

3. Draw a single pulley that will give no mechanical advantage and another single pulley which will give a mechanical advantage. Show the reason for the difference in mechanical advantage.
4. A piece of aluminum whose volume is 6.8 cc. weighs 18.5 grams. Find its weight in a liquid twice as heavy as water.
5. The following units are purposely misplaced and the statements, as they now stand, are nonsensical, but by an interchange of the first words in each statement, they may be made good sense. Make the proper interchange and so make six correct statements.
 - (a) *Work* of 10 foot-pounds per second.
 - (b) *Mass* of 10 foot-pounds.
 - (c) *Velocity* of 10 feet.
 - (d) *Length* of 10 miles per hour.
 - (e) *Acceleration* of 10 lbs.
 - (f) *Power* of 10 feet per second per second.
6. If it takes a man five seconds to fall from his air-plane, what would be his velocity on striking the ground, and how far would he have fallen during the five seconds? Give the correct units in your answer.
7. What multiple would the velocity obtained in the last question be of that of a train going 30 miles an hour? Or, describe a siphon, with drawing, in such a way as will show how clearly you understand the cause of flow of the liquid.
8. Describe resonance. Or draw different kinds of lenses. What are the two classes? What is the difference between a *real* focus and a *virtual* focus? How may either be obtained experimentally? Or what is meant by a magnetic substance? Give an experiment to illustrate induced magnetism.
9. Explain what is meant by harmonics or overtones. Or make plain that you really understand why pouring water into a dish may make visible a previously invisible body on the bottom. Or explain why an electro magnet is more powerful than a helix of wire without the core and why a horse shoe magnet is most often employed.
10. Many candidates make a mistake and describe a thermometer instead of a barometer instead of a thermometer, but a thermometer is sealed at both ends and a barometer is sealed only at one end. Why is this? How and why do the two instruments differ in length? Why is there a very narrow tube with a comparatively large bulb on the thermometer while the barometer tube is wider and has no bulb on the end? Why are the two filled differently?

LATIN.—X.

3 to 5 p. m., Thursday, 24 June, 1920.

1. Decline the pronoun *idem*, and conjugate the present indicative of *eo*, *volo* (wish), *malo*, *nolo*.
2. (a) Define a deponent verb, and give principal parts of *moror*, *polliceor*, *sequor*, *patior*.
(b) Distinguish both as to form and meaning between the active and passive periphrastic conjugations.
3. Point out the difference between English and Latin in respect to the construction following the active voice of verbs of *saying*, *thinking*, *knowing* and *perceiving*. Write in Latin: He says the Romans will (are about to) come. They see that the Romans are pitching their camp.
4. Give as full a list as you can of Latin verbs, which, tho their English equivalents are transitive, govern the dative case.