Solutions Manual for the

2018 – 2019

"Preparing for the ACT Test"

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English Test: Passage I: Mystery Paper Sculptor, Page 12

1. A – **Intricately** is the best choice to describe the **complexity** of the paper sculptures.

2. G – This choice allows the sentence to flow logically and the modifiers are clearly linked with the nouns.

3. A – Dubbed is the best choice since the staff created a unique name, "poetree".

4. F – The comma creates a natural pause after the introductory prepositional phrase.

5. C – "as horses leap" puts a plural noun and verb together.

6. F – No punctuation is required after the word, "dragon".

7. D – This is a concise way to state that various other sites experienced these sculptures.

8. G – "Eventually" is the proper transition word giving the concept of time.

9. C – "creator" is the subject and must have a singular verb, "is". Beware of those prepositional phrases when doing subject-verb agreement.

10. J – "Regardless of who..." creates a smooth transition to the idea of the intention of the sculptor.

11. C – "her" corresponds with the gender of the sculptor mentioned earlier.

12. F – The other options are redundant with the word "thanks".

13. B – This explains the motivation of the sculptor.

14. J – This is the simplest and clearest way to state the discrepancy between the love for books and the destruction of books to do her art.

15. B – And is the best conjunction.

Passage II: Building a Cork Boat

16. G – We need to bracket the parenthetic expression with commas.

17. C – Of the options, the use of the two dashes is the only one that works properly.

18. F – No punctuation is needed in this part of the sentence.

19. C – "First" sets up the description of several sequential attempts to connect the corks.

20. G – Need to use "than" and "year's" to properly describe the anticipated production time.

21. D – The paragraph describes techniques he used to put corks together, so the word, "strategy", is appropriate.

22. G – Hexagonal is a specific description of the shape of the assembled corks.

23. C – This option creates a parallel form "ing", for the two verbs.

24. H – The word "rigorous" describes a challenging assembly process.

25. B – Proper conjugation of the verb.

26. F – The only comma required is after the introductory clause, "But...".

27. C – Better refers to the preferred choice with two options.

28. *F – No punctuation is required.*

29. D – Any mention is Portugal is redundant since the country was mentioned previously.

30. G – This describes what he likely said as he made his cork pick-ups from the restaurants.

Passage III: Lightning in the Sand

31. C – This removes any redundancy.

32. J – No punctuation is required.

33. C – "Burns" creates the dramatic description of a powerful force.

34. G – "Though" needs to be set apart because it is parenthetic to the flow of the sentence.

35. A – The easy breakage explains why the fulgurite is so hard to find in tact in nature.

36. J – The word "while" is unnecessary as a connecting word and the other options do not make good connections. Omit is the best approach.

37. C – Sustained winds tend to expose these fragile objects.

38. F – If the winds uncovered the object, it might be visible.

39. D – This statement talks about the outside surface; later the passage describes the interiors.

40. H – "Speckled" captures the light, sporadic arrangement of the bubbles.

41. B – Place the phrase after bubbles which it describes.

42. F – *This is the best choice using the preposition "to".*

43. C – This option ties into the word, "laughed" used previously in the sentence.

44. G – Use "her" to tie in with "she".

45. A – This lists the states in which she searched beaches for the objects.

Passage IV: Planet Earth's Windiest Observatory

46. F – "its" is the possessive form and does not require an apostrophe.

47. B – We need the comma to pair with the comma after the word "facility" and the use of "have" matches the plural "conditions".

48. G – We do not need the comma after "mountains", but do need one after "Peak".

49. D – To emphasize the extreme weather, the comparison to Antarctica is the best choice.

50. F- No change required here as F is the most concise way to recognize the effect of the steep slopes in accelerating the wind.

51. B – We do not require parentheses for the actual wind speed, but do need a strong form of punctuation and the dash is appropriate. A colon could have been suggested, but a semi-colon is not strong enough.

52. F- The word "also" is sufficient to continue the listing of work that the Observatory does.

53. D- We do not require the word "of" since the "of" before "clouds" is sufficient for all three examples of "understanding".

54. H – The simple statement is the best way to describe the work schedule.

55. D – We do not require a contrasting word in this sentence.

56. H – The vehicle has mechanisms for dealing with the snow.

57. A – There are two separate thoughts here and thus two distinct sentences provide the best solution.

58. G – We are looking for a contrast to direct involvement at the site and this option provides it.

59. C – This goes directly after the statement of the hourly data collection.

60. J – This article focuses heavily on the research that is done at the Observatory.

Passage V: The Real McCoy

61: C – This option is the only one that is grammatically correct.

62. G – Commas are not needed.

63. D – This is all that is required and other choices have redundancy.

64. J – The other options are redundant.

65. B – Choice B does give a better picture of the connection between his work for the Railroad and his invention.

66. F – It is best to use the word "number" instead of "amount" since stops can be counted.

67. B – This choice uses the "ing" for of the two verbs.

68. F – This sentence provides an example of other applications of his railroad inventions.

69. D – No word is required at this place in the sentence.

70. F – It was through the "recognizing" that he designed steam engine oilers. Basic idea is that moving parts require lubrication.

71. C – Continuous operation was a result of these oiling innovations and this increase productivity and profits.

72. H – This option keeps the connection between innovation and factory success.

73. D – Working well is the goal of product selection. In today's marketplace, one example of this same emphasis it "genuine GM parts".

74. F – The article started with the question of where the "real McCoy" originated.

75. D – This sentence provide a nice transition between the notion of inferior product and the decision to buy the proven product.

MATHEMATICS TEST

1) SET UP A PROPORTION:

$$\frac{3}{6} = \frac{5}{X} \Rightarrow \begin{aligned} 3X &= 30 \\ X &= 10 \end{aligned}$$

[C]

2) THERE ARE 32 NON-OFFICER MEMBERS
[35-3=32]

PROBABILITY[HIROKO] = 1/32

[K]

3) SINCE THE COMMON BASE IS 2, FOR THE EQUALITY WILL HOLD IF EXPONENTS ARE EQUAL.
THUS:

$$\begin{aligned} 2X+7 &= 15 \\ 2X &= 8 \\ X &= 4 \end{aligned}$$

[B]

4) $f(X) = 5X^2 - 7(4X+3) = 5X^2 - 28X - 21$

$f(3) = 5(3)^2 - 28(3) - 21 = 45 - 84 - 21 = -60$

[J]

5) THERE ARE 8 TWENTIES OUT OF A TOTAL OF 20 BILLS.

$P[\$20] = \frac{8}{20} = \boxed{\frac{2}{5}} = 0.40$

[D]

6) $40 + 2X = 35 + 3X$

$\boxed{5 = X}$

[H]

7) THE DIAGONAL BISECTS THE ANGLES.
THUS $\angle BCA = 57°$
THUS $\angle BAC = 180 - (40+57) = 180 - 97 = 83°$
FINALLY, $\angle CAD = 83°$

[D]

8) $\dfrac{8(\frac{1}{2}) - 3}{\frac{1}{2}} = \dfrac{4-3}{\frac{1}{2}} = \dfrac{1}{\frac{1}{2}} = 2$

[G]

9) THE X COORDINATE IS MIDWAY BETWEEN 1 & 3: +2
THE Y COORDINATE IS MIDWAY BETWEEN 8 & -4: +2
MIDPOINT: (2, 2)

[D]

10) MAXIMUM IS 12 FEET; MINIMUM IS 6 FEET
Δ DEPTH = 12 - 6 = 6 FT.

[G]

11) SLOPE $= \dfrac{\Delta Y}{\Delta X} = \dfrac{(-5-1)}{(2-(-2))} = \dfrac{-6}{+4} = -\dfrac{3}{2}$

[D]

12) $\$221 = 17(X-30)$ $\quad X = \text{SPEED}$

$221 = 17X - 510$

$731 = 17X$

$\underline{43 = X}$

[H]

13) EQ. 1: $8X = 12$ $\quad$ EQ. 2: $2Y + 10 = 22$

$X = \frac{3}{2}$ $\quad$ $2Y = 12$

$Y = 6$

SUM $= \frac{3}{2} + 6 = \underline{7\frac{1}{2}}$

[B]

14) SUM OF FIVE SCORES $= 420$

AVERAGE = MEAN $= 420 \div 5 = 84$

MEDIAN = MEAN $= 84$

$420 - 84 = 336$

[H]

15) $||-8+4| - |3-9|| = ||-4| - |-6|| = |4-6| = |-2|$

$= 2$

[D]

16) $X^{\frac{2}{3}} = \sqrt[3]{X^2}$

[K]

17) $4X = 7Y + 5 \Rightarrow 7Y = 4X - 5$

$Y = \frac{4X}{7} - \frac{5}{7}$

SLOPE $= \frac{4}{7}$

[B]

18) M EVEN & N ODD
SUM MUST BE ODD INTEGER

[K]

19) THIS IS A 3:4:5 RIGHT TRIANGLE

THUS $\overline{AB}$ IS 40
MIDPOINT IS HALFWAY: $40 \div 2 = 20$

[B]

20) SINCE WE DO NOT KNOW ANGLE $\angle DEF$
WE CANNOT DETERMINE $\overline{DF}$.

[K]

21) SURFACE AREA $= 2[8 \times 10] + 2[8 \times 15] - 60$
$= 2[80] + 2[120] - 60$
$= 160 + 240 - 60$
$= 340$ SQ. FT.

[B]

22) W = WIDTH $\quad L = W + 5$

$P = 2W + 2L \Rightarrow 2W + 2(W+5) = 40$
$2W + 2W + 10 = 40$
$4W = 30$
$W = 7.5$ IN.

[F]

23) $0.08(60) = (.2)X$
$4.8 = (.2)X$
$\frac{4.8}{0.2} = X$

$\boxed{24 = X}$

[C]

24) $\$175 = 14 \cdot X$
$12.5 = X$

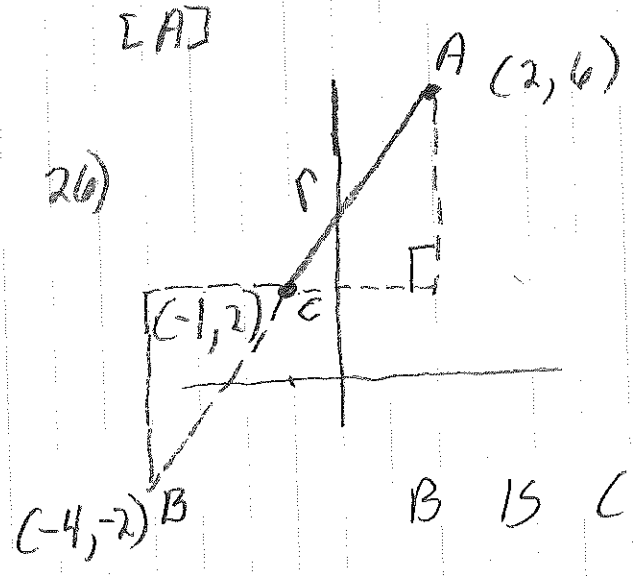
MUST BUY 13 TICKETS TO MAKE THE SEASON PASS ECONOMICAL.

[J]

25) $\dfrac{4.8 \times 10^{-7}}{1.6 \times 10^{-11}} = 3.0 \times 10^{4}$

[A]

26)



$r^2 = 3^2 + 4^2 = 9 + 16 = 25$

$r = 5$ [NOT NECESSARY TO FIND]

B IS $(-4,-2)$

[H]

27) $X^3 - 64 = 0 \Rightarrow X^3 = 64$
$X = \sqrt[3]{64} = +4$

FACTOR IS $(X-4)$

[A]

28) LIST #1 TOTALS $4 \times 90 = 360$
$360 - 80 = 280$ FOR 3 COMMON NUMBERS

LIST #2 TOTAL: $280 + 96 = 376$

AVERAGE IS $376 \div 4 = 94.0$

[H]

29) $a = -2.5 \quad a^2 = +6.25$

[E]

30) $\frac{9}{9} - \frac{2}{9} = \frac{7}{9}$ LEFT $\qquad \frac{7}{9} \div 3 = \frac{7}{9 \cdot 3} = \frac{7}{27}$

[J]

31) $30{,}030 \div 1{,}001 = 30$

$2 \cdot 3 \cdot 5 = 30 \quad \therefore \quad 2 \cdot 3 \cdot 5 \cdot 7 \cdot 11 \cdot 13 = 30{,}030$

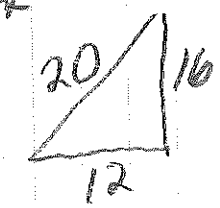
[E]

32) AREA OF TRAEZOID $= \frac{1}{2}(B_1 + B_2)h$

$= \frac{1}{2}(40+28) \cdot 16 = \frac{1}{2}(68)(16) = 544 \text{ IN}^2$

[G]

33) THE SLANT SIDE CAN BE FOUND BY A RIGHT TRIANGLE



3:4:5 TRIANGLE

PERIMETER $= 28 + 16 + 40 + 20 = 104''$

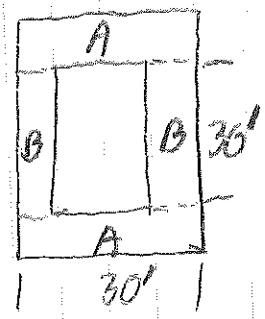
[E] $\quad 104'' \times 1.5 \frac{FT}{IN} = 156 \text{ FT.}$

34) $\frac{40}{28} = \frac{10}{7} = 1.42857...$

$142\frac{6}{7}\%$

[H]

35)



$AREA_A = 30 \times 3 = 90$

$AREA_B = 30 \times 3 = 90$

$TOTAL = 360\ ft^2$

[C]

36) MRS. SMITH'S COST:

3 FANS @ \$52 = \$156

3 SMALL @ \$39.50 = \$118.50

1 LARGE @ \$79 = \$79

TOTAL: \$353.50 → \$354.00

[J]

37) $P(2\ RAINY\ DAYS) = (0.2) \times (0.2) = 0.04$

[A]

38) THE FIRST 4 CHOICES ARE RATIONAL

F) $\sqrt{\frac{1}{4}} = \frac{1}{2}$ G) $\sqrt{4} = 2$ H) $(\sqrt{8})^2 = 8$ J) $\sqrt{16} = 4$

K) $\sqrt{2} + 2\sqrt{2} = 3\sqrt{2}$ IRRATIONAL

[K]

39) $\text{TAN}(\theta) = \frac{4}{10} = \frac{2}{5}$

[D]

40) $|2X-6|+3=5$
$|2X-6| = 2 \Rightarrow 2X-6 = 2$ & $2X-6=-2$
$2X = 10$ $\quad 2X = 6$
$X = 5$ $\quad X = 3$

THIS MATCHES THE EQUATIONS IN [K]

[K]

41) SINCE THESE ARE CUMULATIVE
$13-12 = 1$ SCORE FROM 71-80

[A]

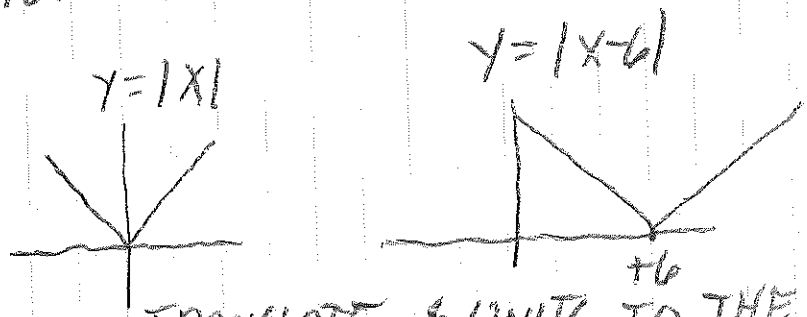
42) $d = 10 \text{ LOG}\left(\frac{1}{K}\right) = 10 \text{ LOG}\left(\frac{1000K}{K}\right) = 10 \cdot \text{LOG}(1000)$
$= 10 \cdot 3 = 30$

[G]

43) 1 POINT: 60 PTS $(80 \times .75 \times 1)$
2 POINT: 108 $(60(.9)(2)$
3 POINTS: 45 $(60(.25)(3)$
TOTAL 213 POINTS

[C]

44)



TRANSLATE 6 UNITS TO THE RIGHT

[F]

45) VOLUME OF SOLDIER $= L \cdot W \cdot \Delta d = 8 \cdot 6 \cdot 2.6 = 124.8$
$\cong 125\ CM^3$

[A]

46) $V_{PACKING} = V_{BOX} - V_{CYLINDER} = (18)^3 - \pi(6)^2 \cdot (12)$

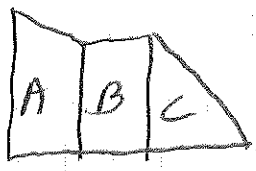
[J]

47) 15 ft = 5 yds AREA = 5 X 7 = 35 YD^2
21 ft = 7 YDS

[B]

48) THE SOLID CIRCLE MEANS THE CHEAPER FARE IS \$9 FOR TARY TAXICABS

[G]

49) 

AREA A = TRAPEZOID $= \frac{1}{2}(4+3)(2) = 7$

AREA B = RECTANGLE $= 1 \cdot 3 = 3$

AREA C = TRIANGLE $= \frac{1}{2}(2)(3) = 3$

TOTAL $= 7+3+3 = 13$

[B]

50) LET X = SMALLER & Y = GREATER NUMBERS

a) $X + Y = 151$

b) $X = \sqrt{Y} + 19$

$X - 19 = \sqrt{Y} \Rightarrow Y = (X-19)^2 = X^2 - 38X + 361$

c) $X + (X^2 - 38X + 361) = 151$

$X^2 - 37X + 361 = 151$

$X^2 - 37X + 210 = 0$

$(X-30)(X-7) = 0 \Rightarrow X = 30$ OR 7

SO Y COULD BE $151 - 30 = \underline{121}$

OR $151 - 7 = \underline{144}$

SO $Y - X = 121 - 30 = 91$

OR $Y - X = 144 - 7 = 137$

[J]

51) THERE IS AN EVEN NUMBER OF NUMBERS

Y MUST BE 15 TO HAVE THE MODE

THE MEDIAN IS $\frac{30+X}{2} = 25 \Rightarrow 30 + X = 50$

$X = 20$

SO LIST IS: 41, 35, 30, 20, 15, 15

MEAN $= \frac{\text{SUM}}{6} = \frac{156}{6} = 26$

[C]

52) $rX + sX^2 = t$ FROM $Y = X^2$

$sX^2 - rX - t = 0$

$X = \dfrac{+r \pm \sqrt{r^2 + 4st}}{2s}$

LOOK AT $r^2 + 4st$. THIS MUST BE GREATER THAN ZERO TO HAVE 2 REAL ROOTS.

[F]

53) THE SEQUENCE MUST BE 3, 8, 13, 18

50TH TERM IS $3 + 49 \cdot 5 = 248$

[A]

54) $\sin^2(X) + \cos^2(X) = 1$ FOR ALL X

[H]

55) $f(X) = \csc(4X) = \dfrac{1}{\sin(4X)}$ WHICH GOES TO ∞ WHEN $\sin(4X) = 0$

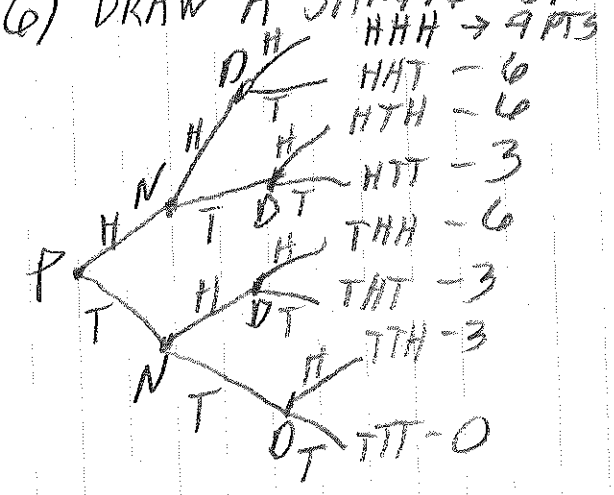
TYPICAL PERIOD FOR $\sin(4X) = 2\pi$

THIS FUNCTION HAS A PERIOD WHICH IS $\frac{1}{4}$ AS LONG

THUS; $2\pi \cdot \frac{1}{4} = \frac{\pi}{2}$

[E]

56) DRAW A SAMPLE SPACE:



PROBABILITY OF ANY OF THE 8 OUTCOMES IS:

$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$

EXPECTED VALUE IS:

$\frac{1}{8}[9+6+6+3+6+3+3+0]$

$= \frac{1}{8}[36] = 4.5$ OR $\frac{9}{2}$

[H]

57) $K^2 - 12 = K \Rightarrow K^2 - K - 12 = 0$

$(K-4)(K+3) = 0$

$K = 4, -3$

$\boxed{K = 4}$

[B]

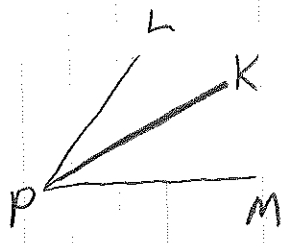
58) $i^N = 1$ CYCLES EVERY FOUR INTEGERS

$i^1 = \sqrt{-1}$, $i^2 = -1$, $i^3 = -\sqrt{-1}$, $i^4 = 1$

[F]

59) $\sin(\frac{\pi}{2}) = 1$ & $\sin(-\frac{\pi}{2}) = -1$ $|\sin(\theta)| \geq 1$ ONLY HOLDS FOR THESE VALUES OF θ BECAUSE $|\sin(\theta)|$ CANNOT BE GREATER THAN 1

(60)



$11X = 2(4X+18)$

$11X = 8X+36$

$3X = 36$

$X = 12$

$4X+18 = 4(12)+18$

$= 48+18 = 66^\circ$

[K]

THE END!!

READING TEST

Passage I: Literary Narrative

1. A – The narrator is reflecting on a memorable time trial in swimming during his senior year in high school.

2. G – As the summer before his senior year ended, he was able to jump a long distance and pull down a string of flags for the first time.

3. A – The narrator hoped there would be plenty of swimmers to push him in attaining his goal, but, alas, he was the only one swimming the 1,000 yard freestyle.

4. J – He entered the "zone" where things slow down and he is able to find resonance in his performance. Many professional athletes report this phenomenon when they do exceptional things in a sport.

5. C – He realized that the world would not be changed if he qualified, but to him, it was all important at this point of his swimming experience.

6. G – If he did not qualify for Junior Nationals, his swimming season in high school would end.

7. D – The time trial this Sunday was hastily put together as a last chance to qualify for the National Event.

8. H – This was the narrator's interpretation of the cheering student's action.

9. C – The indoor pool was "a dank and moldy indoor pool."

10. F – Line 58 describes his September experience when he was able to pull down the string of flags.

Passage II: Social Science

11. D – The author describes the scene that was described by Vavilov in 1929.

12. G – The author is focused on the source of the apple and the fact that this natural fruit was domesticated over the centuries to what was in groceries.

13. D – Lines 31 -36 discuss the 157 plant species that support the domesticated products.

14. J – The famines are mentioned in lines 67 – 69 as a motivator for Vavilov's interest in becoming and agricultural scientist.

15. A – Plant diversity has been drastically reduced over the centuries and this puts our food supply at risk.

16. G – "Named and nurtured" most closely means "identified and cultivated".

17. B – As we lose species, we have less that can withstand the onslaught of disease and pests and when this becomes critical, scientists must develop new variations that can thrive.

18. H – Passage A celebrates the discovery of the source of apples while Passage B alert us to the risks inherent in our food supply.

19. A – The final paragraph discusses the reduction of apple varieties over the past four centuries.

20. H – Lines 46 – 50 provide a paraphrase of the discovery by Vavilov.

Passage III: Humanities

21. C – Berry was easy-going and played mainly in supportive roles with bands.

22. G – The author provides an early example of Berry's genius and talent.

23. D – In lines 13 – 21, the author connects Berry's lack of fame to his not doing many solos and was not a musical leader.

24. In line 19, the author mentions that Berry worked within the recording constraints of the era.

25. D – Lines 32 – 33 discuss the audience of dance parties for this kind of band music and it was not seriously studied.

26. F – "Court" means to attract or garner favor.

27. C – This whole article focuses on the supportive role of horn players in jazz music.

28. J- Line 71 describes the piece as, "odd, haunting, and ultimately relaxing".

29. A – Lines 77 – 78 note that this was the "sole recording in Berry's career to feature him from start to finish".

30. F – In lines 85 – 86, the author describes the piece as, "a cathedral of a solo in its flourishes, angles, ornamentations, reflexivity".

Passage IV: Natural Science

31. D – The main point of the article is to present an explanation for the warping of the Milky Way Galaxy, which is linked to a small satellite galaxy orbiting in a polar orbit above and below the galactic disk.

32. H – There has been some disagreement about the cause of warping in a spiral galaxy.

33. B- The next paragraph discusses the Sagittarius Dwarf Spheroidal Galaxy.

34. J – Line 63 states that Bailin's study is the first to find such a link.

35. C – Lines 80 – 81 state that the momenta are identical in both quantity and direction.

36. G – Lines 5 – 6 describe the "plum" as comprising older stars and a black hole.

37. A – The author mentions that the plum-and-pizza picture breaks down and the hurricane metaphor may be more illustrative.

38. G – Lines 21 – 21 mention a pizza dough being spun in the air by a chef.

39. A – Lines 39 – 41 describe a roughly polar orbit for this spheroidal galaxy.

40. J – Lines 67 – 68 describe the spin or rotation as the motion captured by angular momentum.

Science Test

Passage I:

1. C - Referring to Figure 1, cheese is about 185 mg according to the bar chart.

2. J - Figure 1 shows that peanuts decreased the most throughout the study and especially in the first time interval when the B. germanica would be most likely caught.

3. B - Table 1 shows that protein percentage increases as you read down the column from cat food to peanuts. Figure 1 shows that cat food had the most remaining and this remaining amount decreased as the percent protein increased.

4. D - Each time interval shows a decrease in the mass of food remaining in all four foods; thus this is consistent with the statement that the B. germanica ate during all time intervals.

5. A – The prediction that B. germanica would eat less cat food than ham by the end of the study is confirmed by Figure 1 and the difference between the bar heights is about 55 mg.

6. G – Table 1 shows that Cat food and Ham have more than 50% water content.

Passage II:

7. C – Student 1 states that all five properties must match and only C & D fit that criterion.

8. J – Samples G & H show the same mass, volume, and density, but different melting and boiling points.

9. C – According to the table, the melting point of Sample A is 126 degrees C. Thus it would be in the liquid form. (With a boiling point of 747 degrees C, it could not be a gas.)

10. J – None of the four students agrees with this statement. Student 3 comes close, but does not understand the central role of density, which allows one to ignore the mass and volume parameters in substance identification.

11. A – Samples A & B have equal values for the first three parameters (the key one is density!), but different melting and boiling points. Student 2 focuses on any 3 parameters and Student 3 focuses on the three specific parameter of mass, volume, and density.

12. F – Student 2 focuses on 3 or more properties and would thus agree with the statement, Student 4 requires melting points to be the same.

13. A – When a substance becomes a gas, the molecules will spread out and if the pressure remains at 1 atmosphere, the density will decrease.

Passage III:

14. H – In Experiment 2, 0.30 g of Ni at 30 degrees C resulted in a volume of gas of about 128 mL, according to Figure 2. Figure 1 shows that 128 mL of gas was collected for a mass of 0.30 g.

15. B – Only one temperature was tested in Experiment 1 while Experiment 2 indicates five different temperatures (10, 20, 30, 40, and 50 degrees C)

16. J – Multiple masses (5) were tested in Experiment 1, while Experiment 2 tested five temperatures for a single mass (0.30 g).

17. A – Atmospheric pressure remained constant at 758 mm Hg throughout all 3 steps of both experiments.

18. H – The graph in Figure 2 increases with the increasing temperatures. Thus, if we collected data a 5 degrees C, we would expect it to be less than 107 mL.

19. A – Each molecule of HCl has one hydrogen atom. One molecule of H_2 has two atoms of Hydrogen. Thus, if we have ten moles of HCl, there will be ten atoms of hydrogen and thus 5 molecules of H_2 gas. Each mole of a substance has the same number of molecules according to Avogadro.

20. G – According to Figure 1, 0.25 g of Zn will create 93 mL of gas. Thus two 60 mL test tubes will be required to collect the gas.

Passage IV:

21. C - In Figure 2, V_s is read on the left side of the graph. Thus the maximum positive value is approximately 250 V.

22. H – Time is read on the horizontal axis and the period of V_L in Figure 3 is 20 msec.

23 C – The amplitude of V_L shows the least variation over the time period.

24. H – The voltages of the inductor (V_L) and the capacitor (V_C) are always out of phase and thus are opposite in polarity. This relationship is clearly shown in Figure 3.

25. D – According to the description, negative current flows counterclockwise. Thus, in Figure 2, the solid curve, which is the current "I" is negative from 10 msec through 20 msec. At 15 msec, the current was definitely negative.

26. J – According to Figure 3, the voltage of the Capacitor (V_C) went up and then down. This matches the movement of charge on the Capacitor. With a Capacitor, as charge accumulates, the voltage increases and visa-versa.

Passage V:

27. C – Table 2 shows that Dish 4 has 107 colonies, which is the largest by far.

28. F – Dish 1 had no suspected mutagens mixed with it, so it served as a control on the study.

29. B – Using Tables 2 & 1, the ranking from least to most potential would be Dish 5, 2, 3, 4. Reference to Table 1 gives the Letter designation: P, L, M, N.

30. F – As the concentration of the substance P increases, the number of colonies increases.

31. D – This can be a little tricky. The only thing present <u>before</u> the bacteria were added was the nutrient agar.

32. F – Table 2 shows that Dish 2 had 14 colonies and Dish 3 had 25 colonies. Thus M had about twice the number of L.

33. D – Lacking any repair mechanisms, any repair capability would likely come from the mutagens being tested in the study. Otherwise, there would not be a clear connection between the mutagen and the growth of the bacteria colonies.

Passage VI:

34. G – If water were absorbed, it would affect the results. Choosing a plastic that is non-porous and impermeable, all the water could be accurately measured.

35. A – The new temperature is below the freezing point of water and thus it would be expected to have little to no ice melt.

36. J – Looking at Figure 1, the line graph for wind speeds of 1.0 and 2.5 m/sec showed no runoff after 500 minutes. The other two graphs go to zero after 500 minutes.

37. D – The trial without a sand layer reached a higher maximum and went to zero in the shorter time interval.

38. J – Looking at the levels of runoff in Figure 1 at 200 minutes, 2.5 m/s is the lowest, followed by 0 m/s. The other two fan speeds show similar levels. Thus choice J is the proper display.

39. B – Wind speed was not varied in Study 2, but sand was.

40. G – The volume of the sand layer is calculated by taking the depth (30 cm) times the length (120 cm) times the width (60 cm).

Writing Test

Sample Essay on Kid Stuff

Who says adults cannot play with toys?! Google doesn't when it encourages its employees to play in their workspaces or in larger congregating areas. Colleges and universities are creating Maker Spaces where students and faculty can interact with one another and try to create interesting things. Playfulness is a useful attitude and can be instrumental in the creative process.

Good parenting gives adults the opportunity to interact with children in their world and with their things. Make-believe is great fun with a child who can take a cardboard box and make it into anything from a rocket to a treasure chest. Effective play releases endorphins in both adults and children and serves to relieve stress in those who partake in these hands-on activities. Play can also help all of us partake in group activities such as card games, on-line video games, and numerous sporting endeavors such as walking, jogging, softball, tennis, and golf. And by the way, these activities can be great for one's health and longevity.

We talk a lot in academic and business environments about breaking down silos and creating appreciation for different points of view. One recent observation at a national level is that politicians used to move to Washington and engage in neighborhoods with others from different persuasions and learned to enjoy each other's company. Most do not now take their families to their capitals and fly home on weekends, thus eliminating the opportunities to know each other as soccer moms and weekend warriors. Perhaps our country would not be as divided if we learned to live and play with each other, as children do on a communal playground.

Many adults like to revisit interests that they enjoyed as children or youth. Often adult responsibilities force the suppression of interests such as music, art, and many other enjoyable pastimes. A rekindled interest in comic books, adventure novels such as those by Zane Grey, movies with super-heroes, and hiking in the woods all allow us to nurture those child-hood interests. I know of one adult who did not have the opportunity to learn how to play the piano as a youth and when he had children of his own, he joined them in taking lessons and playing in the annual recitals. Another took up painting and painted a number of pieces that he shared with friends.

Mature, adult action has its place when there are important decisions to be made or serious work to be done. Also, adults can model how to deal with setbacks and learn from mistakes. But in everyday interaction with others, a playfulness can break down various generation gaps and keep lines of communication open between adults and youth, parents and children, teachers and students. Young people can also feel empowered when they can help an adult download an app for a Smartphone, or show someone how to play a videogame.

Children love to be active and engage in sporting activities. It is important to their self-esteem, sense of belonging to a team, and learning how to compete in the world. Athletic activities are also healthy for children and adults need to be physically active to maintain good health and to relieve stress.

I understand that children need their space and do not need adults hovering and engaging in each and every interest that a young person might have. However, the real overlapping interests that are healthy for both generations should be nurtured and the world will be a more accepting place when we break down the barriers between generations.