Institute \$ 75 multine m # " Institute \$ *** Institute m # " multine m # 3 multine m # 'S Institute # # 'S PE myinne # # ** matine # # 3 PS matine # # 3 PS stitute # # 'S PE **ROUND 9** Ro **TOSS-UP** 1) PHYSICS Multiple Choice Which of the following is the magnitude of the focal length of a spherically curved convex mirror in air, where *R* stands for the radius of curvature: 而如此他教祥等死 而时间的称林塔梯 而时间他新林等除 Ro muitute # # 13 X) R divided by 1 X) R divided by 2 Y) R divided by 2 W) R divided by 1.22 Y) R divided by 1.5 Z) R times 4 ANSWER: X) R DIVIDED BY 2 stitute # # * * Constitute # # 'S PE ·13 9% 面动机机称林塔 Y. **BONUS** 1) PHYSICS Short Answer An emergency floodlight draws 1 ampere from its battery pack. How many coulombs will flow through the light in 4 hours? SHULL ME W. Y. Y. PR 上都林 落 吼 ·斯林·洛佩 Ro ANSWER: 14,400 A the state of the 物於 **TOSS-UP** 2) CHEMISTRY *Multiple Choice* About how many calories per gram will it take to sublimate 加加加加 multilite 新林 送 K 面就抽版新林塔 mutute # ** Y. water at standard pressure: W) 180 X) 360 Y) 540 Z) 720 加加林林塔梯 (Solution: sublimation is solid \rightarrow vapor; 80 cal + 100 cal + 540 cal = 720 cal) 频林塔梯 N. ANSWER: Z) 720 institute # No. 2) CHEMISTRY *Multiple Choice* A Buchner (read as: BYOU-kh-ner) funnel is a piece of laboratory glassware often used in chemistry labs for which of the following procedures: W) combustion X) filtration mininte # # B matitute ## # '\$ 1% Withte # # 13 PR Y) centrifugation ANSWER: X) FILTRATION N. institute # High School Round 9 Page 1 to the the B. Ph. to the the B. Ph. to the the B to the We the to the the the to the the B

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W) winds

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- X) subsidence
- Y) lowered atmospheric pressure

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Z) low sunlight levels

ANSWER: W) WINDS

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5) EARTH SCIENCE *Multiple Choice* Which of the following is generally NOT true of the alpine versus arctic tundra biomes:

W) alpine tundra does not contain permafrost whereas arctic tundra does contain permafrost

- X) alpine tundra is warmer and has a longer growing season than arctic tundra
- Y) alpine tundra has a lower species diversity than arctic tundra

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Z) alpine tundra has less severe winters than arctic tundra

ANSWER: Y) ALPINE TUNDRA HAS A LOWER SPECIES DIVERSITY THAN ARCTIC TUNDRA

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前加度新林塔梯 面就抽推新林塔 6) GENERAL SCIENCE *Short Answer* Name 2 of the following 4 choices that are the 2 main logical reasoning methods used in science: inductive; synthetic; observational; deductive

ANSWER: INDUCTIVE; DEDUCTIVE matime # #

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6) GENERAL SCIENCE Short Answer To the nearest whole number, convert 50°F into kelvin:

ANSWER: 283

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(Solution: 5/9(50° – 32°) = 10° C + 273 = 283 K)

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mstitute # * 7) ASTRONOMY Multiple Choice Which of the following is NOT true:

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- W) the star Sirius at its brightest has an apparent magnitude of about negative 1.5
- X) metal-rich stars sometimes have planets

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- Y) typical binoculars allow observation of stars with apparent magnitudes of about 9.0
- Z) the Sun has an apparent magnitude of about negative 12

ANSWER: Z) THE SUN HAS AN APPARENT MAGNITUDE OF ABOUT NEGATIVE 12

(Solution: the Sun's apparent magnitude is -26.73)

mistitute ## 7) ASTRONOMY *Multiple Choice* Astronomers will often refer to certain stars as low metal content stars. In this sense astronomers consider metals as any element:

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- W) heavier than helium
- Y) heavier than copper Z) heavier th

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ANSWER: W) HEAVIER THAN HELIUM

面动机能称林塔 8) PHYSICS Multiple Choice Which of the following MOST directly determines the permittivity of a material:

TOSS-UP

- W) ability of the material to magnetize (%)
- X) electrical susceptibility
- Y) electrical insulation capacity
- Z) electrical conductivity

ANSWER: X) ELECTRICAL SUSCEPTIBILITY

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ANSWER: FARADS PER METER mythute ## # '& PL multilite # # B Withthe the the 's PR

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Withith # # ** 9) CHEMISTRY Multiple Choice Which of the following is one of the main reasons why oxygenates are used as gasoline additives:

- W) allow for more complete combustion
- X) decrease sulfur buildup in engine pistons
- Y) prevent water condensation in stored fuels
- Z) corrosion inhibition

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ANSWER: W) ALLOW FOR MORE COMPLETE COMBUSTION

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9) CHEMISTRY Short Answer Consider the following equilibrium reaction, $PCl_{5(gas)} \leftrightarrow PCl_{2(gas)} + Cl_{2(gas)}$ If a 2 male a set of 2 male and 2 male a set of 2 male a $PCl_{5(gas)} \leftrightarrow PCl_{3(gas)} + Cl_{2(gas)}$. If a 2 mole sample of PCl₅ dissociates to give 0.2 moles of Cl₂ at equilibrium, find the molar amounts, to the 1st decimal place, of PCl₅ at equilibrium:

ANSWER: 1.8

(Solution: 2 - 0.2 = 1.8)

TOSS-UP

exchange genetic information? 10) BIOLOGY Short Answer During what phase of meiosis-one do homologous chromosomes ite See W

ANSWER: PROPHASE-ONE (ACCEPT: PROPHASE)

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10) BIOLOGY Short Answer Order the following 3 choices from the EARLIEST stage to the LATEST stage of ovarian follicle development, and identify which of the structures is typically the LARGEST: secondary follicle; corpus luteum; corpus albicans

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ANSWER: SECONDARY FOLLICLE; CORPUS LUTEUM; CORPUS ALBICANS; mutante ## # 13 1% Astitute the the the astitute ## # '3 PR Astitute the the " the LARGEST = CORPUS LUTEUM Astitute ## # '\$ Willing # # 'S

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Institute \$ 75 面对机机称样等除 TOSS-UP Ro 15) PHYSICS Short Answer What is the general term for the process of making different types of semiconductors by adding slight amounts of impurities into the silicon matrix? ANSWER: DOPING R tinstitute \$5 \$ BONUS 🖄 15) PHYSICS *Short Answer* What specific type of semiconductor is produced by doping silicon with argenic? with arsenic? ANSWER: N-TYPE Institute ## # '& R Ro millitute # # titute **TOSS-UP** 16) CHEMISTRY Multiple Choice The reaction $CuCl_2 + Na_2S \rightarrow CuS + 2NaCl_2$, is an example of what class of chemical reaction: mutute ## # B mutute ## # 'S PL multille ## # 'S P& W) synthesis X) sinc¹ R X) single replacement Y) double replacement Z) decomposition Alitute # # # 18 周时间的称林塔院 Ro ANSWER: Y) DOUBLE REPLACEMENT Taritute # # BONUS 16) CHEMISTRY Short Answer Name all of the following 4 species that contain an odd number of electrons: O₂¹⁻; O₂²⁻; SO₂; CO ANSWER: O_2^{1-} matitute ## # '\$ 12 militute ## # 18 antitute the the "3 PE matinue ## # 18 Y. mutute # # '\$ % mutule ## # '& PL institute ## # '\$ 1% Astitute the the 'S PR Astitute # # 13 PR mitute ## # 18 18 No. 而如此他教林塔梯 面对加根都林塔梯 maxitute ## # '& R 而时间很新林塔梯 Autitute the tot is the Withite the the 's the N. to the the B. Ph. to the the the to the the the

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W) meristem

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- X) ground tissue
- , pumary cellsZ) germinal tissue Y) primary cells

ANSWER: W) MERISTEM

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ANSWER: MIDDLE LAMELLA

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13 Ph ANSWER: VERTICAL LINE TEST (ACCEPT: VERTICAL LINE) minine ## 物水

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18) MATH Short Answer Find the x and y intercepts of the line passing through the point (4, 8)that is perpendicular to the line 3x - 6y - 12 = 0:

ANSWER: *X*-INTERCEPT = (8, 0) (ACCEPT: 8); *Y*-INTERCEPT = (0, 16) (ACCEPT: 16)



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面的机机都拼答 **TOSS-UP** Ro 19) EARTH SCIENCE Multiple Choice Which of the following is a medium or coarse-grained rock that consists primarily of plagioclase feldspar and pyroxene and is essentially the plutonic equivalent of basalt: matilule ## # '& PL 而时间推动林塔梯 面的机机器带样接触 mythute ## # ' K W) diorite N. Y) andesite Z) gabb ANSWER: Z) GABBRO 柳林、浅外 Y. musitute ### BONUS % 19) EARTH SCIENCE *Multiple Choice* Scoria is most typically described as having which of the following textures: W) phaneritic Institute the the 'S PE 面动地推荐林客席 mutute ## # 'S PL mininte ## # B Y) porphyritic Z) vesicule 1/3 Ph Ro ANSWER: Z) VESICULAR 1/2 Ph 1× 1% 1% mailule # # '3 N. TOSS-UP 20) GENERAL SCIENCE *Multiple Choice* Blepharitis (read as: bleff-ah-rye-tis) in humans is an inflammation of the: W) urinary bladder mittute ## # '\$ 1% 面动机机称林塔然 Withthe Start to PS withthe \$6 \$ 15 X) evelid No. Y) fingernail institute \$19 Z) tongue ANSWER: X) EYELID **BONUS** N. 20) GENERAL SCIENCE Multiple Choice Which of the following is a principal component of a siderite meteorite: W) neptunium X) carbon matine # # 3 PE Withte # # 3 PS Antitute the tot is the bilinte # # * 18 Y) iron 柳林場際 N. Z) erbium stitute the ANSWER: Y) IRON Page 10 High School Round 9 to the the Bell to the the B to the the the

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面影曲地教養後 23) CHEMISTRY Short Answer What are the 2 alkenes (read as: al-KEENS) with the shortest carbon chains and lowest molecular weights?

ANSWER: ETHYLENE; PROPYLENE (ACCEPT: ETHENE; PROPENE)

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tinstitute \$10 \$ 23) CHEMISTRY *Short Answer* Arrange the following 4 metals in order of increasing reactivity in dilute HCl: zinc; aluminum; gold; calcium

ANSWER: GOLD; ZINC; ALUMINUM; CALCIUM 面动机机称林塔

TOSS-UP

24) BIOLOGY Short Answer Which one of basic plant cell types has a primary and secondary cell wall that is dead when mature? maximue ## # 3 PS 面动机机新林等除

ANSWER: SCLERENCHYMA

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24) BIOLOGY *Short Answer* Name all of the following 4 plants that produce seeds: mutute # # '& R mstitute # # ' K mutute # ** cycads; ferns; mosses; conifers 80

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institute # ANSWER: CYCADS; CONIFERS

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而此此他称样姿化 25) CHEMISTRY Short Answer What is the general name for a substance that facilitates a chemical reaction by providing an alternative reaction pathway with a lower activation energy while remaining unaltered?

ANSWER: CATALYST 面动机机称林塔 stitute ###

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matinte ## # '& K 面如此推荐林塔梯 加加加他称林塔路 25) CHEMISTRY Short Answer You need to prepare 500 milliliters of a 0.100 molar NaOH solution from a 0.250 molar solution. What volume, in milliliters, of the 0.250 molar solution must mutute # # 'S R be diluted to 500 milliliters? stitute # # # 18 alitute \$ # # B Withthe # # # 18

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ANSWER: 200

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(Solution: $M_1V_1 = M_2V_2$; (0.250M)(*x*) = (0.100M)(500ml), *x* = 200 ml)

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