it be marked that $12\frac{1}{2}$ per cent may be abated from the asking price, and still a profit made of $16\frac{2}{3}$ per cent?

5. Find the contents of a board 18 ft. long, 1 ft. 8 in. wide at one end, and 14 in. wide at the other.

6. A dealer sold 7 barrels of apples for \$32.50, which was $\frac{5}{8}$ as much as he received for all he had left at \$84 a barrel. How many barrels in all did he sell?

7. In a mixture of gold and silver consisting of $98\frac{1}{2}$ oz. there are 6 oz. of silver; how much gold must be added that there may be $\frac{2}{5}$ oz. of silver to 10 oz. of gold?

8. If 80 lbs. of sea water contain 2 lbs. of salt; how much fresh water must be added to these 80 lbs., so that 10 lbs. of the new mixture may contain $\frac{1}{6}$ of a pound of salt?

9. Paid \$121.50 for grain; $\frac{3}{10}$ of it being barley at $62\frac{1}{2}$ cents a bushel, and $\frac{3}{5}$ of it wheat at $\$1.87\frac{1}{2}$ per bushel; the rest of the money was paid for oats at $37\frac{1}{2}$ cents per bushel. How many bushels of grain was bought?

10. A publisher printed an edition of 20,000 copies of a 12mo. book of 400 pages. How much paper did he use, allowing 2 quires to each ream for waste?

LVIII.

1. How many reams of paper are required to supply 4,500 subscribers with a weekly newspaper for a year, allowing a sheet for one copy?

2. How many yards of silk, $\frac{5}{8}$ of yard wide, will be required to line 24 yards of satin $\frac{3}{4}$ of a yard wide?

3. At $3.25 a rod how much less will it cost to fence a piece of land 100 rods square than if the same were in the form of a rectangle twice as long and one half as wide?

4. A man having a field 90 rods square appropriated 5 acres of it to wheat, 100 square rods to garden vegetables, and the remainder to meadow. What fraction of the whole did the meadow comprise?

5. In building a house 200 joists, 10 in. by 3 in., were used, which together amounted to 1,000 cubic feet. What was the length of each?

6. How many cubic feet of masonry in the wall of a cellar $37\frac{1}{2}$ feet long, 26 feet wide, and 9 feet deep, the wall being 2 feet thick, allowing one-half foot for the corners; and what will be the cost at $3.85 a perch?

7. If 8 pounds avoirdupois of drugs are bought for $12.50 a pound, and retailed at the rate of $16.25 a pound apothecaries' weight; what is the gain on the whole?

8. If A can walk 2 miles in 32 minutes, B in 48 minutes, C in 64 minutes, and D in 72 minutes, and they start from a given point at the same time, how far can each go so that on their return they may arrive at the place from which they started at the same time?

9. If $\frac{2}{3}$ of the cost of an article is equal to $\frac{3}{4}$ of the sum for which it was sold, what was the loss per cent?

10. Two boys had each $\frac{9}{10}$ of a bushel of walnuts. The first sold $\frac{2}{3}$ of his to the second. What part of what the second has its equivalent to what the first has?

LIX.

1. Simplify $\dfrac{6\frac{1}{2}+5\frac{1}{6}}{6\frac{1}{2}-5\frac{1}{6}} \times \dfrac{6\frac{1}{2}}{3\frac{1}{4}}+1$

2. How many square feet of lumber will cover a shed 20 feet long, 15 feet wide, and 9 feet high, with a flat roof, deducting a doorway 7 feet high and 3 feet wide?

3. How many square feet of lumber at $6 per 100 sq. ft. will pay for 80 lbs. of dry fish at $3.50 per quintal of 112 lbs.?

4. How many cords of wood can be stowed in a room 20 ft. long, 10 ft. wide, and 9 ft. high?

5. How many miles will a ploughman travel in ploughing a field 500 ft. long and 300 ft. wide, the furrows being 15 in. wide?

6. How many square feet are there in an inch board 20 ft. long, 18 in. wide in one end and $16\frac{1}{2}$ in. in the other?

7. Which is greater ·0025 of a mile, or ·79 of a rod?

8. What will $40.60 amount to in $2\frac{3}{4}$ years at $3\frac{1}{2}$ per cent. per 6 months?

9. If 50 bbls. of flour be purchased at $5.50 per barrel and sold for $300, what will be the gain on 1 bbl. of flour?

10. A man who walked 120 miles in $4\frac{1}{2}$ days at 12 hours per day, travelled how many feet on an average per minute?

LX.

1. If a man can do a job of work in 4 days. and a boy can do $\frac{1}{10}$ as much in $\frac{1}{2}$ of the time, in what time can they do it working together?

2. If 2 men can dig a hole 6 ft. long, 3 ft. wide, and 8 ft. deep in 3 days; in what time can 3 men dig a hole 5 ft. long, 4 ft. wide, and 9 ft. deep?

3. If $2.50 be gained on cloth sold at $22.50; what would be the gain per cent?

4. If a boy in running a race can beat another boy 20 ft. in 50 yards, how often would the first boy go around a course 1,000 ft. in circumference in the time the second boy would go 10 times?

5. If 50 yds. of cloth be purchased at $1.15 per yard, which will yield the greater profit, the sale of the whole

at 30 per cent. more than the first cost, or the sale of $\frac{3}{5}$ of the cloth at 55 per cent profit, and the remainder at first cost?

6. I paid $25 for carpeting at $1.25 per sq. yard. If the length of the floor, for which the carpet was intended, was 15 ft., what was its width?

7. Out of 1 square mile of land a farmer sold to *A* a lot 50 rods long and 20 rods wide, and to *B* a lot 200 yards long, and 484 feet wide; what fraction of the whole had he left?

8. If 7 lbs. of flour are worth 10 lbs. of herring; how much are 10 bbls. of herring worth, if the price of flour is $5.60 per barrel?

9. Which is the better investment, to buy 500 bbls. of flour at $5.50 per barrel and sell it at $5.70 during a period of 6 months, or lend the money during that time at 7 per cent. interest?

10. In how many days will $500 amount to $525 at 6 per cent.?

LXI.

1. Divide $875 among *A*, *B*, *C*, *D*, and *E*; giving *A* $10 more than *B*, *B* $35 less than *C* and *D* together, *C* $5 less than *E*, and *D* $45 less than *C* and *E* together.

2. By selling goods at 63 cents per yard a merchant loses 16 per cent. What per cent will he lose or gain by selling them at 83 cents per yard?

3. *A* can do a piece of work in $\frac{4}{11}$ of a day; *B* can do it in $\frac{6}{13}$ of a day; *C* can do it in $\frac{3}{8}$ of a day, and *D* can do it in $\frac{12}{23}$ of a day. In what time can all working together do the work?

4. A man buys 10 lbs. of coffee at 32 cents per pound, and 4 lbs. of chicory at $11\frac{1}{2}$ cents per pound. He mixes them, and sells the mixture at 39 cents per pound. Find his profit.

5. A bankrupt's debts are $1,700; his assets are $950.75. After paying the cost of the bankruptcy his creditors receive 29 cents on the dollar. What do the costs amount to?

6. An estate yields a gross rental of $8,000, on which an income tax is paid of 1 cent 5 mills on the dollar; the expense of collecting the rent amounts to 4 cents on the dollar. Find the net rental.

7. A grocer increased the price of his sugar, charging for 7 lbs. what he before charged for 8 lbs. He made 25 per cent. profit at the former price. Find his profit at the advanced rate.

8. A railway company takes from a farm a roadway $\frac{5}{8}$ of a mile long and 99 ft. wide, for which the farmer receives $150 an acre. Find the whole amount he received.

9. A man deposited $\frac{5}{9}$ of his money in the Dominion Bank at 5 per cent. per annum, $\frac{3}{8}$ of the remainder in the Bank of Montreal at $4\frac{1}{2}$ per cent. per annum, and the remainder, which is $700, he lends at $5\frac{1}{2}$ per cent. per annum. If the interest is payable half yearly, find his half yearly income.

10. A man in selling his farm asked 30 per cent. more than it cost him. He afterwards sold it at $12\frac{1}{2}$ per cent. less than the price formerly asked and gained $317.50. How much did it cost him?

LXII.

1. Divide 6 days 17 hours 11 minutes by $\frac{8}{11}$.

2. What is the value of the gold in an ornament weighing $13\frac{3}{4}$ dwt., of which $\frac{9}{10}$ are pure gold, and the rest alloy of no value, if $\frac{1}{12}$ oz. of pure gold is worth $18.69?

3. Divide 10 acres into nine equal parts as far as inches, and prove by multiplication.

4. How many pounds, &c., apothecaries weight, are in 10 lbs. 10 dwt., troy?

5. Bought 36 lbs., avordupois, of drugs for $45; at what rate per pound, troy, must I sell to gain 10 per cent.?

6. A tradesman failed for $14,000; his effects are $8,750. What will a creditor lose whose debt is $3,581?

7. Four farmers bought a threshing machine; *A* paying $\frac{1}{3}$, *B* $\frac{2}{7}$, *C* $\frac{8}{11}$, and *D* $93. Find cost of machine.

8. In an orchard $\frac{1}{3}$ of the trees bear apples, $\frac{1}{8}$ plums, $\frac{1}{8}$ cherries, $\frac{1}{5}$ peaches, and 33 pears. How many trees are there in the orchard?

9. *A*, *B* and *C* rented a pasture field for $26. *A* put in 4 cows for 8 months, *B* put in 6 cows for 6 months, when he took 4 cows out, *C* kept 2 cows in the whole year. What ought each to pay?

10. January 1st *A* and *B* go into partnership, *A* with $600, *B* with $750. April 1st *C* joins them with $1,000, when *A* withdraws $150, while *B* puts in $250 more. Dec. 31st the net profits are $900. What is each man's share?

LXIII.

1. A Brama hen eats $1\frac{1}{2}$ bushels of wheat at $1.20 per bushel, lays 180 eggs which weigh 7 to the pound. A Leghorn hen eats $1\frac{1}{4}$ buhs. at $1.20 per bushel, lays 200 eggs which weigh 8 to the pound. Which is the more profitable, eggs being sold by the pound?

2. At what time are the hands of a clock (1) at right angles, (2) directly over each other, (3) again at right angles, and (4) pointing in directly opposite directions between four and five o'clock?

3. How many crowns, half crowns, shillings, sixpences and pence are there in £36 15s. 9d., and of each an equal number?

4. A steamboat runs 78 miles in 6 hours and 20 minutes, her engine making 19 revolutions per minute. How far is she pushed forward by each stroke of her engine?

5. Divide $345 among *A*, *B*, and *C*, so that *B* will receive $5 for *A*'s $4, while *C* receives $6 for *A*'s $5.

6. Bought goods to the value of $960 at 6 month's credit. If I paid $384 at the time of making the purchase, how long should I be allowed in paying the remaining $576?

7. 16 men or 20 boys can do a piece of work in 42 days. How long will 32 men and 16 boys take to do it?

8. The G. C. M. of two numbers is 12; their L. C. M. is 72; one of the numbers is 24. Find the other number.

9. The numerator of a fraction is 22 per cent. of the denominator, and the sum of the terms is 366. Find the fraction.

10. A ship with its cargo is worth $260,000, $\frac{3}{5}$ of the cargo is worth $\frac{1}{8}$ of the ship. Find the value of the cargo.

LXIV.

1. A merchant marked his goods so as to gain 40 per cent. if sold for cash, and 50 per cent. if sold on credit. Find the cash price of an article whose credit price is 45 cents.

2. Mary's age is 40 per cent. of Jane's age, and in 2 years from now the sum of their ages will be 32 years. Find their ages.

3. In a mixture of wine and water $\frac{1}{2}$ of the whole minus 50 quarts is water, but $\frac{1}{3}$ of the whole plus 125 quarts is wine; how many quarts are there of each?

4. A drover bought a number of cattle at $30 a head, and sold 30 per cent. of them for $2,400, gaining thereby $600. Find the number of cattle bought.

5. A book was sold for 40 per cent. more than it cost. The sum of the buying price and selling price is $1.92. Find the buying price.

6. The inside of a trunk is 2 ft. 6 in. long. 15 in. wide, and 15 in. deep. How many square feet of paper will line it?

7. A horse and carriage cost $450, had $40 more been paid for the horse, he would have cost twice as much as the carriage. Find the cost of each.

8. A man spent 8 per cent. of his money, and had $65 more than 40 per cent. of it left. How much had he at first?

9. A person bequeathed $20,000 to a college to become available when the principal and interest amounted to $35,000. The money bears 8 per cent. simple interest. In what time was the bequest available?

10. A man sold a horse at a gain of 30 per cent., and with the money bought another horse which he sold for $124.80 and lost 20 per cent. Find the cost of the first horse.

LXV.

1. A lady spent $\frac{1}{12}$ of her money and had $99.40 more left than she spent. How much had she at first?

2. If pure gold is worth $240 per pound, find the value of the alloy in 20 lbs. of standard gold, which is 22 carats fine and worth $4,500?

3. A stick of timber 36 ft. long, and 20 in. by 18 in. weighs 3,600 lbs. What must be the length of another stick of the same kind of timber which is 12 in. by 8 in., and weighs 1,200 lbs.?

4. A yard stick is broken into two parts, such that $\frac{1}{3}$ of one is double the other. Find the length of the longer part?

5. A man gave his note for $600 at 5 per cent. simple interest, on the first day of January; at the end of 6 months he paid $215 on the note, part of which was to pay the interest then due. How much would redeem his note at the end of the year?

6. By selling a house for $6,000 10 per cent. is lost. What selling price would have gained 10 per cent.?

7. If the double of a certain number be increased by 864, the sum will be 8 times the number. Find the number.

8. A bankrupt's debts are $550, and his assets are $350. He owes one creditor $90. How much will that creditor lose?

9. A certain substance is composed of tin, iron and copper in the proportions of 2, 7 and 3 parts, respectively. If the weight of copper in $\frac{1}{6}$ of it is $3\frac{1}{2}$ tons, find the weight in pounds of the whole quantity, and also of the tin and iron.

10. At $2.40 per rod what will it cost to fence a piece of land 84·5 rods long by 24·75 rods wide?

LXVI.

1. If a druggist buys 24 lbs., avoirdupois, of drugs at $\$9\frac{1}{3}$ a pound, and sells them in prescriptions at 80 cents an ounce, apothecary's weight, what is the gain?

2. Find the weight in tons of 450,000 bricks at 3 lbs. 8 oz. each, and the cost, allowing bricks to be worth $\$5\frac{1}{3}$ per thousand.

3. I am owner of $\frac{3}{4}$ of $\frac{4}{5}$ of $\frac{2}{3}$ of a ship which is worth $30,000, and I sell $\frac{1}{8}$ of my share. What portion have I left, and what is it worth?

4. Two boys run a race of 1 mile, one of them gains 5 ft. in every 110 yards. How far will the other be left behind at the end of the race?

5. A man owns ·1875 of a mine; he sells $\cdot 17\dot{}$ of his share. What fractional part of the mine has he left?

6. If a single article costs 86 cents, how many dozen can be bought for $415.20?

7. A house and its furniture are worth $32,324.58; the house is worth 8 times the furniture. What is the house worth?

8. Simplify $2\frac{3}{4} + \frac{5}{2}$ of $\dfrac{7}{3\frac{1}{5}} \div 1\frac{77}{242}$.

9. A person buys 3 lbs. of tea at 74 cents per pound, and mixes it with 5 lbs. at 56 cents per pound. What is the cost of 1 lb. of the mixture?

10. If 1 cwt. of on article cost $33.60, at what price per pound must it be sold so as to gain $\frac{1}{10}$ of the outlay?

LXVII.

1. What taxes will a man pay on property valued at $1,560.50 at the rate of 9 mills on the dollar?

2. Find the amount of the following bill:—$18\frac{3}{4}$ yards of silk at $1.40 per yard, $22\frac{1}{2}$ yards of tweed at $1.10 per yard, 10 barrels and 50 lbs of pork at $16 per barrel, 1250 lbs. of oats at 45 cents per bushel, 750 ft. of lumber at $6.40 per thousand feet?

3. Find the simple interest on $240, from June 16th, 1882 to October 16th, 1883, at 5 per cent per annum.

4. If $\frac{3}{8}$ of a pole is in the mud, and $\frac{2}{5}$ of the remainder in the water, and 12 ft. in the air, find the length of the pole.

5. Find the cost of plastering the walls and ceiling of a room 24 ft. by 18 ft., and 14 ft. high, at 25 cents a square yard, allowing the doors and windows to occupy $\frac{1}{4}$ of the area of the walls.

6. Find the number of revolutions the hind wheel of a waggon will make more than the front one in passing over $1\frac{1}{2}$ miles, circumference of wheels being 10 and 15 ft. respectively.

7. Reduce $\frac{2}{3}$ of an hour to the decimal of $\frac{3}{4}$ of 48 minutes.

8. A man's debts amount to $8,500 and he is able to pay only $4,750. How much on the dollar does he pay, and what will a man lose to whom he owes $1,475?

9. A merchant's cash price is 10 per cent. above cost, and his credit price is 5 per cent. above his cash price If the cash price of an article is $8.80, find the cost and credit prices.

10. A merchant buys 240 bush. of wheat; which is more profitable for him to sell it at $130 cash, or $135 on 9 month's credit, money being worth 6 per cent.?

LXVIII.

1. Express the sum of the sum and difference of MDCCXL and $\overline{\text{IX}}$CDXXIX in Roman numerals.

2. The quotient=3 times the remainder=1728, and the divisor=the difference between remainder and quotient. Find the dividend.

3. (1) How many 100-acre farms in a section of land a mile and a quarter square? (2) How many ditto in a section 1 mile 280 rods one way, and 320 rods the other way? (3) Give the length and breadth of a farm of each section in rods.

4. A boy trundles a hoop from Seaforth to Clinton, a distance of $7\frac{1}{2}$ miles. If in going over 33 feet the hoop turns round 6 times, how often does the hoop turn round?

5. A prisoner escaped from Kingston penetentiary and travelled 126 miles a day. Four days afterwards a detective starts after him, and goes exactly the same route at the rate of 210 miles a day. How many days will the prisoner have been at liberty when he is caught?

6. In travelling over the Canadian Pacific Railway from Ottawa to Montreal, a distance of 100 miles, a person observes by his watch that he passes a mile-stone every 3 minutes, and a telegraph post every 6 seconds. If the train is going uniformly, find the number of telegraph posts passed over.

7. A father gave his two children, James and Lucy, \$8.60 and \$6.80, respectively, to buy luncheons for their holiday party, (the luncheons all to be of the same size and as costly as possible). James was to invite the boys, so that there would be one boy for each luncheon purchased with his money, and Lucy the girls with a similar understanding. How many of each were invited?

8. Suppose a bin 5 ft. long, 5 ft. wide, and 5 ft. high holds exactly 100 bush. of grain, find the height of a bin $12\frac{1}{2}$ ft. square that will hold 750 bushels.

9. A school of 50 children is kept open 44 weeks during the year and 5 days during the week. The children pay nothing for the days they attend, but forfeit two cents for every day they are absent. At the end of the year the payments for absence amounted to \$25. Find the average daily attendance.

10. A dying man left his country to be divided among his widow, 3 sons, 4 daughters, as follows: the widow to get half as much again as a son and twice as much as a daughter, also $\frac{1}{25}$ was to be deducted for expenses. It was found that each daughter received \$1800.00, How much was his property worth?

LXIX.

1. A father and son by working 9 hours a day can finish a piece of work in 5 days, the father doing twice as much

work as the son. How many hours a day would the son alone have to work to finish a piece of work 5 times as large in 90 days?

2. If by selling a cap for $2.50 I gain $\frac{1}{8}$ of the cost price, what fraction of the cost would represent my gain had I sold it for $3?

3. Divide 620 marbles among James, John, Tom and Alex., so that for every 2 James gets John may get 3, for every 2 John gets Tom may get 5, and for every 2 Tom gets Alex. may get 7.

4. *A* can do a piece of work in 5 hrs., *B* in 6, and *C* in 8. *A* works at it by himself $1\frac{1}{4}$ hrs., then *B* by himself $2\frac{1}{3}$ hrs. How long will it take *C* to finish the work?

5. If 3 men, or 4 women, or 5 children can be boarded a week for $7.20, how much would it cost to board a man, his wife and 4 children for 13 weeks?

6. *A* owns $\frac{7}{17}$ of a potato plot, and *B* the remainder. When the potatoes are dug in the fall it is found that $\frac{1}{8}$ of the difference between their shares is 42 bush. 2 pks. Find how many bushel belong to *B*.

7. A merchant has 9 times $\frac{8\frac{3}{5}-5\frac{2}{5}}{8\frac{3}{5}+5\frac{2}{5}}$ of $\frac{4\frac{3}{7}}{7\frac{3}{4}} \div \frac{13}{31}$ acres of land. If $1\frac{3}{5}$ of $\frac{1}{2\frac{1}{4}} \div \frac{5}{16}$ of $6\frac{2}{3}$ of an acre of it be sold for 3,650 guineas, find the value of the remainder in dollars and cents. (1s.=24$\frac{1}{3}$c.)

8. The width of a large hall is $\frac{2}{3}$ its length, and the distance around its wall is 112 feet. Find the difference in cost between carpeting it with carpet 21 in. wide at 87$\frac{1}{2}$ cents a yard, and with carpet 35 in. wide at $1.25 a yard.

9. Mr. Jones has a $\frac{2}{3}$ interest in a mine. If he sells $\frac{9}{17}$ of his interest, what decimal will represent his interest in the mine then?

10. At the first quarterly examination ·425 of the children were examined in arithmetic, $\dot{2}\dot{7}$ in history, ·1469 in grammar, and the remainder 41 in reading. How many children were in the school?

LXV.

1. The yearly sales of a general merchant amounted to $29,100. On groceries, which formed $\frac{1}{4}$ of the sales, he made a profit of 20 per cent, on boots and shoes, which formed $\frac{1}{3}$ of the sales, he made a profit of 30 per cent., and on dry goods, which formed the remainder, he made a profit of $33\frac{1}{3}$ per cent. How much did the merchant make during the year?

2. A liquor dealer bought a barrel of beer for $12.20, and retailed it at 5 cents a pint. Find his gain per cent.

3. Fanny put $204.40 in the Post Office Savings Bank on Jan. 17th, 1884, for which she would get interest at 4 per cent. How much did she receive from the bank when she withdrew it March 14th, 1885?

4. Four men hired a pasture for $45. The first man put in 5 cows for 6 weeks, the second 4 cows for 7 weeks, the third 3 cows for 8 weeks, and the fourth 2 cows for 9 weeeks. How much should each pay of the $45?

5. Find the cost of building a side-walk 4 ft. wide on both sides of a street a quarter of a mile long, with a 3-inch plank and costing $8 a thousand.

6. What fraction of the distance round the earth will represent the width of the North Temperate Zone?

7. Find the cost of plastering the walls of a school-room 33 ft. long, 18 ft. wide, and 11 ft. high, making allowance for 6 windows each 6 ft. by $3\frac{1}{2}$ ft., 2 doors reaching to the floor each 7 ft. by $3\frac{1}{2}$ ft, and wainscotting round the room $1\frac{1}{2}$ ft. high, at 18 cents a yard.

8, A watch which gains 90 seconds in 14 hours marks the correct time at the beginning of the week. What will be the correct time when it marks the end of the week?

9. What time will the watch in the previous question mark at the end of the week?

10. An English youth in a Hamilton coal yard weighed out coal by the long ton at $7.50 a ton until he had booked $93.75. What would have been the weight and price by the short ton weight?

LXXI.

1. What is the difference in the cost of fencing, at 15 cents a rod, two 10-acre fields, one being square, and the other being 30 rods wide?

2. A stick of timber 8 in. thick contains 10 cubic feet. A block 3 ft. long is cut off, and the stick then contains 8 cubic feet. Find length and breadth of stick.

3. A merchant marks an article at 40 per cent. advance on cost, but deducts 20 per cent. of his price for a friend, and still gains $1.08. Find cost price.

4. I invest $18,000 in an enterprise which yields me 5½ per cent. My income is taxed, and I find I have $975 after the tax is paid. What per cent. income tax do I pay?

5. A manufacturer sells an article to a merchant at 20 per cent. advance on cost, the latter sells it at 25 per cent. advance on cost to him. The last purchaser pays $30. Find first cost.

6. A London merchant buys silk from a Paris merchant by the metre, and sells it at same price per yard. What is his gain per cent. if the metre is 39.371 in. long?

7. Two trains start from the same station, one 2 hours ahead of the other. Their respective rates are 25 and 30 miles per hour. The faster train arrives 1 hour before the slower. Find distance travelled.

8. At what time between 1 and 2 o'clock are the hour and minute hands at an angle of 60 degrees?

9. With the hands in the above position, if 7⅓ in. of the circumference intervenes between the point of minute hand and the point indicated by the hour hand, find length of minute hand and distance it travels in 24 hours. Circumference=3⅐ times the diameter.

10. What fraction of ½ is ⅔ of 7?

LXXII.

1. A man buys a farm for $60 and sells ⅓ of it for ⅓ more than it cost him, gaining on the part sold $400. How many acres did he keep?

2. A father gave his eldest son $\frac{1}{3}$ of his money and $1,000 more, but if he gave him $\frac{1}{7}$ of his money he would have given him $2,000 more than he got. How much was the father worth, and how much did he give his eldest son?

2. The main building at the centennial was 1,880 feet in length, and covered 20 ac. 11 per. 5 ft. 36 in.; how many yards wide was it?

4. *A* and *B* have the same income. *A* lays by a fifth part of his, but *B* by spending more than *A* finds himself at the end of 4 years $220 in debt. Find their incomes.

5. A man has two kinds of flour; the first is worth $2.50 a barrel more than the second, and 9 bbls. of the second are worth as much as 7 of the first. What is the price of each per barrel?

6. Bought a quantity of wine for 675.32$\frac{1}{2}$ at 85 cents per gallon, but a part having leaked out, the remainder was sold at $\frac{2}{3}$ gain and the original cost was realized. What quantity leaked out?

7. At an election of a member of parliament $\frac{1}{15}$ of the constituency refused to vote, and of two candidates the one who is supported by $\frac{13}{20}$ of the whole constituency is returned by a majority of 5. Find the number of votes cast for each.

8. A train going at the rate of 30 miles an hour passes a man walking at the rate of 5 miles an hour in 18 seconds, man and train going in the same direction. Find the length of the train in yards.

9. A certain garden is 12$\frac{2}{3}$ rods long and 9$\frac{1}{4}$ rods wide. At 2$\frac{1}{2}$ cents per cubic foot, what will it cost to dig a ditch around it that shall be 3$\frac{1}{2}$ ft. wide and 4 ft. deep?

10. A buyer expended equal sums of money in the purchase of horses, cows and sheep. In the sales he gained $\frac{1}{5}$ on the horses, and $\frac{1}{8}$ on the cows, but lost $\frac{1}{4}$ on the sheep, receiving for the whole lot $4,675. Find the sum expended on horses, cows and sheep.

LXXIII.

1. *A* and *B* engage in trade. *A* furnished $\frac{7}{16}$ of the capital, and *B* $\frac{9}{16}$. If *B* should transfer 379\frac{1}{2}$ of his capi-

tal to *A* their shares would be equal. How much did each furnish?

2. *A*, *B* and *C* traded together. *A* put in $140, *B* $250 and *C* 120 yards of cloth. They gained $230, of which *C*'s share was $100. Find price per yard of *C*'s cloth.

3. A man having lost $\frac{1}{4}$ of his capital is worth exactly as much as another who has just gained $\frac{3}{20}$ on his capital, the second man's capital was originally $9,000; find the first man's capital.

4. Bought 3,000 bushels of wheat at $1.50 a bushel. What must I ask per bushel that I may fall $\frac{1}{5}$ on the asking price and still make $\frac{4}{25}$ profit, allowing $\frac{1}{10}$ of the sales for bad debts?

5. A man laid $\frac{2}{7}$ of his fortune in speculation and put out on interest the remaining $6,800; at the end of the year he had gained $\frac{5}{17}$ as much by speculation as he laid out, and his interest was $\frac{1}{8}$ of the principal. What was his fortune, and how much did he gain during the year?

6. A piece of oak timber with its end 24 in. square contains 16 cubic yards. Find its value when sold at 55 cents per foot in length.

7. A wine merchant bought a hogshead of wine for $149. A part having leaked out he sold the remainder for $2.98 a gallon and found his loss to be $\frac{1}{21}$ on the cost. How many gallons leaked out?

8. A farmer sells 20 bags of wheat, averaging $2\frac{1}{2}$ bushels per bag, to a merchant at $1.05 a bushel and gains 20 per cent. He receives in payment 2 suits of clothes at $25 each. The merchant's gain on his goods being 25 per cent.; find who gained the most.

9. I bought $\frac{2}{7}$ of a ship, but the property having fallen in value 8 per cent., I sell 14 per cent. of my share for $2,760. What was the value of the ship at first?

10. A certain principal, at simple interest, for a given time at 8 per cent. amounts to $710.40, and at 6 per cent. for same time to $652.80. Find the principal and rate.

LXXIV.

1. A newsboy buys 144 newspapers each day at 10 cents a dozen. He sells them at 1 cent each. At the end of 6 days he has 8 old papers on hand. How much money has he made during the week?

2. A book agent bought 90 books at $2 each. He sold them at $3.50 each. His expenses were $10. He was unable to collect for 3 books. How much did he gain or lose?

3. If a clerk receives $640 a year, and his expenses are $500 a year, how many years will it take him to pay for a house and lot worth $1,120?

4. How much water must be added to a gallon of milk worth 4 cents a quart, so that it may be sold for 5 cents a quart, and give a profit of one-half of cost?

5. A ton of coal is worth $6.50, and lasts on an average 21 days. How much money will be required to buy coal from 15th Oct. to 15th May?

6. A man sold 2 houses for $1,500 each; on the one he gained $\frac{1}{5}$ of the cost price; on the other he lost $\frac{1}{5}$ of the cost price. How much did he gain or lose on the two houses?

7. Three men hired a horse for a journey from A to B and back again. Half way from A to B they overtake a fourth man who agrees to pay his share of the cost for the distance he rides to B and back half-way to A. What should he pay if the whole cost of the horse is $5?

8. How many square rods are there in 100 square chains?

9. Find the cost of carpeting a room 12 ft. by 16 ft. with carpet 27 in. wide at $1.35 per yard.

10. There are 40 pupils in a room 36 ft. long, 30 ft. wide, and 15 ft. high. How many cubic yards of air are there for each pupil?

LXXV.

1. If a certain number be taken from 2,000,002 the remainder will be 709,008. What is the number?

2. If a tradesman makes $2\frac{1}{2}$d. profit on every shilling's worth of goods he sells, what amount of goods must he sell a year to be in receipt of an income of £100?

3. Simplify the following fractions:—

$$\frac{\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}{2\frac{1}{2}+3\frac{1}{3}+4\frac{3}{5}} \div \frac{\frac{2}{3} \text{ of } \frac{3}{4}}{\frac{4}{5} \text{ of } \frac{5}{6}}$$

4. A man after paying income-tax at the rate of 2d. in the pound, found he had £178 10s. left. What was his original income?

5. A man bought a horse and saddle. The saddle cost a third of the whole, and the horse caught £60. What was the cost of both?

6. Find the difference between $\dot{6}$ of a guinea and $\dot{3}4\dot{2}$ of a shilling.

7. If 18 men can dig a trench 36 yards long in 24 days by working 8 hours a day, how many many men will dig a trench 48 yards long in 56 days, working 9 hours a day?

8. What sum of money will produce £591 12s. 4d. as simple interest in 4 years at $2\frac{1}{2}$ per cent.?

9. How much paper $\frac{3}{4}$ yard wide would be needed to paper a room 30 ft. long, 24 ft. wide, and $12\frac{1}{2}$ ft. high?

10. If by selling oranges at 24 for 1s. 6d. I gain 50 per cent., at what price ought I to sell them per doz. to gain $66\frac{2}{3}$ per cent.?

LXXVI.

1. A grain of gold is beaten out in leaf to cover 56 sq. inches. What weight will be required to for gilding the face of a cube whose edge is $3\frac{1}{2}$ ft?

2. By selling goods for 60 cents a pound 8 per cent. is lost. What advance must be made in the price in order to gain 15 per cent. on the cost?

3. Divide \$27.12$\frac{1}{2}$ among three persons, giving the second \$5 less than the first, and twice as much as the third.

4. At what time between 5 and 6 o'clock are the hour and minute hands of a watch exactly together?

5. A flour merchant bought 120 barrels of flour for $650, paying $5.75 for first quality, and $5 for second quality. How many barrels were first quality?

6. How much water is there in a mixture of 100 gallons of wine and water, worth $1 per gallon, if 100 gallons of the wine cost $120?

7. Imported 4 pipes of wine at $2.15 a gallon, and paid $57.60 freight, and a duty of 24 per cent. I sold the whole for $1,980. What was my gain per cent.?

8. A farmer sold 34 bus. of corn and 56 bus. of barley for $63.10, receiving 35 cents a bushel more for the barley than for the corn. What was the price of each per bushel?

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

10. What is the number from which if $7\frac{1}{2}$ be subtracted $\frac{2}{3}$ of the remainder is $91\frac{1}{2}$?

LXXVII.

1. What will be the expense of an oil cloth for a hall 7 yds. long, and 10 ft. wide, at $1.25 a square yard?

2. How much water must be mixed with 100 gals. of vinegar, at 60 cents a gallon, to reduce the value to 50 cents a gallon?

3. A train 110 yards long, moving at the rate of $\frac{1}{4}$ mile a minute, meets another train moving at the rate of 40 ft. a second, and passes it in 8 seconds. Find the length of the last train.

4. A clock which loses 5 minutes in 24 hours is 10 minutes fast at noon on Monday. What o'clock will it show at 6 on Wednesday morning?

5. The interest on a certain sum of money for $2\frac{1}{2}$ years at 7 per cent. is $5.87\frac{1}{2}$. What is the sum of money?

6. Sold $\frac{4}{5}$ of an article for $\frac{3}{4}$ of what it cost. What was the gain per cent. ?

7. A publisher wishes to net 75 cents on each copy of a book. What price should he put upon it that he may be able to allow the trade 20 per cent. discount ?

8. A grocer gained $12\frac{1}{2}$ per cent by selling 10 lbs. of sugar for $1. How much will he gain by selling 11 lbs. for $1 ?

9. What principal will amount to $500 in 5 years at 4 per cent. simple interest ?

10. A customer bought what he supposed was $48 worth of tea, but a false weight having been used he got only $42 worth. How many ounces were given for a pound ?

LXXVIII.

1. A shilling weighs 3 dwts. 15 grs., of which 3 parts out of 40 are alloy and the rest pure silver. How much per cent. is there of alloy, and what is the weight of pure silver ?

2. Add together the greatest and least of the fractions $\frac{3}{4}$, $\frac{7}{8}$, $\frac{11}{20}$, $\frac{19}{20}$, and subtract this sum from the sum of the other two fractions.

3. What must be rate of interest per cent. per annum in order that the interest on $50 may be 1 cent a day ?

4. The cost of carpeting a room, whose length is 18 ft., at 3s. 6d. a sq. yard, is £5 12s. ; and the cost of painting the walls at 4s. 6d. a sq. yard is £17. Find the height and breadth.

5. How much cotton, 4 ft. wide, at 3d. a sq. foot, must be given in exchange for 393·7 metres of silk $\frac{4}{5}$ of a yard wide, at 4 francs per sq. metre; £1 being worth 25·15 francs, and 1 metre being 39·37 inches ?

6. Which is the greater rate of interest £7 for the use of £145 or £4½ for the use of £91 15s. for a year ?

7. 3 men, 4 women, 5 boys, or 6 girls can do a piece of work in 60 days : how long will it take 1 man, 2 women, 3 boys, and 4 girls working together ?

8. A man goes out with £3 5s. 4d. in his pocket. He spends $\frac{3}{7}$ of it in one shop, and $\frac{3}{8}$ in another. To how many poor people can he give $5\frac{1}{2}$d. each with the remainder?

9. The carpeting of a room twice as long as it is broad at 5s. per sq. yard cost £6 2s. 6d., and the painting of the walls at 9d. per sq. yard cost £1 6s. 3d. What is the height of the room?

10. A clock is right at mid-day to-day, but it gains 1 minute per day. What will be the time when it points to mid-day to-morrow?

LXXIX.

1. A boy spent $\frac{1}{2}$ his money in one shop, $\frac{1}{3}$ of the remainder in a second, and $\frac{1}{5}$ of what he had left in the third. He had 1s. at last; how much had he at first?

2. A man agreed to work for 30 days on condition that for every day's work he should receive 40d., and that for every day's absence he should forfeit 18d. At the end of the time he received £3 11s.; how many days did he work?

3. A constituency had $\frac{2}{3}$ of its number Conservatives. In an election 25 refused to vote, and 60 went over to the Liberals; the voters were now equal. How many voters were there altogether?

4. Walking $4\frac{1}{4}$ miles an hour, I start after a friend whose pace is 3 miles an hour; how long shall I be in overtaking him?

5. A clock gains 4 minutes a day. What time should it indicate at 6 o'clock in the morning, in order that it may be right at 7 15 p.m. on the same day?

6. A boat's crew can row 8 miles an hour in still water. What is the speed of a current if it takes them 2 hrs. and 40 min. to row 8 miles up and 8 miles down?

7. $\frac{2}{3}$ of *A's* money is equal to *B's*, and $\frac{4}{5}$ of *B's* is equal to *C's*; in all they have £770, what have they each?

8. I bought a certain number of apples at 3 a penny, and $\frac{5}{8}$ of that number at 4 a penny. By selling them 16 for 6d. I gain $3\frac{1}{2}$d. How many apples did I buy?

9. If I lend a sum of money at 6 per cent. the interest for a certain time exceeds the loan by $100; but if I lend it at 3 per cent. for a fourth of the time the loan exceeds the interest by $425. How much do I lend?

10. A grocer wishes to make spice at 8s. a pound with another sort at 5s. a pound, so as to make 60 pounds worth 5s. a pound. What quantity of each must he take?

LXXX.

1. A cistern whose capacity is 960 gals. is filled in 30 minutes by 3 pipes, the first of which conveys 12 gals. more, and the third 7 gals. less than the second, per minute. How much flows through each pipe in a minute?

2. *A* can do $\frac{3}{4}$ of a piece of work in 12 days, *B* can do $\frac{1}{2}$ in 10 days, and *C* can do $\frac{1}{4}$ in 4 days. In how many days will they complete their work if all work together?

3. In a division the majority was 162, which was $\frac{3}{11}$ of the whole number; how many voted on each side?

4. If $3 are paid for the use of $60 for 4 months, what rate of interest is charged?

5. In what time will $1,280 amount to $1,500 at 7 per cent. simple interest?

6. How many thousand square feet of plank will be required to make a plank-walk 300 yds. long, and 6 ft. broad, allowing $\frac{1}{4}$ inch space between each foot of length?

7. What will it cost to carpet a floor $17\frac{1}{2}$ ft. long, and $13\frac{1}{2}$ ft. wide, with carpet 27 in. wide, and costing $1.35 per linear yard?

8. How many 3-cent postage stamps will be required to be sold to clear $2 a day; the profit on the sale being 5 per cent?

9. A lump of ice is 4 ft. long, 2 ft. thick, and 3 ft. wide. How many cubic feet of water will it make when melted, water expanding 10 per cent. when it turns to ice?

10. When wheat is $1.25 per bushel flour is $6 per barrel. What should be price of flour when wheat is 90 cents per bushel, the cost of making a barrel of flour being 37½ cents?

LXXXI.

1. In walking a mile *A* took 1,980 steps and *B* 2,880. Find the difference in length of step?

2. *A*, *B*, and *C* start from the same point to go round an island 84 miles in circumference. If *A* goes 8 miles, *B* 10 miles, and *C* 12 miles per day, when will they all be together again?

3. A man worked 3 months of 25 days each, and 10 hours per day, at 8 cents per hour, and received in payment 2 loads of wheat, each containing 15 bags of 2½ bus. each. Find the price of the grain?

4. How many horses must be bought at $90 each so that after allowing 90 cents for the food of each for a week, and then selling each at $120, there may be a gain of $349.20?

5. What will it cost to ditch a road, on each side, for a quarter of a mile, at 40 cents per rod?

6. I bought 2½ of ⅘ of 20 bus. 1 pk. 1 qt. of grain for $51.92, and sold 12 bus. 2 pks. 1 gal. of it for $20.20. Find gain on each bushel.

7. A merchant lost ⅔ of his capital, and then gained $800, and was then worth $4,000. How much did he lose?

8. How many packages, 4 inches each way, can be packed in a box whose interior dimensions are 64 in., 43 in., and 35 in.?

9. A man bought a quantity of flour for $1,800, used 20 lbs. and sold ⅓ of the remainder for $1,568, which was $224 more than cost. Find number of pounds bought?

10. What is the value of a pile of wood 32 ft. long, 11 ft. high, and 6 ft. wide, at $4.74 per cord?

LXXXII.

1. How far may a person ride in a carriage going at the rate of 8 miles per hour, so that if he walked back at the rate of 3 miles per hour he may be gone $5\frac{1}{3}$ hours?

2. 2 hens and 3 ducks cost \$1.15, and 8 hens and 5 ducks cost \$2.85. How much more does a duck cost than a hen?

3. What will it cost to carpet a room 12 ft. long, and 8 ft. wide, with carpet 27 in. wide, worth \$1.35 per yard?

4. A man gave $\frac{3}{7}$ of $1\frac{5}{8}$ times his money for a buggy, $\frac{4}{5}$ of what remained for harness and had \$15 left. Find how much the buggy cost more than the harness.

5. In what time will \$250.50 amount to \$295.59 at 8 per cent. simple interest?

6. *A* does $\frac{2}{5}$ of a work in 4 days when *B* comes to help him, and they finish the work in $1\frac{3}{4}$ days more. How long would each by himself take to do the whole of the work?

7. How many square yards are there in a walk 6 ft. wide that surrounds a lot which, inside of the walk is 16 rods long and contains $\frac{1}{2}$ an acre?

8. A man borrows \$300 for 2 years at a certain rate, and \$400 for $3\frac{1}{2}$ years at 1 per cent less, (both simple interest). He pays in all \$136 of interest. Find the rate in interest.

9. In a mixture of wine and water the wine is $\frac{10}{13}$ of the whole. After $\frac{1}{4}$ of the mixture is withdrawn 8 gals. of water are added, and the wine is found to be $\frac{2}{3}$ of the mixture. Find the original quantities.

10. A piece of land is $400\frac{7}{8}$ rods each way. If a road 100 ft. wide is cut through this, parallel to the side, how many acres will be taken away?

LXXXIII.

1. *A* and *B* engage in business; *A* puts in \$15,000, and *B* \$18,000. *A* is to have $\frac{1}{12}$ of the profits for managing the business. How should a profit of \$3,600 be divided?

2. A railway train travels at the rate of 20 miles per hour including stoppages, and 30 miles per hour when it does not stop. In what distance will it lose 3 hours by stoppages?

3. *A* and *B* can do a piece of work in 6 days, *B* and *C* in 8 days, *C* and *A* in 9 days. How long will *A*, *B*, and *C* take?

4. Divide $760 among *A*, *B*, and *C*, so that *B* may have $160 more than *A*, but $50 less than *C*.

5. A house and lot cost £660 15s. 7½d.; the house cost 14 times as much as the lot. Find cost of house in Canadian currency. (£15=$73).

6. Stair carpet, for steps 8 in. high and 9 in. deep, for the flight of a 14-foot storey, is 22 in. wide; find the cost at 62½ cents a yard.

7. In the previous question find the number of surface yards of carpet.

8. How many cubes, with a 3-inch edge, could be cut from a stick of timber 16 in. thick, 22½ in. wide, and 23 ft. long, allowing a quarter-inch saw cut?

9. What length of timber of the same size would give 7,000 cubes?

10. If the French metre, which measures 39·37079 in., is ·0000001 of one-fourth of the distance around the earth; find the distance in miles, to three decimal places.

LXXXIV.

1. One egg contains as much nutriment as 3 oz. of beef. If eggs are worth 20 cents a dozen and beef 11 cents a pound, which is the cheaper diet?

2. Find the cost of setting out a forest of 10 acres with walnut, putting the trees 12 ft. apart, supposing the trees to cost $120 per thousand, and the labor of planting 10 per cent. of the cost of the trees.

3. A commission merchant received a consignment of peaches, one-half of which he sold at 45 cents a basket, and the rest at 75 cents a basket. His commission at 2½ per cent. amounted to $12. How many baskets did he receive?

4. St. Thomas is 81° 15′ and Halifax 63° 36′ West Longtitude. When it is 12 o'clock noon at St. Thomas, what is the time at Halifax?

5. 10,000 cords of pine are used annually in the manufacture of lucifer matches. Each cubic inch makes on the average 55 matches; 50 matches are put in a paper, and 36 papers in a box. How many boxes of matches are made every year?

6. How much is the freight on 1,847 bush. of wheat from London to Montreal at 13 cents per cwt.?

7. If a man travel at the rate of a minute of distance in 10 minutes of time, how long will he be in travelling around the world?

8. Six hundred and twenty-five-thousandths of a stock of dry goods worth $6,000 was destroyed by fire. Find the loss sustained by a member of the firm who had $\frac{2}{5}$ share in the business.

9. A farmer gave 1,260 lbs. of flour, at $5.25 per barrel, and his note for $30 payable in 6 months with interest at 8 per cent. per annum, for a waggon. How much did the waggon cost him?

10. Find the cost of shingling the roof of a building, each side of which is 36 ft. x 15 ft. The shingles are to be laid $4\frac{1}{2}$ in. to the weather, and cost $2.25 per thousand. N B.—4 in. is reckoned as the width of a shingle.

LXXXV.

1. A miller paid $73.50 for grain; $\frac{3}{5}$ of it being wheat at 90 cents a bushel, and $\frac{2}{5}$ of it oats at 35 cents a bushel; with the rest of the money he bought peas at 60 cents a bushel. How many bushels of grain did he purchase?

2. The gallon contains 277·274 in. How many bushels will a bin 4 ft. 6 in. long, 3 ft. 4 in. wide, and 4 ft. 8 in. deep hold?

3. For field culture, strawberries are put in rows 3 ft. 6 in. apart, and 1 ft. 6 in. apart in the row. How many plants are required for an acre of ground?

4. Canadian coal oil is worth 25 cents a gallon, while American oil costs 35 cents a gallon. It is found by actual experiment that a lamp filled with the former is consumed in 15 hours, but when filled with the latter lasts 20 hours. Which is the more economical?

5. Two-thirds of my journey was made by railroad at the rate of 25 miles an hour, and the rest by stage at 6 miles an hour. The time occupied in travelling was 3 hrs. 42 min. Find the length of my journey.

6. A farmer offers his servant $15 a month including board for a term of 1 year, or $27.75 a month without board; he accepts the latter, and claims that he has saved $7.50 by doing so. How much per week did he pay for board? N.B.—52 weeks=1 year.

7. The contract of gravelling a road to a depth of 3 in., and a width of 8 ft. is let by the rod. What should be the tender of a man who can haul 6 loads of 1 cubic yard each per day, and who values the labor of himself and his team at $2.25 per day?

8. At what price per yard must a merchant mark cloth, which cost 80 cents a yard, so that by reducing his price 10 per cent. he may still have a profit of 20 per cent.?

9. The ice on a pond, whose area is $\frac{1}{2}$ an acre, is 10 in. thick. How many tons of ice may be taken from the pond, supposing a cubic foot of ice to weigh 56 lbs.?

10. A man who can do as much work in 2 hours as his son can do in 5 hours, receives $1.25 a day. What should be the weekly wages of the son?

LXXXVI.

1. The cost of preparing a field for wheat is $\frac{1}{8}$, of seed $\frac{1}{15}$, of harvesting $\frac{1}{12}$, and of threshing and marketing $\frac{1}{10}$ of the price obtained for the wheat. Find the profit on every $100 worth sold.

2. How much inch lumber is required for enclosing a barn, sheeting the roof and laying a double floor over the whole; its dimensions being 60 ft. long, 32 ft. wide, and 18 ft. high, and the gables are 12 ft. above the eaves?

3. A physician bought 2 lb., troy, of quinine at $2 25 per oz., and in dealing it out charged at the rate of a cent a grain. Find his gain per cent. on his outlay.

4. Bought a piece of dress goods for $12.96. There were as many yards in the piece as it cost cents per yard. How many yards did I buy?

5. A man having a 10-acre field which is 32 rods wide wishes to divide it into town lots of $\frac{1}{8}$ of an acre each. If a street 66 ft. wide is laid out the entire length of the field through its centre, what will be the frontage of each lot, and into how many lots will the field be divided?

6. If equal quantities by measure of oats at 42½ cents, barley at 60 cents, peas at 75 cents, and rye at 70 cents be chopped and mixed for feed, find what the mixture is worth per bushel.

7. If equal weights of the above at the same prices be mixed, find the price per bushel.

8. Allowing toll at $\frac{1}{10}$, in the last question, what would the mixture cost per cwt.?

9. If the coal used for 2 rooms average 1 ton a week for 6 months, find the cost per hour, the rooms being open 5 days in the week and 8 hours a day, with coal at $6.50 a ton.

10. If the temperature, in the previous question, average 70°, what would it cost to keep the temperature at 60° for 6 weeks?

LXXXVII.

1. If the regular fare on a railway is 3 cents per mile, but $\frac{1}{6}$ is allowed off the full fare when return tickets are bought, find the distance between two places if a return ticket costs $1.80.

2. 450 leaves of a certain kind of paper make an inch of thickness. Find the thickness of a book 6 in. by 4 in. in which 10 sq. yds. of the paper are used.

3. *A* has $1,095, *B*, his brother in England, has £500. How many pounds should *A* receive from *B* in order that both may have the same amount of money?

4. *A* can run 8 yards while *B* runs $7\frac{1}{2}$. How much of a start should be given to *B* in a quarter-mile race in order that neither may win?

5. A farmer sold 2,450 lbs. of hay at $12 per ton, and 1,500 lbs. wheat at $1.20 per bushel, and lent the money he had received at 8 per cent. per annum for $7\frac{1}{2}$ months. What sum will he have altogether at the end of that time?

6. A grocer mixed 40 lbs. of tea worth 56 cts. per pound with 35 lbs. of another kind, and then had a mixture worth 60 cts. per pound. Find price of the second tea per pound.

7. A reaping machine moving at the rate of $2\frac{1}{2}$ miles per hour goes along one side of a field of grain in 6 min., cutting $\frac{1}{8}$ of an acre. What width does the machine cut?

8. A man has a field with three sides, 40 rods, 24 rods, and 124 yds. He wishes to use boards which, when placed lengthwise, will fence any one of the sides exactly. What is the longest board he can use, and how many will go around the field?

9. If 5 francs = $92\frac{1}{2}$ cents, and $\$4.86\frac{2}{3}$ = £1 sterling, express a franc as a fraction of a shilling.

10. William has $240 lent at $7\frac{1}{2}$ per cent. per annum interest. John has $200 lent, and he receives as much money for interest as William. What rate per cent. does John charge?

LXXXVIII.

1. A man can do a piece of work worth $37.50 in 15 days. With the help of a boy he could do it in 12 days. How many days would the boy alone need to work at it to earn $10?

2. A clock ticks 3 times in 2 seconds, and the distance around the outside circle on the dial plate is 30 in. Supposing the end of the minute hand to move on this circle how far will it go while the clock ticks 720 times?

3. It cost $23.10 to fence a square field at $3\frac{1}{2}$ cents per yard. How many acres are there in the field?

4. I bought a watch and chain, giving $50 more for the watch than for the chain. $\frac{1}{4}$ of the price of the watch was equal to $\frac{2}{3}$ of the price of the chain. What did I pay for each?

5. A person finds that after spending 30 per cent. of his income he can save $1,330. How much could he save if he spent only $\frac{1}{2}$ as much?

6. A piece of cloth would be worth $65 if it were $\frac{1}{12}$ longer. If the price of a yard be $1.25, how many yards in the piece?

7. How many feet of lumber, board measure, in 20 planks, 14 ft. long, 9 in. wide, and $1\frac{1}{2}$ in. thick?

8. *A* owns $\cdot 06\dot{9}0$ of a farm. *B* who owns $\cdot 37\dot{9}$ of the same farm has 61·56 acres more than *A*. How many acres in the whole farm?

9. A man earns $350 every $2\frac{1}{2}$ months. If he spend in 5 months what he earns in $3\frac{1}{2}$, how much will he save in a year?

10. Mr. *A* borrowed $1,460 at the bank on the 4th. July at 10 per cent. interest. When he returned the money he had $16 interest to pay. Counting 365 days to the year, find on what day he repaid the money.

LXXXIX.

1. I sold $\frac{5}{8}$ of my farm, but I bought back, at one time, $\frac{1}{3}$ of the farm, and at another time 20 acres. I then lacked 50 acres of having the whole farm. How many acres in the whole?

2. A farmer sold 168 bush. of oats. The difference between the $\frac{1}{7}$ and the $\frac{1}{8}$ of the sum received was $8. Find the price per bushel.

3. In a school are 40 girls and a number of boys, and $\frac{1}{3}$ of the number of boys equals $\frac{1}{7}$ of the whole class. How many boys are there?

4. A person had 75 acres of his farm cleared, and this was $\frac{5}{8}$ of the whole. He bought a piece of bush land, after which the cleared land was $\frac{2}{3}$ of the whole. How many acres did he buy?

5. A merchant bought a piece of cloth for $72. He kept 25 yds. for his own use, and sold the rest at an advance of 10 per cent. on cost, receiving for it $57.20. What did the cloth cost him per yard?

6. At a uniform rate of 7 ft. per second, how much air will pass through a 12x14-inch ventilator in 12 hours?

7. How often would the ventilator, in the previous question, change the air in a room 15x20x30 ft.?

8. If water expands $\frac{1}{10}$ in freezing, and an inch of water makes a foot of steam, find the number of yards of steam that can be made from a sheet of ice $2\frac{1}{2}$ in. thick over a pond 1 acre in extent.

9. If a 9-columned page of a newspaper, which is 27 in. from top to bottom, be filled with advertisements at 8 cents a line, find the profit therefrom, allowing $\frac{2}{3}$ for cost of publication.

10. The pure silver in a Canadian 50-cent piece weighs $\frac{4}{5}$ of $\frac{3}{4}$ of $\frac{1}{37}$ of 1 lb. Troy; while that in a U. S. 50-cent piece weighs $\frac{1}{2}$ of $\frac{9}{10}$ of 412½ grains. How many U. S. 50-cent pieces are worth as much as 363 Canadian ones?

XC.

1. Land which cost $9,000 was sold at a profit of 25 per cent. If it was sold for 10 per cent. less than was asked for it, what was the asking price?

2. What will it cost to fence a square 10-acre field at $4.50 a rod?

3. A cellar 22 ft. long, 18 ft. wide, and 7 ft. deep is found to be full of water. Find the weight of water in pounds, if a gallon of water weighs 10 lbs. and occupies 277·2 cubic inches of space.

4. A farm contains 120 acres; its width is $\frac{3}{4}$ of its length; find its length in yards.

5. A dealer, in measuring off 90 yds. of carpet, uses by mistake a yard measure, which is half an inch too short; how much too short will the customer find his carpet when he comes to lay it?

6. Soldiers marching in "quick time" take 116 paces in a minute, the length of each pace being 30 in.; how many hours of actual marching will be required to go from Toronto to Hamilton, if the distance is 760 yds. less than 40 miles?

7. A gallon is found to contain 277·274 cubic inches; find the number of cubic inches in a bushel. If a bin of wheat is 5 ft. long, 5 ft. wide, and 5 ft. deep, how much will it contain more or less than 100 bushels?

8. A farm worth $10,000 is rated by the assessor at ⅘ of its actual value. What amount of taxes will be paid on it at 2 mills in the dollar?

9. A dealer buys certain articles at the rate of 10 for 9 cents, and sells them at the rate of 9 for 10 cents. Find his gain per cent.

How many dozen articles must he handle in order to gain $19?

10. A manufacturer sells goods to a merchant at a profit of 50 per cent., but the merchant fails and pays his creditors 75 cents on the dollar. What per cent. will the manufacturer gain or lose on his goods?

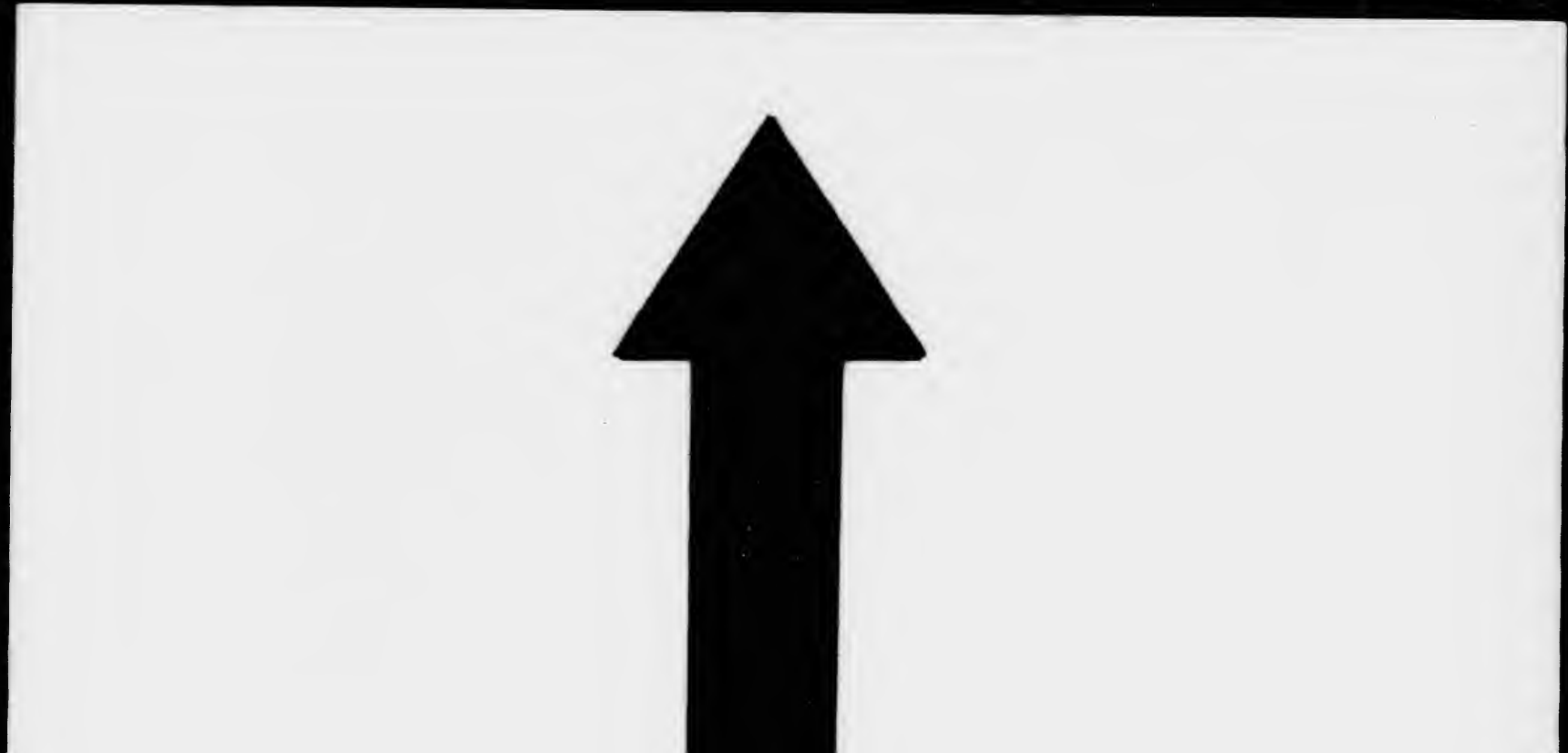
A. E. CAVERHILL, Esq., High School, Beamsville.

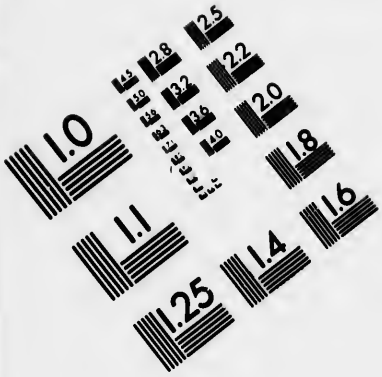
XCI.

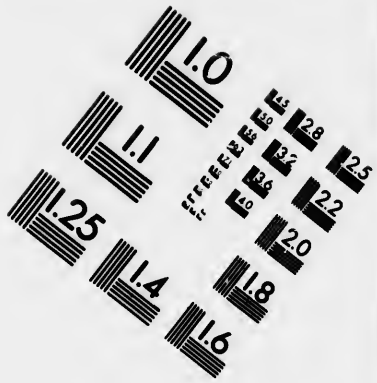
1. Reduce 233 lbs. 4 oz., troy, to tons, cwt., qrs., lbs., etc.

2. On Tuesday at 6 a.m. there are 360 gals. of water in a well, and water flows in continually at the rate of 30 gals. per hour. At 8 a.m. on Thursday a pump begins to work, and is worked each working day from 8 a.m. to 6 p.m., and the well is thus emptied at noon on the following Wednesday. How many gallons per hour are pumped out of the well?

3. The circumference of the fore wheel of a buggy is 11 ft., and that of the hind wheel 13 ft. In what distance will the fore wheel make 20 revolutions more than the hind wheel?







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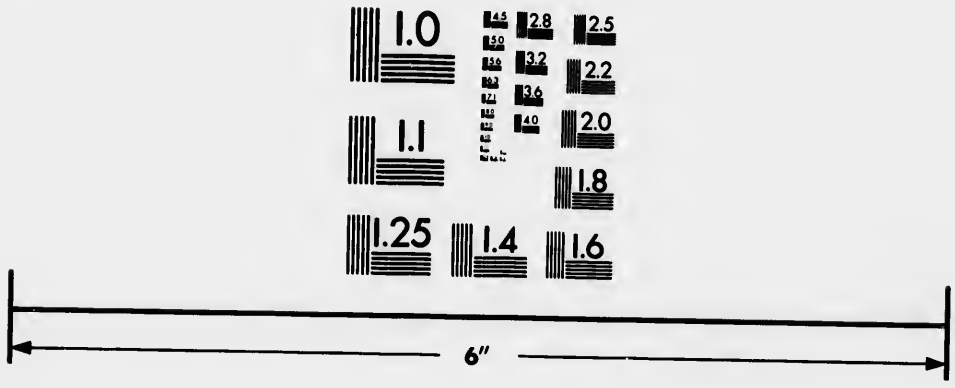

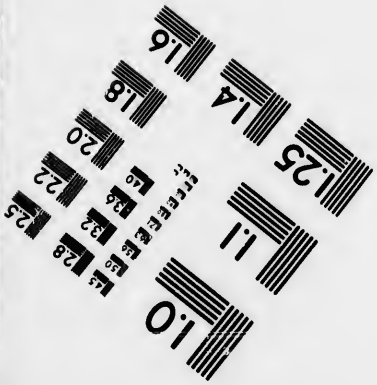

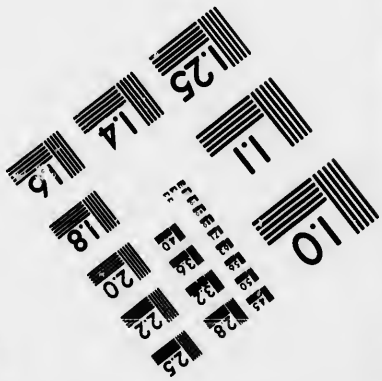

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4. Assuming that water expands $\frac{1}{10}$ in freezing, find the weight of 143 cubic feet of ice. (Weight of a cubic foot of water=62½ lbs.)

5. A merchant who sells at 20 per cent. above cost receives for a week's sales $1,500. What is his gain?

6. *A* and *B* buy cloth at the same price. *A* makes a profit of 20 per cent on his sales, *B* sells at an advance of 20 per cent on his buying price. *A's* selling price is 6 cents per yard higher than *B's*. Find the cost per yard.

7. A merchant buys cloth at $1.60, and sells at an advance of 25 per cent. It is found that his yard measure is $1\frac{7}{11}$ in. too short. Find the merchant's gain per cent.

8. 60 yds. of paper would paper a room, if the paper did not overlap. How many yards will be required if $\frac{1}{10}$ of the length is lost in matching, and the paper overlaps $\frac{1}{7}$ of its width?

9. Two clocks indicate correct time at noon. One clock gains $3\frac{1}{3}$ min., and the other loses $1\frac{2}{3}$ min. per hour. When will the minute hands of the two clocks first be at the same point on the circumference of the dial, and at what point?

10. A merchant in selling cloth raises the cost price 20 per cent. It is found that the yard measure by which he bought was an inch too long, and the yard measure by which he sold an inch too short. What is his gain per cent.?

XCII.

1. A reaper which cuts $5\frac{1}{2}$ ft. wide is drawn 9 times around a 10-acre field, whose length is 4 times its breath. How many acres of grain are left standing?

2. The number of males in a reformatory in 1884 is 25 per cent. more than in 1883; the number of females is 10 per cent. less, while the whole number of inmates in 1884 is 5 per cent. more than in 1883; also the number of inmates in 1884 is 140 more than in 1883. Find the number of male and female inmates respectively in 1883.

3. A sidewalk is laid around a rectangular plot, with its inner edge touching the sides of the plot, and it is found that 160 ft. less of the same lumber will lay a sidewalk of the same width around the plot, with its outer edge touching the sides of the plot. If the lumber is $1\frac{1}{2}$ in. thick, find the width of the sidewalk.

4. By selling 175 yds. of tweed at \$1.50 per yard a merchant gains \$10.50 more than twice as much as he would have lost had he sold it \$1.20 per yard. Find the cost price per yard.

5. *A* and *B* dig a ditch 120 rods long. The soil at one end is clay, and at the other end sand. If the whole of the ditch were sand *A* could dig the ditch alone in 30 days, and *B* in 24 days. If the whole length were clay *A* could dig the ditch in 40 days, and *B* in 60 days. *A* begins at the clay soil, and *B* at the sandy soil: they together dig the ditch in 17 days. What length of the ditch was clay, and what length sand?

6. A grocer bought 10 gals. of wine at \$3 per gallon, and wishes, by buying inferior wine at \$2 per gallon and mixing, to sell the mixture at \$2.50 per gallon and gain 20 per cent. on his outlay. How many gallons of inferior wine will he require to buy?

7. A stream has a current of $\frac{1}{2}$ mile per hour. An oarsman rows a certain distance down the stream in 60 min., when he returns and rows back to the place whence he started in 64 min. How far down the stream did he row?

8. *A* lets a farm to *B* for 1 year; *B* to provide all the seed and do all the work, and pay as rent $\frac{1}{4}$ of the crop. *A*, however, lends 30 bush. for seed. After threshing *B* draws away 120 bush. How much must *A* draw as an equivalent for the 120 bush., and also for the 30 bush. seed grain lent to *B*?

9. 5 men and 3 boys complete a piece of work in 15 days; similarly 12 men and 6 boys complete the same in 6 days. How long would 9 boys take to do the work?

10. Three men *A*, *B*, and *C* start from the same point at the same time and in the same direction around an island 73 miles in circumference. *A* travels at the rate of

7, *B* 12, and *C* 17 miles per hour. When will they all be together for the first time; also when will they be together at the point of starting?

R. S. STRATH, Esq., Collegiate Institute, St. Catharines.

XCIII.

1. From a cask containing 120 gals. of wine and 96 of water a quantity is drawn which contains $4\frac{4}{5}$ gals. more wine than water. How much wine remains in the cask?

2. Through how many of the spaces on the dial of a clock does the hour hand pass, while the minute hand passes from 2 to 11?

3. *A* runs at the rate of 8 miles an hour, *B* at the rate of 7 miles an hour. How much of a start (in time) can *A* give *B* in a mile race, so as to win by 44 yds.?

4. The simple interest on a sum of money for 5 months at $6\frac{2}{3}$ per cent. per annum is $\$2.12\frac{1}{2}$ more than the simple interest on the same sum for $4\frac{2}{4}$ months at $7\frac{1}{2}$ per cent. Find the sum.

5. *A* can do a piece of work in $7\frac{1}{2}$ days, *B* can do twice as much as *A* in the same time. What part of the work can both together do in $1\frac{1}{3}$ days?

6. A boy has a certain number of marbles. He loses $\frac{1}{5}$ of them and then wins 12; he then loses $\frac{1}{5}$ of what he has and again wins 12. He now has 92, how many had he at first?

7. The simple interest on a note of \$80 for 8 months is $3\frac{1}{3}$ per cent. What rate per cent. is the interest calculated at?

8. A man buys 240 bush. of wheat at \$1.08. He sells $\frac{1}{3}$ of it at $\$1.12\frac{1}{2}$, $\frac{2}{5}$ of it at \$1.20, and the remainder at such a price that he gained on all \$12.80. Find selling price of the third lot.

9. 20 men can do a piece of work in 12 days. After working a certain time 4 of the men leave, and the work is finished in $13\frac{1}{3}$ days. How many days did the 4 men work?

10. A man works from 7:15 a.m. to 1:30 p.m. manufacturing certain articles at the rate of 5 in 12 min. He sells these at the rate of 10 cents per dozen. What does he receive for them?

L. J. BIRCHARD, M.A., PH.D., COLLEGIATE INSTITUTE, BRANTFORD.

XCIV.

1. Find the G. C. M. of 1 rod 1 sq. p. 1 sq. yd. 5 sq. ft. 22 sq. in., and 13 sq. p. 10 sq. yds. 8 sq. ft. 38 sq. in.

2. The driving wheels of an engine are 14 ft., and the front wheels 10 ft. in circumference, and the latter make 88 revolutions per minute more than the former. Find the rate of the train.

3. A farmer bought 150 ac. of land at $75 an acre; he sold 2 ac. 3 r. 20 p. at $80 an acre, and a lot 25 rods long and 20 rods wide at $1.20. At how much per acre must the remainder be sold to gain $1,000 on the whole?

4. A person having to walk a distance of 32 miles in 8 hours, walks at the rate of $3\frac{1}{2}$ miles per hour over the first half of the distance, and $4\frac{1}{2}$ miles per hour over the second half. How much will he be behind time?

5. A servant agreed to work a year for $215 and a watch; at the end of 5 months his just due was $75 and the watch. How much was the watch worth?

6. The earth taken out of a cellar 30 ft. long, 20 ft. wide, and 6 ft. deep is spread over $\frac{1}{11}$ of an acre; how thick a covering will it make?

7. A grocer bought 2,000 lbs. of sugar for $125. He sold $\frac{1}{3}$ of it, giving 11 lbs. for a dollar. How many pounds should he give for a dollar in selling the remainder to gain $42\frac{8}{11}$ dollars on the whole?

8. Tom has 25 marbles, Dick as many as Tom together with $\frac{1}{2}$ as many as Harry, and Harry as many as Tom and Dick. How many have Dick and Harry?

9. How many cubic feet of timber are there in a box without a lid, made of plank 2 in. thick, whose inside measures 10 ft. 6 in. long, 18 in. wide, and 18 in. deep?

10. How many sq. yards in the surface of 1,728 separate blocks of a cubic inch each, and how many yards in the sum of the lengths of all their edges?

XCV.

1. How many suits of clothes, each containing 7·25 yds. of cloth, can be made from 76·125 yards, and how much cloth will be required?

2. There are about 400,000,000 of people in China. How long a line would they form if placed in a row, allowing 3 ft. space for each person. How long would it take the line to travel its own length at 4 miles per hour, 10 hrs. a day, and resting on the Sabbath?

3. The sum of $50 is made up of half-dollars, quarter-dollars, ten-cent pieces, and five-cent pieces, the value of all the coins of each denomination being the same. How many coins are there in all?

4. The American eagle weighs 250 grains. Find how many tons of gold it would take to equal in value the worth of W. H. Vanderbilt, who was possessed of about $200,000,000?

5. A farmer sold his wheat at 95 cts., barley at 60 cts., oats at 40 cts. a bushel, receiving $2,280 for the whole. His income from the barley was twice that from the oats and $\frac{3}{5}$ of that from the wheat. How many bushels had he of each?

6. Find the difference between 9 ac. 3 r. 39 per. 30 yds. 7 ft. 65 in., and 10 ac.

7. If a cut of beef is worth $\frac{2}{7}$ of a barrel of flour, and 30 lbs. of flour is worth $2\frac{2}{3}$ bush. of potatoes, find the value of 775 lbs. of beef when potatoes are $37\frac{1}{2}$ cts. a bushel.

8. How many car loads of food do the people of London consume daily, supposing the population to be 5,000,000, each person to require $2\frac{1}{4}$ lbs., and each car to carry

20 tons? How long a train would they make, and how many engines would it take to draw it, a car being 30 ft. long, and an engine drawing 200 tons?

9. A person's property consists of cash, stocks, and notes. The cash is \$250 more than $\frac{2}{7}$ of the whole, the stocks \$500 less than $\frac{3}{5}$ of the whole, and the notes \$150 less than $\frac{6}{35}$ of the whole. How much has he invested in each?

10. Two streets, each 60 ft. wide, are opened in each direction through a square block of land containing 10 ac. Find the cost of paving the street at 75 cts. a sq. yard; the cost of fencing the whole 9 blocks at 40 cts. a rod, and the value of the lot at \$150 an acre?

H. S. McLEAN, Esq., High School, Clinton.

XCVI.

1. A grocer sells a dollar's worth of sugar at $12\frac{1}{2}$ cts per pound, but he uses a pound weight which is 2 oz light. How much is the customer cheated?

2. Divide \$740 among 10 men, 12 women, and 20 boys so that a man gets \$3 as often as a woman gets \$2, and a boy gets \$2 as often as a man gets \$6.

3. How many cords of wood are there in a pile which covers $\frac{2}{3}$ of an acre and is 6 ft. in height?

4. How many minutes were there between 7:30 a.m., Jan. 20th, 1876, and 10:30 p.m., Mar. 1st, 1877?

5. From 10 ac. take 8 ac. 3 r. 39 per. 30 yds. 6 ft. 108 in.

6. A woman sells a plate of butter weighing 12 lbs. This includes the weight of the plate, which was $\frac{1}{15}$ that of the butter. She buys 3 lbs. of tea at 50 cts. per pound, and has 30 cts. over. How much did she get for the butter per pound?

7. I bought 10 lbs. of tea and 12 lbs. of coffee for \$8 40. The tea was 40 cts. dearer per pound than the coffee. Find the price of each per pound.

8. At 10 cts. per sq. yard what will it cost to paint the outside of a rectangular box 6 ft. long, 4 ft. 9 in. wide, and 4 ft. 6 in. high?

9. If the mint price of gold is £3 17s. 9d. per oz., what is the value of a lump of gold which balances exactly a piece of iron, the weight of which is ½ a pound?

10. Find the interest on $2,400 from the 13th day of Jan., 1888, to the 26th of March of the next year.

XCVII.

1. 3 men can do as much as 6 women, or as 12 boys. How long will it take 4 men, 6 women, and 10 boys to do a work that 10 and 2 women can do in 4 days?

2. A cubic inch of gold is rolled into a sheet 3 ft. long and 2 ft. wide. Find its thickness.

3. A man charges 40 cts. for cutting a log into 5 pieces. What should he be paid for cutting a log twice as thick into 10 pieces, supposing the wood in the latter to be ⅛ harder than in the former?

4. Find the cost at $7.50 per thousand of inch lumber sufficient to make a close fence 40 rods long and 5½ ft. high.

5. By selling borax at 5 cts. per oz. I make a profit of 20 per cent. What did it cost per pound?

6. Bought $75 worth of sugar, and $144 worth of tea. On the sugar I lost 7½ per cent., and on the tea I gained 16 per cent. Did I gain or lose on the whole and how much?

7. A dealer invested $690 in flour at a certain average price per barrel. He sold a number of barrels for $216, at $6.75 per barrel, losing $\frac{1}{10}$ of the cost of the amount sold. At what price per barrel must he sell the remainder so as to clear $50 on the whole?

8. A rectangular cistern is 5 ft. long, 4 ft. wide, and 6 ft. deep. Find the number of gallons of water that it will contain, supposing a gallon to weigh 10 lbs., and a cubic foot 1,000 oz. What will the depth of the water be when there are 150 gals. in the cistern?

9. 4 lbs. of tea at 70 cts. are mixed with 3 lbs. at 60 cents. At what price per pound must the mixture be sold to give a gain of $\frac{1}{13}$ of the outlay?

10. Simplify $\frac{(\frac{1}{2} \div \frac{1}{3} \text{ of } \frac{1}{4}) - (\frac{1}{4} \div \frac{1}{3} \times \frac{1}{4})}{\frac{3}{7} \text{ of } \cdot 0003 \div \cdot 25}$.

XCVIII.

EAST MIDDLESEX PROMOTION EXAMINATION.

1. (*a*) When you are given the product and multiplier how do you find the multiplicand?

(*b*) When you have the quotient, divisor and remainder how do you find the dividend?

(*c*) When you know how much all the articles together cost, and the number of articles, how do you find the price of one article?

(*d*) The quotient is 29, the dividend is 141,578, the remainder is 5 times as much as the quotient; find the divisor.

2. (*a*) Reduce 98 days 168 hrs. to weeks.

(*b*) 34,864 sq. rods of land to sq. feet.

3. (*a*) Add 27,509 yds. of wire, 5,812 rods, 899 ft., 108 in., 54 miles. Give the answer in feet. Put all the work on paper.

4. (*a*) How many paper bags, each to contain 11 lbs. 4 oz. ($1's worth) can be filled from a ton of sugar?

(*b*) A grain bin 9 ft. long and 4 ft. wide contains by measurement 150 bush. of oats. How many bags, each to hold on an average 2 bush. 3 gals. 3 qts., can be filled from the contents of the bin?

5. A lady purchased 14 yds. 27 in. of silk at $2.40 per yard, a fur cloak costing 80 cts. less than twice as much as the silk, and groceries amounting to $14.60. Find the total cost of her purchases.

6. Make a bill of the following items. Use your ruler in drawing the lines needed for the bill:

Mrs. F. L. Woodcamp bought of Messrs. Anderson & Co., 5th Sept.—3 lbs. 2 oz. of tea at 64 cts. per pound.;

5 lbs. 4 oz. of lard at 12 cts. per pound. 19th Sept.—3 qts. of syrup at 60 cts. per gallon ; 25 lbs. of rice at $4.50 per cwt. 3rd Oct.—18 herrings at 25 cts. per dozen ; 5½ lbs. of sugar at 11 lbs. for $1.

7. Find the value of a pile of 4 foot cord wood 68 ft. long, 7 ft. high ; 9 cords are bargained for at $4.50 per cord, and the remainder at 4.40 per cord.

8. Find the cost of carpeting with tapestry 27 in. wide at 85 cts. per yard, a room 31 ft. 6 in. long, and 13 ft. 4 in. wide. Will 6 strips of carpet the length of the room have to be bought ?

9. Find the amount of 2,275 lbs. of wheat at 76 cts. per bushel, and 2,380 lbs. of wheat at $1.30 per cwt.

XCIX.

NORTH WELLINGTON PROMOTION EXAMINATION.

1. Define Proportion, Commission, Stock, Principal, Days of Grace.

2. Name and give examples of the different kinds of Vulgar Fractions. Simplify

$$\frac{2\frac{1}{4}}{2\frac{2}{3}} + \frac{2\frac{1}{2}+5\frac{1}{2}}{3\frac{1}{3}+9\frac{1}{3}} + \frac{1}{2} + \frac{3}{8} \text{ of } \frac{8}{10}$$

3. Divide 500 by ·25, the quotient by ·025, the second quotient by 50 ; what is the result ?

4. A room 31 ft. 4 in. in length requires 54 sq. yards 7 sq. feet 72 sq. inches of carpet to cover its floor ; what is its breadth ?

5. The population of a certain city increases $\frac{1}{15}$ each year ; its present population is 34,560. Find the difference between what its population was two years ago, and what it will be one year hence.

6. A rectangular farm containing 50 ac. is 220 yds. wide. How long will a person take to walk around it at the rate of 4 miles an hour ?

7. *A* and *B* run a race of 200 yds., and *A* wins by 3 yds. *A* and *C* run over the same course and *C* wins by 2 yds. What start can *C* afford to give *B* in a 200 yard race?

8. If 20 men do as much as 48 boys in a day, how many days will it take 72 boys to finish a work, $\frac{1}{4}$ of which has been done by 30 men in 24 days?

9. A horse is sold for $133, at a gain of 5 per cent.; what selling price would give a gain of 25 per cent.?

10. The quotient is 7,469, the divisor 728, and the remainder 19. If the dividend remain unchanged, what divisor would give a quotient of 5,419, having for remainder 1,958?

11. A debt of $5,680 is due *A*, *B* and *C*. *C* is allowed 1·25 per cent. for collecting the debt. Of what is left *A* receives ·35, *B* ·28, and *C* the balance. How much does each receive?

12. A vessel has two supply tanks and one waste pipe. The supply pipe will fill the vessel with water in 6 and 8 min. respectively, the waste pipe will empty it in 12 min. The vessel is empty when the 3 pipes are opened; in what time will it be filled?

C.

COUNTY OF LANARK PROMOTION EXAMINATION.

1. Simplify $7,543 \times 3 - 804 \times 4 \times 1 + 7,632 \times 2 \times 5 - 452 \times 2 - 8,416 \div 7 + 4,247 \times 8$.

2. If *A* pays $572.33 for a plot of ground containing 1 ac. 3 ro. 13 sq. po. 10 sq. yds. 103 sq. in., what will *B* have to pay for 1 ac. at the same rate?

3. A G.T.R. train, in $10\frac{1}{2}$ hrs., runs from Toronto to Montreal, a distance of 333 miles. It stops for 5 min. at each of 18 stations. What is the rate of train when travelling?

4. Divide $540 among *A*, *B* and *C*, and give *A* $3 and *C* $8 as often as *B* gets $4.

5. Mr. Brown bought a number of barrels of apples for $270, and sold them for $360, thereby gaining 75 cts. a barrel; how many barrels did he buy, and what did it cost him a barrel?

6. How many sq. feet in the walls of a room 24 ft. long, 20 ft. wide, and 14 ft. high? Find the cost of painting the floor at 5½ cts. per sq. foot.

7. Distinguish between a Common Measure and the Greatest Common Measure.

What is the smallest sum of money with which I can buy pigs at $5 each, cows at $27, or horses at $105?

8. A man bought 120 ac. of land for $7,800. He sold 30 ac., gaining $10 per acre, and on ½ the remainder he lost $15 per acre. Find what the remainder must be sold for per acre in order that a gain of $300 be made on the whole transaction.

CI.

COUNTY OF BRANT PROMOTION EXAMINATION.

1. Define Greatest Common Measure or Divisor, Least Common Multiple, Decimal Fraction, Compound Fraction, Complex Fraction.

2. How much cloth will be required to make 6 coats, 2¼ yds. each; 7 waistcoats of ⅞ yd. each, and 16 pairs of trowsers, requiring 1¾ yds. 1 in. each?

3. How many boxes, each holding 96 lbs., will contain 1 ton 13 cwt. 2 qrs. 10 lbs.?

4. How many yards of carpet 3 ft. wide will cover the floor of a room 36 ft. long and 27 ft wide?

5. What will a farm cost which is 320 rods long and 80 wide at $60 an acre?

6. Find the greatest number of which 334,495, 106,260 are multiples; and the least number of which 26, 33, 39, 44, are divisors.

7. If 3 ducks are worth 4 chickens, and 3 geese are worth 10 ducks, find the value of a goose; a pair of chickens being worth 60 cts.

8. A person bought two horses and a wagon for $210, and he paid for each horse twice as much as for the wagon. What did he pay for each horse?

9. Find the result of $\frac{3}{5}+\frac{7}{10}+\frac{1}{2}$ and of $1\frac{1}{2}+2\frac{1}{3}+3\frac{1}{4}+4\frac{1}{5}$.

10. *A* does $\frac{1}{2}$ of a certain work, and *B* $\frac{1}{3}$ of it; if *C* finishes it how much will he do?

CII.

ONTARIO EDUCATION DEPARTMENT EXAMINATION PAPERS.

DECEMBER, 1881.

1. Divide three hundred and fourteen and *one hundred and fifty-nine thousandths* by eight thousand nine hundred and thirty-seven *ten-billionths*.

2. Divide the difference of $13\frac{1}{3}\div\{(2\frac{3}{7}-2\frac{8}{11})\times 1\frac{1}{7}\}$ and $\{13\frac{1}{3}\div(2\frac{3}{7}-2\frac{8}{11})\}\times 1\frac{1}{7}$ by $13\frac{1}{3}\div 2\frac{3}{7}-2\frac{8}{11}\times 1\frac{1}{7}$.

3. Find the amount of the following bill in dollars and cents, the shilling being worth $24\frac{1}{3}$ cts.:—115 yds. Brussels carpet, at 5s. 10d.; 95 yds. Dutch stair, at 2s. 7d.; 84 yds. Kidderminster, at 3s. 7d.; 72 yds. drugget, at 2s. 8d.; 10 doz. stair rods, at 5s. 6d.

4. Lead weighs 11·4 times as much as water, and platinum weighs 21 times as much as water. What weight of platinum will be equal in bulk to 56 lbs. lead?

5. Find the difference in cost between 200 ft. of chain cable, 76 lbs. to the foot, and 600 ft. of wire rope, 18¼lbs. to the foot, the chain costing 15s. 6d., and the rope costing 23s. 6d. per cwt.

6. By selling tweed at $2.60 a yard it was found that $\frac{2}{9}$ of the cost was gained; what selling price would have gained $\frac{7}{9}$ of the cost?

7. A plate of copper 5 ft. 6 in. long, 3 ft. wide, and $\frac{3}{4}$ in. thick, is rolled into a sheet 4 ft. 6 in. wide, and 6 ft. long. Find its thickness.

8. How many bricks, 9 in. long, $4\frac{1}{2}$ in. wide, and 4 in. thick, will be required for a wall 30 ft. long, 17 ft. high, and 4 ft. thick, allowing that the mortar increases the bulk of each brick $\frac{1}{15}$?

9. A grocer gained 20 per cent. by selling 10 lbs. sugar for $1. Afterwards he increased his price, giving only 9 lbs. for $1. How much per cent. did he make at the increased price?

JUNE, 1882.

1. Define Greatest Common Measure. State the principle on which the rule for finding the G.C.M. of two numbers depends.

Find the G.C.M. of 68,590,142, and 85,054,059.

2. A dealer bought 8 carloads of lumber, each containing 9,870 ft., at $13.50 per M. He retailed it at $1.43 per 100 ft. Find his gain on the whole lot.

3. Show that $\frac{2}{3} = \frac{8}{12}$, and that $\frac{2}{3} \div \frac{4}{7} = \frac{14}{12}$.

Simplify the following:—

$$\frac{26\frac{3}{7} - 1\frac{1}{21}\frac{3}{1}}{\frac{4}{5} + 1\frac{1}{3} - \frac{3}{5} \text{ of } 1\frac{7}{12}} \text{ of } \frac{5\frac{1}{3}}{52\frac{1}{1}}.$$

4. Prove that $2{\cdot}3 \times {\cdot}04 = {\cdot}092$.

Add together 154·2125, ·5421, ·0001235, 741·206, ·03, and 4567·0004.

Reduce 75.0125 cwt. to ounces.

5. A steamer makes a nautical mile (6,072 ft.) in 3 min. 50 secs. Find her rate per hour in statute (common) miles.

6. There is a solid pile of bricks which is 36 ft. long, 16 ft. 6 in. wide,, and 14 ft. 6 in. high, and contains 122,496 bricks of uniform size; each brick is 9 in. long and $4\frac{1}{2}$ in. wide; find its thickness.

7. A London merchant transmits £250 10s. through Paris to New York; if £1=24 francs, and 6 francs=$1.14 American currency, what sum in American currency will the merchant realize?

8. In a map of a country the scale is $\frac{1}{10}$ of an inch to a mile (*i.e.* $\frac{1}{10}$ of an inch represents a mile), and a township is represented on this map by a square whose side is half an inch. How many acres in a township?

9. If 4 men or 6 boys can do a work in 8 days, how long will it take 8 men and 4 boys to do such a piece of work?

10. *A* and *B* were candidates for election in a constituency of 2,700 voters. The votes polled by *A* were, to those polled by *B*, as 23 to 25, and *B* was elected by a majority of 100. How many persons did not vote?

DECEMBER, 1882.

1. From 935 take 846, explaining clearly the reason for each step.

The difference between 82,610 and the product of two numbers is 70,300,000. One of the numbers is 9,402; find the other.

2. Find the amount of the following bill:—36 lbs. 8 oz. beef at 16 cts.; 16 lbs. 10 oz. mutton at 14 cts.; 7 lbs. 12 oz. pork chops at 12 cts.; 15 lbs. 6 oz. turkey at 18 cts.; 4 lbs. 10 oz. suet at 16 cts.

3. Find the L.C.M. of 11, 14, 28, 22, 7, 56, 42, 31; and the G.C.M. of 40,505, 124,083.

4. Prove that $\frac{3}{4}$ of 1=$\frac{1}{4}$ of 3.

Simplify $\dfrac{\frac{5}{14}-\frac{3}{7}\text{ of }\frac{1}{2}}{\frac{5}{16}+\frac{7}{12}\text{ of }3\frac{1}{4}-\left(\frac{7}{8}\text{ of }\frac{8}{11}-\frac{1}{8}\right)} \div \dfrac{\frac{1}{2}\text{ of }\frac{1}{2}+\frac{3}{2}\text{ of }5}{9\frac{1}{3}-1\frac{2}{3}}$

5. Prove that 1·025÷·05=20·5.

Find the cost of ·0625 of 112 lbs. sugar, when 1 lb. cost ·0703125 of 16s.

6. Reduce 45,740,108 sq. inches to acres.

7. The bottom of a cistern is 7 ft. 6 in. by 3 ft. 2 in. How deep must it be to contain 3,750 lbs. of water, a cubic foot of water weighing 1,000 oz.?

8. *A* runs a mile race with *B* and loses; had his speed been a third greater he would have won by 22 yds. Find the ratio of *A*'s speed to *B*'s.

9. *A* does $\frac{2}{3}$ of a piece of work in 6 hours; *B* does $\frac{3}{4}$ of what remains in 2 hours; and *C* finishes the remainder of the work in 30 minutes. In what time would all working together do the work?

10. By selling tea at 60 cts. per lb. a grocer loses 20 per cent.; what should he sell it at to gain 20 per cent.?

JUNE, 1883.

1. What is the object of Division? Write down the relation connecting the Divisor, Dividend, Quotient, and Remainder.

Divide 108,419,716,001 by 18,748,005.

2. Find, by "casting out nines," whether the following is correct:—$349,751 \times 28,637 = 10,015,819,397$.

Find the weight of 500,000 bricks at 4 lbs. 2 oz. each, and the cost—in dollars and cents—at 27s. 6d. each, allowing 4s. 2d. to make a dollar.

3. A merchant received from England the following invoice in sterling:—

375 tons iron plates, at £8 15s. 6d.
107½ tons bar iron, at £11 14s.
10 tons bulb iron, at £10 10s.
17 tons T iron, at £15 10s.
48 tons steel, at £18 7s. 6d.
15 tons rivets, at £11 1s.

Find the amount of this invoice in Canadian currency, allowing the shilling sterling to be equal to 24⅓ cts.

4. At $1.75 per rod, what will it cost to fence a piece of land 63.5 rods long and 27·75 rods wide?

5. Simplify:—

$$1 - \tfrac{1}{8} + \frac{1}{24} - \frac{61}{5040} + \frac{277}{72576}; \text{ and } \frac{4\frac{7}{10} + 5\cdot\dot{8}\dot{1} - 2\cdot5}{4\frac{7}{10} \text{ of } 32 \text{ of } .\dot{4}\dot{5}}.$$

6. Gunpowder is composed of nitre, charcoal and sulphur, in the proportion of 15, 3, and 2. A certain quantity of gunpowder is known to contain 20 cwt. of charcoal; find its weight, and also the weight of nitre, and of sulphur it contains.

7. Bought 360 gals. of wine at \$2.60 a gallon; paid for carriage \$17.20, and for duties \$86.50. If $\frac{3}{10}$ of it be lost by leakage, at what price must the remainder be sold to gain \$50 on the whole transaction?

8. Find the interest on a note for \$257.81, dated Jan. 3rd, 1883, and paid April 6th, 1883, at 3 per cent. per annum.

9. The length of a second's pendulum is 39·37079 in.; if 64 French metres are equal to 70 yds., by what decimal of an inch will the length of a second's pendulum differ from one metre?

10. At what time between 4 and 5 o'clock are the hands of a clock (1) coincident, (2) at right angles?

DECEMBER, 1883.

1. Multiply the sum of 59,404, and 47,675 by their difference, and divide the product by $7 \times 13 \times 19$.

2. Bought oranges at the rate of 10 cts. per doz., and sold them at the rate of 5 oranges for 11 cts. How much did I gain on 11 boxes, each containing 20 doz.?

3. A man bought a rectangular field 40 rods long by 25 rods wide, paying therefor at the rate of \$300 per acre, and then had it fenced at the rate of \$1.50 per rod. Prove that the land cost him exactly ten times as much as the fence.

4. Divide \$1,200 among *A*, *B*, and *C*, so that *A* may have \$70 more than *B* and twice as much as *C*.

5. Divide the sum of $\frac{2}{5}$ of $8\frac{1}{3}$ and $2\frac{1}{7}$ of $5\frac{5}{8}$ by the difference between $\frac{3}{7}$ of $3\frac{1}{2}$ and $\frac{1}{2}$ of $\frac{1}{3}$ of $2\frac{2}{3}$.

6. Add together 1·302, 3·2589, and 40·93. Multiply the sum by ·00297, and divide the product by 90·09. (Decimals, not vulgar fractions, to be used in doing the work, otherwise no marks to be allowed).

7. A farmer sold a load of hay at $16.25 per ton; the whole weight of the waggon and hay was 2,875 lbs.; the waggon alone was found to weigh 1,083 lbs. How much did the farmer receive for his hay?

8. *A* can run a mile in 5 min., *B* can run it in 6 min. How many yards start should *A* allow *B* in order to make their chances equal?

9. Three men can dig a certain drain in 8 days. They work at it for 5 days, when one of them falls ill, and the other two finish the work in 5 days more. How much of the work did the first man do before he fell ill?

10. Find the interest on $275.80 for 91 days at 7 per cent. per annum.

JUNE, 1884.

1. The quotient is 12434, the remainder 2763, and the dividend eighty-seven millions nine hundred and eleven thousand one hundred and twenty-three. Find the divisor.

2. Find the L. C. M. of 11, 7, 21, 28, 22, 27, 81, 243, 216; and the G. C. M. of 94605 and 96509.

3. A sidereal day is 23 hours 56 minutes, and the mean solar day is 24 hours. Reduce the difference between the two to the decimal of a sidereal day.

4. Simplify

(1). $$\frac{(3\frac{2}{5} - \frac{2}{11}) \text{ of } 6\frac{5}{12}}{1\frac{7}{10} - \frac{1}{11} \text{ of } 12\frac{6}{5}} \div (6\tfrac{1}{7} - 1\tfrac{1}{7}).$$

(2). $$\frac{\frac{2}{15} \text{ of a guinea} - \frac{2}{15} \text{ of a £}}{8\text{s. } 10\frac{2}{3}\text{d.}}$$

5. A grain dealer bought 64 bars of oats, weighing (including bags) 3616 lbs. The bags averaged 1 lb. 12 oz. each. The dealer paid 34 cents a bushel for the oats, and sold them at 42½ cents a bushel. How much was his gain?

6. A plate of metal ½ inch thick was burnished on one side for 11s. 6½d., at 2¼d. per square inch. Find the weight of the plate, supposing a cubic foot of the metal to weigh 62½ lbs.

7. *A*, *B*, and *C* do a work in 12 hours; *A* and *B* can do it in 16 hours, and *A* and *C* in 18 hours. In what time can each do it separately?

8. An army, in its first engagement, lost 1 in 10 in killed and wounded, and in its second engagement 3 in 25 of the remainder; there were then 3960 men left. How many men went into the first engagement?

9. Find the duty on 8 hogsheads of sugar, each weighing 1200 lbs. gross, at $1\frac{3}{8}$ cents per lb., 16% being allowed for tare.

10. (1) Find the interest on $225.40 for 16 months at 8% per annum.

(2) The amount of a certain principal was $307.20 for $3\frac{1}{2}$ years, and $312 for $3\frac{3}{4}$ years. Find the principal and the rate.

DECEMBER, 1884.

1. Of what number is 8,967 both divisor and quotient?

2. Find the greatest number that will divide 11,067 and 35,602, leaving as remainder respectively 17 and 21.

3. Find the amount of the following bill:—$12\frac{1}{2}$ yds. cassimere at $2.75 per yard; $18\frac{1}{2}$ yds. silk at $1.17; $23\frac{3}{4}$ yds. flannel at $37\frac{1}{2}$ cts.; 112 yds. print at $9\frac{1}{2}$ cts.; 55 yds. shirting at $17\frac{1}{2}$ cts.; $37\frac{1}{2}$ yds. tweed at $1.12.

4. Simplify

(*a*) $5\frac{1}{2} + 2\frac{1}{3} \div 11\frac{1}{4} \times 7\frac{1}{2} + \frac{\$18.64}{\$1.16\frac{1}{2}}$.

(*b*) $\{\frac{4}{5} \times \frac{9}{11} \times 0{\cdot}02 \times 0{\cdot}456\} \div \frac{1}{11}\frac{9}{7}$ of $\frac{3}{5}$.

5. The cost of carpeting a room 15 ft. long, with carpet 27 in. wide costing 90 cts. a yard, is $22.50. What is the width of the room?

6. A boy can do a piece of work in $4\frac{1}{2}$ days, and a man can do the same in $\frac{3}{7}$ of the time. How many days will both working together require, to do five times the amount of work?

7. How much water must be added to 92 gals. of brandy worth $4.60 a gallon, in order that the mixture may be worth only $3.60 a gallon?

8. Find the simple interest on $275.60 from 18th July, 1883, till 13th Sept., 1884, at 6 per cent. per annum.

9. At what time are the hands of clock exactly 2 min. space apart between 4 and 5 o'clock?

JUNE, 1885.

1. Express in words:—17089653·005904, $705·637, and MDCCCLXXXV.

2. Simplify:— $\frac{5}{17}$ of $(3\frac{1}{2}+9\frac{1}{14})$ ÷ $\frac{4}{13}$ of $\frac{\text{£15 10s. 2d.}}{\text{16s. 2d.}}$.

3. Find the value of $17\cdot65\dot{4}+4\cdot8\dot{3}5\dot{}+6\cdot40\dot{8}\dot{}$.

4. Make out a bill of the following goods:—23 yds. cotton at 11 cts.; 13 yds. gingham at 23 cts.; 25 yds. flannel at 37 cts.; 18½ yds. tweed at $1.50; 12½ yds. serge at $1.75; 6½ yds. broadcloth at $4.50.

5. A merchant purchases sugar at $7.50 per cwt.; at what price per pound must he sell it in order to gain 10 per cent.?

6. Find the simple interest on $167 for 3 yrs. 9 mos. at 7 per cent. per annum.

7. In what time will any sum of money double itself at 6 per cent. simple interest?

8. $1,200 is to be divided between two persons, *A* and *B*, so that *A's* share is to *B's* share as 2 to 7.

9. At what two times between 3 and 4 o'clock are the hands of a watch equally distant from the figure III.?

10. A man having $720 spends a part of it, and afterwards received 7½ times as much as he spent; he then had $1,305. How much did he spend?

DECEMBER, 1885.

1. Define the following terms:—Factor, Prime Number, Multiplication. Write down all the Prime Factors of 2,310.

2. (*a*) Reduce to simplest form :—$\frac{9534}{15663}$.

(*b*) What is the least number from which 1224 and 1656 may each be taken an exact number of times?

3. A man who lost $\frac{1}{3}$ of his fortune in one year, and $\frac{2}{5}$ of the remainder the next year, had $900 left. Find the amount of his fortune at first.

4. What quantity taken from $159\frac{1}{7}$ will make it exactly divisible by $12\frac{5}{8}$?

5. Express 3·74976 minutes as the decimal of a week.

6. What will 11,750 ft. of lumber cost at $27.50 per thousand?

7. Name the units of length, time, and sterling money.

8. Find the simple interest on $800 for 3 yrs. at $5\frac{1}{2}$ per cent.

9. A cistern has three pipes; the first will fill it in 10 hrs., the second in 12 hrs., and the third in 15 hrs. In what time will they together fill the cistern?

JULY, 1886.

1. (*a*) Multiply the *sum* of forty-eight thousand six hundred and thirty-nine and thirty-nine thousand five hundred and thirty-seven by their *difference*, and divide the *product* by sixty-four.

(*b*) The product of four numbers is 827658432; the first number is 12, the product of the second and third is 144; find the fourth.

2. Make out a bill of the following articles:—1 piece of flannel, $28\frac{1}{2}$ yds., at 68 cts. a yard; 35 yds. of calico, at 15 cts. a yard; $3\frac{1}{2}$ doz. pairs of stockings, at $2.10 a doz.; 7 pairs of gloves, at 90 cts. a pair; $12\frac{1}{2}$ yds. Irish linen, at $1.12 a yard; 4 pairs of muslin curtains, at $4.20 a pair.

3. What will it cost to fence a lot of 49 ft. front and 180 ft. depth at $1.15 a foot?

4. (*a*) A horse worth $170 and three cows worth $36 each, were exchanged for 14 calves and $82. Find the value of a calf.

(*b*) A farmer sold an equal number of horses, cows, and calves, receiving $3540 for the whole. Valuing a horse at $69, a cow at $37, and a calf at $12, find the number of each.

5. (*a*) What sum of money will produce $300 interest in $2\frac{1}{2}$ years at 6%, simple interest?

(*b*) At what rate per cent., simple interest, will a sum of money amount to 3 times itself in 25 years?

6. Divide $1000 among *A*, *B*, and *C*, so that *A* may have $60 more than *B*, and twice as much as *C*.

7. 5 men can do a certain piece of work in 20 days; after working 15 days they are joined by another man, and the whole work is completed in 19 days. What fraction of the whole work is done by the sixth man?

8. In a 440 yds. bicycle race *A* can give to *B* 20 yds. start, and to *C* 30 yards. *B* and *C* ride a 440 yards race starting even. By how much does *B* win?

DECEMBER, 1886.

1. Simplify $\frac{1}{2} - \frac{2}{3}$ of $\frac{5}{8} + \frac{7}{78}$, and find how many times the result is contained in $\frac{3}{8} \div (\frac{7}{9}$ of $\frac{3}{14} - \frac{1}{8})$.

2. Divide the product of ·037 and ·0025 by the sum of ·9, ·02, and ·005.

3. If a road is four rods wide, how many miles of it will make ten acres?

4. A lot 150 feet long and 100 feet wide is to be surrounded by a close board fence 6 feet high; what will the boards cost at $12.50 per thousand feet?

5. A farmer bought a number of horses and cows for $2000. There were three times as many cows as horses, and a horse cost twice as much as a cow. If each horse cost $80, how many cows did he buy?

6. A man has a salary of $400 a year and has $500 in the bank. If he spends $500 a year, in what time will his money be all gone?

7. What will a dollar amount to in 3 years 219 days at $7\frac{1}{2}$ per cent. per annum?

8. A man borrows $900, for the use of which he has to pay $3 a month; how long will he have had it when the interest is 50c. on every dollar borrowed?

9. A dealer sold an article for $8.10 and lost 10 per cent.; at what selling price would he have gained 10 per cent.?

10. How can you tell, without actually dividing, whether a number can be divided by 9 without leaving a remainder?

11. If a cow gives 12 qts. 1 pt. of milk every day, and 1 lb. 8 oz. of butter can be made from 25 qts. of milk, how many lbs. of butter can be made in one week from the milk of 16 cows?

12. A man bought a quantity of tea supposed to be done up in packages of 1 lb. each, for which he was to pay $64; on weighing them, however, it was found that each package was 1 oz. too light. How much should he pay for the tea?

JULY, 1887.

1. What multiple of 595 divided by 595 gives as quotient 595?

2. Find the least common multiple of $2, $3, $4, $5, $10, $20, $50, and $100.

3. A man owns $\frac{3}{5}$ of $\frac{5}{6}$ of $\frac{7}{10}$ of an investment; on selling $\frac{2}{7}$ of his share, he finds himself worth $100 less than before; what is the value of the whole investment?

4. Change $\frac{1}{12}$ of $\frac{1}{3} + \frac{1}{3 + \frac{1}{4}}$ to a simple fraction.

5. What principal will amount to $840 in 5 years at $4\frac{1}{2}$ per cent.?

6. If 1 pound of thread makes three yards of linen $1\frac{1}{4}$ yards wide, how many pounds would make 45 yards of linen 1 yard wide?

7. A man sold 2 farms for $3000 each; on one he gained 20 per cent., and on the other he lost 20 per cent. Did he gain or lose on the whole and how much?

8. If a garrison of 1000 men have provisions for 12 months, how long will the provisions last if at the end of 2 months they be reinforced by 500 men?

9. A merchant sold a piece of cloth for $24 and thereby lost 25 per cent. What per cent. would have been the gain had he sold it for $34?

DECEMBER, 1887.

1. Ten cents will buy 3 oranges, 4 lemons, or 5 apples; how many apples are worth as much as 5 doz. oranges and 7 doz. lemons?

2. A man can run 100 yds. in 10 sec. How many miles will a steamboat go in 5½ days at the same rate?

3. Find the interest on $150 from the 16th July to the 9th of December, at 5 per cent. per annum.

4. A person borrows money for 6 years at 3½ per cent., and repays at the end of the time, as principal and interest, $847; how much did he borrow?

5. A map is drawn to a scale of half an inch to a mile, how many acres are represented by a square inch on the map?

6. One workman charges $3 for a day's work of 8 hrs., and another $3.50 for a day's work of 9 hours. Which had I better employ, and how much shall I have to pay him for work that he can do in a fortnight, working 6 hours a day?

7. Water in freezing expands 10 per cent. If a cubic foot of water weighs 1000 oz., find the weight of a cubic foot of ice.

8. A merchant bought 1000 yds. of carpet at 60 cts. a yard, and sold two-fifths of it at a profit of 30 per cent., one half at a profit of 20 per cent., and the rest at a loss of 20 per cent. How much did he receive for the carpet?

9. A piece of land is surrounded by a stone wall 8 ft. high and 2 ft. thick; the land inside the wall is 100 ft. long and 50 ft. wide. How many cubic feet of stone does the wall contain?

10. A house and lot are together worth $2100; one-fourth of the value of the house is equal to one-third of the value of the lot; find the value of each.

11. A cubical cistern is 5 feet deep; how many gallons of water will it hold if 277·274 cubic inches make a gallon?

JULY, 1888.

1. Prove the rules for division (1) of vulgar fractions, (2) of decimals, using as examples $\frac{3}{4} \div \frac{5}{7}$ and $\cdot 012 \div \cdot 6$.

2. A produce merchant exchanged $48\frac{3}{8}$ bushels of oats at $39\frac{3}{4}$ cts. per bushel, and $13\frac{1}{2}$ barrels of apples at $3.85 a barrel, for butter at $37\frac{1}{2}$ cts. a pound; how many pounds of butter did he receive?

3. A train going 25 miles an hour starts at 1 o'clock p.m. on a trip of 280 miles; another going 37 miles an hour starts for the same place at 12 minutes past 4 o'clock p.m.; when and where will the former be overtaken?

4. If in a certain town $3093.75 was raised from a $\frac{3}{4}\%$ tax, what was the value of the property in the town?

5. By selling my cloth at $1.26 a yard I gain 11 cents more than I lose by selling it at $1.05 a yard; what would I gain by selling 800 yards at $1.40 a yard?

6. How many thousand shingles, 18 inches long and 4 inches wide, lying $\frac{1}{3}$ to the weather, are required to shingle the roof of a building 54 feet long with rafters 22 feet long, the first row of shingles being double?

7. A farmer employs a number of men and 8 boys; he pays the boys $.65 and the men $1.10 per day. The amount that he paid to all was as much as if each had received $.92 per day. How many men were employed?

8. A field, whose length is to its width as 4 to 3, contains 2 a. 2 r. 32 rods; what are the dimensions?

9. A man having lost 20% of his capital is worth exactly as much as another who has just gained 15% on his capital; the second man's capital was originally $9000. What was the first man's capital?

JULY, 1889.

1. A bushel of wheat weighs 60 lbs., and a barrel of flour weighs 196 lbs. If 3 lbs. of wheat make 2 lbs. of flour, how many barrels of flour can be made from 343 bushels of wheat?

2. Find the interest on $597.50 for 2 years 5 months 12 days at 8 per cent. per annum.

3. *A* and *B* start together and walk in the same direction, *A* at the rate of 4 miles an hour, and *B* at the rate of 3 miles an hour. At the end of 7 hours *A* turns and goes back. How many miles will *B* have gone when he meets *A*?

4. The circumference of a wheel is $\frac{22}{7}$ of its diameter; find the diameter of a wagon wheel which makes 360 revolutions in going a mile.

5. A town, whose population was 10000, increased 10 per cent. every year for 3 years; what was its population at the end of that period?

6. The map of Ontario recently issued by the Crown Lands Department is drawn on a scale of 8 miles to an inch. On this map the Township of Scott measures $1\frac{5}{16}$ inches in length and $1\frac{1}{8}$ inches in width. How many acres does it contain?

7. Write down neatly the following statement of six weeks' cash receipts, add the amounts vertically and horizontally, and prove the correctness of the work by adding your results:—

	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.	Total.
1st.	$28.79	$34.71	$35.33	$30.10	$27.97	$47.81	
2nd.	23.87	30.03	29.38	33.84	26.77	48.77	
3rd.	16.99	27.09	28.77	30.16	24.95	43.07	
4th.	29.13	33.72	30.81	39.17	28.47	50.05	
5th.	18.47	32.29	26.73	34.45	28.88	54.39	
6th.	19.02	27.06	30.04	29.89	29.51	61.93	
Totl							

8. If for $7 I can have the use of $35 for 3 yrs. 4 mos., how much a month shall I have to pay for the use of $8750?

9. It is required to build a sidewalk a quarter of a mile in length, 8 ft. wide and 2 inches thick, supported by three continuous lines of scantling 4 inches square. What will the lumber cost at $17 per thousand feet?

JULY, 1890.

1. Write down the following statement of six weeks' cash receipts; add the amounts vertically and horizontally, and prove the correctness of the work by adding your results:—

	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.	Total.
1st.	$65.95	$24.89	$79.79	$40.78	$37.59	$89.61	
2nd.	58.71	41.65	24.67	94.26	70.26	42.51	
3rd.	47.58	99.57	50.60	80.71	91.82	89.76	
4th.	29.69	70.80	87.91	74.93	36.63	21.90	
5th.	81.45	56.93	54.82	96.57	12.72	96.67	
6th.	42.63	68.77	81.79	60.86	31.87	75.82	
Total							

2. A boy's age now is one-fifth of his father's. In six years it will be one-third of his father's present age. How old is he?

3. Some Atlantic liners consume 200 tons of coal per day. They average 8 days out and 8 back. In case of accidents they carry a supply for 4 days extra. How many cubic yards of the hold of such a steamer will be occupied with coal for her round trip if each ton is 33 cubic feet?

4. In a factory 12 men, 16 women, and 30 boys are employed. At the end of a week they receive $330.00. A man is paid as much as two women, and a woman as much as three boys. What is the share of each?

5. A farmer, whose property is assessed at $9600, pays on the dollar $1\frac{3}{4}$ mills for township rates, $1\frac{1}{4}$ for county rates, $1\frac{1}{2}$ for railway bonus, and $2\frac{1}{2}$ for school rate. How much does he pay in all?

6. On June 29th, 1890, I borrow $16.50, to be returned April 30th, 1892. With interest at $6\frac{1}{2}$ per cent., what amount must I then pay?

7. In what time would a field, 80 by 60 rods, pay for underdraining lengthwise, at 2 cents per foot, if the field yield 2 bushels, at 66 cents, per acre more than before draining? The drains are 4 rods apart, and the first drain runs down the centre of the field.

8. If 18 men do $\frac{2}{3}$ of a piece of work in 30 days of 10 hours, in what time should 15 men do the whole, working 9 hours a day?

9. Two men start from the same point at the same time to walk in the same direction around a block of land $1\frac{1}{4}$ miles on each side. *A* goes at the rate of 4 miles and *B* 3 miles an hour. How far will *A* walk before he overtakes *B*?

THE PUBLIC SCHOOL ALGEBRA

ON THE

INDUCTIVE METHOD

BY

C. CLARKSON, B.A., Prin. Coll. Institute, Seaforth, Ont.

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5. **Avoid all difficult examples.**
6. **Grade the steps very carefully.**
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