

# Granada Hills

## 1. Biology

### Toss Up: Multiple Choice

The organ that produces glucagon is under what organ-system?

W) Musculo-Skeletal

X) Nervous

Y) Endocrine

Z) Circulatory

**Toss Up Answer: Z**

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### Bonus: Short Answer

Most pharmaceutical insulin is produced using what species of bacteria?

**Bonus Answer: E. Coli**

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## 2. Mathematics

### Toss Up: Short Answer

What is the sum of coefficients of the expression  $(x+1)^3$  (cubed)

**Toss Up Answer: 8**

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### Bonus: Short Answer

A student is riding a roller coaster. The track resembles the equation  $y = \sin(t)$ , where  $y$  is the height and  $t$  is the time elapsed in seconds. At what time, rounded to the nearest second, does the student reach the first peak of the roller coaster? Assume degrees.

**Bonus Answer: 90**

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## 3. Chemistry

### Toss Up: Multiple Choice

What is the name of the group of the periodic table that includes selenium?

W) Halogens

X) Noble gases

Y) Alkali metals

Z) Chalcogens

**Toss Up Answer: Z**

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### Bonus: Short Answer

What is the general name of the compounds that are highly toxic and are formed from reacting ammonia with baking soda?

**Bonus Answer: Chloramines**

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## 4. Earth and Space Science

### Toss Up: Short Answer

Tahiti, an archipelago in the South Pacific, is an example of what type of island?

**Toss Up Answer: Oceanic**

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**Bonus: Short Answer**

CuFeS<sub>2</sub> , one of the most common ores for mining copper, is the chemical formula for what mineral?

**Bonus Answer: Chalcopyrite**

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## 5. Energy

**Toss Up: Short Answer**

In what city was the protocol that phased out the use of chlorofluorocarbons signed?

**Toss Up Answer: Montreal (Do not accept Vienna)**

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**Bonus: Multiple Choice**

At what national laboratory was a Shelby Cobra 3D printed in 2015?

- W) Oak Ridge National Laboratory
- X) Argonne National Laboratory
- Y) Lawrence Berkeley National Laboratory
- Z) Lawrence Livermore National Laboratory

**Bonus Answer: W**

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## 6. Biology

**Toss Up: Multiple Choice**

What part of the brain controls the ability to understand speech?

- W) Olfactory
- X) Frontal
- Y) Broca's Area
- Z) Wernicke's Area

**Toss Up Answer: Z**

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**Bonus: Short Answer**

Which neural tissue facilitates neural messages from the left to the right hemispheres?

**Bonus Answer: Corpus Callosum**

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## 7. Physics

**Toss Up: Multiple Choice**

A runner begins a sprint on a perfectly circular track. In 5 seconds, the runner travels exactly    of lap. If the runner begins with a velocity of 10m/s, and ends with a velocity of 10m/s, what is the average angular velocity of the runner?

- W) 5
- X) 12

Y) 13

Z) 18

**Toss Up Answer: Z**

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**Bonus: Short Answer**

What is the angular momentum of a solid sphere with a mass of 100 Kilograms and a radius of .1 Meters rotating at an angular velocity of 5 radians per seconds about the center of the sphere?

**Bonus Answer: 2**

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## 8. Earth and Space Science

**Toss Up: Multiple Choice**

Which of the following elements exist in the highest concentration on the surface of the moon?

W) Aluminum

X) Nickel

Y) Silicon

Z) Iron

**Toss Up Answer: Y**

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**Bonus: Short Answer**

A sun-like star has an apparent magnitude of 8, and an absolute magnitude of 3. Approximately how far away is the star in kiloparsecs?

**Bonus Answer: 0.1**

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## 9. Physics

**Toss Up: Short Answer**

Name every force that is acting upon a mid-air cannonball that was shot from a cannon at a 45 degree angle, ignoring air resistance

**Toss Up Answer: Weight (Accept: Force of gravity/Gravitational force)**

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**Bonus: Short Answer**

Planet Phi, weighing 100 kg, is 13 meters away from Planet Theta of 1200 grams. In kilograms per meters per second squared, what is the Universal Gravitational Force expressed between the two planets? Round to one significant figure.

**Bonus Answer:  $5 \times 10^{-11}$**

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## 10. Biology

**Toss Up: Multiple Choice**

One mantis shrimp has how many more sets of photoreceptors than one dog?

W) 2

X) 4

Y) 14

Z) 27

**Toss Up Answer: Y**

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**Bonus: Short Answer**

By name or number, name all of the following species that produce insulin in the Brockmann body.

- I) Salmon
- II) Chimpanzee
- III) Horse
- IV) Tilapia
- V) Octopus

**Bonus Answer: I and IV only**

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**11. Mathematics**

**Toss Up: Short Answer**

Assuming random chance decides admission, and the acceptance rate for University A is 10% and the acceptance rate for University B is 20%, what is the probability that a student will be rejected from both to the nearest hundredth.

**Toss Up Answer: 0.72 (Accept 72%)**

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**Bonus: Multiple Choice**

A teacher wants to buy pizza for the very hardworking kids of Science Bowl. Which of the following options will provide the least square inches of pizza per dollar?

- W) 2 10 inch diameter pizzas for \$15
- X) 2 square pizzas with side length 10 inches for \$20
- Y) 1 14 inch diameter pizza for \$12
- Z) 1 12 inch diameter pizza for \$10

**Bonus Answer: X**

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**12. Earth and Space Science**

**Toss Up: Short Answer**

What two isotopes of hydrogen are used to produce helium in nuclear fusion?

**Toss Up Answer: Deuterium and Tritium**

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**Bonus: Multiple Choice**

Which of the following types of Martian Meteorites are the most commonly found on Earth?

- W) Nakhla
- X) Shergottite
- Y) Zagami
- Z) Chassignite

**Bonus Answer: X**

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### 13. Biology

#### Toss Up: Short Answer

Red-green color blindness is a sex-linked recessive disorder. If a color blind father has children with a carrier mother, what percentage of their daughters should be red-green colorblind?

Toss Up Answer: 25%

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#### Bonus: Short Answer

Shaggy fur is dominant over straight fur and white fur is dominant over brown fur. If a hamster with straight, white (homozygous) fur is mated with a heterozygous shaggy, white hamster, what percentage of their offspring should have straight, white fur?

Bonus Answer: 50%

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### 14. Chemistry

#### Toss Up: Short Answer

Helium has a molar mass of 4 grams per mole and effuses at a rate of 10 moles per minute. If you have an unknown gas with a molar mass of 16 grams per mole, How many moles per minute would it effuse at?

Toss Up Answer: 5

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#### Bonus: Short Answer

By name or number, indicate all of the following choices that would undergo SN1.

- I. 2-bromo-2-methylpropane
- II.  $\text{CH}_3\text{CHCHCH}_2\text{Cl}$
- III. Polyethylene

Bonus Answer: I only

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### 15. Energy

#### Toss Up: Multiple Choice

What type of geothermal power plant relies on highly pressurized water to generate electricity?

- W) Dry Steam
- X) Binary Cycle
- Y) Subsurface reservoir
- Z) Flash Steam

Toss Up Answer: Z

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#### Bonus: Short Answer

What nuclear power plant was formerly located on the Pacific Coast of California in San Diego County and was closed in 2013?

Bonus Answer: San Onofre

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### 16. Chemistry

#### Toss Up: Short Answer

What element has one electron in the 4f subshell?

**Toss Up Answer: Lanthanum**

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**Bonus: Multiple Choice**

The compound  $\text{NbCl}_5$  would have which of the following shapes?

- W) octahedral
- X) seesaw
- Y) square planar
- Z) trigonal bipyramidal

**Bonus Answer: W**

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## 17. Earth and Space Science

**Toss Up: Short Answer**

Which scientist is noted with identifying the relationship between a galaxy's distance from a body and its speed?

**Toss Up Answer: Edwin Hubble**

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**Bonus: Multiple Choice**

Which of the following is close to the value of the average temperature of Venus's atmosphere?

- W) 270 C
- X) 390 C
- Y) 470 C
- Z) 590 C

**Bonus Answer: Y**

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## 18. Physics

**Toss Up: Short Answer**

What is the spin of a tau neutrino?

**Toss Up Answer: \_**

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**Bonus: Short Answer**

A system contains a capacitor with two plates. The area overlapped by two plates is  $5\text{m}^2$ . The dielectric constant of this system is 3.5. Initially, the capacitance is 20 farads. What is the distance between the plates?

**Bonus Answer: 7/8**

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