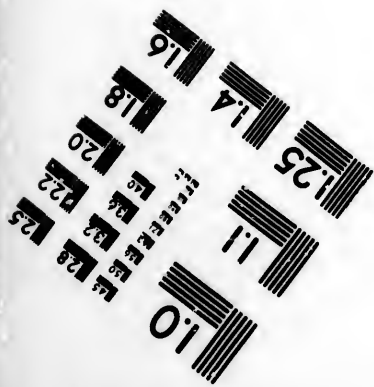
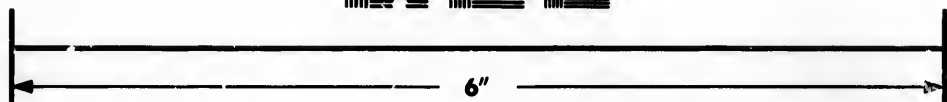
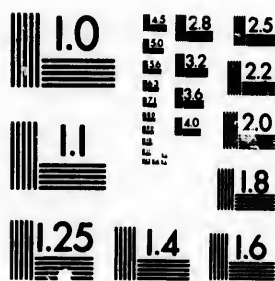


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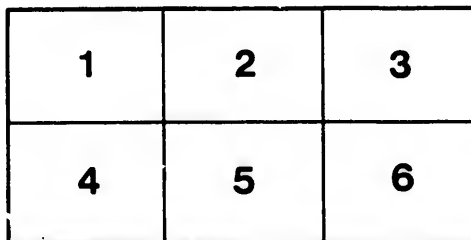
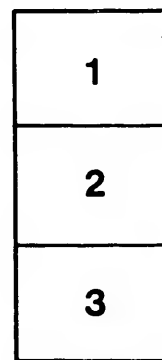
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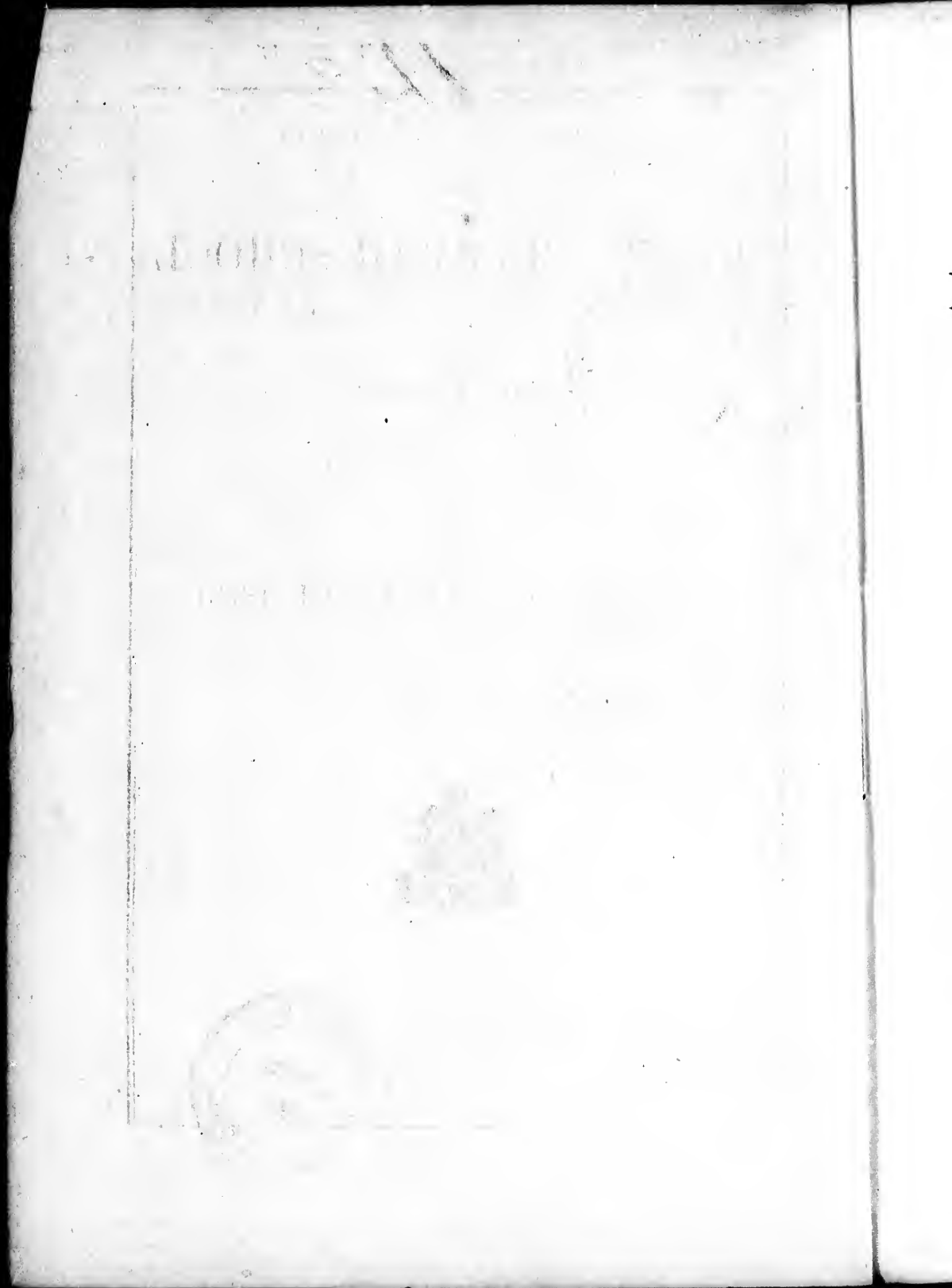


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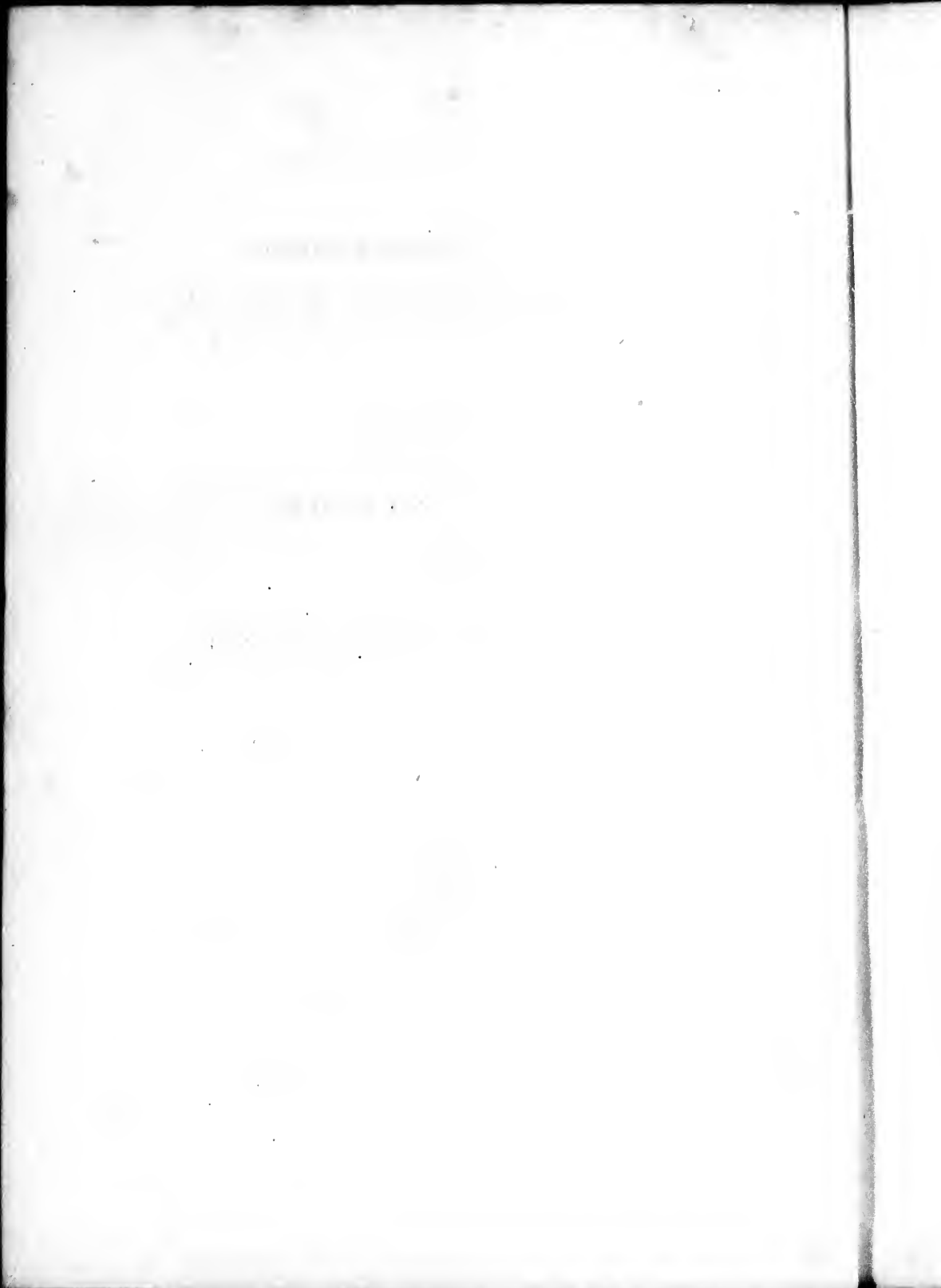


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COURSE OF INSTRUCTION

IN THE

Model Grammar School

FOR UPPER CANADA.

The Model Grammar School, established by the Council of Public Instruction for Upper Canada, under the authority of the Legislature (Consolidated School Act, 22 Vict. cap. lxiv. sec. 120), is mainly intended to exemplify the best method of teaching the branches required by law to be taught in the Grammar Schools, especially Classics and Mathematics, as a model for the Grammar Schools of the country. It is also intended that the Model Grammar School shall, as far as possible, secure the advantages of a Normal Classical School to candidates for Masterships and Teacherships in the Grammar Schools.

The regular curriculum of five years embraces an extended course of instruction in Latin, Greek, Mathematics, French, German, English Grammar, Literature and Composition, History and Geography, both ancient and modern, Logic, Rhetoric, and Mental Science, Natural History and Physical Science, Evidences of Revealed Religion, the usual Commercial Branches, Drawing, Music, Gymnastic, Fencing, and Drill Exercises; the more advanced Students will also attend Lectures in the various departments of Literature, Science and Art.

Only one hundred pupils will be admitted.

Accordingly, the numbers in each class will be strictly limited, in order that a due regard may be paid to the peculiar temper and disposition of each pupil, and that the utmost efficiency may be secured in the cultivation of the intellectual faculties, and the inculcation not only of the principles but of the practice of a high-toned morality.

Every pupil must follow the prescribed course of instruction for his class, and pass the entrance examination thereto. When the first or lowest class is being annually formed in September, this shall consist in Reading, Spelling to dictation, and orally Writing, the simple and compound rules of Arithmetic, Simple Proportion, the elements of English Grammar, and outlines of Geography.

A preference will be given to those who in addition to the preceding requirements pass an examination in the Latin Declensions, and the four Regular Conjugations.

Applicants for admission to the higher classes will be subjected to an examination corresponding to the class for which they are candidates.

The school contains large and well ventilated class-rooms, with ante-rooms, a library, laboratory, and a hall for assembling the whole school. The most recent improvements in school architecture and furniture have been adopted. A play-ground of nearly two acres is attached, with gymnastic apparatus, and covered sheds for exercise in wet weather.

The course of instruction is so arranged as to prepare and strengthen the mind for the more severe study of each succeeding year.

By the peculiar system of discipline adopted, the conduct and the application of the pupils will be regulated by motives similar to those by which our conduct in after life is influenced, and the various honours will be made to depend as much on good conduct as sound scholarship.

Terms and Admission Fees.

There are four Scholastic Terms in the year, as follows :—

WINTER TERM—From the 7th of January, to the Thursday before Easter.

SPRING TERM—From the second Monday after Good Friday, to the fourth Friday in July.

SUMMER TERM—From the end of the long Vacation, to the 31st of October.

AUTUMN TERM—From the 1st of November, to the 22nd of December

The following are the Admission Fees :

For one pupil, Ten dollars per term ; payable in advance.

For two brothers, Eight dollars each, per term ; ditto.

For three or more brothers, Six dollars each, per term ; ditto.

Pupils from a distance can board in private houses sanctioned by the Council, at prices agreed upon by the parents of the pupils and the keepers of the houses.

A pupil will be allowed to board in any private family, at the request of his parents.

Pupils may enter at any time by passing the necessary examination.

All applications for admission to be transmitted in writing to the Rev. Dr. RYERSON, Chief Superintendent of Education.

NOTICE TO GRAMMAR SCHOOL MASTERS.

The vacations in the Model Grammar School have been altered, so as to allow an opportunity to Grammar School Masters of visiting the School during their own vacations.

NOTICE TO CANDIDATES FOR GRAMMAR SCHOOL MASTERSHIPS.

The Examination of Candidates for Grammar School Masterships takes place in the Normal School Buildings, on the first Monday in January, April, July, and October, of each year.

Committee of Examiners :

THOMAS J. ROBERTSON, M.A., *Chairman.*

Rev. WILLIAM ORMISTON, D.D.

GEORGE R. R. COCKBURN, M.A.

Rev. JOHN AMBERY, M.A.

} *Inspectors of*
Grammar Schools
for
Upper Canada.

Examination Papers, 1860.

I.—GREEK.

1. Translate, Sophocles, *Œdip. Rex.* vv. 151–159, and vv. 216–229 :

ὦ Διὸς ἀδυσπέδ' φάτι, τίς ποτε τᾶς πολυχρύσου
Πυθῶνος ἀγλαὰς ἔβασ
Θήβας; ἐκτέταμαι φοβερὰν φρένα, δείματι παλλῶν,
ἦμε Δάλιε Παιᾶν,
ἀμφὶ σοὶ ἀζόμενος, τί μοι ἦ νέον,
ἢ περιτελλομένας ὤραις πάλιν ἐξανύσεις χρέος
εἰπέ μοι, ὦ χρυσέας τέκνον Ἐλπίδος, ἄμβροτε Φάμα.
πρωτά σε κεκλόμενος, φύγατερ Διὸς, ἄμβροτ' Ἀθάνα.

αἰτεῖς· ἂ δ' αἰτεῖς, τᾶμ' ἔαν θέλῃς ἔπη
κλύων δέχεσθαι τῇ νόσῳ θ' ὑπηρετεῖν,
ἀλκὴν λάβους ἂν κἀνακούφισιν κακῶν·
ἀγὼ ξένος μὲν τοῦ λόγου τοῦδ' ἕξερῶ,
ξένος δὲ τοῦ πραχθέντος. οὐ γὰρ ἂν μακρὰν
ἔχουον αἰτὸς, μὴ οὐκ ἔχω τι σύμβολον.
νῆν δ', ὕστερος γὰρ ἀστὸς εἰς ἀστοὺς τελῶ,
ὑμῖν προφωνῶ πᾶσι Καδμείους τάδε·
ὅστις ποθ' ὑμῶν Λαῖον τὸν Λαβδάκου
κάτοιδεν ἀνδρὸς ἐκ τίνος διώλετο,
τοῦτον κελεύω πάντα σημαίνειν ἐμοί·
κεῖ μὲν φοβεῖται, τοῦτ' ἰκλήμ' ὑπέξελὸν
αἰτὸς καθ' αὐτοῦ· πείσεται γὰρ ἄλλο μὲν
ἀστεργές οὐδὲν, γῆς δ' ἄπεισιν ἀβλαβής.

2. Give an account of the origin and progress of tragedy among the Greeks, and contrast it with the tragic representations of the present day.
3. State the legend of the play.

4. Scan vv. 151–159; mark the quantity of each syllable; and give the metrical name of each verse.
5. vv. 211–227: ἐὰν θέλῃς—λάβοις ἄν. Illustrate by various examples and translations the doctrine of hypothetical sentences.

1. Translate *Odyssey ix.* 413–435:

Ὦς ἄρ' ἔφαν ἀπίοντες· ἐμὸν δ' ἐγέλασσε φίλον κῆρ,
 Ὦς ὄνομ' ἐξαπάτησεν ἐμὸν καὶ μήτις ἀμύμων.
 Κύκλωψ δὲ στενάχων τε καὶ ὠδίνων ὀδύνησιν,
 Χερσὶ ψηλαφύων, ἀπὸ μὲν λίθον εἶλε θυράων,
 Αὐτὸς δ' εἰνὶ θύρησι καθέζετο χεῖρε πετάσσας,
 Εἴ τινα που μετ' ὄεσσι λάβοι στείχοντα θύραζε·
 Οὐτῶ γὰρ ποῦ μ' ἤλπετ' ἐνὶ φρεσὶ νήπιον εἶναι.
 Αὐτὰρ ἐγὼ βούλευον ὕπως ὄχ' ἄριστα γένοιτο,
 Εἴ τιν' εὔαιροισιν· θανάτου λύσιν ἢ δ' ἐμοὶ αὐτῷ
 Εὐροίμην· πάντας δὲ δόλους καὶ μῆτιν ὕφαινον
 Ὦς τε περὶ ψυχῆς· μέγα γὰρ κακὸν ἐγγύθεν ἦν.
 Ἦδε δέ μοι κατὰ θυμὸν ἀρίστη φαίνεται βαυλή.
 Ἄρσενες οἷες ἦσαν εὐτρεφέες δασύμαλλοι,
 Καλοὶ τε μεγάλοι τε, ἰοδνεφῆς εἶρος ἔχοντες·
 Τοὺς ἀκέων συνέεργον εὐστρεφέεσσι λύγοισιν,
 Τῆς ἐπι Κύκλωψ εὐδε, πέλωρ ἀθεμίστια εἶδος.
 Σύντρεις αἰνίμενος· ὁ μὲν ἐν μέσῳ ἄνδρα φέρεσκεν.
 Τῷ δ' ἐτέρῳ ἐκάτερθεν ἔτην σώοντες εὔαιρους.
 Τρεῖς δὲ ἕκαστον φῶτ' οἷες φέρον· αὐτὰρ ἔγωγε
 (Ἄρνεϊδς γὰρ ἔην, μήλων ὄχ' ἄριστος ἀπάντων),
 Τοῦ κατὰ νῶτα λαβὼν, λασίην ὑπὸ γαστέρ' ἔλυσθεῖς
 Κεῖμην· αὐτὰρ χερσὶν αὐτοῦ θεσπεσίοιο
 Νωλεμέως στρεφθεῖς ἐχόμεν τετλητότι θυμῷ.

2. Give the ordinary forms of any dialectic varieties between vv. 413 and 420.
3. Notice and explain any metrical peculiarities in vv. 413 to 442.
4. Discuss briefly the question as to whether the *Iliad* and *Odyssey* were the production of the same author.

5. Parse ἔφαν, καθέζετο, ὄεσσι, ὕφαινον, εἶδε, φέρεσκε, στρεφθεῖς.
6. Place the accents and bearings to the following: Ὡστε ἀδειπνοὶ ἦσαν οἱ πλείστοι τῶν Ἑλλήνων· ἦσαν δὲ καὶ ἀναριστοὶ· πρὶν γὰρ δὴ καταλυσαὶ τὸ στρατεῦμα πρὸς ἀριστον βασιλεὺς ἔρανη. Ταύτην οὖν τὴν νύκτα οὕτω διεγεγοντο.

GREEK PROSE.

7. However since I have spoken at length about the birth of children, I wish also to explain their education. Of the rest of the Greeks, then, those who pretend to educate their sons best, as soon as ever their children understand what is spoken, forthwith set servants over them as pedagogues, and send them to masters to learn both the elements of learning and polite accomplishments, and the exercises of the palaestra.

II.—LATIN.

Translate Ovid Fasti I—587—610.

Idibus in magni castus Jovis æde sacerdos
 Semimaris flammis viscera libat ovis :
 Redditaque est omnis populo provincia nostro :
 Et tuus Augusto nomine dictus avus.
 Perlege dispositas generosa per atria ceras ;
 Contigerunt nulli nomina tanta viro.
 Africa victorem de se vocat : alter Isauras,
 Aut Cretum domitas testificatur opes.
 Hunc Numidæ faciunt, illum Messana Superbum :
 Ille Numantina traxit ab urbe notam.
 Et mortem et nomen Druso Germania fecit,
 Me miserum, virtus quam brevis illa fuit !
 Si petat a victis, tot sumat nomina Cæsar,
 Quot numero gentes maximus orbis habet.
 Ex uno quidam celebres, aut torquis adeptæ,
 Aut corvi titulos auxiliaris habent.
 Magne, tuum nomen rerum mensura tuarum est :
 Sed qui te vicit, nomine major erat.

Nec gradus est ultra Fabios cognominis ullus ;
 Illa domus meritis Maxima dicta suis.
 Sed tamen humanis celebrantur honoribus omnes ;
 Hic socium summo cum Jove nomen habet.
 Sancta vocant augusta patres : augusta vocantur
 Templa, sacerdotum rite dicata manu.

- (2) Explain the allusions in the following words:—(a) Ceras, (b) Africa, (c) Isauras, (d) Cretum, (e) Numantina, (f) Germania, (g) torquis, (h) corvi, (i) Magne, (k) Maxime.
- (3) Idibus.—Sketch the division of time among the Romans, give a tabular calendar for this month, and give the Latin for the following dates:—5th September; 12th November; 31st December; 1st January.
- (4) Si petat.....mat.—State and illustrate by examples the doctrine of the subjunctive mood in Latin, and compare it with the Greek.

- (1) Translate freely, Horace I. Ode 21.

Dianam teneræ dicite virgines,
 Intonsum, pueri, dicite Cynthium,
 Latonamque supremo
 Dilectam penitus Jovi.
 Vos lætam fluviis et nemorum coma,
 Quæcunque aut gelido prominet Algido,
 Nigris aut Erymanthi
 Silvis aut viridis Cragi;
 Vos Tempe totidem tollite laudibus
 Natalemque, mares, Delon Apollinis,
 Insignemque pharetra
 Fraternaque humerum lyra.
 Hic bellum lacrimosum, hic miseram famem
 Pestemque a populo et principe Cæsare in
 Persas atque Britannos
 Vestra motus aget prece.

- (2) Mark the scansion of the first four lines, and name the metre.

- (3) Scan and give the metrical name of each of the following lines :

Mæcenas atavis edite regibus.
Jam satis terris nivis atque diræ
Terrait urben.

Sic te diva potens Cypri.
Sic fratres Helenæ lucida sidera.
Te deos oro, Sybarin cur properas amando.

- (4) Write short notes on the words : (a) *intonsum*, (b) *Cynthium*, (c) *Algido*, (d) *Erymanthi*, (e) *Cragi*, (f) *Tempe*.
- (5) Give a sketch of the poets of the Augustan age and of their principal writings.

LATIN PROSE.

Fortune in another quarter served the Romans no less effectually. The Macedonian ambassadors, after having concluded their treaty with Hannibal at Tifata, made their way back into Bruttium in safety, and embarked to return to Greece. But their ship was taken, off the Calabrian coast, by the Roman Squadron on that station ; and the ambassadors, with all their papers, were sent prisoners to Rome. A vessel which had been of their company escaped the Romans and informed the King of what had happened. He was obliged, therefore to send a second embassy to Hannibal, as the former treaty had never reached him ; and though this mission went and returned safely, yet the loss of time was irreparable, and nothing could be done till another year.—
Arnold's Rome, vol. III, p. 189.

LATIN VERSE.

The spacious firmament on high,
With all the blue ethereal sky,
And spangled heavens, a shining frame,
Their great original proclaim.
Th' unwearied sun from day to day
Does his Creator's power display.
And publishes to every land,
The work of an Almighty hand.
Soon as the evening shades prevail,
The moon takes up the wondrous tale,
And nightly to the listening earth,
Repeats the story of her birth.

III.—ANCIENT HISTORY AND GEOGRAPHY.

1. Give an account of the legislation of Lycurgus.
2. Give an account of the legislation of Solon and contrast it with that of Servius Tullius.
3. Contrast the Spartan and Athenian constitutions, and illustrate by historical examples their effect on the Spartans and Athenians respectively.
4. State the reforms of Pericles and their permanent effect on the Athenians.
5. Compare the system of colonization of Greece, Rome, and Great Britain.
6. Sketch the career of Miltiades.
7. Explain the agrarian laws of the Gracchi, and give reasons for condemning or defending them.
8. Sketch the career of Pompey.
9. Give a short life of Hannibal.
10. Give a chronological table of the leading events in Roman History between B. C. 100 and the death of Augustus.
11. Give a similar table of Grecian History between 500—414 B. C.
12. State briefly the causes, leading events, and results of the Peloponnesian war. (For 5th class only.)

IV.—ANCIENT GEOGRAPHY.

(In the following questions always give the ancient and modern name, if known.)

1. Mention the six large basins draining Gallia Antiqua.
2. Trace the Rhodanus from its mouth to its source, and give the towns in the order you pass them, and any historical or other circumstances connected with each.
3. Trace the Rhenus from its source to its mouth, and give a short running commentary as you proceed on your course.
4. Give an outline map of Gaul shewing its ancient divisions, its drainage and leading towns.
5. Do the same with Italia.
6. Start from Genoa and coast along to Rhegium, and state in order the divisions, and the leading towns and rivers you would pass on the western side of the Apennines.

V.—MODERN HISTORY AND GEOGRAPHY.

1. State the causes of the high prerogative of the crown during the reign of Henry VIII.
 2. Give an account of the proceedings of the Long Parliament, and discuss briefly the ground on which you would oppose or defend the execution of Charles I.
 3. Mention the circumstances which led to the Restoration.
 4. Explain the Corporation Act.
 5. Explain the Uniformity Act.
 6. Describe the members of the *Cabal* Ministry and the origin of the term.
 7. Give the articles of the Treaty of Dover.
 8. Explain the Declaration of Indulgence.
 9. Explain the Test Act.
 10. Mention concisely the more immediate causes of the Revolution of 1688 and the permanent changes wrought in the constitution. Contrast that Revolution with those in modern times, and explain the difference.
-

VI.—MODERN GEOGRAPHY.

11. Mention the rivers that fall into the Atlantic. (12) The Baltic. (13) The Gulf of Mexico.
14. Give seven counties in the basin of the Thames and the leading towns in each.
15. Describe the mountain systems of Europe and Asia.
16. Describe the mountain systems of North and South America.
17. Define minutely the position of the following:— (1) Stettin; (2) Cologne; (3) Copenhagen; (4) Amsterdam; (5) Brussels; (6) Munich; (7) Perth; (8) Turin; (9) Malta; (10) Palermo (11) Bombay; (12) Cyprus.

VII.—FRENCH.

(All answers to be in French.)

I.—Translate into French :

Disappointed in his object, Almagro prepared to march on Cuzco, the capital, as he regarded it, of his own jurisdiction, to get possession of that city, and there make preparations to meet his adversary in the field. Sotelo was sent forward with a small corps in advance. He experienced no opposition from the now defenceless citizens; the government of this place was again restored to the hands of the men of Chili, and their young leader soon appeared at the head of his battalions, and established his winter quarters in the Inca capital.

II.—Translate into English :

Le dragon à plusieurs têtes et le dragon à plusieurs queues.

Mon sang commence à se glacer ;

Et je crois qu'à moins on s'effraie.

Je n'en eus toutefois que la peur sans le mal

Jamais le corps de l'animal

Ne put venir vers moi, ni trouver d'ouverture.

Je rêvais à cette aventure,

Quand un autre dragon, qui n'avait qu'un seul chef,

Et bien plus d'une queue, à passer se présente,

Me voilà saisi derechef

D'étonnement et d'épouvante,

Ce chef passe, et le corps, et chaque queue aussi :

Rien ne les empêcha ; l'un fit chemin à l'autre.

LA FONTAINE'S Fables ; I-XII.

1. Give the meaning of the Fable, fill up all the ellipses and destroy inversions.
2. Give the primitive tenses of the verbs marked in italics.

III.—Translate into English :

Ils s'adressèrent au baron de Crothusen et au chancelier Mulier ; ils leur dirent qu'ils venaient dans le dessein de servir de fidèles gardes au roi ; et que, s'il voulait, ils le conduiraient à Andrinople, où il pourrait parler lui-même au grand-seigneur. Dans le temps qu'ils faisaient cette proposition, le roi lisait des lettres qui arrivaient de Constantinople, et

que Fabrice, qui ne pouvait plus le voir, lui avait fait tenir secrètement par un jannissaire.—CHARLES XII., Book 6th.

1. Give the contents of the 6th Book.
2. Translate: "He applies himself to his studies."
3. Give one compound tense of *s'adressèrent*.
4. What other verb is conjugated just like *dirent*?
5. *Servir*, its Present Indicative.
6. Explain the two *de servir de*.
7. Et *que*, what sort of word is *que* here; and by what governed?
8. *Il*, who is it?
9. State the accusatives to *tenir* and *fait*.
10. Point out all the idiomatic words or phrases.

IV.—GRAMMATICAL QUESTIONS.

1. Along with the full examples for each, give the rules of the agreement of the past participle of an active, neuter, passive, impersonal and reflective verb.
2. State the place of the subject with regard to the verb, and in what it differs from the English.
3. What difference is there between *c'est à vous de* and *c'est à vous à*; *anoblir* and *ennoblir*; *atteindre une chose* and *atteindre à une chose*; with examples.
4. Give the plural of: *Hôtel-Dieu*, *auto-da-fé*, *post-scriptum*, *basse-cour*, *avant-coureur*, *un passe partout*; with English and reasons why.
5. When do we use independent sentences: *son*, *sa*, *ses*, *leur*, *leurs*, or *en*, and the article in speaking of things. Examples.
6. Give the feminine of: *tuteur*, *serviteur*, *absous*, *dissous*, *doux*, *faux*, *erat*; and plural of: *général*, *nasal*, *carnaval*, *régal*, *éventail*, *bestial*.

VIII.—ENGLISH LANGUAGE.

- (1) Analyse the following sentence :

Some time thus spent, the young man grew at last into a petty anger ; that a bird whom art had never taught cleffs, moods, or notes, should vie with him for mastery, whose study had busied many hours to perfect practice :

- (2) Shew what remains of inflection there are in English ; and by a comparative view of modern European tongues, that in conformity with the general law they have gradually lost their inflective power. Shew the *rationale* of this. What have they substituted in its place ?
- (3) What have we lost by the verb " Weorthan " being dropped from our language. What have we gained by new applications of " Sceal " and " Wille " ? Give the derivations and radical meanings of the Auxiliary Verbs in English, German, French and Spanish.
- (4) Why do the modern Gothic tongues deviate less widely from their originals than the Romance languages from the Latin.
- (5) Give a historic view of the successive strata of the English Vocabulary, marking as definitely as you can the dates of the several accessions.
- (6) Shew that the Anglo-Saxon is the base of our language. Give the eight classes of words you would consider the characteristic marks of the mother tongue of any people.
- (7) Give the words added to our language from the Celtic, Latin of the first and second periods The general character of the Normand French accessions to our tongue, with instances. Compare these with their originals. Give the Saxon equivalents for the following, with their derivations still found in our language :—
Death.—To go.—To bow.—To twist.
- (8) Give a few of the miscellaneous Elements in our language.
- (9) Give the proximate and ultimate derivations of the following :—
Desire, Chivalry, Shore, Earl, Mercy, Poltron, Curfew, Count.
Souvent, Asez, Chez, Etablir, Jamais, Noël.

IX.—COMPARATIVE PHILOLOGY.

- (1) Divide on some principle all known languages.
- (2) What are the Romance languages? Whence their name?
- (3) What objection has been lately urged to the term "Indo-Germanic" as applied to the family of languages it was supposed to embrace. Give the more correct term.
- (4) Shew in Greek,—and where they are represented—in English and French, the comparative terms for the following, accounting for the respective changes: Vinum, Ovum, Sylva, Equus, Deus, Quatuor, Sequor, Aratrum, Sisto, Sub, Cum, Sal.
- (5) Explain "Grimm's Law." Shew its simplicity and utility in comparative Philology. Shew its truth by the comparison of a few German and English words.
- (6) Shew the principal Laws that regulated the transition of the Latin into the French.
- (7) Give instances in English and French where from the derivation of a word having been forgotten it has been introduced a second time into these languages and in a different form.
- (8) Shew by a comparison of the following words in various languages they must severally have had one primitive root, from which it has passed into these: "Daughter," "Tongue," "Pursue," "Stand."

X.—ARITHMETIC.

1. A person is obliged to transfer £4,000 Bank Stock, on which 6 per cent. interest is paid, when the price is $150\frac{1}{2}$ to the 3 per cents., at $90\frac{1}{2}$; how much does he lose or gain in annual income?
2. Given that the area of a circle is 3.14159 times the square of the radius, find the radius of a circle whose area is 6 acres.
3. Find the simple interest of \$924.50 for 2 years, 5 months, and 7 days, at 6 per cent.

4. Calculate the diagonal of a cube containing 15.625 cubic inches.
5. If a debt of \$1,600 be payable in 2 months, one of \$2,400 in 4 months, and another of \$2,000 in 6 months; find the true equated time of payment, the rate of interest being 5 per cent.
 - (a) Give the rule by which the equated time is commonly determined.
6. Find the true present worth of \$8612.80 due 2 years hence, at 6 per cent. simple interest.
7. Shew that discount as calculated by the banker, exceeds the true discount by the interest on the true discount.
8. A note for £850, drawn August 10th, at 4 months, is discounted September 12th at 7 per cent. ; find the amount received.
9. Prove the rule for the reduction of circulating decimals to equivalent vulgar fractions.
10. Convert 8632 from the denary to the quinary scale.
11. Prove the rule for pointing, in multiplication of decimals.
12. For what sum must an insurance be effected, at $3\frac{1}{2}$ per cent., on a vessel worth \$12,000, so as to cover both the loss of the vessel and the premium paid for insurance ?
13. Denoting a given sum of money by P , and the sum to which it will amount in t years at r per cent., simple interest by A ; deduce the relation $A = P \left(1 + \frac{rt}{100} \right)$
14. A man by the sale of his farm for \$9,100, gained a profit of 30 per cent. on the cost price. What had he paid for it ?
15. Find by duodecimal arithmetic, the area of a floor, 26 ft. 6 in. long, by 18 ft. 10 in. wide.
16. In what time will a given sum of money double itself, at 6 per cent., simple interest ?
17. A block of marble 6 ft. long, 4 ft. wide, and 3 ft. deep, cost \$302.40; what should be the width of another block, 5 ft. long, and $1\frac{1}{4}$ ft. deep, whose value is \$80.

X1.—ALGEBRA.

(1) Solve the equations

$$(a) \left. \begin{aligned} \frac{x+y}{x-y} + \frac{x-y}{x+y} &= \frac{5}{2} \\ x^2 + y^2 &= 90 \end{aligned} \right\}$$

$$(b) \sqrt{x} - \sqrt{a+x} = \sqrt{\frac{a}{x}}$$

$$(c) \left. \begin{aligned} \frac{m}{x} + \frac{n}{y} &= a \\ \frac{n}{x} + \frac{m}{y} &= b \end{aligned} \right\}$$

$$(d) \frac{7}{x^2 + 4x} + \frac{21}{3x^2 - 8x} = \frac{22}{x}$$

$$(e) \frac{(a + x^{\frac{1}{2}})^{\frac{1}{2}}}{x^{\frac{1}{4}}} + \frac{(a - x^{\frac{1}{2}})^{\frac{1}{2}}}{x^{\frac{1}{4}}} = x^{\frac{1}{4}}$$

$$(f) \sqrt[3]{a + \sqrt{x}} + \sqrt[3]{a - \sqrt{x}} = \sqrt[3]{b}$$

(2) Find the H. C. M. of $x^6 + x^2y - x^4y^2 - y^3$
and $x^4 - x^2y - x^2y^2 + y^3$

(3) The sum of the two digits of a certain number multiplied by the number is 36, and if 9 be added to the number, the digits are transposed. Find the number.

(4) Deduce an expression for the sum of n terms of a geometric series.

(5) The sum of 2 numbers is 8, and the sum of their cubes 224 : find them.

(6) Sum the series 2, 4, 6, &c., to 30 terms.

(7) Write down the 6th term of $(ax + x^2)^{-4}$

- (8) One gallon of wine worth \$8 is mixed with 160 gallons of wine worth \$4.50 a gallon.—At what price per gallon must the mixed wine be sold that a profit of 15 per cent. may be made?
- (9) Show that $2^n - 1$ will represent the total number of combinations of n things taken 1, 2, 3, . . . n together.
- (10) Prove the Binomial Theorem when the index is a positive integer.
- (11) A and B walk towards each other from 2 stations 105 miles apart. A walks 15 miles the first day, 14 the second, 13 the third, and so on. B walks 12 miles the first day, 10 the second, 8 the third, &c. When will they meet?
- (12) Show that the arithmetic, geometric and harmonic means between a and c are in geometric progression.
- (13) A shopkeeper, by the sale of a piece of goods, realizes a profit of 10 per cent, but had he sold it one shilling a yard less he would have lost 5 per cent. Required the cost price per yard.
- (14) On how many nights may a different guard of 4 men be draughted from a corps of 30 men? (a) On how many nights would any one man in such a case be on guard?

XII.—GEOMETRY.

- (1) Parallelograms upon equal bases and between the same parallels, are equal.
- (2) To a given straight line to apply a parallelogram, which shall be equal to a given triangle, and have one of its angles equal to a given rectilineal angle.
- (3) If a straight line be divided into any two parts, the squares on the whole line, and on one of the parts, are equal to twice the rectangle contained by the whole, and that part, together with the square, on the other part.

- (4) To describe a square that shall be equal to a given rectilineal figure.
- (5) The angle at the centre of a circle, is double of the angle at the circumference upon the same part of the circumference.
- (6) Upon a given straight line, to describe a segment of a circle, which shall contain an angle equal to a given rectilineal angle.
- (7) To inscribe an equilateral and equiangular pentagon in a given circle.
- (8) Similar triangles are to one another in the duplicate ratio of their homologous sides.
- (9) To describe a rectilineal figure which shall be similar to one, and equal to another rectilineal figure.
 - (a) Given the base and vertical angle, to find the triangle whose area is a maximum.
 - (b) If the opposite sides AB , CD , of a quadrilateral be produced to meet in the point E , and F and G be the middle points of the diagonals AC , BD , then will the triangle EFG be one-fourth of the quadrilateral $ABCD$.
 - (c) Through two given points to describe a circle, intersecting a given circle so that the chord of intersection shall be of a given length.

XIII.—TRIGONOMETRY.

- (1) Given that $\sec. A = 1.5$, find $\sin. A$.
- (2) Shew that $\cos. (A - B) = \cos. A \cos. B + \sin. A \sin. B$.
- (3) Two sides of a triangular field, including an angle of $35^{\circ} 10'$, are 12 and 15 chains in length respectively. Find the number of acres in the field, 1 acre = 10 square chains.

(4) Prove the formulæ

$$(a) \sin. 2 A = \frac{2 \tan. A}{1 + \tan.^2 A}$$

$$(b) \sin.^2 A - \sin.^2 B = \sin. (A + B) \sin. (A - B)$$

$$(c) \tan.^2 A = \frac{1 - \cos. 2 A}{1 + \cos. 2 A}$$

$$(d) \tan \frac{1}{2} (A + B) = \frac{\sin. A + \sin. B}{\cos. A + \cos. B}$$

(5) In a triangle, A B C, whose sides are a. b. c., and perimeter 2 s, prove that

$$\sin. \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{bc}}$$

(6) From a boat I observe that the elevation of the top of a tower on a cliff is $21^\circ 20'$, and rowing directly towards the tower for 500 yards, I now observe the elevation of the top and bottom of the tower to be $49^\circ 3'$, and $41^\circ 20'$, respectively. What is the height of the cliff and of the tower?

(7) In a triangle A B C, given that A B = 50 ft. B C = 20 ft. and angle A B C = $20^\circ 15'$, find the remaining side and angles.

