CHAPTER XVI.

APPLICATIONS OF INTEREST.

PROMISSORY NOTES.

270. Promissory Notes.—If a person borrows **money of** another person, or buys goods on credit (that is, without paying for them immediately), he usually gives a *note*, or *written promise* to pay the given sum of money at a given date in the future (or on demand), with or without interest, as the case may be.

This written promise is called a **promissory note.** A promissory note given by one person to another is usually of the following form:

$350.   PHILADELPHIA, PA., *Oct. 12, 1900.*
Thirty days after date, I promise to pay James Scudder, or order, three hundred and fifty dollars, value received, with interest at six per cent.

WILLIAM HEYWOOD.

From the general form as here given, notes may vary by the omission of the words "or order," or by the omission of the time clause ("thirty days after date"), or by the substitution of a definite date, as "on Nov. 12," for the time clause; or by the omission of the interest clause ("with interest at six per cent."); or by the insertion of clauses not given in the above form, as "without defalcation," or of a clause specifying the bank where the note is payable; or by being signed by several persons.

The essential parts of the note are the **date**, the **promise to pay, person to whom, amount,** the words " **value received**," and **signature.**

If the words "value received" are omitted, the holder of the note may be required to prove that the value of the note had been received by him.

271. Definitions.—The **maker** of a note is the person who signs the note, as William Heywood in the note of Art. 270.

The **payee** is the person to whom the note is made payable, as James Scudder in the above note.

The **face** (or principal) is the sum promised to be paid.

The face of the note is written in the body of the note in words, not figures, to avoid fraud or error. The number of cents, however, is usually expressed in figures, as the hundredths of a dollar.

272. Maturity of Notes.—In some states, as New York, New Jersey, Pennsylvania, and Illinois, a note matures, that is, is legally due, at the end of the time specified in the note. Thus, the above note (Art. 270) is due 30 days after Oct. 12, 1900, that is, on Nov. 11, 1900.

In other states, as California, Tennessee, etc., a note is due three days after the time specified in the note. These three days are called **days of grace.** Thus, if the above note had been given in Knoxville instead of Philadelphia, it would have been due Nov. 14, instead of Nov. 11.

Days of grace were formerly allowed in all states, but their use is gradually being abolished by law.

When the time of a note is specified in months, calendar months are used. Thus, if a three-months note is given on June 5, it falls due on Sept. 5 (or Sept. 8, if days of grace are allowed). If, however, a note for 90 days is given on June 5, it falls due on Sept. 3 (or Sept. 6).

If a note falls due on a Sunday or a legal holiday, it matures on the nearest business day preceding, except in Pennsylvania, where it falls due on the first business day following.

It is becoming customary to specify in the note the day on which the note becomes due, instead of stating the number of days or months which the note is to run.

If no time for which the note is to run is specified in the note, the note is payable at any time on which the holder of the note may choose to call for its payment, that is, it is due *on demand.*

273. Interest on Notes.—If a note contain the words "with interest," interest is computed on the note from the date at which the note is given. Thus, interest on the above note (Art. 270) is computed beginning with Oct. 12.

If, however, the words "with interest" are omitted, interest is computed from the day on which the note becomes due; thus, if, in the above note, the words "with interest at 6%" were omitted, interest would be computed beginning with Nov. 11.

Interest on notes is usually computed for the exact number of days (even when the note runs for a certain number of months), allowing either 360 or 365 days to the year.

Since notes are usually given for 30, 60, or 90 days, it is generally convenient to find the interest at 6% for 60 days (which interest equals 1% of the principal), and for such parts of 60 days as are needed, to take their sum and then obtain the interest at any other rate if such rate is used. This, in effect, constitutes still another method of computing interest than those given in Chapter XV., and is called the **Two Months Method.**

Ex. Find the amount due on the following note at maturity.

$860.42. TRENTON, N. J., *May 12, 1898.*
Three months after date, I promise to pay Stephen Blake, Eight Hundred Sixty $\frac{42}{100}$ Dollars, value received, with interest at 5%.

JAMES EVANS.

SOLUTION.

The note is due 3 mo. after May 12, that is, on Aug. 12.
From May 12 to Aug. 12, the number of days is as follows:

May, 19 days.	Int. on $860.42 for 60 da. at 6%	= $8.604
June, 30 "	" " " 30 " "	= 4.302
July, 31 "	" " " 2 " "	= .2868
Aug., 12 "	" " " 92 " "	= 13.193
Total, 92 "	" " " " " 1%	= 2.199
	" " " " " 5%	= 10.99
		860.42
	Amount due Aug. 12	= $871.41, *Result.*

EXERCISE 135.

Find the date of maturity and the amount due then, on each of the following notes:

1. $360. ALBANY, N. Y., *April 7, 1901.*
Four months after date, I promise to pay Bradley Goold, Three Hundred Sixty Dollars, with interest, at 5%, for value received.

JONATHAN SCUDDER.

2. $935. PRINCETON, N. J., *Dec..5, 1892.*
On demand, we, or either of us, promise to pay, with interest at 4½%, to Charles R. Watson, Nine Hundred Thirty-five Dollars, without defalcation. HORACE DAY,
(*Paid, 8 mo. from date.*) EARNEST F. KEIGWIN.

3. $700. PHILADELPHIA, *Oct. 8, 1897.*
Ninety days after date, I promise to pay William Black, Seven Hundred Dollars, with interest at 3½%, for value received.

ELLERY FRANKLIN.

4. $520.60. CHICAGO, ILL., *Dec. 14, 1899.*
Six months after date, I promise to pay Sherman Thatcher, Five Hundred Twenty Dollars and $\frac{60}{100}$, with interest, at 6%, for value received. BENJAMIN CARROLL.

5. $1400. TRENTON, N. J., *March 8, 1873.*
On July 1, 1893, I promise to pay Robert Dolliver, or order, Fourteen Hundred Dollars, with interest at six per centum, for value received. ROGER SOMERVILLE.

6. $250. ALBANY, N. Y., *Feb. 1, 1875.*
On the 21st of January, 1899, I promise to pay Dwight Ogden, Two Hundred Fifty Dollars, with interest at five per centum.

F. I. SHELL.

7. A 90-day note for $2800, with interest at 5½%, was paid at maturity. What amount was due?

8. A 3-month note for $6750 at $4\frac{3}{4}\%$ was paid when due. What amount was due?

9. Write a 60-day note with your teacher as payee and yourself as maker, for $100, interest at 5%. Then compute its value when due.

10. Write a 6-month promissory note for $1670, bearing interest at $4\frac{1}{2}\%$, with Horace Mansfield as maker and John Douglass payee. Then compute its value at maturity.

11. Write a demand note for $3250, at $5\frac{1}{2}\%$, with yourself as payee and Richard Smith as maker. Compute its value 6 yr. 7 mo. 8 da. from date.

12. What is due on a promissory note for $6840.90 at 4%, 23 yr. 11 mo. 23 da. after date? Write such a note, giving its date and its date when due.

Some other facts relating to the use of promissory notes are of value, though they do not directly affect arithmetical computations. Among them are the following:

274. Transfer of Notes.—If a note be written in a certain form, it may be sold or transferred by the payee or holder to another person. Such a note is said to be **negotiable**.

In order to be negotiable, a note must be made payable to the "order of" the payee, or to the "bearer." (Details in the form of notes, and in methods of computing interest on notes, vary in different states and localities. The pupil should question a local banker and discover the forms and methods necessary in his state, or customary in his locality.)

In order to transfer a note, the payee or holder must write his name across the back of the note. If only the signature be written, the indorsement is said to be "general indorsement" or "indorsement in blank"; if the words "please pay to the order of" a specified person, are written with the signature underneath, the indorsement is said to be "special."

If a note is made payable to "bearer" merely, it may be transferred without indorsement.

275. Failure to Pay a Note.—If the maker of a note fails to pay the note when it becomes due (or, if the note be payable on demand, when it is presented for payment), every indorser of the note becomes liable for the payment of the entire note. (If an indorser has written the words "with-

out recourse" above his name, he is not liable. Several indorsers may have an agreement to share the amount of the note between them.)

In case of the failure of the maker of a note to pay the note, the usual method of the holder is to collect the amount of the note from the last indorser, who collects it in like manner from the preceding indorser, etc., up to the first liable indorser. The holder, however, may, if he chooses, collect the amount of the note from any liable indorser, such collection, however, releasing all indorsers *subsequent* to the one from whom collection is made, though prior indorsers are still liable.

A **protest** is a written notice sent by a notary public at the request of the holder of a note to the indorsers of the note, that the note has not been paid when due.

If a protest is not sent to an indorser on the day on which the note matures, the indorser is released by law, unless the words "waiving demand and notice" have been written above the indorser's signature. If the notice has been properly made out and mailed by the notary, the law assumes that a protest has been made.

276. Kinds of Notes.—In what has been said, reference has been made to different kinds of notes, which may be termed **time note**, **demand note**, **negotiable note**, and **non-negotiable note**. The pupil may give formal definitions of these. Beside these are other kinds of notes, as follows:

A **joint note** is a note signed by two or more persons, each of whom is liable for his share of the amount of the note.

A **joint and several note** is a note signed by several persons, each of whom is liable, not only for his share of the note, but also for the entire note if the other signers fail to pay. Instead of "I promise," the note reads "we, or either of us, promise" to pay, etc.

Bank bills or notes are promissory notes issued by banks and payable on demand.

PARTIAL PAYMENTS.

277. Partial Payments.—It is frequently convenient for the maker of a note, instead of paying the note all at one time, to make **partial payments** on it, as money comes into his possession, till the entire note is paid.

278. Indorsements.—The partial payments made are written on the back of the note and called *indorsements*. Each

indorsement specifies the amount paid and the date of payment, with the signature of the holder of the note, and is thus, in effect, a receipt for each amount paid on the note.

Several kinds of indorsements occur in business, but all have reference to a writing of some sort on the back of a business paper, the word indorsement being obtained from the Latin word "*dorsum*," meaning "back."

279. United States Rule *for the settlement of a note on which partial payments have been made.* The Supreme Court of the United States, reasoning that interest shall not be reckoned on interest nor on any payment, has fixed the following rule for allowing for partial payments which have been made in the settlement of a note. The same rule has been adopted by most of the State Governments, the chief exceptions being New Hampshire, Vermont, and Connecticut.

Find the amount of the principal until the time of the first payment; if the payment exceeds the interest due, subtract the payment from the amount and use the remainder as a new principal; if, however, the payment is less than the accrued interest, find the amount of the principal to the date of that payment at which the sum of the payments exceeds the interest to date; subtract the sum of the payments from the amount and use the remainder as a new principal; proceed in like manner till the amount due on the day of settlement is determined.

It is seldom that a payment less than the accrued interest is made; when such a payment occurs, it is usually easy to determine that it is less than the accrued interest by a simple mental trial.

The time between dates in partial payments is usually found by subtracting months and days, and not by determining the exact number of days between dates.

Ex. Find the amount due on the following note on Jan. 1, 1898.

$800.   NEW YORK, *Jan. 1, '96.*
Two years from date, I promise to pay James White, or order, Eight Hundred Dollars, for value received, with interest.

SAMUEL HILLMAN.

Indorsed with the following payments, Apr. 1, '96, $10; Jan. 1, '97, $100; Apr. 10, '97, $200.

SOLUTION.

As the interest on $800 for 3 months is $12, the first payment is less than the interest to date. Hence, we have

Interest on $800 from Jan. 1, '96, to Jan. 1, '97, =	$48
Principal, =	800
Amount, =	848
Sum of payments to Jan. 1, '97, =	110
Remainder for new principal, =	738
Interest on $738 from Jan. 1, '97, to Apr. 10, '97, =	12.17
Amount, =	750.17
Payment Apr. 10, '97, =	200
New principal, =	550.17
Interest from April 10, '97, to Jan. 1, '98, =	23.93
Amount due on Jan. 1, '98, =	$574.10, *Result.*

EXERCISE 136.

1. $600.   HARRISBURG, PA., *November 1, 1888.*
Three years after date, I promise to pay George Morris, Six Hundred Dollars, with interest at 5%.

THEODORE JOHNSON.

The following endorsements were made: Jan. 1, 1889, $60; July 1, 1890, $100; Dec. 10, 1890, $220.
What remained due at maturity?

2. What is due July 1, 1899, on a note for $2100, dated Jan. 1, 1897, with interest at 4%, on which are the following payments endorsed:
Sept. 1, 1897, $450; Aug. 1, 1898, $620; Feb. 1, 1899, $500?

3. A note for $2400 dated July 15, 1880, drawing interest at 5%, bears following endorsements:
Dec. 20, 1880, $740; Mar. 30, 1881, $250; June 18, 1882, $600. What is due Dec. 1, 1882?

4. How much is due Jan. 1, 1900, on a 6% note for $1500, dated Oct. 20, 1897, and endorsed as follows:
Dec. 30, 1897, $450; July 9, 1898, $25; Nov. 7, 1899, $600?

5. How much remains due Oct. 15, 1888, on a 5% note for $3600, dated June 23, 1885, and endorsed as follows:

Oct. 9, 1885, $100; Jan. 7, 1886, $200; Aug. 20, 1887, $300; Jan. 31, 1888, $1500?

280. Merchants' Rule.—When a note is settled within a year of the date at which it is given, merchants frequently use the following rule to determine the amount due when partial payments have been made.

Find the amount of the principal to the date of settlement; find the amount of each payment from the time it was made to the date of settlement; take the sum of the amounts of the payments, and subtract it from the amount of the principal; the remainder will be the balance due.

Since the periods of time are short in these notes, interest is usually calculated for the exact number of days. The method of exact interest is used in the following problems:

Ex. Find the amount due on Dec. 31, 1897, on a note for $300, interest at 7%, dated Feb. 15, 1897, on which the following payments have been made: Mar. 25, $75; June 1, $37.50; Oct. 10, $50.

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SOLUTION.

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Amount of $300	from Feb. 15 to Dec. 31	(319 da.) =		$318.35
" 75	" Mar. 25 "	(281 da.) =	$79.04	
" 37.50	" June 1 "	(213 da.) =	39.03	
" 50	" Oct. 10 "	(82 da.) =	50.79	
			168.86	

Balance due Dec. 31, '97, $149.49

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EXERCISE 137.

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1. A note for $790 at 6%, dated Jan. 15, 1891, bears two indorsements: July 1, $400; Nov. 19, $60. What is due Dec. 31, 1891?

2. Find the amount due Dec. 15, 1898, on a 5% note for $2500, dated Mar. 12, 1898, and indorsed as follows: May 17, $800; Aug. 10, $350; Nov. 1, $90.

3. Find the amount due Nov. 30, 1894, on a 4% note of $1500, dated Feb. 6, 1894, and indorsed as follows: Apr. 25, $350; June 6, $240; Aug. 7, $120; and Nov. 1, $400.

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BANK DISCOUNT.

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281. Bank Discount.—The holder of a promissory note may need money immediately. If either the maker of the note or an indorser of it be of good financial standing, he can usually obtain money on the note by taking it to a bank and selling it ("putting it in bank"). He indorses the note by writing his name on the back, deposits the note in the bank, and in return the bank pays him the sum due at the maturity of the note, less the interest on this sum from the date at which the note is deposited at the bank to the date of maturity.

The sum paid out by the bank is called the *proceeds* or *avails.*

The sum deducted from the amount due at maturity is called the **bank discount.** Hence, the bank discount on a note is *the simple interest from the date at which the note is discounted to the date of maturity computed on the amount of the note at the date of maturity.*

282. Kinds of Notes Discounted.—(1) A merchant who sells goods on time frequently receives a note promising to pay for the goods at the end of one, two, or three months, or of a certain number of days. Such a note may or may not bear interest. He obtains money by indorsing it and depositing it in a bank. In this case the money is paid to the *indorser.*

Such notes are frequently discounted on a date later than the date on which the note was given, called the date of discount.

(2) A person desiring money may make out a note payable to a friend, sign it himself, and get his friend to indorse. He takes it to the bank himself and secures the money on it. In this case the money is paid to the *maker* of the note; the note

does not bear interest, and the note is discounted on the date on which it is made.

(3) A person desiring money may make out a note payable to a bank, sign it himself, take it to the bank, and obtain the money, depositing property of value, as stocks, bonds, etc., called "collateral," to secure the payment of the note. Such a note needs no indorsement.

Banks reckon time by months or days, according as one or the other is specified in the note, and compute discount by the use of tables, which usually count 360 days in a year, 30 days in a month.

In Pennsylvania, Delaware, Maryland, Mississippi, and the District of Columbia, discount is reckoned on the *day of discount*, as well as the day of payment. Thus, a 60 days note in Pennsylvania is discounted for 61 days; in Mississippi (where days of grace are allowed) for 64 days.

Ex. 1. What are the proceeds on a note for $500 for 60 days (with grace) discounted at a bank at 6%?

SOLUTION.

The note has 63 days to run.

$$\text{Interest on \$1 for 63 da.} = \frac{63}{6 \times 1000} = \$.0105$$

Interest on $500 for 63 da. = $500 × .0105 = $5.25

$500 − $5.25 = $494.75, *Proceeds.*

Ex. 2. Find the proceeds of the following note:

$650.   PHILADELPHIA, PA., *Jan. 6, '98.*

Ninety days after date, I promise to pay to the order of Anthony Fisher, Six Hundred and Fifty Dollars, value received, with interest.

Discounted at 5%, Jan. 26, '98.   ROBERT ALLEN.

SOLUTION.

The note is an interest-bearing note, hence it is necessary first to find its amount at maturity. It is to be observed that the note is given in Pennsylvania, and that therefore there are no days of grace, and that discount is computed on the day of discount as well as the day of maturity.

Interest on $650 for 90 da. at 5%,	= $8.13
Amount of note when due (Apr. 6),	= 658.13
From Jan. 26 to Apr. 6 (inclusive), = 71 da.	
Discoun. on $658.13 at 5% for 71 da.,	6.49
$658.13 − $6.49 = $651.64, *Proceeds.*	

In the following examples it is important that the pupil, before working an example, observe carefully:

1. Whether the time to run is *days* or *months*;
2. Whether the note bears *interest* or not;
3. The *date* when the note is discounted;
4. The *State* in which the note is given, and therefore whether *days of grace* are allowed, and whether the *date of discount* is included in the time.

EXERCISE 138.

1. Find the proceeds of a note for $1200 on 90 days, discounted at 7%. At 8%.

2. Find the bank discount on a note for $870, due in 90 days, at 6%. Find same with 3 days of grace.

3. A note for $800, due in 60 days, was discounted at the bank at 7%. Find proceeds.

4. A 6-mo. note for $650, dated June 1, was discounted July 15, at 6%. Find discount and proceeds.

5. A 3-mo. note for $1400, dated July 15, was discounted Aug. 10, at 5½%. Find the proceeds.

6. A 90-day note for $5000, *with interest* at 6%, dated May 4, was discounted June 8 at 8%. Find the proceeds.

In each of the following, determine the day of maturity, time to run, discount, and proceeds:

7. $1600.   TRENTON, N. J., *June 1, 1895.*

Three months after date, I promise to pay George Williams, Sixteen Hundred Dollars, for value received.

Discounted at 6%, July 15.   WASHINGTON NORRIS.

8. $2000.   BALTIMORE, MD., *Feb. 20, 1897.*

Ninety days after date, I promise to pay Jacob Warren, Two Thousand Dollars, with interest at 6%.

Discounted at 7%, April 1.   ANDREW FLEMING.

9. $870.   PHILADELPHIA, *July 10, 1896.*

On the 10th of January next, I promise to pay John Wanamaker, Eight Hundred Seventy Dollars, with interest at 5%.

Discounted Oct. 1, at 6½%.   FREDERIC TOWNSEND.

10. A note for $1200, bearing interest at $4\frac{1}{2}\%$, dated Oct. 25, 1896, due Feb. 28, 1897, and discounted Dec. 1, at 7%.

11. A 90-day note given Dec. 16, 1895, for $1800, bearing interest at 3%, was discounted Dec. 30 at 6% (with 3 days of grace).

12. What is the difference between the true discount and the bank discount on $500 for 3 yr. 6 mo. at 5%?

13. Find the proceeds of a note dated Oct. 15, 1896, for $460.30, payable in 9 months, bearing interest at 6%, and discounted February 25, 1897, at 7%.

14. A note for $2300, dated July 30, 1899, and payable in 90 days, with interest at 5%, was discounted September 23, at 7%. Find proceeds.

283. Proceeds to be a Certain Sum.—If a person wishes to obtain a certain sum, as $200 on a 3 mos. note at 6%, from a bank, it will be necessary to determine the face of the note that will yield that sum.

Thus, on a note for $1 the bank would pay in the above case $1 — .015, or $0.985. Hence, to obtain $200, the face of the note must be as many dollars as $0.985 is contained times in $200, or $203.05.

The student may verify this result by obtaining the proceeds of $203.05 for 3 mo. at 6%.

Hence, in general,

Divide the given proceeds by the proceeds of $1 for the given time and rate.

EXERCISE 139.

Find the face of the note which,

1. Is to run 60 days, and when discounted at 6% to realize $891.

2. Is to run 6 months, and when discounted at 7% realizes $3493.30.

3. When discounted at the bank for 4 mo. 9 da. at 8% will give $72850.

4. I owe a man $800 and wish to pay him by a 6-mo. note. What sum must the note demand so that when discounted at the bank at 8%, the debt is exactly paid?

5. Let the student verify all of these results by employing the principles of the few preceding exercises.

COMPOUND INTEREST.

284. Compound Interest.—If interest is not paid when it becomes due, under some circumstances interest on the unpaid interest, as well as on the principal, is computed for the next period of time, and so on. Such interest is called **compound interest.**

Ex. Compute the compound interest on $400 for 3 years at 5%.

SOLUTION.

Principal,	= $400,	(1st principal)
Interest for the first year,	= 20	
Amount at end of first year,	= 420,	(2d principal)
	.05	
Interest for second year,	= 21.00	
	420	
Amount at end of 2d year,	= 441.00,	(3d principal)
	.05	
Interest for 3d year,	= 22.05	
	441	
Amount at end of 3d year,	= 463.05	
	400	
	$63.05,	*Compound Interest.*

If the above example had called for the compound interest on $400 for 3 yr. 2 mo. 15 da., instead of 3 years merely, we would find the compound amount for 3 years as above, or $463.05, then find the simple interest on this sum for 2 mo. and 15 da., or $4.82, and add this to the compound interest, giving $67.87 as the compound interest for 3 yr. 2 mo. 15 da.

Savings banks usually compute interest on deposits in this way, adding the interest to the principal at the end of a stated period, as six months. Compound interest is not, however, allowed by law on ordinary debts.

When the annual rate of interest is 5%, for instance, and the interest is compounded semi-annually, the compound interest is obtained by computing the interest for twice as many periods of time as there are years, at half the annual rate, 2½%.

Thus, to find the compound interest on $500 for 4 years at 7%, find the compound interest on $500 at 3½% for 8 periods of time.

In computing compound interest, it is often useful to use tables giving the amount of $1 for various rates for different periods of time.

EXERCISE 140.

Find the compound interest of :

1. $250 for 4 yr. at 5%.

2. $1800 for 6 yr. at 4%.   Also find amount.

3. $900 for 3 yr. at 6% compounded semi-annually.

4. $680 for 4 yr. at 5% compounded semi-annually.

5. $1600 for 5 yr. at 4½%.

6. $600 for 3 yr. 4 mo. at 5%.   Also find amount.

7. $3000 for 4 yr. 6 mo. at 4%.

8. $2500 for 5 yr. 3 mo. at 6%.   Find amount too.

9. What is the difference between simple and compound interest on $1500 for 6 yr. at 5% ?

10. What sum at 4% compound interest will amount to $1000 in 4 yr. ?   In 5 yr. ?   In 3 yr. 9 mo. ?

ANNUAL INTEREST.

285. Annual interest is simple interest on the principal, together with simple interest on each unpaid installment of interest.

In some States, if a note or bond contains the words " with interest payable annually," simple interest can be collected on each unpaid year's interest from the date at which it becomes due to the date of settlement, *i. e.*, annual interest can be collected.

Ex. Find the annual interest on a note for $500 for 4 years at 6%.

SOLUTION.

Interest on $500 for 1 year at 6%   = $30
    " $500 " 4 "   6%   = $120
    " $30 " 3 + 2 + 1 (or 6) years = $10.80
                          $120 + $10.80 = $130.80, *Annual Interest.*

EXERCISE 141.

Find the annual interest and amount of :

1. $700 at 5% for 3 yr.

2. $1200 at 4% for 5 yr.

3. $90 at 3½% for 4 yr.

4. $125 at 6% for 3 yr. 6 mo.

5. $750 at 4% for 4 yr. 4 mo.

6. Find the difference between annual interest and compound interest of $360 at 5% for 5 yr.

7. Find the simple, the exact, the compound, and the annual interest on $4800 at 5% for 6 yr. 6 mo.

EXCHANGE.

286. Exchange is a system of business whereby payments are made at a distance by means of drafts or bills of exchange, which largely cancel each other, and hence call for little actual transmission of money.

Illustration.—James Smith, of Chattanooga, owes Daniel Compton, of New York City, $250. To send the money in the mail would involve risk of loss; to send it by express would be expensive. A direct check on a Chattanooga bank might be expensive for Compton to collect. Hence, Smith goes to a bank in Chattanooga (the Farmers'), which has money on deposit in a New York bank (the Chemical) and buys a draft, or order, in which the Farmers' Bank directs the Chemical Bank to pay the required sum to Daniel Compton, thus:

FARMERS' BANK,

$250.   CHATTANOOGA, TENN., *Jan. 25, 1900.*

At sight, pay to the order of Daniel Compton, two hundred and fifty dollars, value received.

THOMAS FORSYTH,

To the CHEMICAL NATIONAL BANK,   *Cashier.*
NEW YORK, N. Y.

287. A **draft** is a written order in which one party directs another to pay a specified sum to a third party.

The **maker** or **drawer** is the person who signs the draft.

The **drawee** is the person directed to pay the sum.

The **payee** is the person to whom the money is to be paid.

In the above draft, the maker is Thomas Forsyth; the drawee is the Chemical National Bank; and the payee is Daniel Compton.

288. Par, Premium, Discount.—If, in buying a draft, a person has to pay the exact face of the draft, exchange is said to be **at par**; if more than the face, exchange is said to be **at a premium**; if less than the face, exchange is said to be **at a discount.**

Premium and **discount** of exchange (apart from paying for the labor involved in the exchange) arise from the fact that the banks of one large money-center, as San Francisco, may owe the banks of another large center, as Chicago, a considerable sum, as $1,000,000. Hence, the San Francisco banks must either be at a considerable expense in sending this money to Chicago, or must pay interest on it. In this case, a person in San Francisco, buying a draft on Chicago, would have to pay a considerable premium, since his draft would increase the balance at Chicago against San Francisco. On the other hand, a person at Chicago, buying a draft on San Francisco for a large amount, might get the draft at a discount, since it would diminish the balance against San Francisco and the cost of transmitting the same.

289. Sight and Time Drafts.—A sight draft is one which is to be paid immediately on presentation.

A **time draft** is one payable after a specified time.

A time draft is to be presented immediately to the drawee, and, if he agrees to pay it, he writes the word "accepted" across the face, with the date and his signature. This is called an acceptance, is equivalent to a promise to pay, and, in effect, makes the draft a promissory note.

It is evident that, since a time draft is not payable until its maturity, its value, apart from the cost of exchange, is the face value, less the bank discount on it up to the time of maturity.

Ex. 1. Find the cost of a draft on New York for $500 at $\frac{1}{2}$% premium.

SOLUTION.

Premium = $\frac{1}{2}$% of $500 = $500 × .005 = $2.50
Face of draft   = $500
        Cost of draft   = $502.50, *Result.*

Ex. 2. What must be paid in Boston for a draft on St. Louis, at 30 days, for $1200, exchange being at $\frac{1}{4}$% premium?

SOLUTION.

Discount on $1200 for 33 days   = $6.60
Proceeds of $1200 = $1200 − $6.60 =   1193.40
Premium on $1200 at $\frac{1}{4}$%   =   3.00
Cost of draft = $1193.40 + 3.00   = $1196.40, *Result.*

EXERCISE 142.

Find the cost of a draft for:

1. $900 at $\frac{1}{4}$% premium.   *3.* $7600 at $\frac{1}{4}$% premium.

2. $2500 at $\frac{1}{8}$% discount.   *4.* $100000 at $\frac{1}{8}$% discount.

*5.** $570, payable in 30 days, exchange being at $\frac{1}{4}$% premium, and interest at 6%.

6. $3000, payable in 60 days, exchange being at $\frac{1}{8}$% discount, and interest at 5%.

7. $2400, given by a Boston merchant to a Chicago manufacturer, payable in 60 days, exchange at $\frac{3}{4}$% premium.

8. What is the difference between a check and a draft? Between a negotiable note and a draft?

* Allow no days of grace in solution of these examples.

9. How large a sight draft can be bought for $2500, exchange being at $\frac{3}{8}$% premium?

10. What will be the cost of a draft for $1680, payable in 60 days after sight, exchange being $\frac{1}{2}$% premium, and interest being at 6%?

11. Find face of a draft on New York, at 90 days' sight, bought for $450, exchange being $1\frac{1}{2}$% premium, and interest at 5%.

290. **Foreign exchange** is exchange between different countries.

Exchange between two places in the same country is called **domestic exchange.**

In foreign exchange, a draft is usually called a **bill of exchange.** Usually three bills, forming a **set of exchange,** are drawn. To prevent loss or delay, each is sent by a different route. Each specifies that when it is paid the other two of the set become void.

Foreign exchange is based on the par of exchange, or the legal value of the currency of one country in terms of that of another. For instance, the par value of a pound sterling is $4.8665.

Ex. What is the cost in Philadelphia of a bill of exchange on London for £250, when exchange is at $4.875 for the pound sterling?

OPERATION.

$4.875
250
243750
9750
$1218.75, *Cost.*

EXERCISE 143.

1. What is the cost of a bill of exchange on London for £2250 at $4.87 a pound sterling?

2. What is the cost in New York of a bill of exchange on London for £6300 at $4.865 to a pound sterling?

3. What is the face of a bill of exchange on London that was purchased for $13406.25, exchange being quoted at $4.875 to a pound sterling?

4. When exchange is quoted at 5.18$\frac{3}{4}$ francs to $1, what will be the face of a bill of exchange on Paris that is bought for $2300?

5. When exchange on London is quoted at 4.85, what will be the face of a draft that can be bought for $7779.40?

6. What will a bill of exchange on Liverpool for £135 15s. 6d. cost, exchange being at 4.86?

7. Find the cost of a bill of exchange on Antwerp for 14176.75 francs, exchange at 5.17$\frac{1}{4}$.

8. Find cost of bill of exchange on Berlin for 7648 marks, exchange at 23¢.

9. How much must be paid in Boston for a bill of exchange on Hamburg for 1330 marks, exchange at 23$\frac{3}{4}$¢?

10. How large a bill of exchange can be bought on Paris for $8000, exchange being at 5.21?

11. How large a bill of exchange can be bought on Berlin for $8000, exchange at 24$\frac{1}{8}$¢?

EQUATION OF PAYMENTS.

291. Example.—William Smith owes Stephen Day the following sums:

$500 payable in 4 mo.
300 " " 8 mo.
400 " " 9 mo.

It will be a useful exercise for the pupil to determine the date when in equity the entire debt of $1200 can be paid as a single payment.

EXERCISE 144.

1. A man owes three accounts to the same person, $750 due in 8 mos., $560 due in 5 mos., and $600 due in 6 mos. When can the entire amount be paid in one sum?

2. On Jan. 1st, X. gives Y. four notes as follows: 1st for $700 due in 9 mos., 2d for $850 due in 6 mos., 3d for $400 due in 4 mos., and 4th for $600 due in 7 mos. On what date will a single payment equitably cancel all notes?

3. What is the average date for paying three notes, due, 1st, March 20, $500; 2d, April 25, $600; 3d, June 3, $400?

4. Four notes for $750 each are due respectively Aug. 1, Oct. 8, Nov. 20, and Dec. 5. What is the average date of maturity?

5. Find the equated time of paying $430 due in 8 mos.; $350 due in 9 mos.; $1000 due in 6 mos.

6. Find the equated time of paying following bills: $60 due in 30 days; $100 due in 60 days; $360 due in 90 days; and $250 due in 30 days. They all bear date Oct. 17.

7. Of a debt, $\frac{1}{3}$ is due in 7 mos., $\frac{1}{4}$ in 6 mos., and the rest in a year. Find the equated time that one payment ought to pay it all.

8. Three bills are due as follows: Aug. 5, $365, Oct. 10, $470, Dec. 14, $930. Find the average time of payment.

9. Three notes are due as follows: 1st for $320, June 1st; 2d for $480, Aug. 20; 3d for $520, Oct. 30. I wish to substitute one note for $1320. What should be its day of maturity?

10. A man bought a house for $6400 on 8 months' credit. He paid $2000 at time of purchase; when should the balance be due?

11. A man owes $500 due in 8 mos., $900 due in 6 mos., and $1200 due in a year. After 5 months he pays $1000. When in equity should the remainder be due?

12. A man owes $12000 due in 9 months. If he pays $6800 in 5 months and $2700 in 2 months more, when ought the balance be paid?

13. A certain debt is to be paid $\frac{1}{2}$ down, $\frac{1}{8}$ in 8 months, and $\frac{1}{4}$ in 9 months, and the balance in a year. If the payments are all made in one, when is it equitably due?

CHAPTER XVII.

RATIO AND PROPORTION. PARTNERSHIP.

RATIO.

292. Ratio.—If the quotient of one number divided by another occurs in a problem, it is often of advantage not to perform the division immediately, but to indicate the division for the time being. Thus, in Ex. 2 of Art. 95, the quotient of 200 divided by 9 being indicated for the time being, it was not found necessary to perform the division at all, since 9 ultimately was canceled by a factor of the multiplier, 54.

A **ratio** is the indicated quotient of one number divided by another number of the same kind.

293. The **terms** of a ratio are the quantities whose quotient is indicated. The first of these (the indicated dividend) is called the **antecedent**; the second (the indicated divisor) is called the **consequent**.

Thus, in the ratio 12 to 8, 12 is the antecedent, 8 the consequent.

294. Symbols.—A ratio is usually indicated by the sign, :, between the numbers compared. This sign is probably an abbreviation of $\div$, the sign of division.

Thus, the ratio of 12 to 8 is denoted by $12 : 8$; it may also be indicated in the fractional form, $\frac{12}{8}$.

295. A **compound ratio** is the product of two simple ratios. Thus, $\frac{2}{3} \times \frac{5}{7}$, or $\frac{2 \times 5}{3 \times 7}$, is a compound ratio.

It may also be expressed thus $\begin{cases} 2 : 3. \\ 5 : 7. \end{cases}$