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## SAMPLES OF ENTRANCE AND SCHOLARSHIP EXAMINATION PAPERS 1920

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# ENTRANCE EXAMINATION PAPERS

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## ENGLISH I

1. Write a sentence to illustrate each of the following; in each case underline your illustration: (a) an adjective clause; (b) an adverbial clause of result; (c) a clause used as the object of a verb; (d) an infinitive adjective phrase; (e) an infinitive phrase of purpose; (f) a compound sentence with one complex member; (g) the past tense third person singular of the verb *to lie* (*to recline*); (h) the passive indicative future third person plural of the verb *to see*; (i) *will* and *shall* correctly used in the third person singular; (j) *will* and *shall* correctly used in the first person plural.

2. Write a narration of not less than four hundred words on any one of the following topics:

The Biblical story of Ruth.

Odysseus's return.

Aeneas's descent into the nether-world.

Shylock's defeat.

Charles the wrestler and Orlando.

The fall of Caesar.

Sydney Carton's sacrifice.

The draining of the Stone-pit.

Governor Pyncheon's death.

3. Write a composition of not less than two hundred words on any one of the following topics:

Electing a president of the United States.

A country store.

Why I go to college.

The evils of strikes.

The high cost of living.  
My favorite book.  
The right kind of vacation.  
My early school-days

## ENGLISH II

[Answer one question in each group.]

### *Group I. Drama*

1. Compare Macbeth's first and second interview with the witches, stating in each case the occasion, his frame of mind, the prophecies, and the influence on his subsequent conduct.
2. Trace the influence of his father (alive or dead), of his mother, and of Ophelia upon Hamlet.

### *Group II Poetry*

1. Identify each of the following passages and explain the meaning of the italicised expressions:
  - (a) Sometime let gorgeous Tragedy  
In *scepter'd pall* come sweeping by,  
*Presenting Thebes, or Pelops' line,*  
*Or the Tale of Troy divine,*  
Or *what* (though rare) of later age  
Ennobled hath the *buskin'd stage*.
  - (b) And all *this tract that fronts the falling sun,*  
*A noble peer of mickle trust and power*  
Has in his charge, with tempered awe to guide  
*An old and haughty nation, proud in arms:*  
*Where his fair offspring, nursed in princely lore,*  
*Are coming to attend their father's state,*  
*And new-intrusted scepter.*

- (c) Then to *the well-trod stage anon,*  
If *Jonson's* learned sock be on,  
Or sweetest Shakespeare, *Fancy's* child,  
Warble his *native wood-notes* wild.  
And ever, against *eating* cares,  
Lap me in soft *Lydian* airs,  
*Married to immortal* verse,  
Such as the *meeting soul* may pierce.

2. Give a brief sketch of Wordsworth's life and character, illustrating your comment by reference to the thoughts of the following poems: *Peele Castle (Nature and the Poet)*, *She was a Phantom of delight*, *Ode to Duty*, *Ode on Intimations of Immortality*, and *The world is too much with us*.

### Group III. Oratory

1. Show the difference between Lord North's plan of taxing the American colonies and the plan advocated by Edmund Burke. State Burke's objections to the former and his defence of the latter. What plan had previously been in effect, and why was it not satisfactory?

2. State the occasion of Washington's *Farewell Address*, Webster's *First Bunker Hill Oration*, and Lincoln's *Gettysburg Address*. What do you consider the most important bit of advice in each?

### Group IV. Essays

1. Name Johnson's literary friends, the principal events of his life, his most important works, and the distinctive features of Macaulay's style.

2. Discuss Carlyle's explanation of his statement: "We do not think that the blame of Burns's failure lies chiefly with the world." Describe *The Cotter's Saturday Night*.

*Group V General*

1. Describe an impressive situation in which one of the following takes a prominent part: Gareth, Hervé Riel, Roderick Dhu, the ancient Mariner, Rustum.

## GREEK

## A. XENOPHON

1. *Translate into clear, idiomatic English:*

(Chirisophus retorts to Xenophon's joke)

Ἀλλὰ μέντοι, ἔφη ὁ Χειρίσοφος, καὶ γὰρ ὑμᾶς τοὺς Ἀθηναίους ἀκούω δεινοὺς εἶναι κλέπτειν τὰ δημόσια, καὶ μάλα ὄντος δεινοῦ τοῦ κινδύνου τῷ κλέπτοντι, καὶ τοὺς κρατίστους μέντοι μάλιστα, εἶπερ ὑμῖν οἱ κράτιστοι ἄρχειν ἀξιοῦνται· ὥστε ὦρα καὶ σοὶ

5 ἐπιδείκνυσθαι τὴν παιδείαν. Ἐγὼ μὲν τοίνυν, ἔφη ὁ Ξενοφῶν, ἔτοιμός εἰμι τοὺς ὀπισθοφύλακας ἔχων, ἐπειδὴν δειπνήσωμεν, ἵεναι καταληψόμενος τὸ ὄρος. ἔχω δὲ καὶ ἡγεμόνας· οἱ γὰρ γυμνήτες τῶν ἐπομένων ἡμῖν κλωπῶν ἔλαβόν τινας ἐνεδρεύσαντες· τούτων καὶ πυνθάνομαι ὅτι οὐκ ἄβατόν ἐστι τὸ ὄρος,  
10 ἀλλὰ νέμεται αἶξι καὶ βουσίν· ὥστε εἴανπερ ἄπαξ λάβωμέν τι τοῦ ὄρους, βατὰ καὶ τοῖς ὑποζυγίοις ἔσται. ἐλπίζω δὲ οὐδὲ τοὺς πολεμίους μενεῖν ἔτι, ἐπειδὴν ἴδωσιν ἡμᾶς ἐν τῷ ὁμοίῳ ἐπὶ τῶν ἄκρων· οὐδὲ γὰρ νῦν ἐθέλουσι καταβαίνειν εἰς τὸ ἴσον ἡμῖν.

## B. GRAMMAR

1. Explain the syntax of καταληψόμενος (7), κλωπῶν (8), τούτων (9).

2. Tell in order the types of the four conditions found in the above passage.

3. Give the principal parts of λάβωμεν (10), μενεῖν (12), ἴδωσιν (12).

4. With the above passage as an example, what can you say in general about the use of connectives in Greek?

5. State the rule for moods and tenses in subordinate clauses which are thrown into Indirect Discourse.

### C. COMPOSITION

*Translate into Greek:*

After Clearchus had been ill-treated in this way, he called together his soldiers to a public meeting and, breaking into tears, he said to them: "Soldiers! You see that I am grieved at what has taken place. You know that I have stood in friendly relations to Sparta. However, since you have resolved not to follow him any longer, I shall march *with you*."

### D. HOMER

*Translate:*

"ὦ γέρον, αἰεὶ τοι μῦθοι φίλοι ἄκριτοί εἰσιν,  
ὥς ποτ' ἐπ' εἰρήνης πόλεμος δ' ἀλίσστος ὄρωρεν·  
ἡ μὲν δὴ μάλα πολλὰ μάχας εἰσήλυθον ἀνδρῶν,  
ἀλλ' οὐκω τοιόνδε τοσόνδε τε λαὸν ὄπωπα·

5 λίην γὰρ φύλλοισιν εἰκότες ἡ ψαμάθοισιν  
ἔρχονται πεδίοιο μαχησόμενοι περὶ ἄστυ·  
Ἕκτωρ, σοὶ δὲ μάλιστ' ἐπιτέλλομαι ὣδέ γε ῥέξαι·  
πολλοὶ γὰρ κατὰ ἄστυ μέγα Πριάμου ἐπικούροι,  
ἄλλη δ' ἄλλων γλῶσσα πολυσπερέων ἀνθρώπων·

10 τοῖσιν ἕκαστος ἀνὴρ σημαινέτω οἷσί περ ἄρχει,  
τῶν δ' ἐξηγείσθω, κοσμησάμενος πολιήτας."

ὦς ἔφαθ'. Ἕκτωρ δ' οὔτι θεᾶς ἔπος ἡγνοίησεν,  
αἶψα δ' ἔλυσ' ἀγορὴν, ἐπὶ τεύχεα δ' ἐσσεύοντο.  
πᾶσαι δ' ὠίγνυντο πύλαι, ἐκ δ' ἔσσυτο λαὸς,

15 πεζοὶ θ' ἱππῆές τε· πολὺς δ' ὄρυμαγδὸς ὄρώρει.  
Ἔστι δὲ τις προπάροιθε πόλιος αἰπεῖα κολώνη,

έν πεδίῳ ἀπάνευθε, περίδρομος ἔνθα καὶ ἔνθα,  
τὴν ἦτοι ἄνδρες Βατίειαν κικλήσκουσιν,  
ἀθάνατοι δὲ τε σῆμα πολυσκάρθμοιο Μυρίνης·

20 ἔνθα τότε Τρῳέες τε διέκριθεν ἡδ' ἐπικούροι.

- 1 To whom does γέρον (1) refer?
- 2 Write lines 8–9 and mark scansion.
- 3 Give the Attic form or substitute of ἔφατο (12), ἱππῆες (15), πόλιος (16), διέκριθεν (20).

## LATIN

### I. FIRST YEAR LATIN

1. Write the genitive and ablative singular and the genitive and accusative plural of: *dies, caedes, eques, ager, agger, frater, corpus, exercitus, virtus, jus, modus, genus, nox, vox, pax, lex, ordo, ratio, altitudo, homo, flumen*; and the neuter singular nominative and genitive of: *iste, ipse, ille, idem, vetus, solus*.

2. Give the positive, comparative and superlative degrees of the adverbs derived from *recens, peritus, gravis, facilis, acer*.

3. Give a synopsis in the second person plural (indicative and subjunctive, active and passive) of: *obsideo, sentio*.

4. Give the principal parts of: *instruo, repello, maneo, traho, dubito, possum*.

5. What tense or tenses would be possible, according to the rule for the sequence of tenses after (a) *te rogo quid* etc.; (b) *te rogabam quid* etc.; (c) *te oro ut* etc.; (d) *tibi imperavi ne* etc.

6. Translate into Latin, marking all long vowels in what you write:



- (a) Wondering why they had withdrawn from the shore, Caesar inquired of the captives the cause.
- (b) When he ordered this man to be arrested, he learned that he had fled a little while before.
- (c) They thought they would persuade the Romans to give them lands.
- (d) If any one should report this to Ariovistus, he would inflict the severest punishment on us.
- (e) He feared that we would not go home.
- (f) I prevented him from doing this.
- (g) He exhorted his men not to lose hope.

7. Translate:

Postquam id vidit, copias suas Caesar in proximum collem ducit, equitatumque, qui *sustineret* hostium impetum, misit. Ipse interim in monte medio triplicem aciem instruxit legionum quatuor; sed in summo monte duas legiones, quas in Gallia citeriore proxime conscripserat, et omnia auxilia collocavit, ac totum montem *hominibus* complevit; et interea omnia in unum locum *conferri*, et *eum* ab his, qui in superiore acie erant, *muniri* jussit.

Account for the construction of each italicized word in the above passage.

## II. SECOND YEAR LATIN

1-6. Answer 1, 2, 3, 4, 5 and 6 under First Year Latin (above).

7. Translate:

Pro his Divitiacus (nam post discessum Belgarum, dimissis *Æduorum copiis*, ad eum reverterat), facit verba: "Bello-vacos omni tempore in fide atque amicitia civitatis *Æduæ fuisse*: impulsos a suis principibus, qui *dicerent* *Æduos* a

Cæsare in servitutem *redactos* omnes indignitates contumeliasque *preferre*, et ab Æduis defecisse et *populo* Romano bellum *intulisse*. Qui hujus consili principes *fuissent*, quod *intelligerent* quantam calamitatem civitati *intulissent*, in Britanniam profugisse. Petere non solum Bellovacos, sed etiam pro his Æduos, ut sua clementia ac mansuetudine in eos *utatur*. Quod si fecerit, Æduorum auctoritatem apud omnes Belgas amplificaturum; quorum auxiliis atque opibus, si qua bella inciderint, *sustentare* consuerint."

Account for the mood and tense of each italicized verb and for the case of each italicized noun in this passage.

### III. THIRD YEAR LATIN

1-5. Answer questions 1, 2, 3, 4 and 5 under First Year Latin (above).

6. Translate (a) if you have read pro Marcello; otherwise (b):

(a) Omnia sunt excitanda tibi, C. Caesar, uni, quae jacere sentis, belli ipsius impetu, quod necesse fuit, perculsa atque prostrata: constituenda judicia, revocanda fides, comprimendae libidines, propaganda suboles, omnia, quae dilapsa jam diffluxerunt, severis legibus vincienda sunt. Non fuit recusandum in tanto civili bello, tanto animorum ardore et armorum, quin quassata res publica, quicumque belli eventus fuisset, multa perderet et ornamenta dignitatis et praesidia stabilitatis suae, multaque uterque dux faceret armatus, quae idem togatus fieri prohibuisset: quae quidem tibi nunc omnia belli vulnera sananda sunt, quibus praeter te nemo mederi potest.

(b) Nunc, ut a me, patres conscripti, quandam prope justam patriae querimoniam detester ac deprecet, percipite, quaeso, diligenter quae dicam et ea penitus animis vestris

mentibusque mandate. Etenim si mecum patria, quae *mihi vita* mea multo est carior, si cuncta Italia, si omnis res publica *loquatur*: "M. Tulli, quid agis? Tune *eum*, quem esse hostem comperisti, *quem ducem* belli futurum vides, quem expectari imperatorem in castris hostium sentis, auctorem sceleris, principem conjurationis, evocatorem servorum et civium perditorum, exire patiere, ut abs te non emissus ex urbe, sed immissus in urbem esse videatur? Non hunc in *vincula* duci, non ad mortem rapi, non summo supplicio mactari imperabis? Quid tandem te impedit?

Account for the construction of all italicized words. In what respect is the construction of *mactari* an exception to the rule?

7. Translate into Latin:

- (a) When he hesitated, I asked him why he had not already set out.
- (b) We have arrested men who remained at Rome for receiving Catiline.
- (c) We waited two days for your friends to bring the letters.
- (d) I do not believe that death was ordained by the gods for the sake of punishment.
- (e) He came from Athens to Geneva March 9.
- (f) After these letters had been read aloud we consulted with each other.

8. When did Cicero live? When and how did he die?

#### IV FOURTH YEAR LATIN

1. Translate:

At pius Aeneas, per noctem plurima volvens.  
Ut primum lux alma data est, *exire* locosque

Explorare novos, quas vento *accesserit* oras,  
 Qui teneant (nam inculta videt), hominesne *feraene*,  
 Quaerere constituit, sociisque exacta referre.  
 Classem in convexo nemorum sub rupe cavata  
 Arboribus clausam circum atque horrentibus umbris  
 Occulit; ipse uno graditur comitatus *Achate*,  
 Bina manu lato crispans hastilia *ferro*.  
*Cui* mater media sese tulit *obvia* silva,  
 Virginis os habitumque gerens et virginis arma,  
 Spartanae, vel qualis equos Threïssa fatigat  
 Harpalyce volucremque fuga praevertitur Hebrum.

Account for the construction of each italicized word (giving reason for mood, tense, case, etc.).—From what book of the Aeneid is this passage taken? Write briefly on the contents of the third book of the Aeneid.

2. Write out the first three lines of this passage, indicating the metrical feet, the principal caesura and the length of each syllable.

3. Who was Cybele? Iris? Proserpina? Acestes? Iulus? Calchas? Creusa? Hecuba?

4. What and where was Acheron? Charybdis? Cumae? Drepanum? Orcus? Ilium? Tenedos?

5. When did Vergil live? What did he write besides the Aeneid?

6. Write the principal parts of *volvo*, *exire*, *accesserit*, *videt*, *quaerere*, *exacta*, *referre*, *clausam*, *graditur*.

7. Write the genitive and ablative singular and the genitive and accusative plural of: *locus*, *qui*, *homines*, *nemorum*, *hastilia*, *sese*, *os*, *arma*, *acer* (in all genders).

## GERMAN

## FIRST YEAR GERMAN

N.B. State where and how long you have studied German.

## PART ONE

*Oral Examination (One hour)*

## PART TWO

*Written Examination (Two hours)*

## I

*Translate into English:*

- Franz fand im Garten in einer Hecke ein Vogelnest. Jubelnd lief er zum Vater, holte diesen in den Garten und zeigte ihm seinen Fund. „Sieh nur,“ rief der glückliche Knabe, „sieh nur das zarte, weiche Nestchen von Heu, Moos und Wolle und
- 5 darin die vier niedlichen Eier! Ich möchte diese Eier nehmen und damit spielen. Darf ich wohl, Vater?“ „Nein, lieber Franz,“ antwortete der Vater, „laß nur die Eier im Neste liegen, du erlebst daran noch mehr Freude.“—Franz ließ sie liegen, ging aber am andern Morgen wieder hin und fand sogar
- 10 fünf Eier. Er erzählte dies dem Vater wieder, und dieser sagte: „Nun bleibe einmal vierzehn Tage weg vom Nestchen, dann aber will ich selbst mit dir hingehen.“—Das geschah, und wie sehr freute sich Franz, als er jetzt mit dem Vater wieder zu dem Neste trat und statt der Eier fünf kleine, nackte Vöglein erblickte. Die
- 15 sperrten die Schnäbel auf, als wollten sie Futter haben. Vater und Sohn traten jetzt auf die Seite. Da kam bald die Mutter der Vöglein und hatte ein Würmchen im Schnabel, mit dem sie die Kinderchen fütterte. „Siehst du,“ sagte der Vater, „hättest du damals die Eier ausgenommen, so würdest du jetzt die Freude

20 nicht haben." Täglich ging nun Franz zu seinem Neste, bis die Vögelchen größer wurden und endlich fortflohen. Im andern Jahre aber kamen die Alten wieder und bauten ihr Nest in dieselbe Stätte.

## II

1. Give the nominative and genitive singular and the nominative plural with corresponding form of the definite article (model: *der Mann, des Mannes, die Männer*) of: *Garten* (1. 1), *Hecke* (1), *Vogelnest* (1), *Eier* (5), *Freude* (8), *Tage* (11), *Sohn* (16), *Mutter* (16).

2. Decline in singular and plural: *der glückliche Knabe* (3), *das zarte, weiche Nestchen* (4), *die Alten* (22).

3. Give the third person singular of *tragen* and *hinbringen* in all tenses of indicative and subjunctive modes, active and passive voices.

4. Give the principal parts (model *aufstehen, stand auf, aufgestanden*) of: *fand* (1), *lief* (2), *rief* (3), *möchte* (5), *lass* (7), *erlebst* (8), *bleibe* (11), *hingehen* (12), *geschah* (12), *trat* (14).

## III

Translate into German:

1. He sat at a large table upon which lay several books.

2. Anna is the prettiest girl in our little village. She is prettiest when she laughs.

3. He said that she had not had the apples.

4. Last week I came with my best friend to Ithaca. We wish to remain four years in this beautiful city. But perhaps I shall have to go home very soon.

5. If it were not so warm today, I could work better; still I hope to receive sixty at least.

## SECOND YEAR GERMAN

N.B. State where and how long you have studied German.

## PART I

*Oral Examination (One hour)*

## PART II

*Written Examination (Two hours)*

## I

*Translate into English:*

Ein Wolf und ein Lämmlein kamen von ungefähr beide an einen Bach, zu trinken; der Wolf trank oben am Bach, das Lämmlein aber fern unten. Da der Wolf des Lämmleins gewahr ward, lief er zu ihm und sprach: „Warum trübst du

5 mir das Wasser, daß ich nicht trinken kann?“ Das Lämmlein antwortete: „Wie kann ich dir's Wasser trüben? Trinkst du doch über mir und möchtest es mir wohl trüben.“ Der Wolf sprach: „Wie? Fluchst du mir noch dazu?“ Das Lämmlein antwortete: „Ich fluche dir nicht.“ Der Wolf sprach: „Ja,

10 dein Vater tat mir vor sechs Monden auch ein solches.“ Das Lämmlein antwortete: „Bin ich doch dazumal nicht geboren gewesen, wie soll ich meines Vaters entgelten?“ Der Wolf sprach: „So hast du mir aber meine Wiesen und Äcker abgenagt und verderbt.“ Das Lämmlein antwortete: „Wie ist das

15 möglich? Hab' ich doch noch keine Zähne.“— „Ei,“ sprach der Wolf, „und wenn du gleich viel ausreden und schwatzen kannst, will ich dennoch heut' nicht ohne Speise bleiben,“ und würgte also das unschuldige Lämmlein und fraß es.

Ein Esel begegnete einem hungrigen Wolfe. „Habe Mitleiden

- 20 mit mir!" sagte der zitternde Esel; „ich bin ein armes, krankes Tier; sieh nur, was für einen Dorn ich mir in den Fuß getreten habe!“—„Wahrhaftig, du dauerst mich,“ versetzte der Wolf. „Und ich finde mich in meinem Gewissen verbunden, dich von diesen Schmerzen zu befreien.“ Kaum war das Wort  
25 gesagt, so ward der Esel zerrissen.

## II

1. Decline with the definite article in each case: *Wolf, Lämmlein, Bach, Wasser, Wiese, Acker, Zahn.*
2. Give a synopsis in the 3d sing. act., all modes and tenses of: *fressen, trinken.*
3. When is the subjunctive used in indirect discourse? Illustrate by turning sentences in I from direct to indirect discourse.
4. What are the differences between separable and inseparable compound verbs? Illustrate by examples from I.

## III

*Express in German:* In fables not all animals are friends. In fact most of them are enemies. The larger often eat the smaller. Some are wise like the fox; others are stupid like the donkey. The hare runs very swiftly. But he cannot always escape the fox. If he were wiser, perhaps he would not have to run away. However, it is a good thing that he likes to run. It improves his appetite. He is usually hungry, but he eats plants, not other animals. The latter are accordingly not afraid of him.



## THIRD YEAR GERMAN

N. B. State where and how long you have studied German.

## PART I

*Oral Examination (One hour)*

## PART II

*Written Examination (Two hours)*

## I

Translate the following passages into English:

## (a)

An dieser Stelle gestatten die Reisenden sich häufig den Spaß, mit lauter Stimme zu rufen: „Wie heißt der Bürgermeister von Oberwesel?“ Das unschuldige Echo antwortet natürlich: „—esel. Ein so profaner Scherz an einem so herrlichen Orte ist

5 beinahe eine Entheiligung.

Auf der einen Seite die Lorelay, auf der anderen Oberwesel, aber auf allen Seiten Klöster, Schlösser, Ruinen, und auf allen Bergen lange Strecken dunkelgrünen Weinlaubs, überall freundliche Städte und Dörfer, so liebevoll von den starken Bergen auf

10 ihren mächtigen Rücken getragen,—was Wunder, daß selbst das blaue Himmelssdach sich tiefer herunter neigt, dieses Bild zu schauen und zu verschönern? was Wunder, daß der sonst so rastlose Fluß hier stille steht und sich zum See erweitert, um mit Muße diese Herrlichkeiten beschauen zu können? was Wun-

15 der, daß Frau Sage gerade hier die rührendsten Geschichten von Liebesleid zu erzählen weiß? Hier lernt und fühlt man die Liebe; die Liebe zu Gott, zur Natur, zu den Menschen; hier gibt es kein größeres Unglück, als nicht zu lieben, und keine größere Sünde, als herzlos zu sein.

(b)

- 20 Niemand wußte genau, welch' eine Bewandniß es mit diesem Gaste habe. Aber man erzählte sich, es sei ein Gespenst, das alle hundert Jahre einmal in die Stadt Herbesheim wiederkomme, vom ersten Advent bis zum letzten Advent darin hause, zwar kein Kind beleidige, aber richtig jeder Braut den Hof mache, und
- 25 damit ende, ihr das Gesicht in den Nacken zu drehen. Des Morgens finde man sie, das Antlitz im Rücken, tot im Bette. Was dies Gespenst aber noch vor allen Gespenstern in der Welt auszeichnet, ist, daß es nicht etwa nur in der gesetzlichen Geisterstunde, nachts zwischen 11 und 12 Uhr, sein Wesen treibt,
- 30 sondern es soll am heitern, lichten Tage in wahrer Menschengestalt auftreten, ganz modisch wie andere Erdenkinder gekleidet einhergehen, überall hinkommen und sich einführen.

## II

Grammatical questions based on the preceding passage:

1. Give the principal parts with the auxiliary of the perfect tense, and the third person singular present indicative (model: *weggehen, ging weg, ist weggegangen, geht weg*) of the following verbs: *rufen* (2), *antwortet* (3), *getragen* (10), *steht* (13), *weiss* (16), *wiederkomme* (22).

2. Decline in both numbers: *lauter Stimme* (2), *den starken Bergen* (9), *ihren mächtigen Rücken* (10), *das blaue Himmelsdach* (11).

3. Name and explain the subjunctives in passage b.

Give an example in German of the unreal conditional (contrary to fact) and of the optative subjunctive.

## III

Translate into German:

"Once there was a little girl who was called Little Red Riding-hood (*Rotkäppchen*), because she always wore a red hood. She

had an old grandmother, who lived all alone in a great wood, and who was very good to her, and gave her many pretty things. She had also given the little girl the red hood. Now one day the mother of Little Red Riding-hood, when the grandmother was ill, sent her daughter out through the woods to bring to grandmother food and drink. A wolf met her in the woods and asked what was the way to the house of the grandmother. Then he hastened to the house and devoured the grandmother and when Little Red Riding-hood came, he devoured her, too. But the hunter heard the wolf snoring (*schnarchen*), cut him open and released (*befreien*) the grandmother and Little Red Riding-hood."

## IV

Write a letter in German (about fifty words) to a friend, inviting him or her to visit you, and promising some pleasure or entertainment. Date, address, and sign the letter properly.

## FIRST YEAR FRENCH

## PART I

Oral and aural examination

(1 hour)

## PART II

(2 hours)

## I. Translate:

Voyez-vous, disait le vieux capitaine, vous ne savez pas, vous autres, ce que c'est que le drapeau. Il faut avoir été soldat; il faut avoir passé la frontière et marché sur des chemins qui ne sont pas ceux de la France; il faut avoir été

éloigné du pays, sevré de toute parole de la langue qu'on a parlée depuis l'enfance; il faut s'être dit, pendant les journées de fatigue, que tout ce qui reste de la patrie absente, c'est ce lambeau de soie aux trois couleurs françaises qui flotte là-bas, au centre du bataillon; il faut n'avoir eu, dans la fumée de la bataille, d'autre point de ralliement que ce morceau d'étoffe déchirée, pour comprendre et pour sentir tout ce que renferme dans ses plis cette chose sacrée qu'on appelle le drapeau.

II. Give the principal parts of: *finir, aller, dormir, prendre*.

Give the present indicative of *mettre*, the imperfect indicative of *devoir*, the future of *voir*, the conditional of *donner*, the past definite of *courir*, the past indefinite of *venir*, the present subjunctive of *dire*, the imperfect subjunctive of *rompre*.

III. Give the plural of: *genou, journal, travail, oeil, nez*.

Give the feminine of: *acteur, bas, extérieur, nouveau, cher*.

IV. Translate: Come if you can. Put some there. When they arrived, they were cold and hungry. This lesson is less difficult than the first. She paid a dollar a dozen for them. They lent them to her. He told me he could not find any. Do not touch them. A week from today we shall be at home. I have lost the books which he gave me. I am glad she is there. If his mother had done that she would have told him. He used to live in the United States for six months and in France or Italy for six months. A friend of mine sold me his. Those whom you love are always right. I had forgotten what he asked.

V. Write ten lines of any poem or prose passage in French which you may have learned.

## SECOND YEAR FRENCH

## PART I

*Oral and aural examination (One hour)*

## PART II

*(Two hours)*1. *Traduire:*

Voici ce qui s'était passé. En arrivant à Dol, les paysans s'étaient dispersés dans la ville, chacun faisant à sa guise. Ils avaient garé leur artillerie avec les bagages sous les voûtes de la vieille halle, et, las, buvant, mangeant, ils s'étaient couchés pêle-mêle en travers de la grande rue, plutôt encombrée que gardée. Comme la nuit tombait, la plupart s'endormirent, la tête sur leurs sacs. C'était une douce nuit de juillet; les constellations resplendissaient dans le profond bleu noir du ciel. Tout ce bivouac, qui était plutôt une halte de caravane qu'un campement d'armée, se mit à sommeiller paisiblement. Tout à coup, à la lueur du crépuscule, ceux qui n'avaient pas encore fermé les yeux virent trois pièces de canon braquées à l'entrée de la grande rue. Un paysan se dressa, cria: qui vive? et lâcha son coup de fusil; un coup de canon répliqua. Puis une mousqueterie furieuse éclata. Toute la cohue assoupie se leva en sursaut. Rude secousse. S'endormir sous les étoiles et se réveiller sous la mitraille. Le premier moment fut terrible. Rien de tragique comme le fourmillement d'une foule foudroyée. On criait, on courait, beaucoup tombaient. Les gars, assaillis, ne savaient plus ce qu'ils faisaient et s'arquebusaient les uns les autres. Les balles sifflantes rayaient l'obscurité. Tout était fumée et tumulte. Les chevaux ruaient. On marchait sur les blessés. On entendait à terre des hurlements. Les soldats et les officiers se cherchaient. Ce fut comme un abatis d'arbres; tous tombaient les uns sur les autres.

2. *Traduire en français:*

- (1) He died poor although he was once very rich.
- (2) We are to have a house built next year which will be prettier than yours.
- (3) I want you to come here at six o'clock, if you will have time enough to do so.
- (4) You surely ought to have known that Molière is a great author.
- (5) Your father told me everything your brother had done.
- (6) I cannot do such things; am I not an American?
- (7) What is the matter with that boy today?
- (8) How fine the weather is today! Can't we go for a ride?
- (9) I have been living in the United States for eighteen years.
- (10) I am looking for a house which will be larger than this one.
- (11) Whoever you are, you must obey the law.
- (12) Your father has just come; shall I tell him to come in?
- (13) The people of the village in which he used to live were very glad that he had returned there.
- (14) Even if you were to say so, I should not believe it.
- (15) I have more than fifty francs, but my brother has less than that.

3. (A) *Ecrire les temps primitifs des verbes:*

vivre, savoir, venir, aller, craindre.

(B) *Conjuguer:*

- (a) Présent du subjonctif: *vouloir, faire, savoir.*
- (b) Passé indéfini—de l'indicatif: *partir, s'en aller.*
- (c) Imparfait du subjonctif: *venir.*

4. Ecrire au moins 75 mots en français sur le sujet:  
L'importance de l'automobile dans la vie moderne.

### THIRD YEAR FRENCH

#### PART I (*One hour*)

Oral and aural examination

#### PART II (*Two hours*)

##### I. Translate:

(a) Paris has a child, and the forest has a bird; the bird is called the sparrow; the child is called the "gamin"  
This little being is joyful. He does not eat every day, and he goes to the show, if he sees fit, every evening. He has no shirt on his back, no shoes on his feet, no roof over his head; he is like the flies of the sky, which have none of these things. He is from seven to thirteen years old, lives in troops, sleeps in the open air, wears an old pair of trousers of his father's which go down lower than his heels, an old hat which comes down below his ears, runs about, watches, searches, kills time, swears like a trooper, is acquainted with thieves, sings songs, and has nothing bad in his heart. This is because he has in his soul a pearl, innocence; and pearls do not dissolve in the mire. So long as man is a child, God wills that he be innocent. If one asked the great city: "What is that?" she would answer: "it is my little one."

- (b) (1) I told him that I wouldn't go if it should rain.  
(2) There is no one here who knows what I want.  
(3) She wished me to do something for her before she went away.  
(4) That Englishman has been studying French for a long time, and now he speaks it very well.



(5) Every time I went to town he would be there in front of his house and would always say something to me.

II. Quelle que soit la chose qu'on veut dire, il n'y a qu'un mot pour l'exprimer, qu'un verbe pour l'animer et qu'un adjectif pour la qualifier. Il faut donc chercher, jusqu'à ce qu'on les ait découverts, ce mot, ce verbe et cet adjectif, et ne jamais se contenter de l'à peu près, ne jamais avoir recours à des supercheries, même heureuses, à des "clowneries" de langage pour éviter la difficulté.

Il n'est point besoin du vocabulaire bizarre, compliqué et nombreux qu'on nous impose aujourd'hui sous le nom d'écriture artiste, pour fixer toutes les nuances de la pensée; mais il faut discerner avec une extrême lucidité toutes les modifications de la valeur d'un mot suivant la place qu'il occupe. Ayons moins de noms, de verbes et d'adjectifs aux sens presque insaisissables, mais plus de phrases différentes, diversement construites, pleines de sonorités et de rythmes savants. Efforçons-nous d'être des stylistes excellents plutôt que des collectionneurs de termes rares.

Il est, en effet, plus difficile de manier la phrase à son gré, de lui faire tout dire, même ce qu'elle n'exprime pas, de l'emplir de sous-entendus, d'intentions secrètes et non formulées, que d'inventer des expressions nouvelles ou de rechercher, au fond de vieux livres inconnus, toutes celles dont nous avons perdu l'usage et la signification, et qui sont pour nous comme des verbes morts.

III. Give the principal parts of:

Pouvoir, faire, conquérir, joindre, savoir, sentir, boire.

IV Write a short composition of about a hundred and fifty words on one of the following subjects:

(a) L'Europe après la guerre.

(b) Une lettre à un ami qui vient de recevoir un prix de français à l'école.



## SPANISH

## FIRST YEAR SPANISH

I. Oral test.

II. Conjugate the following forms:

- (1) Present indicative of *encontrar, ser, decir*.
- (2) Imperfect indicative of *ir, andar, escribir*.
- (3) Preterite indicative of *poner, sacar, comer*.
- (4) Future indicative of *volver*.
- (5) Conditional of *hablar*.

III. Translate into Spanish:

- (1) He gave them to her.
- (2) The water is cold.
- (3) They will bring you the letter you are looking for.
- (4) Put on your hat.
- (5) I want to read some interesting book.
- (6) Are you very hungry?
- (7) He left the room at once.
- (8) They had to get home at eight o'clock.
- (9) Are the lessons in this grammar easy?
- (10) I have not written to them.

IV (a) Write out the cardinal numerals from 1 to 16.

(b) Quote a Spanish poem or proverb which you have learned.

V Translate into English:

En la república de Bolivia, situada como se sabe en el centro mismo de Sudamérica, todos los ferrocarriles que se han construido en los últimos años tienen el carácter de ferrocarriles de montaña, y todos ellos han presentado en su construcción dificultades importantes, provenientes de la natura-

leza excepcionalmente quebrada que presenta el país por todas partes. Pero ninguno de los ferrocarriles hasta ahora terminados tiene el carácter del que ahora se construye por cuenta del Gobierno de Bolivia entre la ciudad de La Paz y el rico distrito agrícola de Yungas.

Las dificultades principales que esta línea tiene que vencer provienen de las marcadas diferencias de nivel que con ella se deben salvar, a través de valles estrechos que en muchos puntos tienen el carácter de cañones imponentes. Se tendrá una idea de estas diferencias de nivel, sabiendo que la línea a partir de la ciudad de La Paz, cuya altura es de 3,600 metros sobre el nivel del mar, debe ascender y tramontar la cordillera principal de los Andes, pasando por un abra cuya altura alcanza a 4,640 metros sobre el nivel del mar.

## SECOND YEAR SPANISH

### I. Ejercicios orales.

II. Dése una sinopsis (tercera persona del singular de todos los tiempos) de *saber, morir, acostarse, poner, ir, vestir, hacer, tener*.

### III. Tradúzcase al español:

—Have you seen John to-day?—Not yet, but he said that he would come at about four o'clock.—I want you to do something for me.—What is it?—Will you tell him that he can have the books he asked me for, whenever he wants?—All right, I'll tell him. He asked me yesterday if you had received them. He has been waiting for them for a long time.—I'm sorry that it has taken so long to get them. You know that nothing comes quickly now. Last week I received some things which I ordered three months ago.—It's fearful. I'm afraid that nobody is working, except the politicians.—They don't have to work, man; it's a game for them.—Well,

may be. But at any rate, we students have to work hard.—I wish I had!—What! Haven't you studied for these examinations?—Yes, but it has been very hot and I was pretty tired after a winter of work; and so I don't feel ready.—Do you think anyone was ever ready for an exam? No, but you ought to look ready.

IV Úsense en una oración completa los siguientes modismos:

*me gustan, volver a hacer, hacer falta, ponerse, echarse a, acaba de, costar trabajo, no poder menos de, la mayor parte de, hay que.*

V Tradúzcase al inglés:

En casa de sus tíos conoció una tarde María a un pariente suyo, primo carnal de su madre, que acababa de quedar viudo, con cuatro niñas pequeñas. El primo Venancio venía de una capital de provincia, donde había pasado bastantes años. Al parecer, era una notabilidad en geología, y lo llamaban para destinarle a los trabajos del mapa geológico.

El primo Venancio era hombre de unos treinta y cinco a treinta y seis años, de mediana estatura, barba rubia y anteojos de oro. Tenía la frente ancha, la mirada cándida; vestía un tanto descuidadamente, y en sus dedos se notaban ennegrecimientos y quemaduras, producidos por los ácidos.

Las cuatro niñas del primo Venancio: Maruja, Lola, Carmencita y Paulita, eran muy bonitas; las cuatro casi iguales, con los ojos negros, muy brillantes, los labios gruesos y la nariz redonda. Al conocerlas, María sintió por ellas un gran afecto, y las niñas, al ver a su prima, experimentaron uno de esos entusiasmos vehementes de los primeros años.

## THIRD YEAR SPANISH

I. Ejercicios orales.

II. Escribanse unas cien palabras sobre uno de estos temas:

- (a) La liga de naciones.
- (b) La situación actual en México.
- (c) Las elecciones presidenciales.

III. Escribase una crítica de algún libro español que V. ha leído.

IV Tradúzcase al castellano:

Restrictions on trade relations with Soviet Russia were removed to-day by the State Department, except in so far as they pertain to the shipment of materials susceptible of immediate use for war purposes. While taken independently of other nations, this action followed extensive exchanges between the United States, Great Britain, and France. It is believed to have been hastened by the recent negotiations between Gregory Kressin, representing the Bolsheviki government, and Premier Lloyd George, looking to the resumption of trade between Great Britain and Russia.

In announcing its action the State Department took particular pains to state that political recognition, present or future, of any Russian authority was neither granted nor intended. It also emphasized that individuals or corporations trading with Russia would do so on their own responsibility and at their own risk, as this government could offer no protection to Americans going to Russia or trading with Russia.

V Tradúzcase al inglés:

Bajaron a la plaza de San Marcial. Voceaban los vendedores los periódicos de la noche. Compró María *La Correspondencia* y *El Herald*, y montaron Aracil y su hija en un tranvía lleno que iba a la Bombilla.

Así, con tanta gente pensó el doctor, no se fijarán en nosotros.

En el trayecto, un señor siniestro, de bigote negro y algo bizco, se dedicó a lanzar miradas asesinas a María, y por último le preguntó en voz baja, si podía hablarla. Ella volvió la cabeza y no hizo caso. Bajaron en la estación del tranvía. El señor bizco, al ver a María cogida estrechamente del brazo de Aracil, desapareció.

Siguieron un poco más adelante padre e hija y llegaron a la parte ancha del camino que tenía a un lado y a otro unos merenderos iluminados fuertemente por luces de arco voltaico.

Entraron en uno de éstos; pasaron a un vestíbulo grande, con un mostrador y varias mesas. Enfrente de la puerta de entrada se abría un patio con árboles, donde tocaba un organillo; de ambos lados del vestíbulo partían dos escaleras.

## HISTORY

### HISTORY A—ANCIENT HISTORY

#### *Preparation.*

- (1) Where have you studied this subject?
- (2) How long have you studied it?
- (3) What text-book or text-books did you use?
- (4) What else have you read on the subject?

Note:—If you are trying for only a half-unit of credit, answer question I and any *four* questions in Greek History or any *four* questions in Roman History.

#### I. *Geography.*

Locate on the outline map six of the following: Cnossus; Carthage; Babylon; Sparta; Syria; Cisalpine Gaul; Saguntum; Miletus; Assyria; Byzantium; Tyre; Massilia; Londinium; Pontus; Mauretania; Thrace; Roman Province of Farther Spain.

**II. *Oriental History.*** (Answer one question only.)

(1) What was the extent of the Persian Empire in 500 B. C.? Give a sketch of its history to that time, and tell what you know about its government.

(2) Write upon the civilization of Egypt in the Pyramid Age (Old Kingdom), discussing the method of writing, trade, art, and architecture of the Egyptians in that period.

**III. *Greek History.*** (Answer one question.)

(1) Tell of the development of popular government at Athens under Draco, Solon, and Clisthenes.

(2) Explain what caused the movement of Greek colonization from 800 to 500 B.C.; locate four general areas colonized, and state three important historical results of this movement.

**IV. *Greek History.*** (Answer two questions.)

(1) Date the Peloponnesian War, give the names of two leaders upon each side, tell what the entire war was about, and state four of its results.

(2) Write rather fully upon the sculpture, architecture, and drama at Athens in the Age of Pericles, naming two sculptors, one architect, and two dramatists.

(3) Explain fully two of the following Greek political terms: city-state (compare with the modern idea of a state); *boulé* (council); ostracism; particularism; Achaean League; Peace of Antalcidas (King's Peace).

(4) Tell all you can of the spread of Greek population into Western Asia and Egypt during the lifetime of Alexander and in the following century. Give five results of this movement.

**V. *Roman History.*** (Answer two questions.)

(1) Give a sketch of the development of the powers of the Roman tribunes from 200 B.C. to the death of Caesar.

(2) What were the provinces added to the Roman state from 250 B.C. to 100 B.C.? In each case tell how these provinces happened to be annexed.

(3) Discuss the careers of Marius and Sulla, showing the differences in their political aims.

VI. *Roman History.* (Answer two questions.)

(1) Tell of the offices in the Roman State which Augustus Caesar took and how these made him supreme. Explain his relation to the Roman Senate.

(2) How did the following emperors receive their powers as emperor: Tiberius, Claudius, Nero, Vespasian, Titus, Trajan?

(3) Tell what you know about the history of Pompeii and results of the excavations there. What bearing has this upon Roman history?

(4) Explain briefly the following names or terms: Agrippa; Tacitus; Nicene Creed; Seneca; wall of Hadrian; Colosseum.

MEDIEVAL AND MODERN EUROPEAN HISTORY

1. Where have you studied this subject?
2. How long?
3. What text-book or text-books did you use?
4. what else have you read on this subject?

(If you are a candidate for only a half-unit of credit, you should answer only the first half of these questions or only the second half. For those prepared for examination on the Middle Ages from the year 476 the first half ends with Group III; but for those prepared for examination only from the year 800 or the year 814 the first half begins with Group II and ends with Group IV. Those who wish examination on only the second half should begin with Group IV. but may omit one question in that group.

Candidates for the full unit of credit may omit Group I in case they are not prepared for examination on the period preceding the year 814. In case they are prepared to deal



with the questions of Group I they may omit one question of Group II and one question of Group IV).

In answering all questions except the map questions, give some dates, or indicate time relation.

### GROUP I

(1) Who was Augustine, and what did he do? Gregory the Great? Boniface?

(2) During the centuries when the Germanic peoples were learning of Christianity what other great religion came into the world? Where? Under whose teaching? Into what regions did it spread?

### GROUP II

(1) Who were the Northmen? In what Christian lands did they eventually establish themselves? Tell the story.

(2) What in the Middle Ages was a "fief"? What a "manor"? What a "village"? What a "town"? What a "gild" (or "guild")? Tell what you can of the life of a medieval merchant.

### GROUP III

(1) Suppose you had listened at Clermont to Pope Urban when he preached the First Crusade, and then had joined a band of knights and journeyed with them to the Holy Land. Tell the story, naming the rivers and the mountains or the seas you had to cross, the kingdoms and the cities on your route, and the strange things you saw. Then mark your route upon the map, inserting in its proper place each name.



## GROUP IV

(1) Tell what you can of Erasmus. Of Copernicus. Of Magellan.

(2) In 1548, when Charles the Fifth published his "Interim," what Christian lands still recognized the religious headship of the Pope? What lands did not? What changes had come in this respect when just a century later, in 1648, the Peace of Westphalia ended the Thirty Years' War?

## GROUP V

*(Answer one question.)*

(1) When was the Edict of Nantes revoked? What were the reasons for this measure? What were the effects of it?

(2) Give the provisions of the Peace of Utrecht. Of the Peace of Paris, 1763. Of the Peace of Paris, 1815. Of the Peace of Paris, 1856.

## GROUP VI

*(Answer one question.)*

(a) What changes were brought about in the institutions of France by the French Revolution?

(b) How was the political system of Germany changed between 1803 and 1815?

## GROUP VII

*(Answer two questions.)*

(1) Write a brief account of either (1) The Unification of Germany; or (2) The Unification of Italy

(2) Write a brief account of the founding of the Third Republic in France, 1870-1875.

(3) What were the provisions of the following: Treaty of 1879 between Germany and Austria? The *Entente Cordiale* between England and France, 1904? The Anglo-Russian Convention of 1907? The Anglo-Japanese treaty of 1902? Treaties of London and of Bucharest of 1913 which closed the first and second Balkan Wars?

#### GROUP VIII

Locate on the map the following: Danzig; Hamburg; Liège; Turin; Saloniki; Adrianople; Zurich; the Po; the Elbe; the Dnieper.

#### AMERICAN HISTORY AND CIVICS

1. In what school did you study American History and Civics?
2. How many weeks?
3. How many hours a week?
4. What textbook did you use?
5. What books did you read as references?

#### AMERICAN HISTORY

##### GROUP I. (*Answer one question.*)

1. Write on the French Exploration and occupation of Canada and the Mississippi Valley before 1750. Mention the leading names in chronological order and discuss more particularly the work of one of the explorers. What was the influence upon French exploration and occupation of the conflict between the French and the Iroquois? What portages played an important part in the explorations of the French?
2. What was the situation with respect to the conflicting claims and rivalry of the French and British in the Ohio Valley about 1750-53? What activities of the French were alarming the British? What activities of the British indicated an intention to assert their claims in that quarter?

GROUP 2. (*Answer one question.*)

1. What connections or similarities can you point out between the colonial governments and the state governments that were to succeed them in the Revolutionary period?

2. Point out the differences between the local institutions of government in New England and in the Southern States,—e. g. Massachusetts and Virginia. What seems to be the historical importance of these differences?

GROUP 3. (*Answer one question.*)

1. What administrative reforms were attempted by Great Britain in the colonies after the French and Indian War and why? What do you understand to be some of the imperial problems of the British Empire at present?

2. Aside from the political reasons advanced for separation from Great Britain before 1776 what economic disadvantages urged the colonies toward independence?

GROUP 4. (*Answer one question.*)

1. What classes of people contributed the most to the number of Tories in the American Revolution? What course was pursued with reference to the property of Tories? Was anything done to secure redress for the Tories at a later time? In what colonies were they most numerous?

2. Describe the work of the Committees of Correspondence and other agencies used in fostering the revolutionary spirit in the colonies. What revolutionary characters were most influential in moving the colonists to action?

GROUP 5. (*Answer two questions.*)

1. What conceptions of government did Jefferson represent in contrast with those of Hamilton? To what class of people did Jefferson's views appeal? Show how Jefferson

and his followers were aided by the mistakes of the Federalists in bringing about the Political Revolution of 1800.

2. What are the significant features of the Jacksonian Democracy of 1820-50? Discuss with reference to the spoils system, suffrage, the relation of political parties to labor, changes in party machinery, and the influence of the frontier communities upon national affairs.

3. What was the position of Lincoln and the Republican party with reference to slavery in 1860? Did the South have reason to believe their slave property was in danger? What was the opinion on this point of Alexander H. Stephens of Georgia?

### CIVICS

*(Answer two questions.)*

1. What constitutional power or right of Congress is thought by some to be impaired by the proposed League of Nations and what reservation on that point is sought? In what other ways is it thought that the freedom of action of the Federal Government might be restricted by the proposed League?

2. Who are citizens of the United States according to the Fourteenth Amendment? Can you point out any disadvantages under which aliens live as compared with citizens? Can the government deport citizens without trial? Can the government deport aliens without trial?

3. Point out the changes in the conception of the duties of the national government toward the people, in contrast with the period before 1875, changes that might be illustrated by the prohibition amendment and legislation of Congress based upon the amendment.

4. What is the responsibility of the Federal Government with respect to legislation by California restricting the holding of land by the Japanese? What constitutional

grounds has California for asserting her right to pass such legislation? To whom must Japan look for redress, to California or to the United States? Explain.

5. Taking as illustrations the levying of taxes, making war, entering into treaties, passing laws of naturalization, and any other functions of government you may wish to select, distinguish between the powers of the Federal Government and a State, showing what each may do and what each may not do.

## ENGLISH HISTORY

### GROUP I

1. What influences made for drawing the several Anglo-Saxon kingdoms together into one?

2. Explain the struggle of Henry I with the Church; of Henry II.

3. What were the causes of the Hundred Years' War?

4. Draw a map of England and place on it ten important towns of medieval England.

5. What were the causes of the emancipation of villeins?

### GROUP II

6. What was Puritanism? What was its relation to Elizabeth's policy?

7. What was the "Instrument of Government"? What was its significance?

8. Name seven wars between England and France during the period 1689-1815, with approximate dates. What results did those wars have upon Britain?

9. How did Canada become part of the British Empire? Australia?

10. What were Gladstone's chief policies?

## ALGEBRA

## ELEMENTARY ALGEBRA

(1) Factor  $21xy - 10x^2 - 9y^2;$   
 $8x^3 + 27b^3$

(2) Solve for  $x$  and check

$$\frac{x-1}{x+1} - \frac{x+1}{1-x} = \frac{2x^2 + 3x - 4}{x^2 - 1}.$$

(3) Simplify

$$\frac{\frac{a}{a-b} - \frac{a}{a+b}}{\frac{b}{a-b} + \frac{a}{a+b}}.$$

(4) A purse contained \$6.55 in quarters and dimes; after 6 quarters and 8 dimes had been taken out, the number of quarters equalled three times the number of dimes. How many of each kind of coin were there?

(5) Solve for  $t$  and check

$$\sqrt{t+4} + \sqrt{t} = 3.$$

(6) The numerator of a certain fraction exceeds its denominator by 5. If the numerator be decreased by 3 and the denominator be increased by 4, the sum of the new fraction and the original fraction is 3. Find the original fraction.

## INTERMEDIATE ALGEBRA

(1) Find and simplify the 12th term of  $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^{15}$

(2) Find  $\sqrt{22 - 3\sqrt{32}}$  in the form of a binomial surd.

(3) The sum of the squares of the two digits of a number is 58. If 36 be subtracted from the number, the digits of the

remainder are the digits of the original number in reverse order. Find the number.

(4) Find the value of  $k$  for which the graphs of the equations

$$\begin{cases} x^2 + y^2 = 5 \\ y = 2x + k \end{cases}$$

will have one and only one point of intersection. Draw the graphs of the two equations using the value of  $k$  which you have found.

(5) Form a quadratic equation whose roots are

$$\frac{5 - \sqrt{-3}}{2} \quad \text{and} \quad \frac{5 + \sqrt{-3}}{2}$$

and write it in simple form.

(6) Three numbers are in geometric progression. The sum of the first and second is equal to the fourth decreased by the first. If 2 were subtracted from the first, 2 from the second, and 8 from the third, the three numbers obtained would be in arithmetic progression. Find the original numbers.

$$(7) \text{ Simplify } \frac{(2^{-5}) (3^4) \sqrt[3]{64}}{(27)^{4/3} \sqrt{\frac{1}{16}}}$$

## ELEMENTARY AND INTERMEDIATE ALGEBRA

(1) Solve for  $x$  and check

$$\frac{x-1}{x+1} - \frac{x+1}{1-x} = \frac{2x^2 + 3x - 4}{x^2 - 1}$$

(2) A purse contained \$6.55 in quarters and dimes; after 6 quarters and 8 dimes had been taken out, the number of quarters equalled three times the number of dimes. How many of each kind of coin were there?

- (3) Solve for  $t$  and check

$$\sqrt{t+4} + \sqrt{t} = 3.$$

(4) The sum of the squares of the two digits of a number is 58. If 36 be subtracted from the number, the digits of the remainder are the digits of the original number in reverse order. Find the number.

(5) Find the value of  $k$  for which the graphs of the equations

$$\left. \begin{aligned} x^2 + y^2 &= 5 \\ y &= 2x + k \end{aligned} \right\}$$

will have one and only one point of intersection. Draw the graphs of the two equations, using the value of  $k$  which you have found.

(6) Three numbers are in geometric progression. The sum of the first and second is equal to the fourth decreased by the first. If 2 were subtracted from the first, 2 from the second, and 8 from the third, the three numbers obtained would be in arithmetic progression. Find the original numbers.

$$(7) \text{ Simplify } \frac{\binom{-3}{2} \binom{4}{3} \sqrt[3]{64}}{\binom{27}{4} \sqrt{\frac{1}{16}}}$$

### ADVANCED ALGEBRA

(1) The sum of a set of consecutive odd integers, beginning with 75 is 5031. What is the last integer of the set?

(2) Write out the term independent of  $x$  in the expansion of  $\left(x^3 - \frac{1}{x^2}\right)^{15}$

- (3) Prove that

$$\frac{1}{3} + \frac{2}{9} + \dots + \frac{n}{3^n} = \frac{3}{4} - \frac{2n+3}{4 \cdot 3^n}.$$



(4) For what values of  $k$  will imaginary values of  $x$  be given by the equation

$$(2k + 1)x^2 + (2k - 2)x + k - 3 = 0?$$

(5) Nine men are to be arranged in three rows of three each for a group photograph; it is agreed that the three tallest men must form the back row. How many arrangements are possible?

(6) By determinants find the value of  $y$  in the set of equations:

$$\left. \begin{aligned} x + y - z + w &= 4 \\ 2x - y - z - w &= 1 \\ x + 2y + 3z + 2w &= 2 \\ y - z - 3w &= 3 \end{aligned} \right\}$$

(7) Find correct to two decimal places the real root of the equation

$$x^3 + 2x^2 - 2x + 5 = 0.$$

## GEOMETRY

### PLANE GEOMETRY

(1) The bisector of an angle of a triangle divides the opposite side ---. Complete this statement and prove it.

(2) Prove that the midpoints of the sides of a quadrilateral are the vertices of a parallelogram.

(3) In the figure  $PA \perp AB$ ,

$QB \perp AB$  and  $RC \perp AB$ .

Prove  $\frac{AC}{CB} = \frac{AP}{BQ}$ .

(4) Construct a square equivalent to a given rectangle.

(5) The area between a circle and an inscribed regular hexagon is 50 square inches. Find the radius of the circle.

(6) The centers of two circles having radii 11 and 3 inches respectively are 28 inches apart. Find at what distances from the centers the common external tangents to the two circles cut the line of centers.

### SOLID GEOMETRY

(1) If three planes meet in pairs in three lines prove that the lines are either concurrent or parallel.

(2) Show that one and only one perpendicular can be drawn to a plane from an external point.

(3) Prove that the sum of any two face angles of a trihedral angle is greater than the third face angle.

(4) Find the locus of all points equidistant from three given points in space not lying on a straight line. Prove your answer correct.

(5) Prove the formula for the volume of a frustum of a pyramid.

(6) If two spherical triangles have the three angles of the one equal to the three angles of the other, show that the corresponding sides are equal.

(7) Define symmetrical spherical triangles and prove that two symmetrical spherical triangles are equivalent.

### TRIGONOMETRY

#### PLANE TRIGONOMETRY

(1) Directly from a figure, show how to reduce  $\sin(180^\circ + A)$  to a trigonometric function of  $A$ ; also  $\tan(180^\circ + A)$ . Assume  $A$  to be a positive angle less than  $45^\circ$

(2) By means of logarithms, compute

$$\sqrt[5]{.00134 \sin 101^\circ 14'}$$

(3) Construct the different angles less than  $360^\circ$ , having  $\frac{3}{8}$  for sine. Determine the cosine of each.

(4) Prove the identity  
 $\sin(60^\circ + x) \cos(30^\circ + x) - \cos(60^\circ + x) \sin(30^\circ + x) = \frac{1}{2}$ .

(5) Find all values of  $x$ , less than  $360^\circ$  in absolute value, that satisfy the equation

$$2 \sin x - 3 \cos x = 2.$$

Use tables when necessary.

(6) A mountain at the seashore is 4 miles high. From its top the angle of depression of the sea horizon is  $3^\circ 18'$

Determine the radius of the earth.

(7) Write the formulas necessary to solve a triangle, given two sides and the included angle.

### SPHERICAL TRIGONOMETRY

(1) In a right spherical triangle having its right angle at  $C$ , prove directly from a figure

$$\cos c = \cos a \cos b.$$

(2) Solve the right spherical triangle, given

$$A = 34^\circ, B = 111^\circ$$

(3) Prove the law of sines for a general spherical triangle.

(4) When the three sides  $a, b, c$  of a spherical triangle are given, the angle  $A$  may be found by the formula

$$\cos A = \frac{\cos a - \cos b \cos c}{\sin b \sin a} \quad (1)$$

$$\text{or } \sin \frac{1}{2} A = \sqrt{\frac{\sin(s-b) \sin(s-c)}{\sin b \sin c}} \quad (2)$$

From (1) derive (2). What advantages has the second formula?

(5) The position of Baltimore is given as  $39^{\circ} 17' \text{ N.}$ ,  $76^{\circ} 37' \text{ W.}$ ; that of Honolulu is  $21^{\circ} 18' \text{ N.}$ ,  $157^{\circ} 55' \text{ W.}$  If we assume the radius of the earth to be 3960 miles, what is the distance between the two cities?

(6) Find the dihedral angles of a regular tetrahedron.

### PLANE AND SPHERICAL TRIGONOMETRY

(1) By means of logarithms, compute

$$\sqrt[5]{.00134 \sin 101^{\circ} 14'}$$

(2) Prove the identity

$$\sin (60^{\circ} + x) \cos (30^{\circ} + x) - \cos (60^{\circ} + x) \sin (30^{\circ} + x) = \frac{1}{2}.$$

(3) Find all values of  $x$ , less than  $360^{\circ}$  in absolute value, that satisfy the equation

$$2 \sin x - 3 \cos x = 2.$$

Use tables when necessary.

(4) In a right spherical triangle having its right angle at  $C$  prove directly from a figure

$$\cos c = \cos a \cos b.$$

(5) Prove the law of sines for a general spherical triangle.

(6) The position of Baltimore is given as  $39^{\circ} 17' \text{ N.}$ ,  $76^{\circ} 37' \text{ W.}$ ; that of Honolulu is  $21^{\circ} 18' \text{ N.}$ ,  $157^{\circ} 55' \text{ W.}$  If we assume the radius of the earth to be 3960 miles, what is the distance between the two cities?

(7) Find the dihedral angles of a regular tetrahedron.

## PHYSICS

## GROUP A

Answer three questions from this group.

1. What is Archimedes' principle? A block of wood floats two-thirds submerged in water and displaces 30 pounds of water. What is the buoyant force of the water on the block? How much does the block weigh in air? How much force would have to be applied to hold the block entirely under the surface of the water? What would be the buoyant force of the water on the block when entirely submerged? Show how each numerical answer is determined.

2. A cord 15 feet long has its ends fastened to two supports placed 12 feet apart in the same horizontal plane. At the center of the cord is fastened a weight of 50 pounds. Find the pull in the cord.

3. A uniform beam 16 feet long and supporting a 800 pound weight placed 1 foot from one end is held in balance by a man weighing 200 pounds. The man applies his weight 10 feet from the fulcrum and the fulcrum is located 4 feet from the 800 pound weight. How much does the beam weight? State the principle used in solving this problem.

4. Define cohesion, mechanical efficiency, horse power, coefficient of friction, density, acceleration, momentum, mechanical advantage, center of gravity, specific gravity.

## GROUP B

Answer four questions from this group.

5. What is meant by the anomalous expansion of water?  
How does boiling differ from ordinary evaporation?

What sort of surface is desirable for the sides and top of a tea kettle? for the surface of a radiator used in heating a room? Explain.

6. Describe briefly how one of the following may be experimentally determined.

- (a) Specific heat of a solid.
- (b) Heat of fusion of ice.
- (c) Linear coefficient of expansion of a metal.

Show how a numerical result may be secured from the data obtained.

7. What determines the pitch of a sound? the loudness?

Describe the nature of a sound wave.

How are "beats" produced? What is meant by a resonant vibration?

8. An image of a lantern slide, 2.5 inches by 3 inches in size is thrown upon a screen placed 60 feet from the lens of the lantern. What must be the focal length of the lens in order to produce an image 7.5 feet by 9 feet in size.

If a larger image were desired should the focal length of the lens be greater or less? Give a reason, other than a numerical solution, for your answer.

9. How is a spectrum formed? Mention two other ways of securing color. Describe the character and state the position of the image formed by a plane mirror.

### GROUP C

Answer three questions from this group.

10. Sketch the magnetic field around a coil of wire in which an electric current is flowing. Indicate direction of current and of field. Show how a compass would set itself if placed at some point in the field.

11. Mention two effects of an electric current that might be used to measure the size of the current. What is the difference between an electric charge and an electric current?

12. If given an electroscope charged negatively, indicate how you would proceed to determine the sign of an unknown charge. Why does a charged body attract an uncharged conductor?

13. A 16-candle-power carbon filament lamp takes .5 ampere at 110 volts. A 200 candle-power gas filled tungsten filament lamp takes 1.45 amperes at 110 volts. Compare the efficiencies of the two lamps.

### CHEMISTRY

(Entrance credit in chemistry does not carry with it University credit in any course in chemistry in Cornell University. Applicants for University credit in Introductory Chemistry, Course I, who have received permission from Mr. Hoy, should take the examination for University credit also being held in this room)

*Answer eight questions only.*

(Atomic Weights: H = 1, N = 14, O = 16, Cl = 35.5, Ca = 40)

1. Describe a method for the laboratory preparation of three of the following substances: (a) potassium nitrate, (b) hydrogen sulphide, (c) silver bromide, (d) iodine. What property has the desired product in each case, which makes it possible to separate it?

2. Describe, with sketch, an experiment by means of which it may be shown that—

- (a) Sodium chloride is an electrolyte, and cane sugar is a nonelectrolyte;
- (b) Ammonia is formed during the destructive distillation of animal matter;
- (c) Water may be decomposed, yielding two volumes of hydrogen for each volume of oxygen.

- (d) Nitrogen gas (in somewhat impure form) may be obtained by removal of oxygen from atmospheric air.

3. Complete and balance any ten of the equations indicated below, using symbols or formulas:

- (1) Quicklime + coke (heated in electric furnace) =
- (2) Silica + coke (heated in electric furnace) =
- (3) Copper sulphate + hydrogen sulphide =
- (4) Copper sulphate + iron =
- (5) Ferric oxide + carbon (heated) =
- (6) Ammonium sulphate + sodium hydroxide =
- (7) Potassium hydroxide (hot, conc.) + chlorine =
- (8) Acetylene + oxygen (ignited) =
- (9) Sodium chloride + manganese dioxide + (conc.) sulphuric acid =
- (10) Carbon dioxide + carbon (red hot) =
- (11) Sodium carbonate + slaked lime =
- (12) Copper + (conc.) nitric acid =

4. Define and illustrate any ten of the following terms: (a) chemistry, (b) acid anhydride, (c) filtrate, (d) deliquescence, (e) kindling temperature, (f) dibasic acid, (g) ion, (h) valence, (i) structural formula, (j) hydrocarbon, (k) catalysis, (l) electron, (m) combustion.

5. (a) Name two metals, each of which yields two oxides, and give the names and formulas of the oxides.

(b) Mention two elements that occur in allotropic forms, and name two or more allotropic forms in each case.

(c) Mention three gases that are easily liquefied, and three that are liquefied with difficulty.

(d) Illustrate by equations the fact that aluminum hydroxide may act either as an acid or as a base.

6. (a) What volume of ammonia gas, measured under standard conditions, could theoretically be obtained from



107 grams of ammonium chloride, by heating with an excess of slaked lime?

(b) What would be the weight of the ammonia?

7. (a) What volume of hydrogen gas, measured under prevailing atmospheric conditions, should be pumped into an empty steel cylinder, with a capacity of 20 liters, in order to bring the pressure up to 10 atmospheres?

(b) State Boyle's Law and the Law of Charles.

8. Describe briefly commercial methods for the preparation of any five of the following products: (a) glass, (b) steel, (c) hydrochloric acid, (d) sulphur, (e) zinc, (f) sodium carbonate, (g) Portland cement.

9. State the Theory of Electrolytic Dissociation. On the basis of this theory explain the changes that take place when (a) dilute sulphuric acid is electrolyzed between platinum electrodes, and (b) a solution of copper sulphate is electrolyzed between copper electrodes.

10. (a) What is meant by the term Fixation of Nitrogen? Describe one of the successful commercial processes for accomplishing this operation. What use is made of the product obtained?

(b) How do you account for the fact that leguminous plants such as peas, beans, and clover do not as a rule require fertilization with nitrogen compounds?

## INORGANIC CHEMISTRY

(Entrance credit in Chemistry does not carry with it University credit in any course in Chemistry at Cornell University. Applicants for University credit in Introductory Inorganic Chemistry, Course I, who have received permission from Mr. Hoy, should take the examination given below).

*Answer all of the ten questions.*

(Atomic Weights:  $H=1$ ,  $N=14$ ,  $O=16$ ,  $Na=23$ ,  $S=32$ ,  
 $Cl=35.5$ ,  $Ca=40$ )

1. Define and illustrate (a) oxidation, (b) allotropy, (c) reversible reaction, (d) molecular weight, (e) homologous series, (f) polymerization, (g) hydrated salt, (h) ionization, (i) sublimate, (j) basic salt.

2. Complete and balance any ten of the equations indicated below, using symbols or formulas:

- (a) Calcium carbide + water (in excess) =
- (b) Bismuth nitrate + water =
- (c) Aluminum sulphate + sodium hydroxide (in excess) =
- (d) Potassium chlorate (heated gently) =
- (e) Sodium chloride + ammonia + carbon dioxide + water =
- (f) Ammonia + chlorine (in excess) =
- (g) Ammonia (in excess) + chlorine =
- (h) Copper + nitric acid (concentrated) + air =
- (i) Sodium nitrite + ammonium chloride =
- (j) Calcium carbonate + water + carbon dioxide =
- (k) Sulphur dioxide + hydrogen sulphide =
- (l) Sodium sulphate + barium chloride =

3. Explain each of the following experimental facts:

- (a) Concentrated hydrochloric acid "fumes" on exposure to the air.
- (b) Solid calcium chloride, phosphorus pentoxide, or potassium hydroxide gains in weight, and becomes liquid, on exposure to the atmosphere.
- (c) Crystals of hydrated sodium sulphate when exposed to the air, gradually lose their crystalline form, and crumble to powder.
- (d) A drop of concentrated sulphuric acid on a wooden table makes a black spot.

- (e) If crystals of hydrated copper sulphate are dissolved in water, the resulting solution will turn blue litmus paper red.

4. Name and write in each case the formula of a substance that will

- (a) Produce a blue coloration in a solution of potassium iodide and starch;
- (b) Yield methane when heated with solid sodium hydroxide;
- (c) Discharge the color of a solution of potassium permanganate acidified with sulphuric acid;
- (d) Cause a rapid evolution of gas when added to a solution of sodium carbonate;
- (e) Form a white precipitate when added to a solution of common salt.

Indicate in each case all products that are formed, and where possible balance the equation expressing the reaction.

5. (a) A dirigible balloon was filled at sea-level with 500,000 cubic feet of gas measured at 774 mm of mercury and at a temperature of 27 deg. C. What would be the volume of the gas at an elevation where the pressure is 430 mm and the temperature—23 deg. C.?

(b) Give two reasons for the use of helium instead of hydrogen for filling balloons. How do you account for the fact that helium, although twice as heavy as hydrogen, affords 92 per cent of the lifting power of hydrogen?

6. (a) In what two crystalline forms does carbon occur in nature? How may each of these be prepared artificially?

(b) What three chemical reactions take place in the ordinary coal fire? Give equations.

(c) Upon what chemical facts is the use of the ordinary chemical fire extinguisher based?

7. (a) What volume of ammonia gas, measured under standard conditions, can theoretically be obtained by heating 61 grams of pure ammonium sulphate with an excess of slaked lime?

(b) What volume of sulphur dioxide, measured under standard conditions, can theoretically be obtained by treatment of 126 grams of pure sodium sulphite with hydrochloric acid in excess?

8. (a) How may air be liquefied? What are the properties of liquid air? To what practical uses is liquid air put?

(b) Describe briefly the system of artificial refrigeration in which liquid ammonia is employed.

9. (a) Summarize briefly the experimental evidence leading to the conclusion that water should be given the formula  $H_2O$ .

(b) State and illustrate the Law of Definite Proportions and the Law of Multiple Proportions.

10. Describe briefly commercial methods for the preparation of any five of the following products: (a) pig iron, (b) steel, (c) sulphuric acid, (d) mono-calcium phosphate, (e) coal gas, (f) nitric acid.

## BOTANY

1. Discuss the characteristics separating plants from animals.

2. Discuss protoplasm as the basis of plant activity.

3. Characterize the four great groups of plants and give examples of each.

4. Sketch a cell of *Spirogyra* and label all parts.

5. Give the life history of one of the algae.

6. Discuss the life history of a moss. Illustrate.

7. Discuss the life history of a fern. Illustrate.
8. Give the chief characteristics of the two large groups of seed plants.
9. Make sketches of a dicotyledonous and a monocotyledonous stem and discuss the differences.
10. Diagram a typical flower and label all parts. Discuss the function of each part.

## ZOOLOGY

For one unit of credit answer all questions; for one-half unit of credit answer any five questions

1. (a) Why has the name "slipper animalcule" been applied to *Paramecium*?  
(b) In reference to this animal define and give the function of (1) the gullet; (2) the contractile vacuoles; (3) cilia.
2. (a) Enumerate the steps in the sexual development of an animal through the formation of the gastrula.  
(b) What are known as larval stages in an animal's life cycle?
3. Give the function of six systems of organs found in complex animals, such as mammals.
4. Discuss the earthworm in respect to (a) locomotion; (b) relation of body cavity to digestive cavity; and (c) organ of respiration.
5. Define (a) protective resemblance; (b) protective mimicry; (c) warning coloration; (d) parasitism; and (e) symbiosis. Give an example of each among insects.
6. What characteristics will distinguish the following classes of vertebrates? (a) amphibians; (b) reptiles; (c) birds; and (d) mammals.

7. Give the zoological significance and the name of an animal in which each of the following is found: (a) pseudopodium; (b) mandible; (c) siphon; (d) spiracle; (e) carapace; and (f) tentacle.

8. State how each of five animals chosen from five phyla is beneficial or harmful to man.

## BIOLOGY

State briefly what biological subjects you have studied, with what proportion of recitation and laboratory work, and for what periods. Any laboratory books or other work done in such courses may be submitted as supplemental to the answers to be written to the following questions.

Answer ten questions, two from each group.

### *Group 1*

1. Characterize the following groups of plants: thallophytes, bryophytes, pteridophytes, spermatophytes, giving an example of each.

2. Describe how insects breathe. What gases are exchanged in the process?

3. What is the function of the liver in man?

### *Group 2*

1. Give the life history of a moss. Diagram a moss plant and label parts.

2. Diagram an amoeba and explain how it breathes, how it feeds, and how it disposes of its waste matter.

3. Describe the process of digestion and absorption in man of bread.

*Group 3*

1. Diagram a perfect flower and label all parts. Distinguish between monoecious and dioecious of plants.
2. What are flagellates? Tabulate their plant characters and their animal characters.
3. What is pasteurization of milk? What benefit is derived therefrom?

*Group 4*

1. Name five flowering plants belonging to different families. Arrange them in a series according to the degree of their complexity.
2. Diagram a cross section of an earthworm and label all the principal parts.
3. State how diseases may spread by (a) mosquitoes and (b) house flies. Name in each case two diseases thus spread.

*Group 5*

1. Name and describe three methods of reproduction in plants.
2. Diagram the brain and spinal cord of a frog. Label all parts and tell what the seat of function is in each part.
3. Name five elements and five compounds commonly found in living things.

**PHYSICAL GEOGRAPHY**

For full unit of credit answer all questions.

For one-half unit of credit answer questions 1, 3, 6, 7, 9, 10.

One-half unit credit will not be given to candidates who attempt to get a full unit of credit by answering all questions, even if they pass a satisfactory examination in the required questions for one-half unit of credit.

1. Define the subject of *physiography of the lands*, making clear how study of it is distinct from the study of regional geography on the one side and from geology on the other.

2. If you visited a region new to you having plains or plateau topography with horizontal rock structure and layers of alternating great and little resistance; how would you determine whether the stream valleys cut into such structure were in the young, mature, or old-age stage?

3. Give reasons why the trade winds blow so steadily throughout the year; tell from which directions to which directions (points of compass) they blow and why they blow along such lines.

4. (a) Name the various topographic forms in which each of the following agencies deposits its load of transported rock material: (a) streams, (b) glaciers, (c) the wind.

(b) Define *loess*.

5. (a) What is the difference in effect on the climate of the lands along which or to which they flow of the (a) Labrador Current and (b) Kuro Sivo or Japanese Current? (b) Where does each of these currents originate?

6. Make small sketch maps (about 2 inches square) showing how each of the following physiographic forms would appear on a *contoured* topographic map: drumlin, undissected volcanic peak built up of "ash" deposits, fault block mountain.

7. (a) How does limestone differ from shale?

(b) Name three varieties of stratified rock and two of igneous rock.

(c) What is the scale of hardness of minerals commonly used; name the mineral varieties in order from softest to hardest.

8. Describe the Columbia Lava Plateau or the Atlantic Coastal Plain of the United States with special reference to the origin and nature of their physiographic features.



9. Describe the phenomenon of *river piracy* or of *river capture*, giving reasons why it occurs.

10. Where does each of the following occur and what are their common characteristics (i. e. in what respects are they similar): *typhoons, cyclones, hurricanes, tornadoes*.

### BOOKKEEPING

For one-half unit answer questions 1–4 inclusive; for one unit answer questions 1–3 inclusive and 5.

1. (a) Give two or three examples of each of the following classes of accounts: Capital, Assets, Income, Liability, Expense.

(b) For what reason should an account in each of the classes stated in (a) be debited; be credited?

2. (a) What is the purpose of a book of original entry; of the ledger?

(b) What advantages are there in using a Journal and a Cash Book as books of original entry in place of the Journal?

3. In checking a set of books the following errors are found:

(a) In posting from a correct Journal entry the debit was posted to A. J. Brown instead of J. G. Brown.

(b) The Journal entry from which posting was made was incorrect. The account debited should have been credited and the account credited should have been debited.

(c) The Journal entry from which posting was made debited the wrong account but credited the right one.

How should these errors be corrected?

4. On January 1, 1920, the following trial balance was taken from the ledger of J. S. Greene, Retail Merchant:

Cash	\$1200.00	L. E. Baxter	.. \$250.00
D. B. Cady	75.00	C. W. Moore	850.00
S. C. Reed. ..	125.00	Notes Payable	1200.00
Merchandise Inven.	2500.00	J. S. Greene,	
Furniture & Fixtures	600.00	Capital	2200.00
	<hr/>		<hr/>
	\$4500.00		\$4500.00

The transactions for the month of January were as follows:

2. Paid \$75.00 for insurance for one year, \$60.00 for insurance on stock and \$15.00 for insurance on furniture and fixtures.

3. Received \$75.00 from D. B. Cady.

5. Received \$25.00 in cash and a 60 day 6% note for the balance due from S. C. Reed.

8. Sold D. B. Cady a bill of goods amounting to \$375.00, on which \$150.00 was paid in cash.

10. Paid note due to-day \$500.00 and interest \$5.00.

12. Gave C. W. Moore a 60 day 6% note for \$350.00.

14. Bought from H. L. Brown a bill of goods amounting to \$400.00; term 30 days net.

16. Sold for cash a bill of goods amounting to \$800.00. Paid wages for two weeks ended the 14th, \$90.00.

17. Paid L. E. Baxter \$150.00.

18. Sold R. G. Russell a bill of goods amounting to \$125.00; terms 30 days net.

20. Bought office supplies for cash, \$12.00.

21. Bought a typewriter from Triangle Stationery Co., for \$105.00 paying \$50.00 down, balance on account.

23. Sold for cash a bill of goods amounting to \$115.00. Paid wages for the week ended the 21st, \$50.00.

25. S. C. Reed prepaid his note \$100.00 and interest \$0.33. Paid note due to-day \$700.00 and interest \$3.50.

28. Bought a bill of goods amounting to \$550.00, terms 60 day 6% note.

30. Paid wages for week ended Jan. 28th, \$50.00.

31. Paid rent for month \$75.00.

Expense bills for the month unpaid amounted to \$32.50 distributed as follows:

Telephone, \$3.50; Light, \$6.00; Heat, \$10.00; Water, \$4.00; Miscellaneous, \$9.00.

The inventory of merchandise at the end of the month was \$2,600.00.

Open the ledger accounts as they stood on the books of J. S. Greene on January 1st. Enter the transactions for January in a Journal and Cash Book, post, take a trial balance, and close the books.

5. The following trial balance was taken from the general ledger of Henderson and Lee on June 30, 1920:

Land	\$3,000.00	
Buildings	8,000.00	
Delivery Equipment	1,009.80	
Reserve for Depreciation of Delivery Equipment		\$69.20
Office Equipment	749.50	
Reserve for Depreciation of Office Equipment		87.70
Cash	1,240.68	
Accounts Receivable.	10,622.24	
Notes Receivable.	1,728.00	
Inventory, December 31, 1919.	8,149.45	
Mortgage Payable.		5,000.00
Accounts Payable		5,475.83
Notes Payable		3,125.00
Notes Receivable Discounted		500.00
P. J. Lee, Capital.		10,991.56

P. J. Lee, Salary		50.00
J. H. Henderson, Capital		10,991.56
J. H. Henderson, Salary		50.00
Purchases	34,508.69	
Purchase Returns		75.90
Sales		52,889.17
Sales returns.	502.70	
Freight Inward	1,380.60	
Insurance on Stock in Store ..	70.00	
Selling Expense	7,674.69	
Delivery Expense	1,276.00	
Real Estate Expense	1,293.76	
Commission Expense	275.60	
General Administrative Expense.	5,727.95	
Purchase Discount		215.64
Interest on Notes Receivable.		42.80
Sales Discount	2,194.25	
Interest on Notes Payable	160.45	
	<hr/>	<hr/>
	\$89,564.36	\$89,564.36

## SUPPLEMENTARY DATA

Inventory of merchandise on hand, June 30, 1920, \$7,468.95.

Insurance unexpired on stock \$35: on real estate, \$75.00  
(credit Real Estate Expense).

Postage stamps and stationery on hand, \$35.60.

Driver.—3 days' wages accrued, \$9.00.

Salesman.—3 days' wages accrued, \$20.00.

Interest accrued on Notes Receivable, \$27.80.

Interest accrued on Notes Payable, \$31.40.

Office furniture costing \$100.00 has been discarded during the period and sold for \$25.00. The only action taken was to debit Cash and Credit Sales.

New furniture costing \$105.00 was purchased January 1, 1920, and charged to Purchases.

Depreciation of Office Equipment, 15% per annum.

Depreciation of Delivery Equipment, 10% per annum.

Depreciation of Buildings, 5% per annum.

Set up a reserve of 1% on net sales to provide for loss on bad accounts.

The partners instruct you to close their respective shares of profit or loss into their capital accounts.

From the preceding trial balance and supplementary data write the journal entries to adjust and close the ledger and prepare a profit and loss statement and a balance sheet.

# SCHOLARSHIP EXAMINATION PAPERS

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## ENGLISH

[Answer questions 1, 2, 3, and two others]

1. Write a composition (not less than four hundred words) on any one of the following topics:

America and the League of Nations.

My interest in biography.

The value of athletics.

Choosing a college.

Some problems in immigration.

The winning of peace.

New Year's resolutions.

A sane vacation.

2. I like the lad who, when his father thought  
To clip his morning nap by hackneyed praise  
Of vagrant worm by early songster caught,  
Cried, "Served him right! 'tis not at all surprising;  
The worm was punished, *sir*, for early rising."

(a) Give the syntax of each of the italicized words in the foregoing selection.

(b) From the same selection make a list of all the phrases and clauses, and indicate the use of each.

3. Name three important English authors of the sixteenth century, five of the eighteenth century, and seven of the nineteenth century. Mention a well-known work by each. Name also five American authors of the nineteenth century.

4. Test the truth of the following statement in the case of Macbeth or Hamlet.

The type of tragedy in which the hero opposes to a hostile force an undivided soul, is not the Shakespearean type. The souls of those who contend with the hero may be thus undivided; they generally are; but as a rule, the hero, though he pursues his fated way, is, at least at some point in the action, and sometimes at many, torn by an inward struggle; and it is frequently at such points that Shakespeare shows his most extraordinary power.—*Bradley*.

5. In single paragraphs, each about a page in length, explain the meaning of any two of the following quotations:

(a) They left me then when the grey-hooded Even,  
Like a sad votarist in palmer's weed,  
Rose from the hindmost wheels of Phoebus' wain.  
—*Milton*.

(b) 'Less Philomel will deign a song,  
In her sweetest, saddest plight,  
Smoothing the rugged brow of Night,  
While Cynthia checks her dragon yoke  
Gently o'er the accustomed oak.—*Milton*.

(c) The floating clouds their state shall lend  
To her; for her the willow bend;  
Nor shall she fail to see  
Ev'n in the motions of the storm  
Grace that shall mould the maiden's form  
By silent sympathy.—*Wordsworth*.

(d) Be through my lips to unawaken'd earth  
The trumpet of a prophecy! O Wind,  
If Winter comes, can Spring be far behind?  
—*Shelley*

(e) Heard melodies are sweet, but those unheard  
Are sweeter; therefore, ye soft pipes, play on;  
Not to the sensual ear, but, more endear'd,  
Pipe to the spirit ditties of no tone.—*Keats*.

6. Choose (a) or (b).

(a) Discuss Burke's use of statistics, classical literature, specific illustrations, and accurate, comprehensive information in his Speech on Conciliation with America.

(b) Contrast the literary style of Washington, Webster, and Lincoln as exhibited in their speeches. Explain the greatness of the Gettysburg Address.

7. Choose (a) or (b).

(a) For what purpose did Macaulay write his Essay on Johnson? Is it suited to the purpose? Explain. What is Macaulay's opinion of Johnson, of Boswell, of Johnson's *Dictionary*, and of *The Lives of the Poets*?

(b) What are the chief merits, according to Carlyle, of Burns's poetry? Explain Burns's failure.

## GREEK

### A.

*Translate:*

Ἐκεῖ δὲ τὰ πιστὰ ἐγένετο, εἶπεν ὁ Κλέαρχος, "Ἄγε δὴ, ὦ Ἀριχίε, ἐπίπερ ὁ αὐτὸς ὑμῖν στόλος ἐστὶ καὶ ἡμῖν, εἰπέ τίνα γνώμην ἔχεις περὶ τῆς πορείας, πότερον ἔπιμεν ἢν περ ἤλθομεν ἢ ἄλλην τινὰ ἐννενοηκένας δοκεῖς ὁδὸν κρείττω. ὁ δ' εἶπεν, "Ἴν μὲν ἤλθομεν ἀπιδόντες παντελῶς ἀνὺπὸ λιμοῦ ἀπολσίμεθα. ὑπάρχει γὰρ νῦν ἡμῖν οὐδὲν τῶν ἐπιτηδείων. ἐπτακίθενα γὰρ σταθμῶν τῶν ἐγγυτάτω οὐδὲ δεῦρο ἰόντες ἐκ τῆς χώρας οὐδὲν εἶχομεν λαμβάνειν· ἐνθα δέ τι ἦν, ἡμεῖς διακορευόμενοι κατεδρακνήσαμεν. νῦν δ' ἐκίνοοῦμεν πορεύεσθαι μακροτέρην μὲν, τῶν δ' ἐπιτηδείων οὐκ ἀπορήσομεν. πορευτέον δ' ἡμῖν τοὺς πρώτους σταθμοὺς ὥς ἂν θυνώμεθα μακροτέρους, ἵνα ὥς πλεῖστον ἀποσκάσωμεν τοῦ βασιλικοῦ στρατεύματος· ἦν γὰρ ἅπαξ δύο ἢ τριῶν ἡμερῶν ὁδὸν ἀπόσχωμεν, οὐκέτι μὴ δύνηται βασιλεὺς ἡμᾶς καταλαβεῖν. ὀλίγῳ μὲν γὰρ στρατεύματι οὐ τολήσει 15 ἐφέπεισθαι· πολὺν δ' ἔχων στόλον οὐ δυνήσεται ταχέως πορεύεσθαι· ἴσως δὲ καὶ τῶν ἐπιτηδείων σπανιεῖ. ταύτην, ἴφθι, τὴν γνώμην ἔχω ἔγωγε.



## B. GRAMMAR.

1. Locate and explain accurately the forms (a) κρείττω (l. 4), (b) ἀπολοίμεθα (l. 6), (c) πορευτέον (l. 11), (d) ἀπόσχωμεν (l. 14), (e) ἐφέπεσθαι (l. 16).
2. Tell all you know of the meaning and syntax of ἵνα, ὥστε, καίπερ, ἄν, μή, ὑπό, ἄτε, and ὥς.
3. Give the principal parts of ἐώρακα, οἶσει and οἶσθα.
4. State the rule of Indirect Discourse for (a) φημί, (b) οἶδα, (c) νομίζω.
5. Decline πᾶς and πρᾶγμα.

## C. COMPOSITION.

Write the following sentences in Greek and also re-write them after ἔφη, οἶδε and εἶπε respectively:

1. He would err (ἀμαρτάνω), if he should do this.
2. Artaxerxes arrested Cyrus with the avowed intention of putting him to death.
3. My conscience tells me (use σύνειδα) I am doing wrong.

## D. HOMER.

*Translate:*

ὧς φάτο, ῥίγησεν δ' ὁ γέρων, ἐκέλευσε δ' ἑταίροις  
 ἵππους ζευγνύμεναι· τοὶ δ' ὀτραλέως ἐπείθοντο.  
 ἂν δ' ἄρ' ἔβη, Πρίαμος, κατὰ δ' ἡνία τείνεν ὀπίσσω·  
 παρ δέ οἱ Ἀντήνωρ περικαλλέα βήσετο δίφρον.  
 τῷ δὲ διὰ Σκχιῶν πεδίωνδ' ἔχον ὠκέας ἵππους. 5

Ἀλλ' ὅτε δὴ ῥ' ἵκοντο μετὰ Τρῶας καὶ Ἀχαιοὺς.  
 ἐξ ἵππων ἀποβάντες ἐπὶ χθόνα κουλυβότειραν  
 ἐς μέσσον Τρώων καὶ Ἀχαιῶν ἐστιχόωντο.  
 ὤρνυτο δ' αὐτίχ' ἔπειτα ἄναξ ἀνδρῶν Ἀγαμέμνων,  
 ἂν δ' Ὀδυσσεὺς πολύμητις· ἀτὰρ κήρυκες ἀγαυοὶ 10  
 ὄρχια πιότ' ἀ θεῶν σύναγον, κρητῆρι δὲ οἶνον  
 μίσγον, ἀτὰρ βασιλεῦσιν ὕδωρ ἐπὶ χεῖρας ἔχευαν.

Ἀτρεΐδης δὲ ἐρυσσάμενος χεῖρεσσι μάχαιραν,  
 ἧ οἱ παρ' Ἰλφους μέγα κουλεὸν αἰὲν ἄωρτο,  
 ἀρνῶν ἐκ κεφαλῶν τάμνε τρίχας· αὐτὰρ ἔπειτα 15  
 κήρυκες Τρώων καὶ Ἀχαιῶν νεῖμαν ἀρίστοις.  
 τοῖσιν δ' Ἀτρεΐδης μεγάλ' εὖχετο χεῖρας ἀνασχών.

1. Give the Attic substitutes for (a) φάτο, (b) ἦος, (c) χεῖρεσσι, (d) κεφαλῶν, (e) τοῖσιν.
2. Mark the scansion of ll. 7-9.
3. Tell the mood and tense of (a) βήσετο, (b) ἔχον and (c) τάμνε.

## FRENCH

### 1. Translate:

(a) Although I do not know what he wanted, I feel that under the present circumstances it would be unwise to act in such a manner.

However well you may speak, you will soon learn that much benefit may be derived from training of this sort.

After having experienced so many difficulties he decided to embark on an entirely new enterprise.

(b) And as little Wolff, running down stairs to learn the meaning of his aunt's exclamation, stood in artless ecstasy before all these splendid Christmas presents, suddenly there were loud cries of laughter out-of-doors. The old woman and the little boy went out to know what it all meant, and saw all the neighbors gathered around the public fountain. What has happened? The children of all the rich people of the village, those whose parents had wished to surprise them by the most beautiful gifts, had found only rods in their shoes. Then the orphan and the old woman, thinking of all the beautiful things that were in their chimney, were full of amazement. But presently they saw the curé coming with

wonder in his face. Above the seat placed near the door of the church, at the same place where, in the evening, a child, clad in a white robe, and with bare feet, had rested his sleeping head, the priest had just seen a circle of gold incrustated with precious stones.—*The Sabots of Little Wolff*, F COPPÉE.

## II. Translate:

Parmi les Français de jadis qui furent à la peine, pour aider les Américains à conquérir leur indépendance, et dont les circonstances remettent les noms à l'honneur, il en est un que l'on semble oublier. C'est pourtant celui qui recevait, pour ses étrennes, le 1<sup>er</sup> janvier 1779, une lettre officielle du président du Congrès, John Jay, où nous lisons: «Les sentiments généreux et les grandes vues, qui seuls ont pu dicter une conduite telle que la vôtre, éclatent dans vos actions et honorent votre caractère. Vous gagnez l'estime de cette République naissante et vous recevez les applaudissements unanimes du Nouveau Monde.»

Le destinataire de ces «applaudissements unanimes» envoyés «par ordre du Congrès», n'était autre que le fameux auteur du *Barbier de Séville*, lui-même, auquel l'importance de son rôle dans la guerre de l'Indépendance vaudra d'ailleurs, pour surcroît de gloire, d'être appelé par le Tout-Paris de la fin du dix-huitième siècle: *Beaumarchais l'Américain*.

Comment avait-il conquis un si vibrant éloge et un tel surnom? Il n'est que juste de le rappeler un peu, aujourd'hui, et il est bon qu'on le sache, désormais.

Le père du frondeur Figaro se mit un jour en tête de décider le roi de France à secourir secrètement les *insurgents*, en attendant qu'il se lançât ouvertement pour eux dans cette «guerre républicaine» que ses frères lui reprocheront impitoyablement, de Coblenz et jusque sous le couteau. Mais la difficulté de réussir ne privait jamais Beaumarchais du plaisir d'entreprendre.

Dès le printemps de 1775, profitant de sa situation de «jockey diplomatique,» c'est-à-dire, en l'espèce, de chasseur de pamphlets à Londres, il adressait en haut lieu des mémoires où il faisait, pour l'exécution de son hardi projet, le siège du Roi et de ses ministres, surtout de Vergennes.

*Beaumarchais Américain, E. LINTILHAC.*

III. Write in French a short composition (about one hundred and fifty words) on one of the following subjects:

The friendship between France and the United States.

A day spent in the woods.

A young woman's choice of a career.

### LATIN

1. Write the genitive and ablative singular and the genitive and accusative plural of: *nex, apex, lex, remex, senatus, vetus* (all genders), *jus, opus, obses, res, Ceres, caedes*.

2. Write the accusative singular and the accusative plural, feminine and neuter, of: *equester, tener, sacer, audax, velox*.

3. Give the principal parts of: *verto, defendo, aufero, veto, maneo*.

4. Give a synopsis, in the third person singular (active and passive), of *relinquo* and *sentio*.

5. State what case constructions are used with *admoneo, interest, ignosco, parco, pario, privo*.

6. Write the Latin equivalent for each of the following uses of "to see," explaining the construction of each equivalent: (a) I went to see; (b) I wish to see; (c) It is pleasant to see you again; (d) That is difficult to see; (e) I command you to see

7. Translate (at sight):

Q. enim Ligarius, cum esset nulla belli suspicio, *legatus* in Africam cum C. Considio profectus est, qua in legatione et civibus et sociis ita se probavit, ut decedens Considius *provincia* satis facere *hominibus* non posset, si quemquam alium *provinciae praefecisset*. Itaque Ligarius, cum diu recusans nihil *profecisset*, provinciam accepit invitus; cui sic praefuit in pace, ut et civibus et sociis gratissima esset ejus integritas ac fides. Bellum subito exarsit, *quod* qui erant in Africa ante audierunt *geri* quam parari: quo audito partim cupiditate inconsiderata, partim caeco quodam timore primo salutis, post etiam studii sui quaerebant aliquem ducem, cum Ligarius domum spectans, ad suos redire cupiens, nullo se implicari negotio passus est.

Account for the case of each italicized noun or pronoun and the mood and tense of each italicized verb in this passage.

8. Translate:

Postquam altum tenuere rates, nec jam amplius ullae  
Apparent terrae, caelum undique et undique pontus,  
Tum mihi caeruleus supra caput adstitit imber,  
Noctem hiememque ferens, et inhorruit unda tenebris.  
Continuo venti volvunt mare magnaque surgunt  
Aequora; dispersi jactamur gurgite vasto.  
Involvere diem nimbi, et nox humida caelum  
Abstulit; ingeminant abruptis nubibus ignes.  
Excutimur cursu, et caecis erramus in undis.  
Ipse diem noctemque negat discernere caelo,  
Nec meminisse viae media Palinurus in unda.

Write out the first two lines indicating the elisions, the division into feet, and the length of each syllable.

9. Translate into Latin:

(a) Having opened Pontus, our army put to flight a very large force of the enemy

(b) Cicero thought that Archias would not have done this, if he had not been a citizen himself.

(c) Let no one doubt that Pompey will carry on this war with great ability.

(d) For the sake of the common safety we shall appoint him to carry on the war.

10. Give a brief account (1) of the military and (2) of the literary activity of Caesar.

## SPANISH

### I. *Tradúzcase al inglés:*

— Esto me recuerda — dijo el *Grillo* — un cuento viejo.

— Cuéntelo usted — dijeron los leñadores.

— Pues era un estudiantón de los antiguos — comenzó diciendo el *Grillo* —. que andaba con la tuna de pueblo en pueblo. Un día se encontró en Madrid muerto de hambre y con un dolor de muelas de padre y muy señor mío. El hombre tenía una peseta en el bolsillo y no sabía qué hacer, porque decía: "Si voy a casa de un barbero y me quito la muela, voy a tener un hambre de perro; y si como y no me quito la muela, se me va a hacer el dolor más rabioso." En esta alternativa, ¿sabéis lo que hizo?

— Yo hubiera comido — dijeron la mayoría de los leñadores.

— Yo me hubiera puesto un emplasto — añadió otro.

— Pues a él se le ocurrió una cosa mejor — repuso el *Grillo*—: verdad que era de la piel del diablo. Fué a una pastelería en donde había mucha gente, y, delante del escaparate, comenzó a gritar: "¡Me comería cien! ¡Me comería doscientos!" Unos soldados que le oyeron, le dijeron: "¿A que no?" "¿A que sí?" "¿Cuánto apostamos?"

"Si pierdo, que me quiten esta muela, pero sólo ésta."  
"Bueno; vamos." Entraron en la pastelería y el estudiante a comer y los soldados a pagar; a la docena, ya no pudo más y se dió por vencido. Le llevaron los soldados a la barbería y el barbero le arrancó la muela. Al salir, todo el mundo había formado un corro a su alrededor y le señalaba y se descalzaba de risa, y decía: "Mirad a este estudiante, que por perder una apuesta se ha dejado quitar una muela." Y el estudiante contestó: "Sí; pero era una muela que me dolía hacía un mes."

—*Pío Baroja*

## II. *Tradúzcase al español:*

The Myles Standish monument, towering high on Captain's Hill on the Duxbury shore, is about to be turned over to the Commonwealth of Massachusetts by the association that built it and which has cared for the monument and the grounds around it for many years. This memorial to the famous Pilgrim captain, first soldier of New England, is a familiar sight to all who have entered Plymouth harbor by the water or who have stood on the Plymouth waterfront and looked across the bay. The hill on which it stands—a part of the big farm on which Capt. Standish and his family settled when they moved there from Plymouth in 1630—is about two hundred feet above the level of the sea. The monument itself is about one hundred and twenty feet high and is surmounted by a statue fourteen feet in height.

The story of the memorial goes back a full half century. The late Stephen M. Allen, who had come into the possession of the old home of Alexander Standish, son of Capt. Myles, gave the site and began the raising of the money. In 1871 he had so far progressed with his plans that exercises were held consecrating the ground. That was the beginning but the story was a long one before the monument was completed. The dedication took place in the summer of 1909, but it was



not until the present summer that the memorial tablets were placed inside. The main tablet commemorates the virtues and achievements of Capt. Myles Standish; the other two are devoted to the themes of religious and civil liberty to which the Pilgrims dedicated themselves.

III. Escribase una composición de unas doscientas palabras sobre sus estudios, especialmente de español, y los motivos que le inducen a matricularse en la Universidad.

### ELEMENTARY MATHEMATICS

1. Express  $\sqrt[4]{89 - 28\sqrt{10}}$  as the difference of two surds.

2. Find an expression of the form  $ax^2 + bx + c$  whose value is 6 when  $x = 2$ , 3 when  $x = -1$ , and 10 when  $x = 4$ .

3. Through a given point  $A$  within a given circle draw a chord equal to a given line.

4. The second of a series of squares has its vertices at the mid-points of the sides of the first one, and, in general, each square of the series has its vertices at the mid-points of the sides of the preceding one. If  $a_1, a_2, \dots, a_n$  represent the length of side of the 1st, 2nd,  $\dots$ ,  $n$ th square respectively, obtain a formula expressing  $a_n$  in terms of  $a_1$ . Also obtain a formula expressing the area of the  $n$ th square in terms of the first one.

5. Two trains are scheduled to leave the cities  $A$  and  $B$ ,  $m$  miles apart, at the same time, and to meet in  $h$  hours; but, the train from  $A$  being  $a$  hours late in starting, and running at its regular rate, the trains meet  $k$  hours later than the scheduled time. What is the rate at which each train runs?



6. An equilateral triangle, a square, and a regular hexagon are inscribed in the same circle. Prove that the square of a side of the triangle equals the sum of the squares of a side of each of the other two figures.

7. Show how to cut off the corners of a square so as to make a regular octagon.

8. Let  $b$  denote the base,  $h$  the altitude, and  $a$  one of the two equal sides of an isosceles triangle. Construct the triangle when  $b$  and  $a + h$  are given in length.

### ADVANCED MATHEMATICS

1. A tank in the form of a rectangular parallelopiped is 8 by 10 by 12 feet. If the volume is increased 500 cubic feet by equal elongations of the dimensions, find the elongation in feet correct to two decimal places.

2. If  $a$  is the first term,  $n$  the number of terms, and  $S$  the sum of  $n$  terms of a geometric series whose common ratio is  $r$ , derive the formula for  $S$ . Given  $a = 3$ ,  $n = 5$ ,  $S = 93$ , derive an equation giving all the values of  $r$ . How many are there? Calculate the integral values of  $r$  by the methods of the theory of equations.

3. Reduce

$$\frac{a^3}{(a-b)(a-c)} + \frac{b^3}{(b-c)(b-a)} + \frac{c^3}{(c-a)(c-b)}$$

to the form  $a + b + c$ .

4. In any triangle with angles  $A, B, C$  and opposite sides  $a, b, c$  respectively, show that

$$(1) \quad b = a \cos C + c \cos A,$$

$$(2) \quad \frac{\cos A}{a} + \frac{\cos B}{b} + \frac{\cos C}{c} = \frac{a^2 + b^2 + c^2}{2abc}.$$

5. An umbrella is partly open and has  $n$  ribs each inclined at an angle  $\phi$  with the center stick of the umbrella. Show that the angle  $\theta$  between any two consecutive ribs is given

by the equation  $\sin \frac{1}{2} \theta = \sin \frac{\pi}{n} \sin \phi$ .

6. Draw the graph of the equation  $y = \sin x + \cos x$ .

7. Prove that the sum of the areas of the lateral faces of any pyramid is greater than the area of the base.

8. How many yards of canvas 30 inches wide will be required to make a conical tent 16 feet high and 20 feet in diameter, if 10% of the goods is allowed for cutting and fitting?



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Directory of Faculty and Students, First Term, 1920-1921, price 10 cents.\*

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Announcement of Sibley College of Mechanical Engineering and the Mechanic Arts, April 1, 1920.

Announcement of the College of Civil Engineering, February 1, 1920.

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