# Harvard College Admissions Exam 

JULY 1869

Of the 210 candidates who took this test, 185 were admitted.

## TRANSLATE INTO LATIN.

Write only as much as you can revise carefully.

1. I do not ${ }^{1}$ care ${ }^{2}$ how ${ }^{3}$ rich Gyges ${ }^{4}$ is.
${ }^{1}$ Express with refert. $\quad{ }^{2}$ Quam. ${ }^{3}$ Dives. $\quad{ }^{4}$ Esse.
2. ${ }^{1}$ Who ${ }^{2}$ more illustrious in ${ }^{3}$ Greece ${ }^{4}$ than Themistocles? ${ }^{5}$ who ${ }^{6}$ when he ${ }^{7}$ had been driven into ${ }^{8}$ exile ${ }^{9}$ did not do harm to his ${ }^{10}$ thankless ${ }^{11}$ country, but ${ }^{12}$ did ${ }^{13}$ the same that Coriolanus ${ }^{12} \mathrm{had}$ done ${ }^{14}$ twenty ${ }^{15}$ years ${ }^{16}$ before.
${ }^{1}$ Quis. $\quad{ }^{2}$ Clarus. $\quad{ }^{3}$ Graecia. $\quad{ }^{4}$ Write in two ways. $\quad{ }^{5}$ Qui. $\quad{ }^{6}$ Cum. $\quad{ }^{7}$ Expellere. $\quad{ }^{8}$ Exilium.
${ }^{9}$ Do harm to, Injuriam ferre with Dative. $\quad{ }^{10}$ Ingratus. ${ }^{11}$ Patria. $\quad{ }^{12}$ Facere. $\quad{ }^{13}$ Idem.
${ }^{14}$ Viginti. ${ }^{15}$ Annus. ${ }^{16}$ Ante.
3. In the ${ }^{1}$ first of the ${ }^{2}$ spring the consul ${ }^{3}$ came to Ephesus, and ${ }^{4}$ having received the ${ }^{5}$ troops ${ }^{6}$ from Scipio he ${ }^{7}$ held a ${ }^{8}$ speech ${ }^{9}$ in-presence-of the ${ }^{10}$ soldiers, ${ }^{11}$ in which, ${ }^{12}$ after extolling their ${ }^{13}$ bravery, he ${ }^{14}$ exhorted them ${ }^{15}$ to undertake a ${ }^{16}$ new ${ }^{17}$ war ${ }^{18}$ with the Gauls, who ${ }^{19}$ had [ ${ }^{11}$ as he said] helped Antiochus ${ }^{11}$ with ${ }^{20}$ auxiliaries.
${ }^{1}$ Primus. ${ }^{2}$ Ver. ${ }^{3}$ Venire. $\quad{ }^{4}$ Accipere. ${ }^{5}$ Copiae. ${ }^{6}$ A. $\quad{ }^{7}$ Habere. ${ }^{8}$ Contio. ${ }^{9}$ Apud. ${ }^{10}$ Miles. ${ }^{11}$ Omit. ${ }^{12}$ Collaudare. (Ablative Absolute). ${ }^{13}$ Virtus. ${ }^{14}$ Adhortari. ${ }^{15}$ Suscipere with ad and Gerundive. ${ }^{16}$ Novus. ${ }^{17}$ Bellum. ${ }^{18} \mathrm{Cum} .{ }^{19}$ Juvare. ${ }^{20}$ Auxilium.

## LATIN GRAMMAR.

5 Write legibly, and number your answers carefully to correspond with the questions.
I. Decline in the singular: facies, idem, ovile, sidus, filius. Decline in the plural: portus, dea, navis. Write the gender over the nouns (rules not required), and mark the quantity of all penultimate and final syllables.
(1) Give the significance of the terminations -ile in ovile; -men in gestamen. (2) Form an abstract noun from felix; from aeger. (3) Form a noun denoting the masculine agent from adjuvo, and a frequentative verb from cieo, and account for the quantity of their penultimate vowels.
(4) Compare humilis, juvenis, and adverbs formed from felix and aeger.
II. Give the principal parts of cado, caedo, tono, reperio, curro, pasco, paciscor, marking the quantity of the penult.
(2) Give all the Infinitives and Participles of abeo, ulciscor; the Present Indicative of fio; the Future Indicative Active and the Present Subjunctive Passive of munio, with the quantity of all penults.
III. What case or cases follow super, tenus, recordor, fruor, similis? (2) Give the principal parts of parco and confido, and the case that follows each. (3) Give the rules for the two cases after pudet, do, doceo, moneo. (4) Give the Latin for "at home," "at Carthage," "from Carthage," "from Italy," "to Athens."

Tu discessu ceterorum nostra tamen, qui remansissemus, caede te contentum esse dicebas.
(5) Give the rules for discessu and caede. What is the antecedent of qui?
IV. Give the rules for the Subjunctive after dum, cum, quominus. (2) Would ne or ut non follow restat and moneo respectively? Why?

Statnisti quo quemque proficisci placeret, * * * * * dixisti paululum tibi esse etiam nunc morae, quod ego viverem. Reperti sunt duo equites Romani qui te ista cura liberarent. Idoneus est qui impetret quera legatum velit.

Exclusi eos quos tu ad me salutatum miseras.
(3) Explain the subjunctives in the above sentences; the tense of impetret. (4) Give the rule for salutatum.

## GREEK GRAMMAR.

[N.B. All the Greek words must be written with the accents.]
I.*

Give an example of Elision. In what words does the accent of the elided vowel disappear with the vowel? What is the word $\tau \varepsilon$ called with respect to accent? Give the other words of the same sort. Write $\tau ı v o ́ ̧ ~ a f t e r ~ \alpha ̉ v \theta \rho \omega ́ \pi r o v ~ w i t h ~ t h e ~ a c c e n t s ~ p r o p e r l y ~ d i s p o s e d ; ~ w r i t e ~ \tau \varepsilon ́ ~ a f t e r ~ \sigma \tilde{\omega} \mu \alpha$.
II.*
 Plural. Give the Gen. Dat. And Acc. in all genders and numbers of ${ }^{\circ} \xi_{\imath o \varsigma}, \gamma \lambda \cup \kappa u ́ \varsigma$, of the Pres. Act. Participle of io $\sigma \tau \mu$, and of the Perf. Act. Partic. of $\beta$ ou $\lambda \varepsilon v(\omega$ (or $\pi \alpha v ́ \omega$ ).
III.
 $\dot{\eta} \delta \dot{\prime} \varsigma$ and compare it. Decline oú in the Dual and Plural and oûtos in the Singular. Give the Cardinal Numerals as far as 12 .
IV.

Give synopses (through all the Moods) of the Aor. Mid. and Aor. Pass. of $\beta$ ou入عv́ $\omega$ (or $\pi \alpha ט ́ \omega$ ), and inflect the Imperatives. Give synopses of the Perf. Pass. of $\pi \lambda \varepsilon ́ \kappa \omega$ and the Pres. Act. of $\delta i \delta \omega \mu$. Inflect the Perf. Pass. Indic. of $\pi \lambda \varepsilon ́ \kappa \omega$ and the Imperfect Pass. of $\tau \tau \mu \alpha ́ \omega$.

## V.

 verbs?
*Candidates for the Sophomore or any higher Class may omit questions I and II, and answer the following:
VI.

What is the construction in Object-Clauses after verbs of striving? How do such clauses differ from Pure Final Clauses? What is a General Supposition? How are General Suppositions expressed? How are Prohibitions in the 2nd and 3rd persons expressed in Greek? Translate é $\varphi \eta \quad \delta \omega \in \sigma ı v \varepsilon i$ סúvaito, and state what form the last three words would have in the Direct Discourse.

## GREEK COMPOSITION．

［N．B．All the Greek words must be written with the accents．］

I．
As $^{1}$ Xenophon ${ }^{2}$ was $^{1}$ sacrificing，${ }^{3}$ a messenger ${ }^{4}$ arrived ${ }^{5}$ from Mantineia ${ }^{6}$ announcing ${ }^{7}$ that his son ${ }^{8}$ Gryllus ${ }^{9}$ was dead．${ }^{10}$

1 omit．
2 Еعvoழஸ̃v．
3 Өv́ $\omega$ ．
4 वैүүє入оร．
5 グк $\omega$ ．

6 Mavtívela．
$7 \lambda \varepsilon ́ \gamma \omega$ ．
8 viós．
9 Гри́入入оऽ．
10 to die，$\theta v \eta \sigma^{\sigma} \chi \omega$ ．

II．
Then ${ }^{1}$ he ${ }^{2}$ laid ${ }^{3}$ aside the garland，${ }^{4}$ but ${ }^{5}$ continued ${ }^{6}$ to sacrifice．
1 k $\alpha$ í．
2 غ่кعĩvo̧．
3 à $\pi$ отí $\theta \varepsilon \mu \alpha$ ．
4 бтદ́ $\varphi \alpha v o \varsigma$.
5．$\delta \varepsilon ́ ~ p r e c e d e d ~ b y ~ \mu \varepsilon ́ v . ~$
$6 \delta 1 \alpha \tau \varepsilon \lambda \varepsilon ́ \omega$ ．

III．
But when ${ }^{1}$ the messenger had added ${ }^{2}$ this ${ }^{3}$ also，${ }^{4}$ that he had died victorious，${ }^{5}$ Xenophon put ${ }^{6}$ the garland on ${ }^{6}$ again．${ }^{7}$

1 غ่̇ $\varepsilon$ í．
$2 \pi \rho о \sigma \tau i ́ \theta \eta \mu$ ．
3 ย่Kعĩvo̧．

4 k $\alpha$ í．
5 vıká $\omega$（participle）

$7 \pi \alpha ́ \lambda ı v$.

# HISTORY AND GEOGRAPHY. 

[Candidates for the Freshman Class will take I., II., III., and any other two. Candidates for the
Sophomore Class will take IV., V., VII., IX.]
I. Bound the basin of the Po, of the Mississippi, of the St. Lawrence.
II. Name the chief rivers of Ancient Gaul and modern France. Is France larger or smaller than Transalpine Gaul? What are the two principal rivers that rise in the Alps? Where is Mount Blanc?
III. Where is the Source of the Danube? of the Volga? of the Ganges? of the Amazon?
IV. Describe the route of the Ten Thousand, or lay it down on a map.
V. Leonidas, Pausanias, Lysander.
VI. Pharsalia, Philippi, Actium, - geographically and historically.
VII. Supply the two names left blank in the following passage from the Oration for the Manilian law:
"Non dicam duas urbes potentissimas, Carthaginem et Numantiam ab eodem $\qquad$ esse deletas; non commemorabo nuper ita vobis patribusque esse visum, ut in uno _________ spes imperii poneretur, ut idem cum Jugurtha, idem cum Cimbris, idem cum Teutonis bellum administraret." Who was Jugurtha? Where was Numantia?
VIII. Compare Athens with Sparta.
IX. Pericles: - the Man and his Policy.

## ARITHMETIC.

Give the work in full; - reduce each answer to its simplest form; and write and arrange your exercise in a legible and orderly manner.
*Applicants for Advanced Standing may omit Nos. 1, 2,3, and 6.
*1. Reduce $\frac{184800}{1180410}$ to its lowest terms.
What is a prime number? When are two numbers said to be prime to each other? Reduce the numerator and denominator of the above fraction to their prime factors.
*2. From $5 \frac{1}{3}$ subtract $\frac{3 \frac{7}{16}}{3 \frac{1}{9}} \div\left(\frac{3}{10}\right.$ of $\frac{4 \frac{5}{7}}{2 \frac{2}{3}}$ of $\left.4 \frac{1}{6}\right)$. Simplify by cancelling.
*3. Divide 33368949.63 by 0.007253 . What is the quotient of 3336.894963 by 72530 ? What is the third power of 0.1 ? of 100 ? Write these answers in words.
4. Find the cube root of 0.0093 to five places of decimals. Find the square root of 531.5 to three places of decimals.
5. Reduce to their lowest terms as vulgar fractions the infinite or circulating decimals 0.225 , 0.00225 , and 0.25225 . Reduce $\frac{3}{7}$ to a circulating decimal.
*6. From 1 sq. rod 5 sq. ft. subtract 7 sq. yd. 139 sq. in.
7. Find the amount of $£ 5012 \mathrm{~s}$. 5 d . at simple interest at 8 per cent., at the end of 5 years 2 months and 3 days.
8. One metre $=39.37$ inches. Compute from this datum the value of 4 miles in kilometres.

## LOGARITHMS AND TRIGONOMETRY.

9. What is the logarithm of 1 in any system? of any number in a system of which that number is the base? In a system of which the base is 4 , what is the logarithm of $64 ?$ of 2 ? of $8 ?$ of $\frac{1}{2}$ ?
10. Find by logarithms, using arithmetical complements, the value of the fraction

$$
\frac{(0.02183)^{2} \times(7)^{2 / 3}}{\sqrt{(0.0046) \times 23.309}}
$$

11. Prove the formula for the cosine of the sum of two angles; and deduce the formulas for the cosine of the double of an angle and the cosine of the half of an angle.
12. In what quadrants is the cosine positive, and in what quadrants negative? Prove the values of the cosine of $0^{\circ}, 90^{\circ}, 180^{\circ}, 270^{\circ}$.
13. Given in an oblique triangle $b=0.254, c=0.317, B=46^{\circ}$. Solve completely.

## ALGEBRA.

Give the work in full; reduce the answers to their simplest form; and write and arrange your exercise in a legible and orderly manner.

1. Reduce the following expression to its simplest form:

$$
\left(9 a^{2} b^{2}-4 b^{4}\right)\left(a^{2}-b^{2}\right)-\left(3 a b-2 b^{2}\right)\left(3 a\left[a^{2}+b^{2}\right]-2 b\left[b^{2}+3 a b-a^{2}\right]\right) b
$$

2. Divide $36 x^{2}+1-64 x^{4}-12 x$ by $6 x-1-8 x^{2}$.
3. What is the reason that when different powers of the same quantity are multiplied together their exponents are added?
4. Reduce to one fraction, with the lowest possible denominator: $\frac{3 a+2 b}{a+b}-\frac{25 a^{2}-b^{2}}{a^{2}-b^{2}}-\frac{a}{2 b}$
5. Divide $\frac{x+y}{x^{2}-2 x y+y^{2}}$ by $\frac{x^{2}+x y}{x-y}$; and reduce the answer to its lowest terms.
6. Find $x$, in terms of $a, b$, and $c$, from the equation $\frac{a-2 x}{b}=\frac{c x-b c}{a}$. What is the value of $x$ when $a=2, b=-1, c=3 ?$
7. A man bought a watch, a chain, and a locket for $\$ 216$. The watch and locket together cost three times as much as the chain, and the chain and locket together cost half as much as the watch. What was the price of each?
8. Solve the equation $\frac{5 x}{x+12}-\frac{8-3 x}{3 x-1}=1$.
9. Find $(a-b)^{6}$ and $\left(x y-\frac{x^{3}}{2 y}\right)^{6}$ by the Binomial Theorem.

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## PLANE GEOMETRY

1. Prove that the perpendicular from the centre of a circle upon a chord bisects the chord and the arc subtended by the chord.
2. To circumscribe a circle about a given triangle.
3. Prove that two angles are to each other in the ratio of two arcs described from their vertices as centres with equal radii.
4. Prove that a line drawn through two sides of a triangle parallel to the third side divides those two sides into proportional parts.
5. State and prove the proportion which exists between the parts of two chords which cut each other in a circle. State what proportion exists when two secants are drawn from a point without the circle.
6. Prove that two regular polygons of the same number of sides are similar.
7. Prove that similar triangles are to each other as the squares of their homologous sides.
8. Show how the area of a polygon circumscribed about a circle may be found; then how the area of a circle may be found; then prove that circles are to each other as the squares of their radii.

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