19. A field was 48 × 35 rods, and the owner increased each dimension 40% of itself. By how many acres and what per cent. did he increase the field?

20. A carpenter built a house at an expense of $5200, and sold it for $7098. What was the gain %?

21. A wholesale grocer buys coffee at 30 cents and sells it at 36 cents a pound. The local grocer buys at 36 and sells at 45 cents. What per cent. does each make? What per cent. would be the wholesale grocer's gain if he sold directly to the consumer for 45 cents?

22. Owning 30% of an office building, a man sold 25% of his share and then valued the balance at $9000. What was the entire building worth at this valuation?

23. What per cent. of 8 bushels, 3 pecks, 4 quarts is 4 bushels, 6.9 quarts?

24. Find the value of 80% of 60 acres, 125 square rods, 20 square yards at $60 an acre.

25. Find $\frac{1}{2}$ % of 90. Of 200. Of 8756. Of $\frac{1}{5}$.

26. Find $\frac{3}{8}$ % of 900. Of 4980. Of $\frac{9}{10}$. Of 1.6.

27. Write decimally, and as a common fraction; ten per cent.; four-fifths per cent.; one-half of one per cent.; one hundred twelve per cent.; eight per cent.; three-tenths per cent.; and eleven hundredths per cent.

28. Write *as* per cent.; $\frac{3}{10}$; $\frac{3}{4}$; $\frac{6}{5}$; $\frac{1}{2}$; $\frac{7}{40}$; $1\frac{1}{5}$; 6; $1\frac{9}{100}$; $\frac{2}{17}$; $\frac{3}{23}$; $\frac{4}{11}$; $\frac{29}{39}$.

29. On an examination a boy got 460 credits out of a possible 500. What should his grade be, expressed in per cent.?

30. A watch was sold for $190 at a loss of 24%. What should it have been sold for to obtain a gain of 5%?

31. A speculator bought 500 shares of railroad stock at $68 a share and sold it at $85 a share. What was his gain %?

32. If a teacher's salary is $2400 and he pays in a year, 15 % of it for board, 4% for room, 3% for clothes, 8% for incidentals, and gives his mother a quarter of his salary, how much is left for saving?

33. A man owned $\frac{4}{5}$ of a hotel and sold 12½% of his share for $7540. At the same rate, what is the value of the hotel?

34. 707.84 is 12% more than what number?

35. If the cost was $\frac{6}{7}$ of the selling price, what is the gain %? Prove your answer in the case where the cost is $420.

36. What per cent. of the year 1904 are the Sundays? Of the year 1903?

CHAPTER XIV.

APPLICATIONS OF PERCENTAGE.

236. Applications of Percentage.—The method of reckoning with reference to 100 as a standard or base has so many advantages that it is widely used in many different departments of practical life.

The computations in these different applications are alike, in that, *first*, they all use 100 as a base, and, *second*, they are all concerned with the three quantities, *base*, *rate*, and *percentage*.

The various applications of percentage, however, differ from the general subject and from each other in that (1) different special names are assigned to one or more of the quantities used (thus the percentage is sometimes called *commission*, or *tax*, or *profit*, etc.); or (2), the base may be determined in some peculiar way; or (3) certain special standard rates are used.

In all cases, however, it will be found that the three quantities, base, rate, and percentage, appear in some form, and that two of them are given to find the remaining one.

PROFIT AND LOSS.

237. The subject of **Profit and Loss** differs very slightly from the general subject of percentage.

Profit or *loss* is the name given the percentage, **profit** being the excess of money received over that expended, and **loss** being the excess of money expended over that received.

The student should carefully note that the *base is the money paid out or invested* (not the money received).

Ex. A man sold his horse for $60, which was a loss of 20%. What did the horse cost him?

SOLUTION.

Making the cost of the horse the base,

80% of the cost of the horse = $60, the selling price.

∴ cost of horse = $\frac{\$60}{.80}$ = $75, *Result.*

EXERCISE 117.

1. Bought for $80 and sold for $100. Find the gain %.

2. Sold for $40 and lost 20%. Find cost.

3. Gained $63 or 7%. Find cost and selling price.

4. Lost 32½% on an investment of $6200. Find the actual loss.

5. Did I gain or lose by buying eggs at 18 ct. a doz. and selling at 32 ct. a score? What per cent.?

6. Who gained more money and who gained a greater per cent.—John, who bought for $60 and sold for $65, or James, who sold for $240 at a gain of 20%?

7. I sold a horse for $404.40 and gained 12⅛%. What would have been my per cent. of loss if I had sold him for $252?

8. Bought two farms for $4500 each, and sold the one for $6300 and the other at a loss of 37%. Did I gain or lose on the transaction and how much?

9. Bought two books for $4 each, and sold one at a gain of 30% and the other at a loss of 90 cents. Did I gain or lose on the transaction? How much? What per cent.?

10. By selling cloth for $1.20 per yd., a salesman lost 20%. How should he have sold it to gain 20%?

11. I sold two watches for $84 each. On one I gained 40% and on the other I lost 40 %. Did I gain or lose on the whole? How much? What %?

12. Carpet is bought at 75 ct. a yd. Expenses amount to 20 cents additional on each yard. What must be the selling price that the dealer may realize an advance of 20%? How must he mark the carpet so that he can allow a 5% reduction and still gain 20%?

13. The farmer charges 10% profit on his wheat; the miller, 25% profit on his flour; the grocer, 20% gain. The consumer pays $5.28 per bbl. What is the first cost to the farmer of the wheat in a barrel of flour?

14. The actual cost of a certain piano is $200; the maker charges an advance of 60%; the agent realizes a profit of 25%, and the deliverer gains 5% for hauling. What is the cost to final owner?

EXERCISE 118.

ORAL.

1. Can a man gain 125%? Can he lose 125%?

2. How many per cent. is it possible to gain? To lose?

3. What is always the divisor in determining the gain or loss per cent.?

4. If I gain 200% on a purchase of $5, what is the selling price?

5. What is the gain per centum if I buy at 40 ct. and sell at 60 ct.?

6. What is the loss per centum if I buy at 60 ct. and sell at 40 ct.?

7. If I lose a new 5-ct. pencil, what was my loss %?

8. If I find a dime, can you tell the gain per cent.? (We cannot, because to have gain % there must be *cost*, and here there was no cost.)

9. If the gain is ¼ the cost, what is the gain %?

10. If the selling price is ¾ the cost, what is the loss %?

11. If the cost is ⅚ the selling price, what is the gain %?

12. If the selling price is twice the gain, what is the gain per cent.?

13. If the selling price is three times the cost, what is the gain per cent.?

14. If the cost is double the selling price, what is the loss %?

15. Sold for ⅔ what cost ½. What was the gain %?

16. Does a merchant gain or lose by buying coal by the long ton and selling it by the short ton, at the same price per ton? How would you find the per cent.?

17. A farmer planted a peck of corn and raised 250 bushels. How would you find the gain %?

TRADE DISCOUNTS.

238. The subject of **trade discounts** has the peculiarities that the percentage is termed **discount**, and that frequently several discounts are applied in succession.

239. Commercial Discounts.—It is the custom of manu-

facturers and various dealers in merchandise to have a fixed or catalogue price for goods, and to make deductions from this, called discounts. Thus, a manufacturer may allow a discount of 25%, owing to the fact that goods are produced more cheaply than when the catalogue was issued, and a further discount of 5% for payment of the bill within a certain time.

The catalogues of goods and prices issued by business houses, are frequently expensive, and when the prices of goods change, owing to cheapened processes of production, it is more economical to print off a brief list of discounts than to issue a new catalogue.

The catalogue price is called the **list price**; the price after the discount has been deducted is called the **net price.**

240. Successive Discounts.—In making several successive discounts *deduct the first discount from the list price, then compute the next discount on the remainder and deduct it from the remainder, and so proceed till all the discounts have been made.*

Ex. A bill of $250 for steam heating apparatus was subject to a discount of 60% and 20%, with 2% off for cash. What sum is needed to pay the bill?

SOLUTION.

Since after 60% is deducted 40% is left,
and " 20% " 80% of the remainder is left,
and " 2% " 98% of the second remainder is left,
the sum required = $250 × .40 × .80 × .98 = $78.40.

EXERCISE 119.

1. A librarian purchases a list of books amounting to $123.80, but is allowed 30% deduction and a 4% discount for cash. Find actual amount due.

2. From an assessment upon $8500 of value the owner obtained three successive reductions of 8%, 15%, and 10%. How large was the final valuation?

3. For damages on a large purchase of dry goods, amounting to $1800, a merchant discounted 5%, then on special sale 7%, and on cash payment 2%. What was final bill?

4. Which is the greater discount on a bill of $15600, and how much—a discount of 40% and then 8%, or one of 48%?

5. What single discount on a bill of $5000 is equivalent to the two discounts of 15% and 20%?

6. Find net cash amount of a bill of $675, subject to the three discounts, 20%, 16%, and 5%. Change the order of discounts in this example and ascertain whether or not there is change in the final amount of the same bill.

7. Prove that it is immaterial in what order several successive discounts on the same bill are made.

COMMISSION AND BROKERAGE.

241. Agents and Commissions.—Goods are frequently bought or sold through an agent, the advantages being that an agent may be in a more favorable place in which to buy or sell goods, and also that an agent by making a specialty of a certain line of goods may be able to buy or sell to greater advantage.

Thus, a farmer may receive a higher price for potatoes by selling them through an agent in a city, than by selling them himself in his own neighborhood.

An agent who buys or sells general merchandise is called a **commission merchant.** Goods sent to him to be sold are called a **consignment,** the person sending them being called a **consignor,** and the person receiving them being called a **consignee.**

An agent at a distance is sometimes called a *correspondent;* the person employing a correspondent is called a *principal.*

242. Commission is the percentage paid a person who buys or sells goods or collects money for another person.

The **base** of a commission is the amount of money paid out or received for goods by the agent.

Ex. 1. An agent sold $3500 worth of goods for a commission of 5%. What was his commission?

$3500 × .05 = $175, *Commission.*

Ex. 2. A gentleman sent an agent $257.50 to expend in buying hay at $20 a ton. The agent charged 3% commission. How many tons of hay did he buy?

OPERATION.

1.03)$257.50($250.
206
515
515
0

$\frac{250}{20} = 12\frac{1}{2}$, *No. of tons.*

EXPLANATION.

Since $257.50 includes both the cost of the hay and 3% commission, $257.50 is 103% of the cost of the hay. Hence, the cost of the hay = $257.50 ÷ 1.03 = $250.

If 1 ton of hay costs $20, the number of tons which can be bought for $250 is $250 ÷ 20, or $12\frac{1}{2}$ tons.

243. Brokerage.—A **broker** is an agent who buys or sells stocks, bonds, bills of exchange, real estate, etc.

A commission merchant receives and sells goods in his own name, sending the net proceeds to the consignor. A broker does not handle the goods, and they are sent directly from the owner to the buyer. Since he is thus saved the labor of handling the goods, he is paid a less percentage for his work.

Brokerage is the commission charged by a broker. In the sale of stocks and bonds, brokerage is reckoned not on the selling price, but on the face or par value of the stocks. It is usually $\frac{1}{8}$%, or $12\frac{1}{2}$ cents on a share of $100.

Ex. A broker sold 36 shares of N. Y. Central stock. What was his brokerage?

SOLUTION.

Since the par value of 1 share = $100,
" " " " 36 " = $3600.
$3600 × .00$\frac{1}{8}$ = $4.50, *Brokerage.*

EXERCISE 120.

1. A commission merchant sold a car of lime for $80 and received 3% commission. What was his commission? How much did he remit to his employer?

2. I sold a lot of real estate for Mr. Jones for $12500 on $3\frac{1}{2}$% commission. What amount should be sent him?

3. An agent sold 560 baskets of peaches at 90 cents a basket and charged $25.20 for doing it. What was his rate of commission?

4. After selling a property worth $8528, the agent sent to the former owner $8229.52. What rate of commission did he charge?

5. A merchant charged 4% for selling a consignment of beef and received $93.40 commission. What was the selling price of the beef?

6. After selling a load of grain, for doing which the agent retained $2\frac{1}{2}$%, he remitted $2691 to his employer. Required the selling price of the grain.

7. A real estate agent sold a house on 3% commission and sent the owner $7229.41. What commission did he retain?

8. If $2388.33 includes commission at 2% and the amount invested in wool, how much was invested?

9. I sent my agent $216.84 to invest in peaches, after deducting 4% commission. How many baskets at 75 cts. each will he purchase for me?

10. What is the brokerage on a sale of 75 shares of railroad stock (par value $100) at $\frac{1}{8}$%? At $\frac{1}{4}$%?

11. Par value of P. R. R. stock is $50. What will be the total cost of 48 shares at $72, including $\frac{1}{8}$%?

12. Suppose in Ex. 11, shares were selling at $63, what would be the total cost?

13. What is the total cost of 28 shares of D. L. & W. stock at $124, counting brokerage at $\frac{1}{8}$%?

14. A speculator sold through his broker 90 shares of C. R. R. of N. J. at $112\frac{1}{2}$. What were the proceeds, brokerage $\frac{1}{4}$%?

15. I sent draft on Drexel & Co. for $4631.25 to pay for stock at $92\frac{1}{2}$ (par $100) and their commission at $\frac{1}{8}$%. How many shares could they buy?

TAXES.

244. Revenue.—Various governments, as the federal, state, county, city governments, need money in order to pay their general expenses, and also do the special work delegated to them, such as maintaining schools, building roads, caring for the insane, etc.

The different governments collect their revenues in different ways. State and local governments generally collect their revenue as *taxes*.

245. Taxes.—A **tax** is money assessed on property or persons by the government for public purposes.

A property tax is a tax assessed on property.

Property is of two kinds, *real estate* and *personal property*. Real estate is property not easily moved, as lands, buildings, etc.

Personal property is movable property, as money, stocks, bonds, household goods, cattle, etc.

A **poll tax** is a fixed sum, as $1, or $2, assessed on each voter in a community without regard to the amount of property he owns.

246. The **method of assessing taxes** in a state, for instance, is usually as follows: A representative body, the state legislature, determines by means of appropriation bills, the amount of money to be expended. The amount of taxable property in the state is determined by local officers called *assessors*, elected by the people in a township or borough or city, the reports of the assessors being summed up by a state official called the Auditor of Public Accounts. The auditor divides the total amount of money to be collected by the number of dollars of taxable property, and thus determines the amount of tax on one dollar. Hence, a *tax is a certain per cent. of the property assessed.*

Thus, if a state desires to expend $1,200,000, and the amount of property in the state is $800,000,000, the tax rate will be $1,200,000 ÷ $800,000,000, or .0015.

The same general method is followed in assessing city, borough, and county taxes.

The different rates of taxes of each government are sent to an official, who calculates the amount of each kind of tax to be paid by each person, corporation, or piece of property, and tabulates the results in a book. The book is given to a collector, who collects each tax and returns it to the proper (county, city, or state) treasurer.

It is the custom in many localities to assess property for not more than $\frac{1}{2}$ or $\frac{2}{3}$ of its real value. After property has been assessed, the owner may appear before the proper official and make claim for such reductions or corrections as he thinks he is entitled to.

If taxes are not paid when due, a certain per cent. is usually added to them as a fine.

Taxes are often stated as so many mills on a dollar.

Ex. What will be the county tax of Samuel Smith, the rate being $2\frac{1}{2}$ mills on a dollar, and his property being valued at $3500.

The tax on $1 = .0025.

Hence, tax on $3500 = $3500 × .0025 = $8.75, *Tax.*

247. Computation of Taxes by Use of a Table.—The computation of the taxes of a community is greatly facilitated by the preparation and use of a table like the following, which gives the tax on various sums at the rate of 3 mills on a dollar.

Prop.	Tax.	Prop.	Tax.	Prop.	Tax.	Prop.	Tax.	Prop.	Tax.
1	.03	10	.30	100	$3.00	1000	$30	10,000	$300
2	.06	20	.60	200	6.00	2000	60	20,000	600
3	.09	30	.90	300	9.00	3000	90	30,000	900
4	.12	40	1.20	400	12.00	4000	120	40,000	1200
5	.15	50	1.50	500	15.00	5000	150	50,000	1500
6	.18	60	1.80	600	18.00	6000	180	60,000	1800
7	.21	70	2.10	700	21.00	7000	210	70,000	2100
8	.24	80	2.40	800	24.00	8000	240	80,000	2400
9	.27	90	2.70	900	27.00	9000	270	90,000	2700

In this table, the columns headed "Prop." give the number of tens of dollars, not number of dollars of property tax

Ex. Compute by use of the table the tax on a property assessed at $5680.

SOLUTION.

Tax on	$5000	= $15.00
" "	600	= 1.80
" "	80	= .24
		$17.04, *Tax.*

EXERCISE 121.

1. What will be R's tax on a farm valued at $4500 if the rate is .007? If it is .0102? If it is .012?

2. Mr. Smith owns a house assessed at $12000 and the tax rate is .021. What will his total tax be, including a poll at $1.50?

3. By the table find tax on the following amounts: $4175; $8925; $10328; $27030; $50409; $66666 at rate .003.

4. If my tax is $132.30 and my property is assessed at $7350, what is the rate?

5. I pay a poll tax of $1.25 and a total tax of $395.25; my property is assessed at $15760. What is the rate?

6. One year a gentleman paid $372.60 when the rate of taxation was $1\frac{2}{3}\%$. What was the value of his property?

7. A tax of $30500 is to be assessed on a town; the real estate is valued at $3500000, and there are 500 polls taxed at $1.50 each. What will be the rate?

8. The real estate in a certain town is valued at $857400 and a tax of $13718.40 is to be assessed. What will A have to pay, his property being worth $14700?

9. Do you detect any similarity between the subject of taxes and of percentage? Any difference?

10. Find by use of the table the tax on amounts of Ex. 3 if the rate were 2 mills on the dollar instead of 3.

CUSTOMS OR DUTIES.

248. Revenues of the General Government.—The general government of the United States obtains its revenue from two principal sources: (1) **Duties** (sometimes called tariff, or customs) which are a tax imposed on goods imported into the country from foreign countries;

(2) **Internal revenue,** that is, taxes charged on certain articles manufactured within the country, as spirituous liquors, articles made from tobacco, etc. Of all these, certain duties only are collected by the use of percentage.

249. Duties are of **two kinds,** *ad valorem* and *specific.*

An **ad valorem** duty is a certain percentage assessed on the value which imported goods have in the country from which they come. Thus, imported silk ribbons pay a duty of 40%; brushes, 40%; manufactured glass, 45%.

A **specific** duty is duty assessed on goods according to their weight or bulk without respect to their value. Thus, imported pig iron pays a duty of $4 a ton; iron ore 40 cents a ton.

Sometimes goods are subject to both an *ad valorem* and a specific duty. For example, preserved fruits, when imported, pay a duty of 1 cent a pound, and also 35% ad valorem.

Goods are said to be on the *free list* when no duty is charged on them.

Ad valorem duties are more just if honestly paid, but they present greater chance for fraud by undervaluation.

Hence, at present, most U. S. duties are specific.

Duties are collected at certain cities, called Ports of Entry, which are determined by law. Each port of entry has a building called a Custom House, where duties are collected under the oversight of a government official called the Collector of the Port.

A duty is computed on the cost of the goods at the port from which they are shipped. This cost includes both the cost price and all charges up to the final shipment. An **invoice** specifying the goods purchased, their cost, etc., is sent to the person or firm importing the goods, and is to be presented by them at the custom house where the goods are received.

Merchandise of certain kinds, imported but not intended for immediate consumption, may be placed in bonded warehouses provided by the United States, and remain there not longer than three years, the owner being at liberty to withdraw it at any time upon payment of the duties and charges.

Ex. What is the duty on 375 yards of cloth at $2.75 a yard, the duty being 20% *ad valorem?*

The duty $= \$2.\overset{.55}{75} \times 375 \times \frac{1}{\cancel{5}} = \$.55 \times 375 = \$206.25$, *Duty.*

EXERCISE 122.

1. What is the duty on 40 pairs lace curtains bought for $6.50 a pair, duty being 28%?

2. A jeweler receives from Switzerland a quantity of watch supplies, costing $2450, and charges amounting to $35. What will be the duty at 8% *ad valorem?*

3. Find the duty at 15% on 80 boxes of candles, each weighing 100 lbs. and costing $8\frac{3}{4}$ cts. per pound.

4. A liquor dealer imports 150 dozen bottles of wine at $2.50 a dozen, duty at 22%. What do the bottles cost him, provided charges *before* landing are $16 and those *after* landing are $9.50?

5. The duty on an invoice of lace goods at 24% was $211.50. What was the cost of the goods? What was the total cost? What must be the selling price to gain 20%?

6. A merchant imported dry goods valued at $7200, on which there was a duty of $1296. What was the custom rate?

7. In the above example, provided the goods cost $3 a yard, what must he ask per yard for them, to gain 10% above all given costs?

8. Compare and contrast this subject with the subject of percentage.

INSURANCE.

250. **Insurance** is a system of business whereby a certain sum is payable in case of loss of property in a specified way, or in case of injury or death of a person.

There are three principal kinds of insurance:

(1) Fire Insurance.
(2) Life Insurance.
(3) Accident Insurance.

Beside these, there are many special kinds of insurance, as marine, tornado, plate glass, employment insurance, etc.

251. The **insurer** or **underwriter** is the person or company taking a risk.

The **insured** or **assured** is the person protected.

The **policy** is the written contract between the insurer and the insured.

The **premium** is the amount paid for the insurance for a certain period of time, as one, three, or five years.

The **rate** of the insurance is either a certain per cent. to be charged on the face of the policy, or, what amounts to the same thing, a certain charge on every $100 or $1000 of the face of the policy. Thus, the rate of insurance on a building may be stated either as $1\frac{1}{2}\%$, or as $1.50 on every $100 insured.

Business buildings are usually insured for a single year, the policy being renewed annually; dwellings and personal property for three years.

In case of loss the underwriter has the choice of replacing the insured property, or paying its value. Only the actual amount of the loss can be recovered.

Ex. A house is insured against fire for $4500 for 3 years. Find the premium, the rate of insurance being $3\frac{1}{2}\%$.

Operation.	Explanation.
$4500 .035 22500 13500 $157.500, *Premium.*	Since the rate of insurance is $3\frac{1}{2}\%$, the premium will be $4500 × .035, or $157.50.

EXERCISE 123.

1. What must be paid for insurance on a property worth $7530, at $1\frac{1}{2}\%$? At $1\frac{2}{3}\%$?

2. On a vessel worth $12000 the owner had paid insurance

3 years, at the rate of $1\frac{1}{2}\%$ annually; then the vessel was wrecked. What was the total loss? How much of it was not recovered by the insurance?

3. A merchant whose stock of goods is worth $26000 gets them insured for $\frac{4}{5}$ of their value, at $\frac{3}{4}\%$. What premium does he pay?

4. A house cost me $6000. I wish to insure it, so that in case of fire I lose nothing. For what must it be insured at 2%?

5. I pay $11.90 premium on insurance of $680. What is the rate?

6. If it cost $82.05 to insure $\frac{3}{8}$ of a store at $1\frac{1}{4}\%$, what is the whole value of the store?

7. I insure my house in one company for $3500, at $\frac{3}{4}\%$, and my barn in another, for $2500, at $\frac{1}{2}\%$. What rate do I pay on my entire insurance?

8. A bank building insured for $75000, at $1\frac{1}{5}\%$, was destroyed by fire after the payment of 4 annual premiums. What was the loss to the company? To the bankers?

STOCKS AND BONDS.

252. Stock Companies and Stocks.—When a business enterprise, as the building and management of a railroad, is too large for the capital of a single person, it is customary for several persons to combine their resources and organize a stock company, for the purpose of carrying on the enterprise. The money thus invested is called the **stock.**

The stock is divided into a number of equal **shares,** each share being usually $100, but sometimes $50 or $25.

The stock company, or corporation, has a **charter** secured by an act of a state legislature, or issued by a state officer in accordance with a general law. The charter specifies the name and purpose of the company, the amount of stock, the method in which the business is to be conducted, etc. A company is usually organized by electing a board of directors, each share of stock being allowed one vote. The board of directors elect officers, as president, secretary, treasurer, etc. Sometimes, however, the officers are elected directly by the stockholders.

Stock certificates are documents issued by a company, stating the number of shares of stock owned by each stockholder respectively.

253. Dividends, Assessments.—When the receipts of a company exceed its expenditures, it usually pays part or all of the net gains to the stockholders as a **dividend.** A dividend is paid out as a certain per cent. of the face or par value of the stock.

When a company is losing money, it often makes an **assessment** on its stockholders to cover a deficit or extraordinary expense. An assessment is also made as a certain per cent. of the par value of stock.

254. Par, Premium, and Discount.—According as a company is paying large or small dividends, and the public has or has not confidence in it, the stock of the company may sell for more or less than its face value.

The **market value** of stock is that for which it will sell. When stock sells for more than its face or par value, it is said to be **above par,** or **at a premium;** when for less, it is said to be **below par,** or **at a discount.**

255. Stocks, Bonds, etc.—Some companies issue stock of two kinds: (1) *preferred,* (2) *common stock.* In dividing the gains of a company, the preferred stock receives a dividend first, up to a certain amount, as 5%, after which the remainder of the net income of the company, if there be any, is apportioned to the common stock. About one-fifth of the railroad stock of the United States is preferred stock.

A **bond** is a note issued by a company to the person from whom the company or corporation borrows money, and specifying the amount, time to run, and rate of interest.

Bonds issued by a company are secured by a mortgage on the property of the company; those issued by a city, county, state, or national government are simply promises to pay, without any such security.

Bonds are either *coupon* or *registered* bonds.

Coupon bonds have small certificates of interest attached, which are cut off, as interest becomes due, and cashed at the proper place, as at a bank.

Registered bonds have the name and address of the owner; and interest, when due, is sent to the owner. Registered bonds must be indorsed in order to be sold.

Bonds receive special names indicating the year when they are due, or number of years which they have to run, the rate of interest, etc. Thus, 4's of 1907 are bonds which mature in the year 1907 and pay 4% interest.

Ex. 1. If I buy 12 shares of New York Central R. R. stock at 120 and receive a semi-annual dividend of $3\frac{1}{2}\%$, what is my annual income from the investment and what per cent. does the investment pay?

OPERATION.

$$\begin{array}{r} \$12 \\ 100 \\ \hline \$1200 \\ .035 \\ \hline 6000 \\ 3600 \\ \hline \$42.000 \\ 2 \\ \hline \$1440)\$84.00(.05\frac{5}{6} \\ 7200 \\ \hline 1200 \\ 1440 \\ \hline = \frac{5}{6} \end{array}$$

EXPLANATION.

The par value of 12 shares at \$100 a share is \$1200. Since the dividend is paid on the par value, the semi-annual dividend on 12 shares will be $3\frac{1}{2}\%$ of \$1200 or \$42. Hence, the annual income is \$42 × 2, or \$84. The cost of 12 shares at \$120 per share is \$1440.

In order to determine the per cent. paid by the investment, it is necessary to determine what per cent \$84 is of \$1440. This is $5\frac{5}{6}\%$.

EXERCISE 124.

1. I bought 25 shares of P. R. R. at \$60 (par is \$50) and received semi-annual dividends of $2\frac{1}{2}\%$. What is my annual income? What per cent. do I receive on the investment?

2. Which is the better investment, 9 shares of stock selling at 120 and yielding 7% on par value of 100, or 10 shares in stock selling at 108 and yielding 6%? (Find the rate per cent. of each investment.)

3. Which brings the greater income, \$6438 invested in 6% bonds selling at \$111 (par \$100), or in 7% bonds selling at \$58 (par \$50)? What is the per cent. in each?

4. What sum must be invested in 5% bonds at 105 to yield an annual income of \$1200?

5. What sum must be invested in 7% bonds at $121\frac{1}{2}$ to yield an annual income of \$3500?

EXERCISE 125.

GENERAL REVIEW.

1. A merchant sells an overcoat for \$50 and gains 25% over total cost. If he had previously paid \$9 duty on the goods, what was their first cost?

2. If a single fare to the city is 60 cents, what per cent. do I save by buying 100 tickets for \$50?

3. What amount must be invested in Illinois 6's at 112 to realize an annual income of \$2100?

4. At $1\frac{1}{4}\%$ I insured my house by payment of \$94.32 premium. What is the value of the house?

5. A school-house is to be built at a cost of \$17484.25. Collector's commission is 3%; assessable property is valued at \$721000. Find the rate of taxation.

6. A jockey sold two horses for \$75 each. On one he gained 20% and on the other he lost 20%. Did he gain or lose on the whole transaction? How much? What per cent.?

7. On one occasion the price of kerosene fell from 12 cents per gallon to 8 cents. What per cent. is the decline? Again it rose from 8 cents to 12 cents. What per cent. was the advance?

8. An importer sold a line of goods for \$15048, thereby gaining 20%. Previous to this, he had paid a duty of 10% on their cost. What was the cost?

9. A man buys a house for \$12000; pays \$230 tax and $1\frac{1}{4}\%$ insurance each of 5 years. He then sold it at a gain of 10% above all cost and expense. What was the selling price?

10. Mr. B. bought stock at \$12 premium (\$50 par) and sold it at a loss of 20%. At what rate was it sold?

11. The first cost of an importer's stock of goods was \$13200; duty was levied at 12%; insurance was computed upon this total value at $2\frac{1}{4}\%$. What would the goods have to sell for, to return the owner 15 per cent. above all cost?

12. By selling 3% bonds at $102\frac{3}{4}$ and investing in stock at 137, a man doubles his income. What is the annual dividend (%) of the stock?

13. If \$7384.80 includes the price paid for a farm and the agent's commission at 2%, find his commission.

14. A coal dealer ordered through his agent 6000 tons coal at $3.30 a ton, paid 3½% commission, $56.25 cartage, and $210.75 freight. He sells it at $3.98 a ton. What is his gain %?

15. I bought 60 shares Lehigh Valley at 32 and sold it at 60. My gain I invested in N. Y. Central at 120. What was the income from this, under their 5½% dividends?

16. Bought a lot of goods at 20% below market price and sold them at 20% above market price. Find my gain per cent.

17. A stationer sold paper at 16 cents a quire, having paid $2.50 a ream for it. Find his gain %.

18. I sold two houses for $5400 each, having gained 20% on one and lost 20% on the other. Did I gain or lose in the double transaction, and what %?

19. A drover bought 75 cows at $30 a head. Ten of them were killed by accident. He sells the rest so as to gain 10% on the transaction. At what price did he sell each cow?

20. A teacher spends 25% of her salary for board, 10% for clothes, 15% for books, 12½% for traveling expenses, and saves the balance, which is $450. What is her salary?

21. I lost 18%, or $600, in the sale of a property. For what did I sell the property?

22. I sold a watch for $90, losing 25%. What is my per cent. gain on a second watch which I sell for $90, so as to profit as much on the one as I lose on the other?

23. What number increased by 33⅓% of itself is 900?

24. Mr. X. raised 496 bushels of wheat, which is 33⅓% more than ⅔ of Mr. Y.'s crop. How many bushels did Mr. Y. raise?

25. A clerk spent 65% of his salary and saved $385. How much did he spend?

26. If a man spends $45.75, which is 60% of his money, how much remains?

27. Which gives the larger percentage return, a $2400 investment yielding $112, or an $8400 investment yielding $378?

28. Who makes the greater per cent., the lad who buys chestnuts at $1.28 a bushel and sells them at 5 cents a quart, or the broker who buys bonds at $144 and sells them at $168?

29. What per cent. is gained by buying coal by the long ton* (2240 lbs.) and selling it at the ordinary ton, $5 a ton in each case?

30. What is the difference between the single discount of 35% on a bill of $640 and three successive discounts of 20%, 10%, and 5%?

31. If I pay $37.50 for insurance on my house at 1¼ per cent., what is the amount of insurance?

32. A grocer mixes two kinds of tea which cost him 36 cents and 60 cents per pound. He sells the mixture at 56 cents a pound. What is his per cent. profit?

33. Bought $128 worth of apples at 80 cents a bushel. Part were damaged, and I sold the rest at an advance of 30%, receiving $137.28. How many bushels were worthless? What was my per cent. profit withal?

34. I sold a horse for $150 and with the money bought another. On the first of these horses I gained 20%, and when the second was sold I lost 20%. On the whole transaction, did I gain or lose? How much? What per cent.?

35. In a cubic foot of water there are 889 ounces of oxygen and 111 ounces of hydrogen. What per cent. of water is oxygen (by weight)? What per cent. is hydrogen? What per cent. of the oxygen is the hydrogen?

36. A merchant by selling a pound of butter gains the cost of an ounce. Find his gain %.

37. The volume of a gallon is what % of a cubic foot?

38. The population of a certain city is 84000, and that of the state in which the city is, 189000. What per cent. of the entire population of the state is that of the city?

39. A merchant bought goods for $1200 and then sold ⅓ of them at a loss of 25%. For what must he sell the remainder to gain 20% on the whole?

40. An agent received $40.625 for selling a house worth $1625. What can you find? Do so.

41. An agent sold 1470 bushels of oats at 60 cents a bushel and charged $26.46 for doing it. What may be found? Find it.

42. For what sum is a house insured if the premium is $17.50 and the rate ⅞%?

43. Out of a possible 72 points in an examination, A got 27 points and B got 58½. Find their percentages of grade.

44. A merchant wishes to mark some goods which cost $1.20 a yard, so that he may reduce them 20% from marked price, and still gain 10%. At what price must they be marked?

45. What single discount is equivalent to the successive discounts of 20% and 10%?

46. What is 16⅔% of 116⅔?

47. 212½ is what per cent. of 916⅔?

48. A desk was sold for $60, at a gain of 20%. What would have been the loss % had it been sold for $40?

49. My house, worth $6400, was insured for ¾ of its value at ⅔%. It was destroyed after the second premium had been paid. What was my actual loss? The company's?

50. Write as a rate per cent. $\frac{1}{6}$; $\frac{7}{10}$; $\frac{7}{15}$; $\frac{9}{40}$; $\frac{1}{300}$; $\frac{13}{10}$; $\frac{5}{3}$; $\frac{27}{6}$.

51. Write as a common fraction and as a decimal: $\frac{3}{4}\%$; $\frac{9}{10}\%$; $7\frac{1}{2}\%$; 340%; 40%; 4%; $14\frac{2}{7}\%$; 625%.

52. A horse worth \$150 was bought for \$25 less and sold for \$25 more than his real value. What % was gained?

53. At \$5 a ton, how many tons of coal can be bought with \$8526, after paying commission of $1\frac{1}{2}\%$?

54. Which is a greater per cent. change, when sugar drops from 6 to 5 cents a pound, or when it advances from 5 to 6 cents? Why?

55. If the cost is $\frac{3}{5}$ of the selling price, find the gain %.

56. If the selling price is $\frac{3}{5}$ of the cost, find the loss %.

57. Bought 320 shares of a certain stock (par \$10) when $3\frac{1}{2}\%$ below par, and sold them when $1\frac{3}{4}\%$ above par. Find my gain in dollars and in per cent.

58. Bought 500 shares of railroad stock at $28\frac{1}{2}$ and sold it at $45\frac{3}{4}$. Allowing $\frac{1}{8}\%$ commission on both purchase and sale, what was my gain?

59. Sold 400 shares of United States Steel preferred, at $98\frac{1}{4}$. With the proceeds I bought 1000 shares of Southern Railway at $31\frac{5}{8}$. Allowing $\frac{1}{8}\%$ commission in each transaction, how much money remained unemployed?

60. Mr. A. sold 800 Reading bonds (4%) at $96\frac{3}{8}$ and bought Erie at 51. How many shares did he buy, allowing commission on bonds at $\frac{1}{4}\%$ and on stock at $\frac{1}{8}\%$?

61. I sent my broker \$10000, asking him to buy some Southern Pacific R. R. stock under 45 and sell it over 60. He bought all he could with my remittance at $42\frac{3}{4}$ and sold it at $60\frac{1}{2}$. Compute the number of shares purchased; his total commission at $\frac{1}{8}\%$; and my profit.

62. In a certain school there are 288 boys and 162 girls. What per cent. of the school is boys? Girls?

63. Into 80 gallons of alcohol are mixed 40 gallons of water. What per cent. of the mixture is water?

64. To bake a certain kind of bread 9 measures of rye meal are mixed with 13 measures of corn meal. What per cent. of the bread is rye?

65. After a reduction of 8% a man's wages were \$22.54. What were they before the reduction?

66. What amount of insurance may I procure on my house by paying \$35 if the rate is $\frac{5}{8}\%$?

67. Twenty per cent. of the selling price of my horse was \$36. What was my profit if I gained 20%?

68. In a certain city there are 73000 white, and 25000 black citizens, What per cent. of the entire population is colored?

69. Sold two horses for \$210 each. On one I gained 20% and on the other I gained \$20. Find my total gain. Also gain per centum.

CHAPTER XV.

INTEREST.

256. Interest.—If a business man does not have money enough of his own to carry on a certain enterprise, he may be enabled to proceed, by borrowing money from another person. In such cases it is customary to pay a certain sum (per annum) in return for the use of the borrowed money.

As money paid for the use of a house is called *rent*, and money paid for the use of a horse is called *hire*, so money paid for the use of money is called **interest.**

Interest is usually reckoned as a certain annual per cent. of the money borrowed.

257. Interest and Time.—The length of time for which borrowed money is used varies greatly according to the needs of the borrower. The time may be only a few days, or it may be a number of years, or of years, months, and days.

Hence, interest differs from percentage in general, in that the element of *time* is to be carefully considered in connection with every problem.

258. The **quantities considered** in interest are the *principal, rate, interest, time, amount.*

The **principal** is the sum of money on which interest is paid.

The **rate** is the per cent. of the principal paid for the use of the principal for one year.

The **interest** is the sum of money paid for the use of the principal for the entire time.

The **amount** is the sum obtained by adding the interest to the principal.

259. Legal interest is interest determined according to a