



FILIPKNOW'S
NMAT
REVIEWER

**A Comprehensive Reviewer for the
National Medical Admission Test**

Ultimate NMAT Prep

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How to Get High NMAT Score Without Review Center: A Definitive Guide.

To qualify for the best medical schools in the Philippines, it's not enough that you have Latin honors or stellar GPA.

Your NMAT ranking or score is equally important.

The NMAT or National Medical Admission Test is a prerequisite for entering a Doctor of Medicine program in the Philippines. While other lesser known schools don't put much weight on your NMAT performance, top schools like UP, UST, and UERM have cutoff scores of 90+, 85, and 75, respectively.

NMAT, therefore, should never be taken for granted because how you perform in the exam can literally define your future as a medical student.

In this guide, we've carefully curated all the best NMAT tips and tricks to ensure you can ace the exam even without enrolling in a review center.

Stick to your own learning style.

At this point, you must have a clear idea already of what makes you tick as a student. In other words, you already know what reviewing or studying techniques work best for you.

Everyone is different. Some learn more by reviewing alone while others absorb more information by joining group studies. Others extract more from audio-visual learning materials while others thrive by reading books.

As the saying goes, if it isn't broke don't fix it. Stick to your own style and make every minute of your review count.

Strengthen your weaknesses.

Reviewing for NMAT is like preparing for UPCAT or civil service exam: You don't have all the time in the world so might as well review strategically.

In the case of NMAT, you only have 2 months at best (if you're taking the March/April schedule) to dedicate for the review. So how can you make the most out of it? By focusing on your weakest areas.

Take a diagnostic exam. Either use the practice test provided to you by CEM or find free/paid NMAT reviewer online. The result of this initial practice exam will give you an idea about the nature of NMAT and which subject areas you need to spend more time on.

When I took the NMAT years ago, I knew right off the bat that I suck at Math and Physics. The diagnostic exam I took only confirmed it.

By knowing your weaknesses from the get-go, you will be able to dedicate more time brushing up on the concepts you've (intentionally) forgotten and in so doing improve your final NMAT score/rank.

Also, don't forget that **NMAT scoring is based on percentile ranking** which means your grade isn't equivalent to the number of questions you got right but on the number of examinees who scored lower than you.

Since most students hate subjects that have anything to do with numbers, you can outperform them and possibly get a 90+ ranking by doing well in these areas (more on this in the next section).

Know the coverage of the exam.

Assuming that you already know your weaknesses based on the results of the diagnostic test, it's time to dust off your old high school or college notes and start reviewing.

However, you can't start the review unless you know what to review in the first place. Know the coverage of the NMAT and use it as a guide on what topics to prioritize.

Subtest	Content Area / Item Type	Items	Time Allotment
Part 1			
Verbal	Analogies Reading Comprehension	40	40 minutes
Inductive Reasoning	Figure Series Figure Grouping Number and Letter Series	40	50 minutes
Quantitative	Fundamental Operation Problem Solving Data Interpretation	40	50 minutes
Perceptual Acuity	Hidden Figure Mirror Image Identical Information	40	40 minutes
<i>Time Limit*</i>			3 hours
BREAK			
Part 2			
Biology	Unity and Diversity of Life Cells and Cellular Processes Genetics The World of Plants and Animals Development Life Processes: Regulation and Homeostasis Organisms and Their Environment	50	35 minutes
Physics	Mechanics Thermodynamics Vibrations, Waves, and Optics Electricity and Magnetism Modern Physics	50	40 minutes
Social Science	Sociology and Anthropology Psychology	50	35 minutes
Chemistry	General Chemistry Analytical Chemistry Organic Chemistry Biochemistry	50	40 minutes
<i>Time Limit*</i>			2 ½ hours

NMAT is composed of two parts.

The first part is the Aptitude Test which measures the examinee's mental ability in answering questions from four

different categories: Verbal, Inductive Reasoning, Quantitative, and Perceptual Acuity.

Part I is the trickiest of the two. It relies on your aptitude more than your stocked knowledge. Most examinees fail to prepare well for this part since they didn't study most of it in high school or college unlike the subjects included in Part II.

The only way to get a high score in Part I is to practice answering as many questions as you can. Since most examinees focus on Part II, it will give you a great advantage if you outscore them in Part I.

NMAT, after all, is based on percentile ranking, not on your raw scores.

The second part, on the other hand, is the Special Areas test which includes questions from four subject areas believed to be the most critical in preparing students for medical education: Biology, Physics, Chemistry, and Social Science.

When reviewing for Part II, prioritize breadth over depth. Instead of delving into advanced concepts in each subject, review the basics usually included in your high school or college syllabus.

Remember, you should make each second of your limited time to review count by covering as many subjects as possible. You won't be able to do that if you waste time gaining "in-depth" knowledge about a single topic.

Take simulated, time-pressured practice tests.

Studies show that you retain more information through repeated testing than from repeated studying. This phenomenon is known as the testing effect and is hinged upon the universal truth that people learn more through application and trial-and-error.

To get your best NMAT score, practice taking exams similar to the content and length of the actual NMAT. You may use the free practice test sent to your e-mail upon registration or the mock exam included in this e-book.

The key here is to answer as many questions as possible to benefit from the testing effect.

Each mistake is an opportunity to improve your weaknesses and brush up on concepts you might have forgotten.

For example, if you got a wrong answer to a Physics question, you can compare your answer to other choices to see why you made a mistake. This is also a great reminder of why you should keep a note of the common Math and science formulas.

NMAT is a time-pressured exam so aside from understanding the test content, you also have to mimic the actual test conditions. To do this, **try answering the practice tests under time pressure: 3 hours for Part I and 2 1/2 hours for Part II.**

If you answer 75% of the questions correctly, you're in good standing. A score lower than 75% means you need more preparation to improve your base knowledge as well as analytical and application skills.

Practice tests should only be used as a guide in improving your test-taking skills. The questions will not likely appear in the actual NMAT so don't waste your time memorizing them.

In addition to improving your stored knowledge, the use of practice tests in your review also builds up your test-taking “muscles,” enabling you to make intelligent guesses even in items you don’t know anything about.

Manage your time wisely.

As a whole, NMAT is relatively easier compared to UPCAT.

However, time is every examinee’s greatest enemy. The first part alone consists of confusing and complex questions that can easily consume a huge chunk of your time if you’re not careful.

If the proctor allows it, wear an analog wristwatch (digital watches aren’t allowed) so you’ll be aware how much time is left and whether you’re already falling behind.

Never waste more than 3 minutes in a single item.

Depending on which strategy you’re most comfortable with, you can tackle either the easiest or the hardest questions first.

READ: How to Answer Multiple Choice Questions Like a Pro

Alternatively, you can classify each question based on its level of difficulty:

- **Easy** – items that you already know the answers to at one glance. Answer them right away.
- **Medium** – questions that require calculations and a little more thinking. Mark these questions and only go back to them once you’re done with the easier questions.

- **Hard** – test items that are too difficult to waste your time on. Make educated guesses and move on.

Additional NMAT Tips.

- **Sleep well before the day of the exam.** Lack of sleep severely derails one's concentration.
- If possible, **visit the testing location a few days before the exam** to familiarize yourself with the area, its traffic condition, and the specific room where you're assigned. If the room is air-conditioned, for example, it won't harm if you bring a jacket just in case.
- Don't forget to **bring the required documents on the test date:** NMAT Identification Form, Examination Permit, Valid School ID/Government-issued ID/Valid Passport, and photocopy of Transcript of Records (for college graduates only).
- **Bring enough pencils (No. 2 or HB) and erasers.** Examinees are also advised to bring a long transparent plastic envelope where they can put their personal valuables and other allowed items.
- **Arrive at the test site early, preferably a few minutes before 7:00 AM.** All examinees must be inside their testing rooms as early as 7:15 AM.
- **Eat a healthy breakfast.** The first part of the exam is 3 hours long so you should never go there with a grumbling stomach unless you want to ruin your concentration.
- **Bring a packed lunch** because the 1-hour lunch break is not enough to eat at nearby restaurants wherein the lines are expectedly long. You can also bring candies so you'll have an extra supply of glucose for your brain while taking the exam. Avoid foods that are crunchy or have strong odors.

Part I: Mental Ability

2

Verbal

Word Analogies

Directions: The questions that follow have two pairs of words. Analyze the first pairing and figure out how they're related to each other. The second pair is related to each other in the same way as the first pair. Choose the missing word from the given choices.

1. FOLLOW : CHASE :: NUDGE :

- A. THRUST
- B. PURSUE
- C. CATCH
- D. PRECEDE

2. MARATHON : RACE :: HIBERNATION :

- A. WINTER
- B. BEAR
- C. DREAM
- D. SLEEP

3. MEDICINE : ILLNESS :: LAW :

- A. ANARCHY
- B. THIRST
- C. DISCIPLINE
- D. SENSITIVITY

4. SCRUFF : NECK :: STERN :

- A. LECTURE
- B. DIRTY
- C. BOAT
- D. WARNING

5. PRINCIPLE : DOCTRINE :: LIVING :

- A. WILL
- B. DEAD
- C. LIKELIHOOD
- D. LIVELIHOOD

6. PALTRY : SIGNIFICANCE :: BANAL :

- A. DISCUSSION
- B. LANDSCAPE
- C. WEALTH
- D. ORIGINALITY

7. CHATTER : TALK :: FLUTTER :

- A. DANCE
- B. WOBBLE
- C. SING

D. FLAP

8. CONJUGATE : PAIR :: PARTITION :

- A. DIVIDE
- B. CONSECRATE
- C. PARADE
- D. SQUELCH

9. CHAGRIN : CRITICISM :: SAG :

- A. CRINGE
- B. PRESSURE
- C. NAG
- D. REDRESS

10. EXTORT : OBTAIN :: PLAGIARIZE :

- A. STEAL
- B. BORROW
- C. IGNITE
- D. APPEAL

11. PALLID : COLOR :: TACTLESS :

- A. HUE
- B. TASTELESS
- C. VERVE
- D. DIPLOMATIC

12. VAUNT : BOAST :: SKEWER :

- A. FLAUNT
- B. CRITICIZE
- C. PREPARE
- D. AVOID

13. DOG : KENNEL :: BIRD :

- A. FLY
- B. FEATHER
- C. AERIE
- D. EAGLE

14. SODDEN : MOIST :: MAUDLIN :

- A. SENTIMENTAL
- B. DISPASSIONATE
- C. REALISTIC
- D. BOLD

15. PRIDE : LION :: SHOAL :

- A. TEACHER
- B. STUDENT
- C. SELF-RESPECT
- D. FISH

16. HILT : SWORD :: NEEDLE :

- A. TEASE
- B. COMPASS
- C. DAGGER
- D. KILT

17. MAVEN : EXPERTISE :: SUPPLICANT :

- A. ARROGANCE
- B. WISDOM
- C. GRACE
- D. HUMILITY

18. DEFER: POSTPONE :: PROFFER

- A. CAUSE
- B. TENDER
- C. AVOID
- D. INFER

19. GALL : VEX :: HEX :

- A. FIX
- B. JINX
- C. INDEX
- D. VIXEN

20. MERCENARY : WAGES :: DILETTANTE :

- A. ENJOYMENT
- B. RIFLE
- C. STRIFE
- D. MARKET

Reading Comprehension.

Directions: This section contains passages from various sources. It will test your ability to understand what you read. Choose the correct answer to each questions asked after each passage.

For questions 21 - 27:

In the 16th century, an age of great marine and terrestrial exploration, Ferdinand Magellan led the first expedition to sail around the world. As a young Portuguese noble, he served the king of Portugal, but he became involved in the quagmire of political intrigue at court and lost the king's favor. After he was dismissed from service by the king of Portugal, he offered to serve the future Emperor Charles V of Spain.

A papal decree of 1493 had assigned all land in the New World west of 50 degrees W longitude to Spain and all the land east of that line to Portugal. Magellan offered to prove that the East Indies fell under Spanish authority. On September 20, 1519, Magellan set sail from Spain with five ships. More than a year later, one of these ships was exploring the topography of South America in search of a water route across the continent. This ship sank, but the remaining four ships searched along the southern peninsula of South America. Finally they found the passage they sought near 50 degrees S latitude. Magellan named this passage the Strait of All Saints, but today it is known as the Strait of Magellan.

One ship deserted while in this passage and returned to Spain, so fewer sailors were privileged to gaze at that first panorama of the Pacific Ocean. Those who remained crossed the meridian now known as the International Date Line in the early spring of 1521 after 98 days on the Pacific Ocean. During those long days at sea, many of Magellan's men died of starvation and disease.

Later, Magellan became involved in an insular conflict in the Philippines and was killed in a tribal battle. Only one ship and 17 sailors under the command of the Basque navigator Elcano survived to complete the westward journey to Spain and thus prove once and for all that the world is round, with no precipice at the edge.

21. In the spring of 1521, the ships crossed the _____ now called the International Date Line.

- A. imaginary circle passing through the poles
- B. imaginary line parallel to the equator
- C. area
- D. land mass

22. The passage was found near 50 degrees S of _____.

- A. Greenwich
- B. The equator
- C. Spain
- D. Portugal

23. Four of the ships sought a passage along a southern _____.

- A. coast
- B. inland
- C. body of land with water on three sides
- D. border

24. One of Magellan's ships explored the _____ of South America for a passage across the continent.

- A. coastline
- B. mountain range
- C. physical features
- D. islands

25. The Pope divided New World lands between Spain and Portugal according to their location on one side or the other of an imaginary geographical line 50 degrees west of Greenwich that extends in a _____ direction.

- A. north and south
- B. crosswise
- C. easterly
- D. south east

26. Magellan lost the favor of the king of Portugal when he became involved in a political _____.

- A. entanglement
- B. discussion
- C. negotiation
- D. problem

27. The 16th century was an age of great _____ exploration.

- A. cosmic
- B. land
- C. mental
- D. common man

For questions 28 – 33:

A soccer field is the setting in the untitled poem below, which was written by Ellen Bryant Voigt.

*Muscular and fleet, he moves without thinking
among the shifting jerseys on the field.
In his wake the paler one,
through wave after wave of the enemy line,
presses the white ball forward: winded and earnest,
he has willed his body to this pitch
until the body is inside his mind
as the mind arranges pieces on the board—now
he cuts a wide angle and passes the ball
though he knows his friend will never give it back.
Ahead of him, always ahead of him:*

*this is the pattern
already set in their early victories,
one at the prow, one at the wheel.*

*Poem from Two Trees by Ellen Bryant Voigt. Copyright © 1992 by
Ellen Bryant Voigt.*

28. In line 1, the word “fleet” most nearly means

- A tall.
- B swift.
- C strong.
- D awkward.

29. In line 3, the phrase “In his wake” means that “the paler one” is

- A. by his side.
- B calling to him.
- C. close behind him.
- D. making a final effort.

30. What is being described in lines 3–5 ?

- A. A soccer team trying to beat a much better team
- B. A soccer player maneuvering the ball past opponents
- C. Two friends competing in drills during soccer practice
- D. A soccer player imagining what an opponent will do

31. The player described in lines 5–7 is apparently

- A. pushing himself to the limit.
- B. playing carelessly, without thinking.

- C. slowing down the action to figure out what to do.
- D. too tired to be able to keep the ball under control.

32. Based on details in the poem, which of the following can be concluded about the soccer players?

- A. They are engaged in an unfriendly rivalry.
- B. They are accustomed to playing together.
- C. They are trying to work out a new formation.
- D. They are not very involved in the game.

33. One of the poem's main themes is

- A. the lack of team spirit exhibited by some players.
- B. the idea that competitive sports turn friends into enemies.
- C. the envy some players feel for the high-scoring players.
- D. the unselfishness required to be a good team player.

For questions 34 – 36:

The entire year of 1989 marked the grand return of the restored steam locomotive to northern Vermont; but people especially loved attending the Steam Train festival during autumn best. During that festival, when the train arrived into the station, the 150 ticketed passengers were transported back in time and treated to the sound of a strong welcoming whistle and the blast of heat from the boiler (if you were standing close enough on the platform) which was very welcome in the crisp cool air. A thrilling tour awaited them. Once everyone boarded the train; the opened windows in the passenger cars afforded passengers an exquisite fragrance of fall leaves and a coal burning steam engine would delight your nostrils in a way that no diesel engine could. If the passengers were not excited enough at this point, they certainly were when they experienced the power of the train reaching its leisurely cruising speed of 40 mph

and time seemed to slow down. Of note were the six passenger cars that were restored to exhibit the craftsmanship of 1918. Even the seats displayed the time honored and historically accurate period details of the early twentieth century. If the fortunate riders could manage to take their eyes away from this wonder of engineering and craftsmanship; the breathtakingly beautiful natural view of 30 miles of Vermont's fall foliage was theirs to behold, just a glance away out the window. At the furthest destination, an apple orchard awaited guests who disembarked. Here they could purchase the very apples that they hand-picked from the trees. It is no wonder that this steam train tour sold out quicker during the autumn than at any other time of the year. The only downside was that it was only a 3-hour round-trip excursion.

34. What is the main idea of this passage?

- A. People enjoy smelling leaves.
- B. Why especially people loved to ride this steam train in the fall.
- C. Coal pollutes the environment.
- D. This steam train tour would be better if it were shorter.

35. Which word best defines the function of the passage?

- A. interrogative
- B. exclamatory
- C. descriptive
- D. defaming

36. It can be implied by the passage that:

- A. after 1989 people got tired of riding the steam train.
- B. the apples were less expensive when you handpicked them.
- C. the author recommends taking this ride in the Fall.
- D. 3 hours on the steam train tour was too long.

For questions 37 – 40:

In a director's effort to produce movies on time and under budget, the quality of said movie is sometimes lacking. Imagine watching a movie 10 times or more with a specific purpose. That purpose is not to memorize the lines or to relive the dazzling special effects. Instead, the goal is to find movie mistakes. This is exactly what Jon Sandys began doing in 1996 after watching the Steven Spielberg film entitled Jurassic Park and James Cameron's movie called True Lies while still in grammar school in England. He noticed several glaring errors in both. When he pointed them out to other people he found that the subject was of interest to many. People found it fascinating that even with the best of editors, mistakes make it to the final movie. Sandys eventually authored books and made regular appearances on a television show's segment that highlighted these movie mistakes. Currently, Sandys focuses primarily on the following types of cinema errors: ones that reveal the movie making process, audio problems, continuity problems, visible crew members, visible equipment, factual errors, plot holes, and character mistakes. He has built this interest into a profitable and very popular internet website. A good example of a movie mistake in Jurassic Park is evident when the T-rex does not leave or make any footprints in the soft mud during his attack on a car. Be observant the next time you watch a movie, perhaps you might spot a mistake!

37. Which of the following describe the Author's view?

- A. Film makers are not professionals.
- B. Rushing to meet production deadlines can produce movie errors that you can find.
- C. Editors need to return to film maker's college to learn new techniques.
- D. It is better to just enjoy a movie the way it is presented.

38. It can be inferred from the passage, Jon Sandys acknowledged that most movies are not perfect and

- A. found ways to turn his interest in those mistakes into a career.
- B. made satirical short movies to ridicule the directors.
- C. tried to improve movies.
- D. was bitter about the mistakes.

39. According to the passage Steven Spielberg:

- A. has made some of the best action movies of all time.
- B. fired his editors to improve his films.
- C. made some errors in his film Jurassic Park.
- D. consulted with James Cameron to make perfect movies

40. Which of the following is not considered a movie mistake?

- A. When an actor's lips do not move when he is heard speaking a line.
- B. If a microphone is seen above an actor's head in a movie set in 1776.
- C. During one scene, the hair style of a character mysteriously goes from combed to uncombed repeatedly.
- D. A boring plotline.

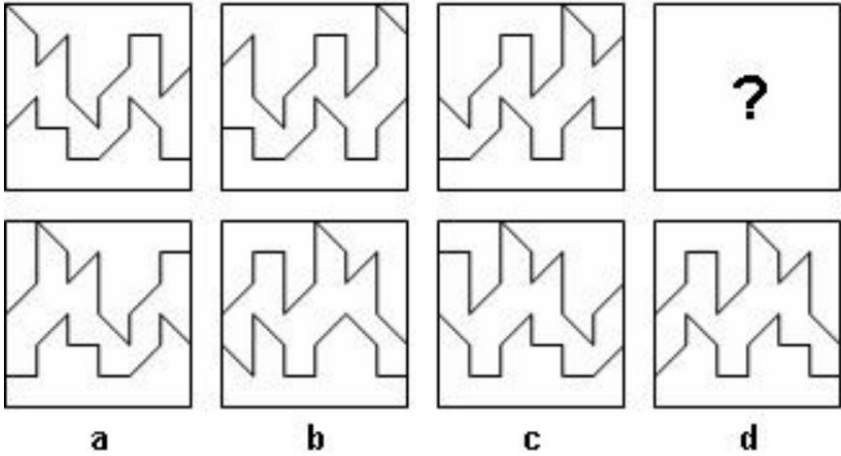
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Inductive Reasoning

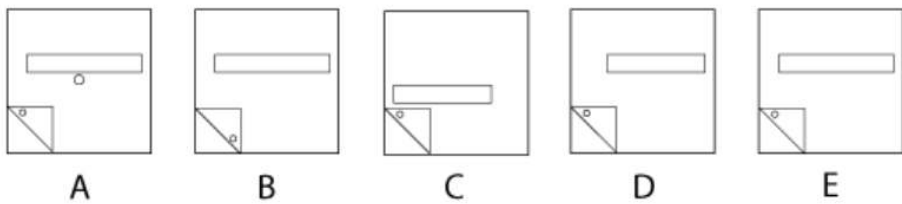
Figure Series.

Directions: In each question, you will be given a series of figures with a logical sequence. Determine the pattern and choose from the given choices the one that best matches the missing/next figure in the series.

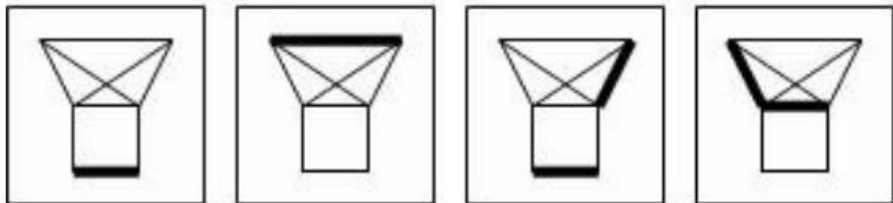
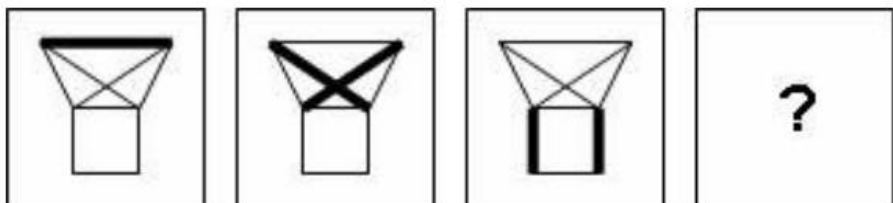
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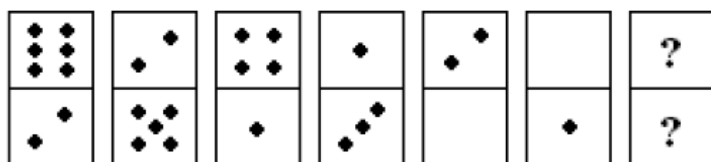
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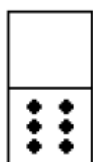
3.



4.



A



B



C



D

5.



A

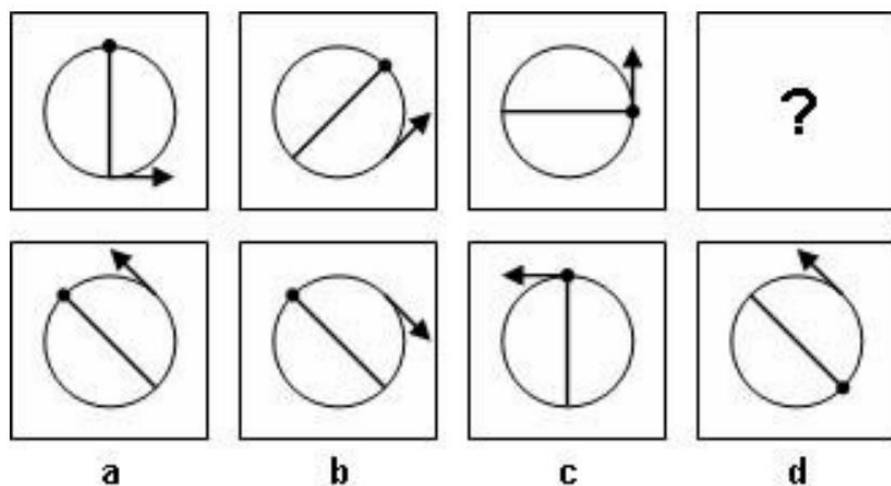
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C

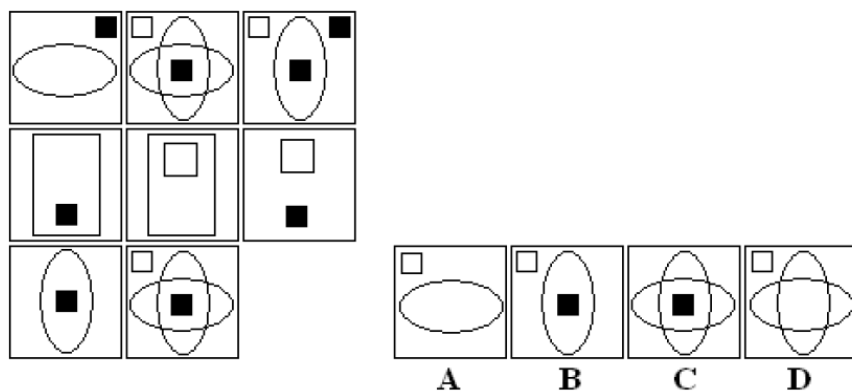
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E

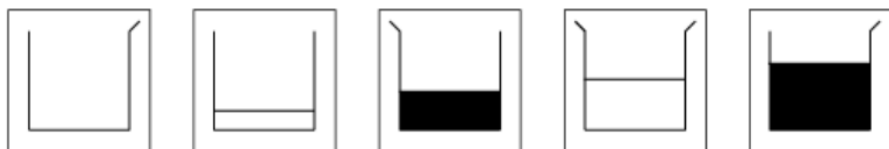
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8.



A

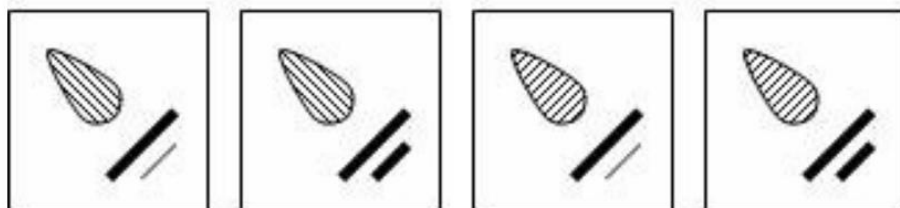
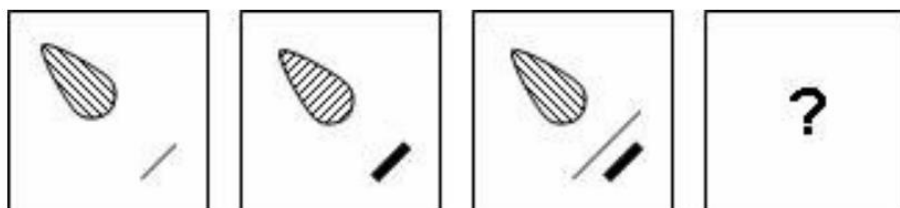
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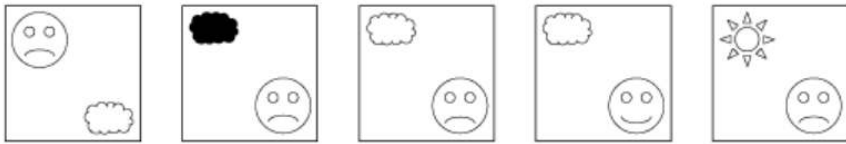
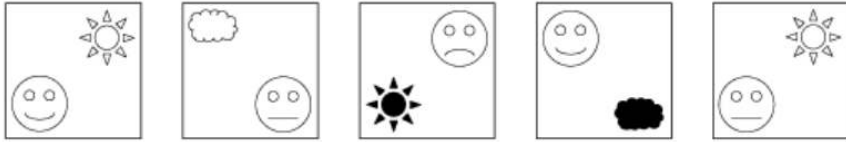
a

b

c

d

10.



A

B

C

D

E

Figure Grouping.

Directions: Each question features a set of figures. Analyze them and determine what makes them related to each other. The one that is different from/not related with all the other figures is the correct answer.

11.



A

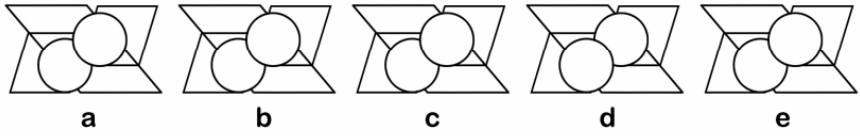
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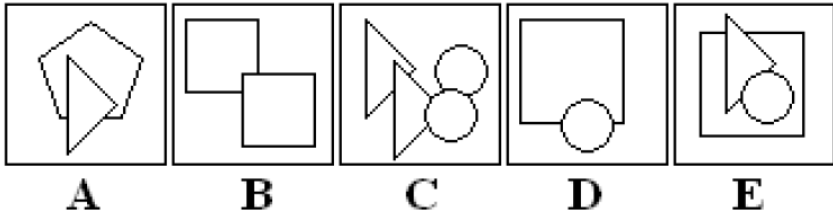
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E

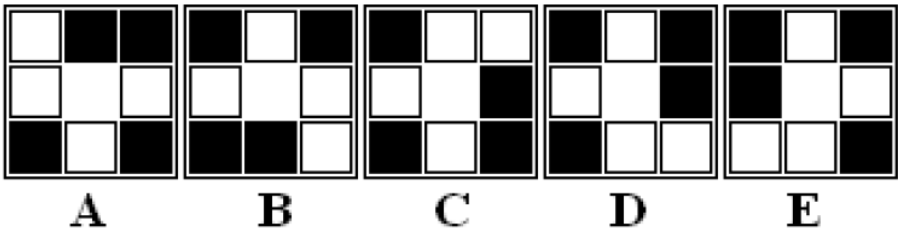
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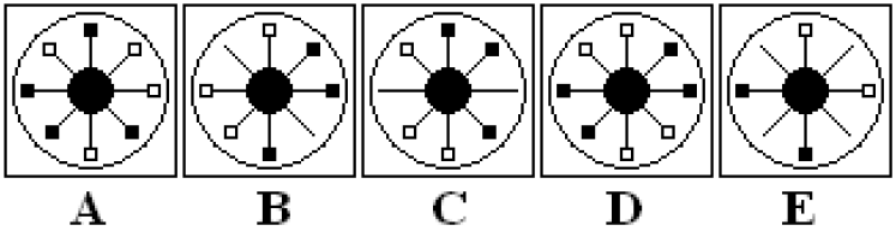
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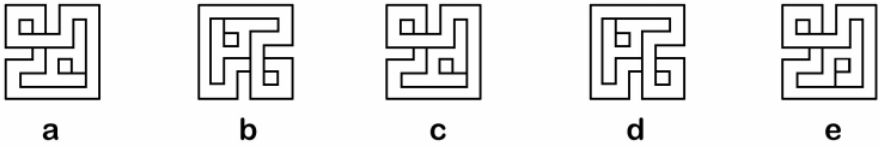
14.



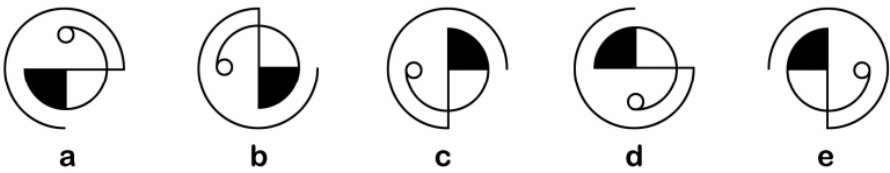
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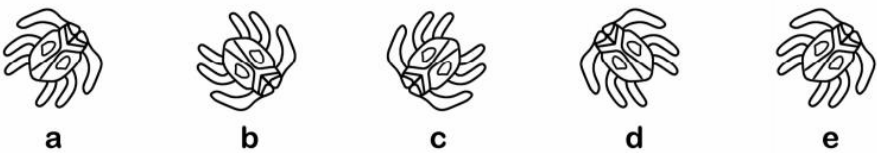
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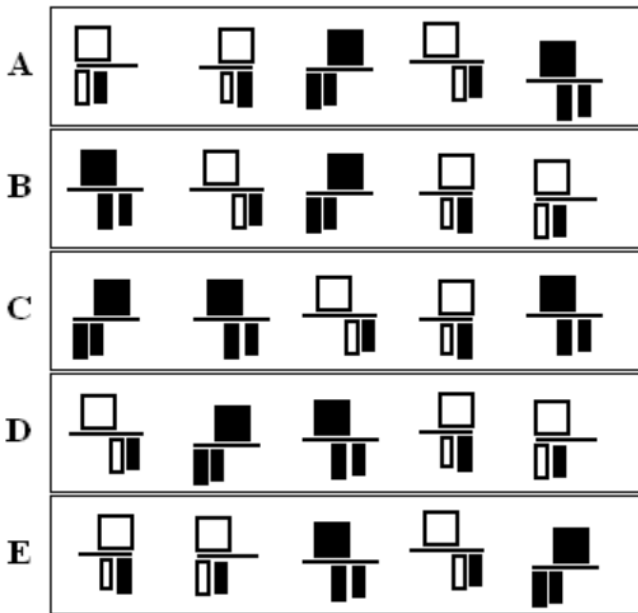
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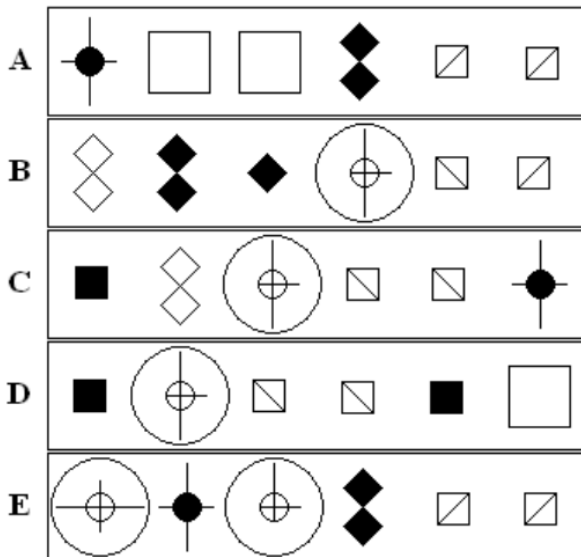
18.



19.



20.



Number and Letter Series.

Directions: Each number or letter series in the following questions has a pattern. Based on this pattern, choose from the choices the numbers or letters you think should come next in the series.

21. FAG, GAF, HAI, IAH, _____

- A. JAK
- B. HAL
- C. HAK
- D. JAI

22. JAK, KBL, LCM, MDN, _____

- A. OEP
- B. NEO
- C. MEN
- D. PFQ

23. BCB, DED, FGF, HIH, _____

- A. JKJ
- B. HJH
- C. IJI
- D. JHJ

24. 3, 11, 19, 27

- A. 33
- B. 35
- C. 37
- D. 39

25. 3, 6, 11, 18

- A. 24
- B. 25
- C. 26
- D. 27

26. 516, 497, 478, 459

- A. 436
- B. 440
- C. 438
- D. 452

27. QAR, RAS, SAT, TAU, _____

- A. UAV
- B. UAT
- C. TAS
- D. TAT

28. 4, 9, 13, 22, 35

- A. 57
- B. 70
- C. 63
- D. 75

29. 11, 13, 17, 19, 23, 29, 31, 37, 41

- A. 43
- B. 47
- C. 51
- D. 53

30. DKY FJW HIU JHS

- A. KGR
- B. LFQ
- C. KFR
- D. LGQ

31. BXJ ETL HPN KLP

- A. NHR
- B. MHQ
- C. MIP
- D. NIR

32. 15, 31, 63, 127, 255

- A. 513
- B. 511
- C. 517

D. 523

33. 5, 11, 17, 25, 33, 43

A. 49

B. 51

C. 52

D. 53

34. QPO, SRQ, UTS, WVU

A. XVZ

B. ZYA

C. YXW

D. VWX

35. P3C, R5F, T8I, V12L

A. Y17O

B. X17M

C. X17O

D. X16O

36. OTE PUF QVG RWH

A. SYJ

B. TXI

C. SXJ

D. SXI

37. BD GI LN QS

- A. TV
- B. VW
- C. WX
- D. VX

38. 126 64 34 20 14

- A. 12
- B. 14
- C. 16
- D. 18

39. 25 34 30 39 35

- A. 45
- B. 44
- C. 46
- D. 50

40. 198 194 185 169

- A. 154
- B. 165
- C. 144
- D. 134

4

Quantitative

Fundamental Operation.

Directions: This test will measure your skills in solving basic mathematical operations. Choose the best answer from the given choices.

1. $2.75 + .003 + .158 =$

- A. 4.36
- B. 2.911
- C. 0.436
- D. 2.938

2. $(3x - 2)(4x + 1) =$

- A. $12x^2 - 8x - 2$
- B. $12x^2 + 5x - 2$
- C. $x^2 - 5x - 2$
- D. $12x^2 - 5x - 2$

3. $7/20 =$

- A. 0.035

- B. 0.858
- C. 0.35
- D. 3.5

4. Solve the equations:

$$3x + 4y = 11$$

$$x - 2y = -3$$

- A. $x = 1$ $y = 2$
- B. $x = -1$ $y = 3/4$
- C. $x = 2$ $y = -3$
- D. $x = 1$ $y = -2$

5. $3(8 - 3) + \sqrt{49}$

- A. 28
- B. 36
- C. 22
- D. 40

6. $(2\frac{1}{4})(3\frac{1}{3}) =$

- A. $\frac{15}{2}$
- B. $\frac{30}{12}$
- C. 6
- D. $\frac{27}{40}$

7. $2 + (\frac{1}{3})^2 - \frac{4}{9}$

- A. $\frac{35}{9}$

B. $-1\frac{4}{9}$

C. $\frac{17}{9}$

D. $1\frac{2}{3}$

8. $(.3)^2 + (.03)^2 =$

A. .099

B. .9900

C. .0909

D. .9090

9. $3[(7 - 5) 2 + (20 - 19) 2] + 14$

A. 3

B. 57

C. 29

D. 1

10. $4[3 + 7(9^2)]$

A. 2280

B. 15, 888

C. 69, 696

D. 17, 424

11. $[2 \div (4 - 2) + 8^2] - [2 - (-1)]^2$

A. 62

B. 68

C. 60

D. 56

Problem Solving.

Directions: This section contains word problems which you should solve by applying basic math concepts. Choose the best answer from the given choices.

12. A soccer team played 160 games and won 65 percent of them. How many games did it win?

- A. 94
- B. 104
- C. 114
- D. 124

13. A repaving crew is putting a new surface on 79 kilometers of road. They have completed 28 kilometers. If they repave 3.4 kilometers per day in the next several days, how many more days will it take them to finish?

- A. 15
- B. 32.5
- C. 14.5
- D. 23

14. The Williams family wants to cover one wall in their living room with 1-foot square mirror tiles. The wall measures 8 feet by 10 feet. How many mirror tiles will they need to cover the wall?

- A. 8
- B. 10
- C. 18
- D. 80

15. The perimeter of a square is 20. Which of the following represents the area?

- A. 5
- B. 10
- C. 20
- D. 25

16. The main road in Belleville is $7\frac{3}{10}$ miles long. So far, $2\frac{3}{4}$ miles have been repaved. How many miles have not been repaved?

- A. $4\frac{11}{20}$
- B. $5\frac{11}{20}$
- C. $4\frac{1}{6}$
- D. $5\frac{1}{6}$

17. A box in a college bookstore contains books, and each book in the box is a history book, an English book or a science book. If one-third of these books are history books and one-sixth are English books, what fraction of the books are science books?

- A. $\frac{1}{3}$
- B. $\frac{1}{2}$
- C. $\frac{2}{3}$
- D. $\frac{3}{4}$

18. Which of the following is the smallest?

- A. $\frac{11}{15}$
- B. $\frac{4}{5}$
- C. $\frac{21}{25}$
- D. $\frac{5}{6}$

19. Kenji has 8 apple trees that each produces about 20 bushels of apples, and 12 apple trees that each produces about 25 bushels. In total, about how many bushels of apples do his trees produce?

- A. 45
- B. 900
- C. 460
- D. 300

20. At a certain convention, the ratio of men to women was 3 to 8. If there were 352 people there, how many were men?

- A. 32
- B. 96
- C. 132
- D. 220

21. The measures of two angles of a triangle are 35° and 45° . What is the measure of the third angle of the triangle?

- A. 95°
- B. 100°
- C. 105°
- D. 110°

22. Last year, about 2,400 people participated in a local Fourth of July parade. This year, about 3,200 people participated. What was the approximate percent increase in participation?

- A. 25%
- B. 50%
- C. 75%
- D. 33%

23. A person travels to work at an average speed of 40 mph, and returns home at 60 mph. Which of the following, in mph, is the average speed for the entire trip?

- A. 45
- B. 46
- C. 48
- D. 52

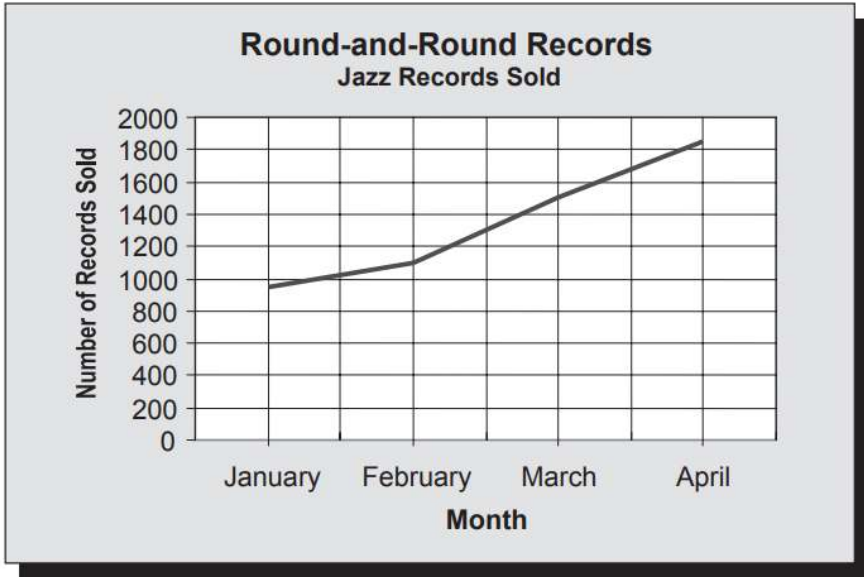
24. Erica bought $3\frac{1}{2}$ yards of fabric. If she uses $\frac{2}{3}$ of the fabric to make a curtain, how much will she have left?

- A. $\frac{1}{6}$ yd.
- B. $\frac{1}{3}$ yd.
- C. $1\frac{1}{6}$ yd.
- D. $2\frac{1}{3}$ yd.

Data Interpretation.

Directions: Each question features a set of data followed by questions related to that data. Choose the correct answer from the given choices.

For questions 25 – 27:



25. About how many more jazz records were sold in April than in February?

- A. 750
- B. 1,850
- C. 2,950
- D. 950

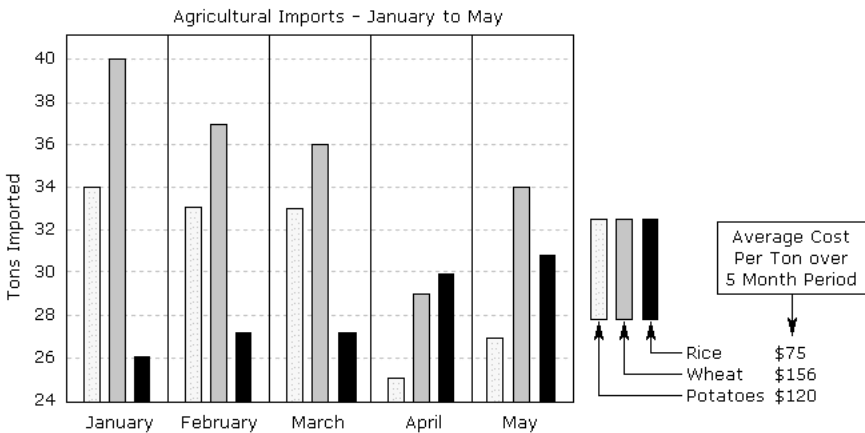
26. Two percent of the jazz records sold in April were from a new label. About how many records were from the new label?

- A. 80
- B. 800
- C. 40
- D. 400

27. March sales accounted for $\frac{1}{7}$ of the total number of jazz records sold all year. About how many jazz records were sold all year?

- A. 7,400
- B. 10,500
- C. 950
- D. 220

For questions 28 – 30:



28. Which month showed the largest total decrease in imports over the previous month?

- A. March
- B. April

C. May

29. What percentage of rice was imported in April?

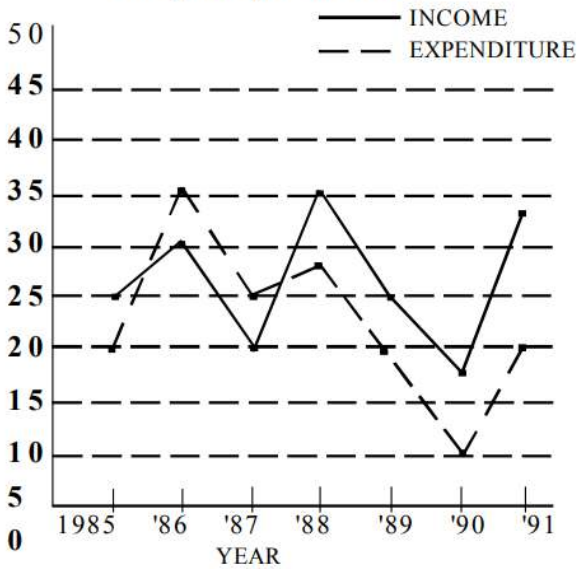
- A. 17%
- B. 19%
- C. 21%

30. What was the total cost of wheat imports in the 5 month period?

- A. 27,500
- B. 25,000
- C. 22,000

For questions 31 -35:

Income and Expenditure of a Company over the years (Rs. in crore)



31. In which of the following years was the difference between the income and the expenditure the maximum?

- A. 1988
- B. 1991
- C. 1986
- D. 1987

32 The income in 1987 was equal to the expenditure in which of the following years?

- A. 1985 only
- B. 1990 only
- C. 1985, 1989 and 1991
- D. 1988 and 1989

33. What was the approximate percentage drop in expenditure from 1988 to 1989?

- A. 35
- B. 25
- C. 75
- D. 40

34. What was the percentage increase in income from 1987 to 1988?

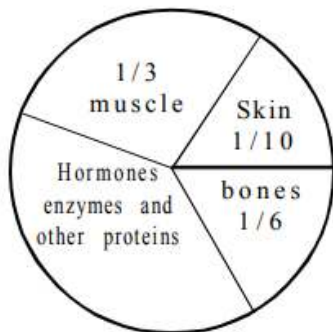
- A. 175
- B. 75
- C. 60
- D. 125

35. In how many of the given years was the expenditure more than the income?

- A. 1
- B. 3
- C. 4
- D. 2

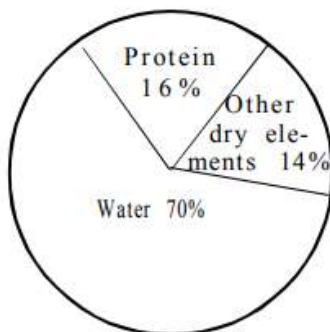
For questions 36 – 40:

Distribution of proteins in human body.



Graph - I

Distribution of Elements in the human body.



Graph - II

36. What is the ratio of distribution of proteins in the muscles to the distribution of proteins in bones?

- A. 1:2
- B. 2:1
- C. 18:1
- D. 1:18

37. What percent to the total weight of the human body is equivalent of the weight of the skin in the human body?

- A. 0.016
- B. 1.6
- C. 0.16
- D. Insufficient information

38. To show the distribution of proteins and other dry elements in the human body, the arc of the circle should subtend at the center at an angle of

- A. 126°
- B. 54°
- C. 108°
- D. 252°

39. What will be the quantity of water in the body of a person weighing 50 kg?

- A. 35 kg
- B. 120 kg
- C. 71.42 kg
- D. 20 kg

40. What part of the human body is made of neither bones nor skin?

- A. $\frac{2}{5}$
- B. $\frac{11}{15}$
- C. $\frac{1}{40}$
- D. $\frac{3}{80}$

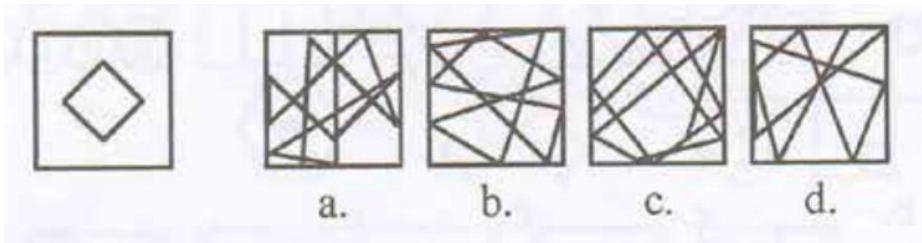
5

Perceptual Acuity

Hidden Figure.

Directions: In each question, there's a simple figure at the left and four or more complicated drawings at the right. Your task is to identify the complicated drawing where the simple figure is hidden. It may appear in a different position but it must have the same size and shape as the simple figure.

1.



2.



a.

b.

c.

d.

3.



a.

b.

c.

d.

4.



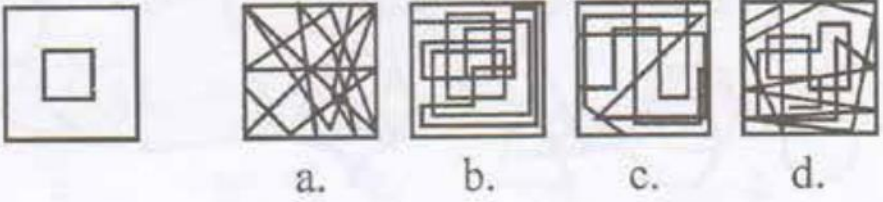
a.

b.

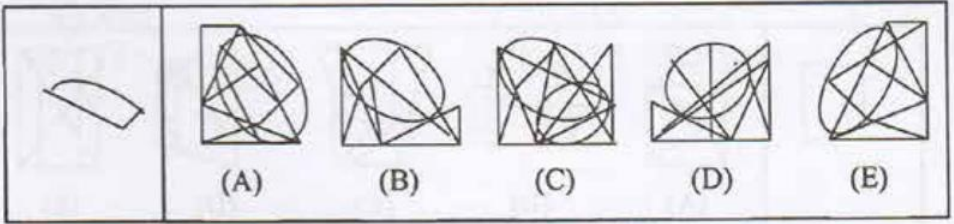
c.

d.

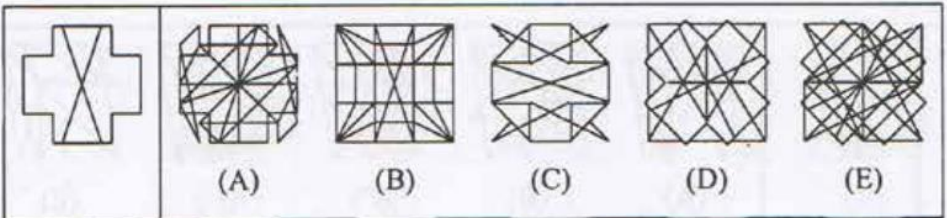
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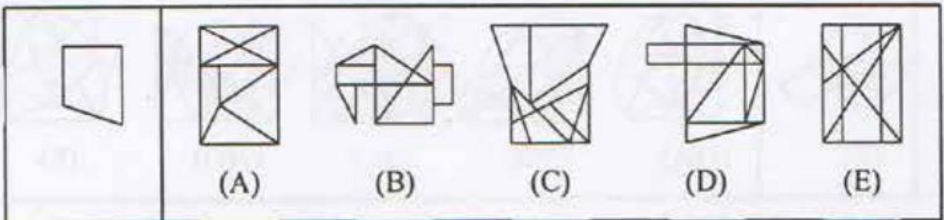
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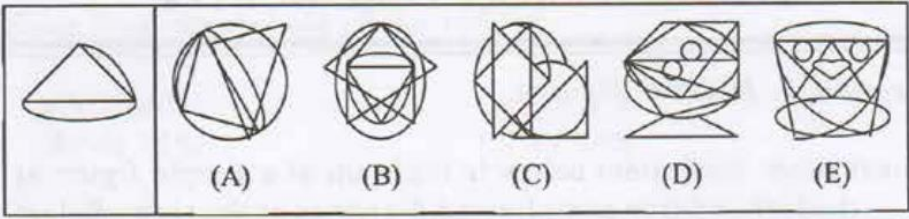
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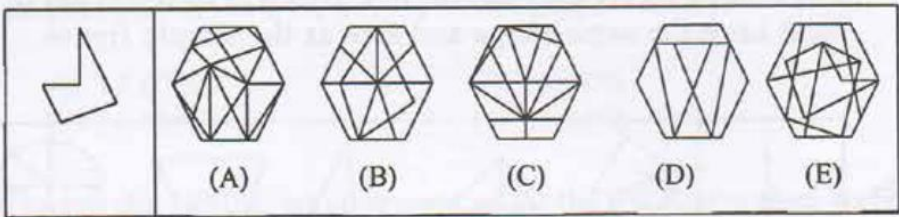
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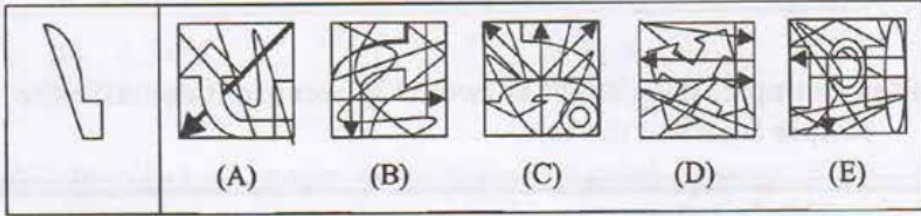
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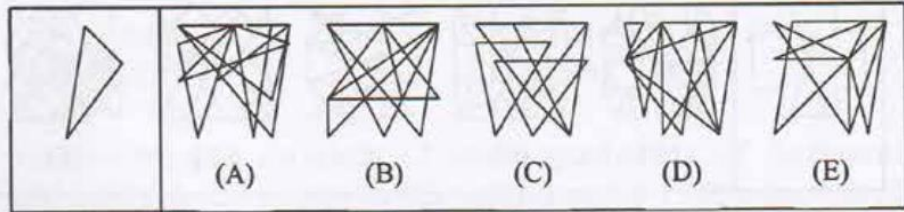
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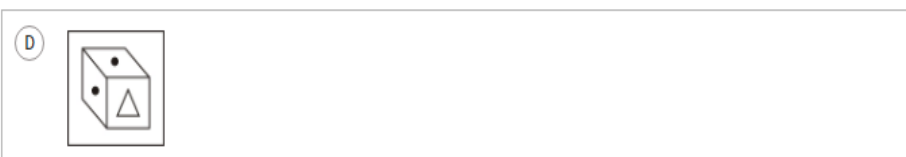
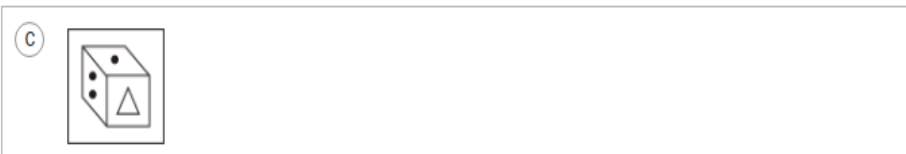
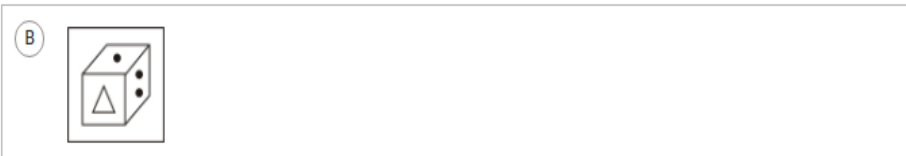
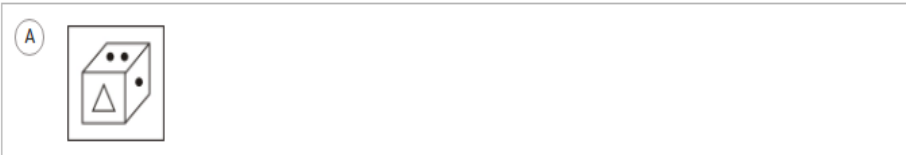
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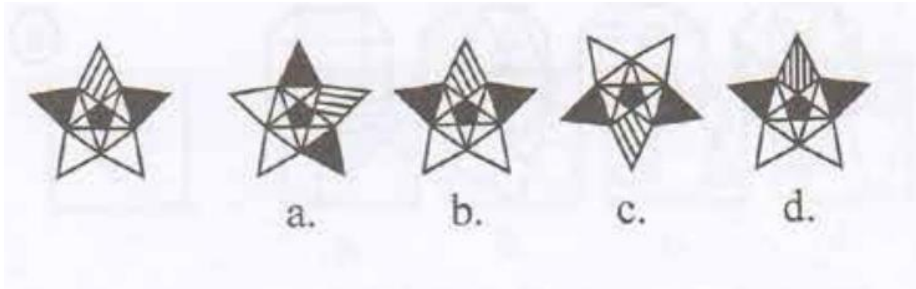
Mirror Image.

Directions: For each question, there is a figure followed by four or five choices. Select from the given choices the one you believe is the mirror image of the given figure.

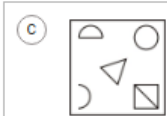
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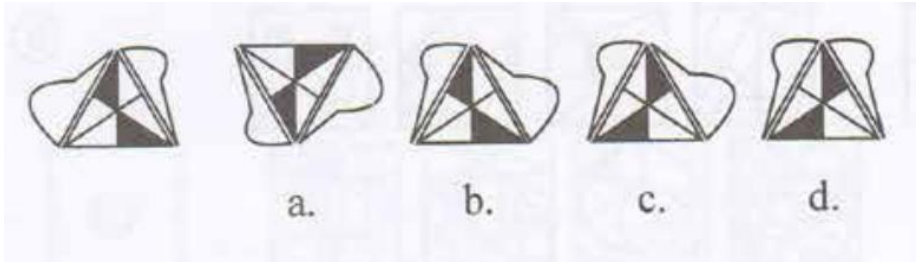
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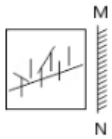
15.



16.

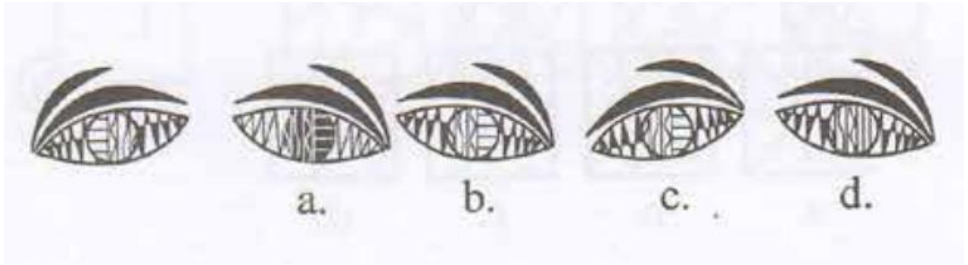


17.

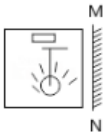






- (A)
- (B)
- (C)
- (D)

18.

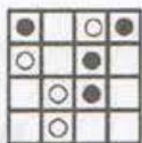
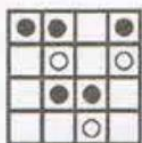


19.

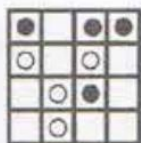


- (A) 
- (B) 
- (C) 
- (D) 

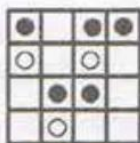
20.



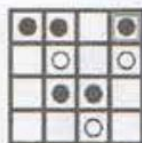
a.



b.



c.



d.

21.



(A)



(B)



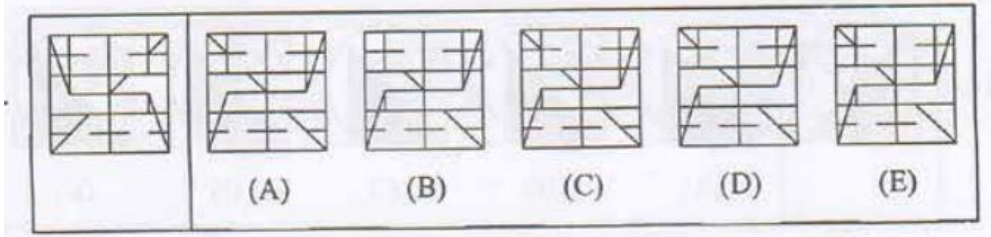
(C)



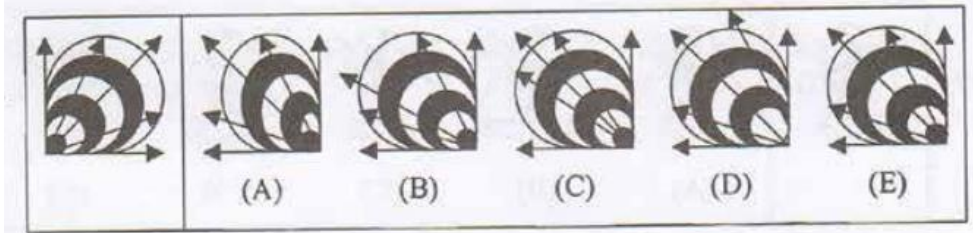
(D)



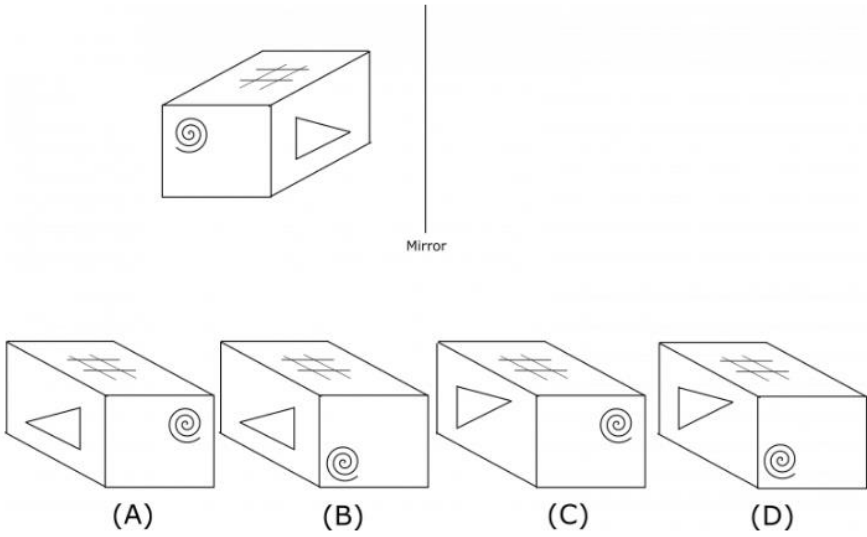
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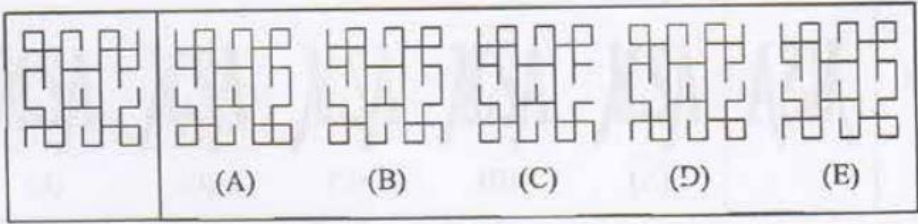
23.



24.



25.



Identical Information.

Directions: Each question contains a sentence, a biographical entry, or a combination of a name and address. The choices that follow are all similar with the given information although written in slightly different ways. **Choose the best answer that matches the given information in terms of punctuation, spelling, and word sequence.**

26. Ina Moran
P.O. Box 929 4189 Nunc Road
Lebanon KY 69409
(389) 737-2852

A. Ina Moran
P.O Box 929 4189 Nunc Road
Lebanon KY 69409
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B. Ina Moran
P.O. Box 929 4189 Nunc Road
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C. Ina Moran
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Lebanon KY 69509
(389) 737-2852

D. Ina Moran
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Lebanon KY 69409
(388) 737-2852

27. Oro, Plata, Mata is a 1982 Filipino film directed by Peque Gallaga, from a screenplay written by José Javier Reyes. The film is considered to be Gallaga's most significant contribution to the Philippine cinema. Set in the Philippine province of Negros during World War II, it tells the story of how two haciendero families cope with the changes brought about by the war.

A. Oro, Plata, Mata is a 1982 Filipino film directed by Peque Gallaga, from a screenplay written by José Javier Reyes. The film is considered to be Gallaga's most significant contribution to the Philippine cinema. Set in the Philippine province of Negros during World War II, it tells the story of how two haciendero families cope with the changes brought about by the war.

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C. Oro, Plata, Mata is a 1983 Filipino film directed by Peque Gallaga, from a screenplay written by José Javier Reyes. The film is considered to be Gallaga's most significant contribution to the

Philippine cinema. Set in the Philippine province of Negros during World War II, it tells the story of how two haciendero families cope with the changes brought about by the war.

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28. Fredrickson, B. L. (2000, March 7). Cultivating positive emotions to optimize health and well-being. *Prevention & Treatment*, 3, Article 0001a. Retrieved from <http://journals.apa.org/prevention/volume3/pre0030001a.html>

A. Fredrickson, B. L. (2000, March 7). Cultivating positive emotions to optimize health and well-being. *Prevention & Treatment*, 4, Article 0001a. Retrieved from <http://journals.apa.org/prevention/volume3/pre0030001a.html>

B. Frederickson, B. L. (2000, March 7). Cultivating positive emotions to optimize health and well-being. *Prevention & Treatment*, 3, Article 0001a. Retrieved from <http://journals.apa.org/prevention/volume3/pre0030001a.html>

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29. Allied Banking Corporation (Allied Bank)

Chairman: Domingo T. Chua

President: Anthony Q. Chua

Business Address: Allied Bank Center, 6754 Ayala Ave., Makati City 1200

Telephone No/s: 816-3311 to 50

Fax No: 810-1705

E-mail Address: info@alliedbank.com.ph

Website: <http://www.alliedbank.com.ph>

A. Allied Banking Corporation (Allied Bank)

Chairman: Domingo T. Chua

President: Anthony Q. Chua

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32. Malunggay, known as horse-radish tree or Ben oil tree in English and whose scientific name is *Moringa oleifera* is indeed a very useful plant. It is rich in nutrients; it helps clean turbid water because it acts as a flocculant that is able to precipitate suspended particles; it is a source of oil; and it has some medicinal properties.

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34. For minor aches and pains, take 2 tablets of Regular Strength Tylenol (dose 325 mg each tablet) every 4 to 6 hours as needed (q4 to q6 PRN). Do not exceed more than 10 tablets in 24 hours, and if the pain persists for more than a day or two, see a physician.

A. For minor aches and pains, take 2 tablets of Regular Strength Tylenol (dose 326 mg each tablet) every 4 to 6 hours as needed (q4 to q6 PRN). Do not exceed more than 10 tablets in 24 hours, and if the pain persists for more than a day or two, see a physician.

B. For minor aches and pains, take 2 tablets of Regular Strength Tylenol (dose 325 mg each tablet) every 4 to 6 hours as needed (q4 to q6 PRN). Do not exceed more than 10 tablets in 24 hours, and if the pain persists for more than a day or two, see a physician.

C. For minor aches and pains, take 2 tablets of Regular Strength Tylenol (dose 325 mg each tablet) every 4 to 8 hours as needed (q4 to q6 PRN). Do not exceed more than 10 tablets in 24 hours, and if the pain persists for more than a day or two, see a physician.

D. For minor aches and pains, take 2 tablets of Regular Strength Tylenol (dose 325 mg each tablet) every 4 to 6 hours as needed (q4 to q6 PRN). Do not exceed more than 10 tablets in 48 hours, and if the pain persists for more than a day or two, see a physician.

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36. University of the Philippines Manila Taft Avenue, Manila Philippines 1000. Tel: (02) 554-8400. PHIC Accredited Hospital Provider ISO 9001:2008 Certified.

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37. Age and Ageing, Volume 35, Issue 4, 1 July 2006, Pages 350–364, <https://doi.org/10.1093/ageing/afl005>. Published: 28 April 2006.

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B. 30 mg tablets: Blue-green, apple-shaped biconvex tablets debossed '101' on one side and 'ACX 3' on the other side.

C. 30 mg tablets: Blue-green, apple-shaped biconvex tablets debossed '101' on one side and 'ACX 30' on the other side.

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39. Side Effects

Dizziness, headache, stomach upset, nausea, vomiting, loss of appetite, diarrhea, constipation, or metallic taste in your mouth may occur. If any of these effects last or get worse, tell your doctor or pharmacist promptly.

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40. Philippine Children's Medical Center
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Part II: Academic Proficiency



6

Biology

Directions: Choose the letter that corresponds to the correct answer.

1. Each amino acid in a protein is specified by

- A. several genes.
- B. a promoter.
- C. an mRNA molecule.
- D. a codon.

2. Organisms that obtain their energy from light can be termed:

- A. autotrophic.
- B. holotrophic.
- C. chemotrophic.
- D. heterotrophic.
- E. heliotrophic.

3. What causes cancer in cells?

- A. damage to genes
- B. chemical damage to cell membranes
- C. UV damage to transport proteins
- D. All of these cause cancer in cells.

4. Fermentation

- A. produces pyruvic acid as an end product.
- B. yields less energy per mole of glucose than aerobic respiration.
- C. occurs only in the presence of oxygen.
- D. prevents glycolysis from occurring.
- E. converts ethanol to glucose.

5. In *Drosophila* (fruit flies), eye color is sex-linked and red eye color is dominant to white eye color. Which of the following are not possible in a cross between a red-eyed male and a heterozygous female?

- A. Red-eyed male.
- B. White-eyed male.
- C. Carrier female.
- D. Homozygous white-eyed female.

6. In respiration, oxygen

- A. combines with lactic acid to form pyruvic acid.
- B. acts as a cofactor for glycolytic enzymes.
- C. yields energy in the form of ATP as it is passed down the respiratory chain.
- D. acts as an acceptor for electrons (and protons), forming water.
- E. combines directly with carbon, forming carbon dioxide.

7. Carbon is an integral part of an ecosystem. It is cycled throughout the ecosystem as it is used and then reused. It is necessary for all life to exist. Carbon is used by plants in the process of:

- A. respiration
- B. photosynthesis
- C. transpiration
- D. decomposition

8. An enzyme is added to an aqueous solution of ATP, DNA, albumen, fat and glycogen; the reaction mixture is incubated for 10 minutes. If an analysis of the mixture reveals the presence of all of the above compounds plus glucose, it can be concluded that the enzyme hydrolyzed some of the:

- A. albumen.
- B. fat.
- C. glycogen.
- D. ATP.
- E. DNA.

9. The step of mitosis in which chromosomes line up along the equatorial plane of the cell is called:

- A. Prophase.
- B. Metaphase.
- C. Anaphase.
- D. Telophase.

10. What cellular organelles would you expect to be absent from fungi?

- A. Mitochondria.
- B. Lysosomes.
- C. Ribosomes.
- D. Golgi bodies.
- E. Chloroplasts.

11. Which of the following represents the action of insulin?

- A. increases blood glucose levels by the hydrolysis of glycogen
- B. increases blood glucose levels by stimulating glucagon production
- C. decreases blood glucose levels by forming glycogen
- D. increases blood glucose levels by promoting cellular uptake of glucose

12. Intracellular organelles that participate in metabolic oxidation involving hydrogen peroxide are called:

- A. centrioles.
- B. endoplasmic granules.
- C. peroxisomes.
- D. lysosomes.
- E. macro bodies.

13. An extra finger in humans is rare but is due to a dominant gene. When one parent is normal and the other parent has an extra finger but is heterozygous for the trait, what is the probability that the first child will be normal?

- A. 0%.
- B. 25%.

- C. 50%.
- D. 75%.

14. Starch, cellulose and glycogen are all

- A. proteins.
- B. linked internally by hydrogen bonds.
- C. water soluble.
- D. polymers of glucose.
- E. nucleic acids.

15. At some stage of development, all chordates have

- A. a pharynx, a vertebral column, and a notochord.
- B. pharyngeal pouches, a notochord, and a dorsal tubular nerve cord.
- C. pharyngeal pouches, a notochord, and a ventral nerve cord.
- D. pharyngeal pouches, vertebral column, and a dorsal tubular nerve cord.
- E. a pharynx and an ectodermally derived, solid nerve cord.

16. Petroleum products, which contain carbon, are burned, and the carbon escapes into the atmosphere as carbon dioxide. But how does it get into the petroleum in the first place?

- A. refineries
- B. plant respiration
- C. decomposing plankton
- D. photosynthesis in plants

17. In anaerobic glycolysis in muscle cells one mole of glucose is oxidized to:

- A. six moles of carbon dioxide.
- B. two moles of acetic acid.
- C. two moles of lactic acid.
- D. two moles of acetyl CoA.
- E. two moles of carbon dioxide and six moles of water.

18. An ecosystem thrives with biotic and abiotic component parts. An example of an abiotic part of an ecosystem is:

- A. micro-bacteria
- B. fungus
- C. minerals
- D. decaying plants

19. A segment of DNA with the sequence GGCATTAGG would be transcribed into a messenger RNA segment with the sequence:

- A. CCGUAAUCC.
- B. AATGCCGTT.
- C. CCGTAATCC.
- D. AAUGCCGUU.
- E. CCGTUUTGG.

20. Down syndrome in humans is due to:

- A. three copies of chromosome 21.
- B. monosomy.
- C. two Y chromosomes.
- D. three X chromosomes.

21. The movement of water soluble molecules through cell membranes, from higher to lower concentrations, by attachment to a carrier protein, describes:

- A. diffusions.
- B. osmosis.
- C. pinocytosis.
- D. active transport.
- E. facilitated diffusion.

22. Organisms that have the characteristics of radial symmetry, water vascular system, a spiny skin, and are found exclusively in a marine habitat would be in which phylum?

- A. Annelida
- B. Chordata
- C. Cnidaria
- D. Porifera
- E. Echinodermata

23. Over time, the same bones in different vertebrates were put to different uses. This falls under the category of:

- A. missing links.
- B. vestigial structures.
- C. analogous structures.
- D. homologous structures.

24. As far as their products are concerned, all biosynthetic reactions in living cells result in:

- A. a more ordered state, therefore a decrease in entropy.
- B. a more ordered state, therefore an increase in entropy.
- C. energy released in the form of ATP.

- D. energy made available for motion.
- E. a more ordered state with no entropy change.

25. To determine an organism's niche, all of the following must be determined, EXCEPT:

- A. how it is classified
- B. what it eats
- C. where it lives
- D. what relationships it has with other organisms

26. Another very important cycle is the Water Cycle. All living things need water to live. This cycle has four main processes. The two processes that return water to the earth are:

- A. evaporation and condensation
- B. condensation and precipitation
- C. transpiration and condensation
- D. evaporation and transpiration

27. Which of the following is the smallest organelle in the cell?

- A. Golgi body
- B. Nucleus
- C. Mitochondrion
- D. Ribosome
- E. Chloroplast

28. Eggs and sperm are genetically very similar, but structurally very different. Why is this so?

- A. Both contain a haploid chromosome number, but eggs must provide nutrients for early development, while sperm must be able to move efficiently.
- B. Both contain a diploid chromosome number, but eggs must provide nutrients for early development, while sperm must be able to move efficiently.
- C. Both contain maternal chromosomes, but only sperm can control which chromosomes are passed on.
- D. Both contain a haploid chromosome number, but only eggs can control which chromosomes are passed on.

29. For a given diameter of an axon, one factor which increases the velocity of a nerve impulse is:

- A. the length of the axon.
- B. the ploidy of the nucleus.
- C. the density of mitochondria along the axon.
- D. maximal stimulation of the neuron.
- E. the presence of a myelin sheath.

30. How is a biochemical pathway regulated?

- A. The product of one reaction becomes the substrate for the next.
- B. The end product replaces the initial substrate in the pathway.
- C. The end product inhibits the first enzyme in the pathway by binding to an allosteric site.
- D. All of these are correct.

31. Which of the following chiefly stimulates action of the respiratory center?

- A. Carbon dioxide in the blood.
- B. Relaxin.
- C. Lack of oxygen in the blood.

- D. Inflation of the alveolus.
- E. Vagus nerve.

32. Replicate copies of each chromosome are called _____ and are joined at the _____

- A. homologues/centromere
- B. sister chromatids/kinetochore
- C. sister chromatids/centromere
- D. homologues/kinetochore

33. The term motor unit refers to

- A. an entire muscle.
- B. a single muscle fiber.
- C. all the muscle fibers innervated by one nerve fiber.
- D. all the motor nerves in one muscle.
- E. all the sliding filaments of actin and myosin in one muscle fiber.

34. During which stage of meiosis does crossing over occur?

- A. prophase I
- B. anaphase I
- C. prophase II
- D. telophase II

35. An example of convergent evolution is

- A. Australian marsupials and placental mammals.
- B. the flippers in fish, penguins, and dolphins.
- C. the wings in birds, bats, and insects.
- D. all of these.

36. The human heart beat is initiated within the

- A. sinus venosus.
- B. Hensen's node.
- C. conus arteriosus.
- D. atrio-ventricular node.
- E. sino-atrial node.

37. Food chains and food webs are models in science which visually show us the different relationships within an ecosystem. The primary difference between the food chain and the food web is:

- A. a food chain shows how energy is stored
- B. a food web shows how energy is used
- C. a food web is a complex system of food chains
- D. a food chain is a combination of different food webs

38. The testicles of male mammals are suspended in the scrotum because:

- A. the optimum temperature for sperm production is less than the normal core body temperature of the organism.
- B. the optimum temperature for sperm production is higher than the normal core body temperature of the organism.
- C. there is not enough room in the pelvic area for the testicles to be housed internally.
- D. it is easier for the body to expel sperm during ejaculation.

39. In the nephron of the kidney, filtration occurs between

- A. Bowman's capsule and Henle's loop.

- B. the glomerulus and Bowman's capsule.
- C. the proximal tubule and Henle's loop.
- D. Henle's loop and the vasa recta.
- E. the peritubular network and the convoluted tubules.

40. The cytoplasm of an animal cell is divided by means of:

- A. A cleavage furrow.
- B. A cell plate.
- C. A cell membrane formed within the cytoplasm.
- D. Mitosis.

41. Sexual and asexual reproduction usually differ in

- A. the ability of the new offspring to reproduce.
- B. the rate at which mutations occur.
- C. the amount of genotypic variation between parent and offspring.
- D. the viability of offspring.
- E. whether or not natural selection can occur.

42. The clean-up crew are the decomposers. Decomposers and scavengers get rid of the garbage and waste in an ecosystem. Decomposers differ from scavengers because they

- A. only eat dead organisms
- B. do not eat dead organisms
- C. break down larger organisms
- D. only feed on dead plants and animals

43. If we could monitor the amount of total gonadotropin activity in pregnant women, we would expect

- A. high levels of FSH and LH in the uterus to stimulate endometrial thickening.
- B. high levels of circulating FSH and LH to stimulate implantation of the embryo.
- C. high levels of hCG in the uterus to stimulate endometrial thickening.
- D. high levels of circulating hCG to stimulate estrogen and progesterone synthesis.

44. In watermelons, the unlinked genes for green color (G) and for short length (S) are dominant over alleles for striped color (g) and long length (s). Predict the phenotypes and their ratios for the cross Ggss x ggSs.

- A. All green short.
- B. 1:2:1 green short: striped long: striped short.
- C. All striped long.
- D. 1:1:1:1 green short: striped short: green long: striped long.
- E. 1:1 green short: striped long

45. Long radishes crossed with round radishes result in all oval radishes. This type of inheritance is:

- A. Multiple alleles.
- B. Complete dominance.
- C. Co-dominance.
- D. Incomplete dominance.

46. Assuming no linkage, how many different kinds of gametes can be produced by an organism with the genotype AaBbcc?

- A. 32
- B. 16
- C. 8

- D. 6
- E. 4

47. Which blood type would not be possible for children of a type AB mother and a type A father?

- A. O.
- B. A.
- C. B.
- D. AB.

48. Under the five-kingdom classification, members of the kingdom Monera are generally separated from the members of all the other kingdoms by having

- A. heterotrophic nutrition versus autotrophic nutrition.
- B. unicellular organization versus multicellular organization.
- C. microscopic size versus macroscopic size.
- D. prokaryotic cells versus eukaryotic cells.
- E. parasite-host relationship versus predator-prey relationship.

49. The process in which water, in the water cycle, goes through a phase change, from a gas to a liquid, is called.

- A. evaporation
- B. transpiration
- C. condensation
- D. precipitation

50. Of the following, which group of invertebrates is apparently most closely related to primitive vertebrates?

- A. Annelida

- B. Mollusca
- C. Cnidaria
- D. Arthropoda
- E. Echinodermata



Physics

Directions: Choose the letter that corresponds to the correct answer.

1. An object moves along the x -axis with a constant acceleration of 6 m/s^2 and an initial velocity of -24 m/s . It is located at $x = 6 \text{ m}$ when $t = 0 \text{ s}$. What is its position when its velocity is zero?

- A. 6 m
- B. -42 m
- C. -90 m
- D. -96 m

2. Which of the following is the primary goal of scientific inquiry?

- A. finding technological solutions to human problems
- B. discovering the fundamental principles that govern nature
- C. developing mathematical techniques for solving problems
- D. investigating fundamental principles that transcend the material world

3. Which of the following experiments led most directly to the quantum theory of light?

- A. Michelson's and Morley's effort to detect the luminiferous ether
- B. Röntgen's discovery of the emission of X-rays from a vacuum tube
- C. Planck's analysis of the spectrum emitted by a blackbody
- D. Hertz's detection of electromagnetic radiation

4. The speed of sound in air is 340 m/s. At what pitch must a 170-cm-tall person sing to produce a sound wave with a wavelength equal to the person's height?

- A. 24.5 Hz
- B. 200 Hz
- C. 255 Hz
- D. 578 Hz

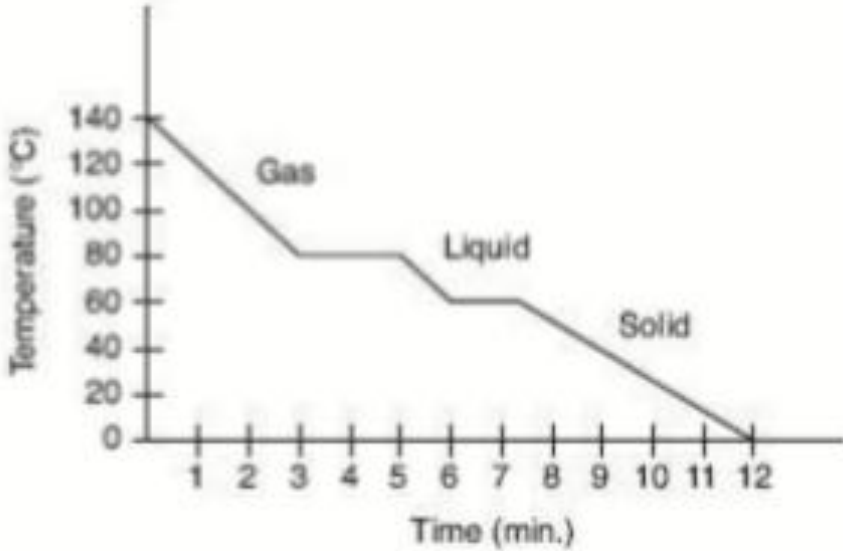
5. A car on a highway has an initial speed of 23 m/s. The car accelerates at a constant rate for 10 s to a final speed of 29 m/s. How far does the car travel during this time interval?

- A. 230 m
- B. 260 m
- C. 275 m
- D. 290 m

6. An organ pipe is closed at one end. As the temperature of the gas inside the pipe increases, which of the following will also increase?

- A. the wavelength of the fundamental frequency
- B. the ratio of the harmonics produced in the pipe
- C. the speed of the waves produced in the pipe
- D. the number of overtones produced in the pipe

7. The following diagram shows the response of 2 kilograms of a gas at 140°C. Heat is released at a rate of 6 kilojoules per minute.



The melting point of this substance is

- A. 0°C
- B. 60°C
- C. 80°C
- D. 140°C

8. A beam of parallel rays is reflected from a smooth plane surface. After reflection the rays will be

- A. converging
- B. diverging
- C. parallel
- D. diffused

9. An elementary particle moving at $0.99c$ with respect to the laboratory frame has a half-life of $16 \mu\text{s}$ in the laboratory frame. What is the half-life of the particle in its own frame of reference?

- A. $0.50 \mu\text{s}$
- B. $2.3 \mu\text{s}$
- C. $4.0 \mu\text{s}$
- D. $15 \mu\text{s}$

10. The acceleration toward the center of an object moving with constant speed around a given circle

- A. is proportional to its velocity
- B. is proportional to the square of its speed
- C. is proportional to the square root of its speed
- D. is inversely proportional to its velocity

11. According to Maxwell's equations, a time-dependent magnetic field will be produced under which of the following circumstances?

- A. The total magnetic flux through a surface is equal to zero.
- B. A field exists that is the gradient of a scalar function.
- C. An electric field varies with time.
- D. The electric flux through surface is zero.

12. The angular speed of a star spinning about its axis increases as the star begins to contract to a smaller radius. Which of the following quantities associated with the star must decrease as this occurs?

- A. moment of inertia
- B. angular momentum
- C. rotational kinetic energy
- D. net external torque

13. Which of the following is one of Einstein's postulates of special relativity?

- A. Events that are simultaneous for one observer are not simultaneous for another observer in motion relative to the first.
- B. The energy of a photon is directly proportional to the frequency of the light.
- C. The momentum of an object approaches infinity as its speed approaches that of light.
- D. The speed of light in a vacuum has the same value in all inertial reference frames.

14. A piece of string, fixed at both ends, is struck to produce a wave in the string. Given that μ is the string's linear mass density and T is its tension, which of the following combinations of values will produce the greatest wave speed?

- A. $\mu = 0.1 \text{ kg/m}$, $T = 0.1 \text{ N}$
- B. $\mu = 0.1 \text{ kg/m}$, $T = 1.0 \text{ N}$
- C. $\mu = 1.0 \text{ kg/m}$, $T = 0.1 \text{ N}$
- D. $\mu = 1.0 \text{ kg/m}$, $T = 1.0 \text{ N}$

15. Use the diagram below to answer the question that follows.



A 36 V battery is in series with a parallel plate capacitor, as shown in the diagram above. The plate separation is 0.20 m. The plates are large, so that the electric field is approximately constant between them. What is the magnitude and direction of the field?

- A. 7.2 N/C to the left
- B. 7.2 N/C to the right
- C. 180 N/C to the left
- D. 180 N/C to the right

16. Boyle's law describes the behavior of a gas when

- A. its pressure is kept constant
- B. its volume is kept constant
- C. its density is kept constant
- D. its mass is kept constant

17. A positive charge is moving with constant speed at right angles to a uniform magnetic field. If the speed of the charge were doubled, the force exerted on the particle by the magnetic field would be

- A. unaffected
- B. quadrupled
- C. doubled
- D. halved

18. Light passes through two parallel slits and falls on a screen. The pattern produced is due to interference and

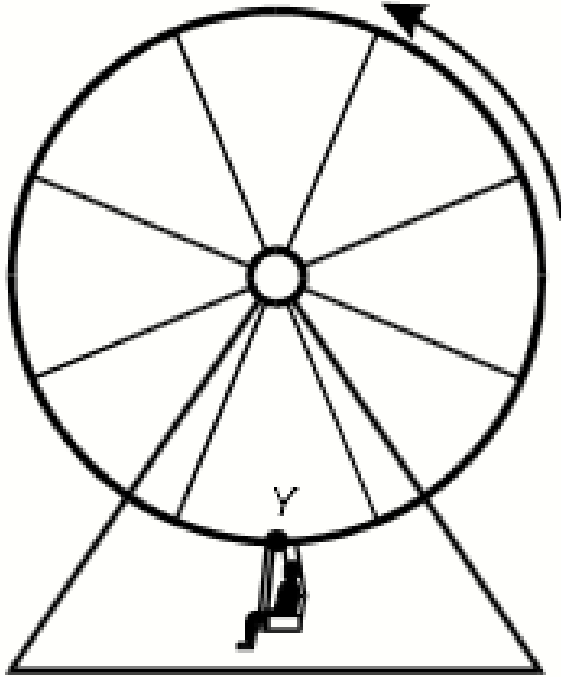
- A. reflection
- B. refraction
- C. polarization
- D. diffraction

19. Which of the following statements is (are) correct about the photoelectric effect?





- I. The number of electrons emitted is independent of the intensity of the incident light.
- II. The stopping potential decreases with increased frequency.
- III. In a graph of maximum kinetic energy versus incident frequency, all metals have different threshold frequencies, but all have the same slope.
- IV. The maximum kinetic energy of the emitted electrons is independent of the intensity of the incident light.

- A. I only
- B. III only
- C. II and IV
- D. III and IV

20. Use the diagram below to answer the question that follows.



The diagram above represents a Ferris wheel rotating at a constant speed. Which of the following vectors represents the acceleration of a person on the wheel at point Y?

- A. 
- B. 
- C. 
- D. 

21. When a beam of light goes from a rarer to a denser medium such as glass and has an angle of incidence equal to zero, which of the following properties of the beam of light does (do) NOT change?

I. Amplitude

- II. Speed
- III. Wavelength
- IV. Direction

- A. I, II, and III only
- B. I and III only
- C. II and IV only
- D. IV only

22. A circular loop of wire is connected in series with a voltage source V and a resistor R . The strength of the magnetic field in the middle of the loop is directly proportional to:

- A. VR .
- B. V/R
- C. V^2R
- D. V^2/R

23. A man standing in an elevator is taken up by the elevator at constant speed. Which of the following is (are) true of the push that the man exerts on the floor of the elevator?

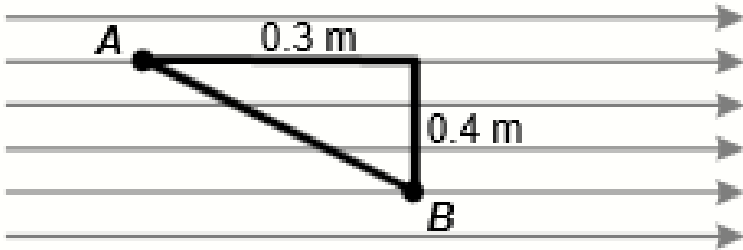
- I. It is equal to his weight.
- II. It is equal to less than his weight.
- III. It is equal to more than his weight.
- IV. It is dependent on the value of the constant speed.

- A. I only
- B. II only
- C. III only
- D. IV only

24. Which of the following particles, all moving with the same velocity, will have the longest de Broglie wavelength?

- A. An electron
- B. A proton
- C. A neutron
- D. An alpha particle

25. Use the diagram below to answer the question the follows.



The diagram above shows an electric field of 10 N/C that is constant in magnitude and direction. What is the electrostatic potential between points A and B?

- A. 3 V
- B. 4 V
- C. 5 V
- D. 7 V

26. The resultant of a 3-newton and a 4-newton force that act on an object in opposite directions to each other is, in newtons,

- A. 0
- B. 1
- C. 5
- D. 7

27. A converging lens produces a real image at a distance of 20 cm for an object located 40 cm in front of the lens. What is the focal length of the lens?

- A. 0.50 cm
- B. 2.5 cm
- C. 13 cm
- D. 20 cm

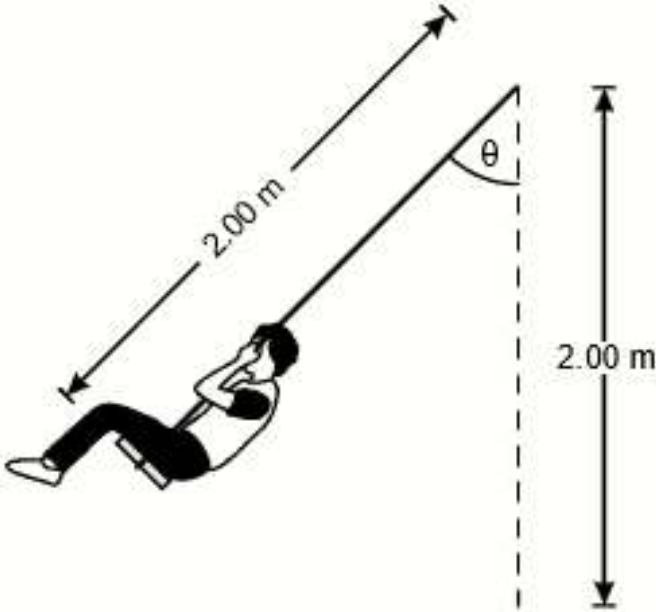
28. It is certain that a rod is electrically charged if it

- A. repels a pith ball
- B. attracts a pith ball
- C. attracts the N-pole of a compass needle
- D. repels the N-pole of a compass needle

29. If the velocity of light in a medium depends on its frequency, the medium is said to be

- A. coherent
- B. refractive
- C. dispersive
- D. diffractive

30. Use the diagram below to answer the question that follows.



The length of each of the ropes on a playground swing is 2.00 m. What is the maximum speed attainable on the swing if the maximum value of θ is 45.0° ?

- A. 1.41 m/s
- B. 2.00 m/s
- C. 3.39 m/s
- D. 8.85 m/s

31. Students in a physics class are learning how to solder electronic components onto a printed circuit board. In addition to working in a well-ventilated area, the students should also wear:

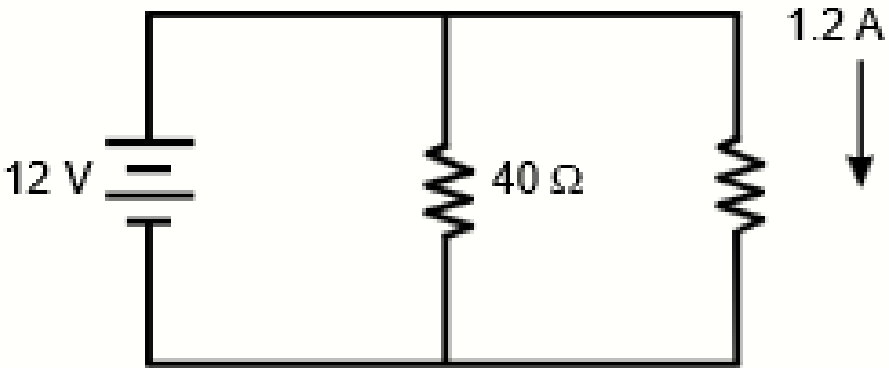
- A. leather gloves
- B. safety glasses
- C. rubber shoes

D. an antistatic wrist strap

32. The time of one vibration of a simple pendulum may be decreased by:

- A. increasing the length of the pendulum
- B. decreasing the length of the pendulum
- C. using a heavier bob
- D. using a lighter bob

33. Use the diagram below to answer the question that follows.



What is the current through the battery?

- A. 0.3 A
- B. 1.2 A
- C. 1.5 A
- D. 2.4 A

34. A horizontal pipe has a diameter of 10.0 cm. Fluid flows in the pipe at 0.500 m/s. The pipe is attached to a smaller pipe that has a diameter of 4.00 cm. What is the speed of the fluid in the smaller pipe?

- A. 0.200 m/s
- B. 1.25 m/s
- C. 3.13 m/s
- D. 12.5 m/s

35. On a dry winter day, a person walks across a carpet, reaches to touch a doorknob, and observes a spark about 3 mm long. Given that the dielectric breakdown of air is approximately 3 MV/m, which of the following is best estimate for the potential difference between the person's hand and the doorknob?

- A. 90 V
- B. 900 V
- C. 9,000 V
- D. 9,000,000 V

36. The following five lengths of thin wire, all of which have the same diameter and length, are connected in a circuit to a battery. Which length of wire generates the greatest power?

- A. 3 m of nichrome wire
- B. 3 m of copper wire
- C. 3 m of lead wire
- D. 3 m of steel wire

37. If the intensity of monochromatic light is increased while incident on a pair of narrow slits in a diffraction experiment, the spacing between maxima in the pattern will

- A. increase
- B. decrease
- C. remain the same
- D. increase or decrease depending on frequency

38. A point source of light is placed at the principal focus of a convex lens. Which of the following will be true of the refracted light?

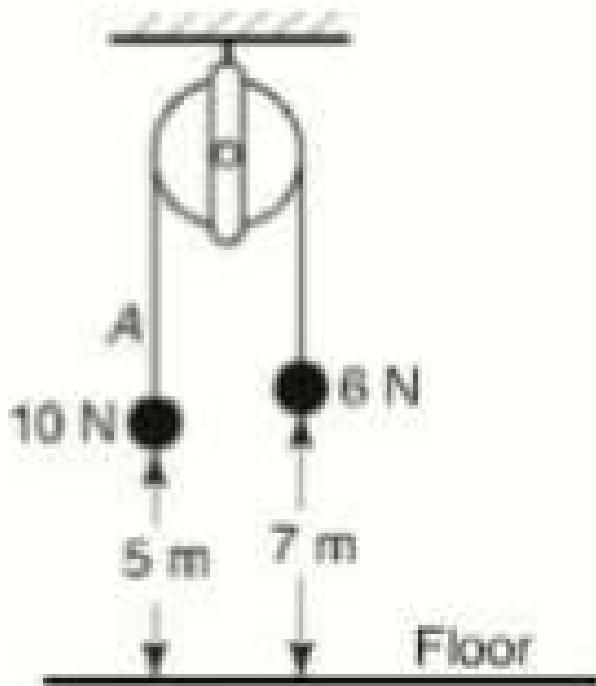
- I. It will diverge.
- II. It will be parallel to the principal axis.
- III. It will seem to come from a point 1.2 of the radius of curvature from the lens.
- IV. It will converge.

- A. I, II, and III only
- B. I and III only
- C. II only
- D. IV only

39. Electrical appliances are usually grounded in order to

- A. maintain a balanced charge distribution
- B. prevent a buildup of heat
- C. run properly using household electricity
- D. prevent a buildup of static charges

40. As shown in the diagram below, two weights, one of 10 newtons and the other of 6 newtons, are tied to the ends of a flexible string. The string is placed over a pulley that is attached to the ceiling. Frictional losses and the weight of the pulley may be neglected as the weights and the string are allowed to move.



At the instant shown in the diagram, the potential energy of the 10-newton object with respect to the floor is, in joules,

- A. 0
- B. 2
- C. 20
- D. 50

41. Which of the following is an action-reaction pair for a space station containing astronauts in orbit about the earth?

- A. the weight of the space station and the centripetal force on the space station
- B. the weight of the astronauts and the centripetal force on the space station

- C. the weight of the space station and the gravitational force of the space station on the earth
- D. the weight of the astronauts and the gravitational force of the space station on the astronauts

42. How many meters will a 2.00-kilogram ball starting from rest fall freely in 1.00 second?

- A. 4.90
- B. 2.00
- C. 9.81
- D. 19.6

43. An object that is black

- A. absorbs black light
- B. reflects black light
- C. absorbs all light
- D. reflects all light

44. Of the following, the particle whose mass is closest to that of the neutron is the

- A. meson
- B. deuteron
- C. neutrino
- D. proton

45. Several students in a physics class are planning to design a wind power system that can generate enough electricity to perform hydrolysis of water in a 500 mL beaker. According to the engineering design process, which of the following should the students do first?

- A. make an expanded sketch of the major parts of the system
- B. build a small, working prototype of the system
- C. define the problem that needs to be solved
- D. brainstorm several alternative designs for the system

46. An object with a constant mass rests on a smooth and perfectly horizontal table. If a horizontal force F is applied, acceleration results. If F is doubled without changing the direction, what will be the effect(s) on the acceleration?

- I. The acceleration will remain the same.
- II. The acceleration will be doubled
- III. The acceleration will decrease.
- IV. The acceleration will increase but not double.

- A. I, II, and III only
- B. II only
- C. II and IV only
- D. IV only

47. Use the diagram below to answer the question that follows.



The diagram above shows a string of length 0.30 m oscillating in its first harmonic. What is the wavelength when the string is oscillating in its third harmonic?

- A. 0.10 m
- B. 0.20 m

- C. 0.45 m
- D. 0.90 m

48. A wire coil of radius 2.0 cm with 10 turns is in a magnetic field of 2.0 T. The field is perpendicular to the plane of each turn of the coil. The coil is wired in series with a resistor of 5.0 Ω . The field drops at a constant rate to 0.0 T in 10 ms. What is the current through the resistor?

- A. 0.50 A
- B. 2.5 A
- C. 8.0 A
- D. 13 A

49. The rate of heat production of a wire immersed in ice water and carrying an electric current is proportional to

- A. the current
- B. the reciprocal of the current
- C. the reciprocal of the square of the current
- D. the square of the current

50. A lens is used to produce a sharp image on a screen. When the right half of the lens is covered with an opaque material, how will the image be affected?

- I. The right half of the image will disappear.
- II. The left half of the image will disappear.
- III. The image size will become approximately half of the original size.
- IV . The image brightness will become approximately half of the original brightness.

- A. I, II, and III only
- B. I and III only

- C. II and IV only
- D. IV only



8

Social Science

Directions: Choose the letter that corresponds to the correct answer.

1. After having your picture taken with a flash camera, you “see” circles of light. This experience is most likely related to

- A. the sensory register
- B. encoding
- C. neural spikes
- D. attention

2. Emily, age 8, is able to grasp her own social position as well as that of the people around her. She begins to consider several tasks and relationships simultaneously. According to George Herbert Mead's theory, Emily is at the _____ stage.

- A. play
- B. game
- C. imitative
- D. preparatory

3. Bill has been identified as a very charismatic individual. He can often persuade classmates to follow him and participate in the things he feels should be accomplished at school. Some have called him a natural leader. According to Gardner's theory of multiple intelligences, Bill has

- A. intrapersonal strengths
- B. interpersonal strengths
- C. political strengths
- D. social strengths

4. Developmental theorists generally agree that development

- A. is sequential
- B. is completely unique to each individual
- C. is sporadic
- D. tends to be unpredictable

5. In Max Weber's stratification typology, which class consists of skilled, semiskilled, and unskilled workers?

- A. The working class
- B. The middle class
- C. The divisional class
- D. The lower-middle class

6. When cognitive theorists speak of "storage", they are generally referring to

- A. assimilating
- B. accommodating
- C. encoding into memory
- D. creating subfiles

7. The process by which some characteristics of a profession are eliminated is

- A. autonomy
- B. specialized training
- C. occupational recognition
- D. de-professionalization

8. Which of the following are always members of a person's family of orientation?

- A. Spouse(s)
- B. Son(s) and daughter(s)
- C. Parent(s)
- D. Aunt(s) and uncle(s)

9. Which of the following factors is NOT a contributor to the global feminization of poverty?

- A. Poor women worldwide do not have access to commercial credit.
- B. Poor women continue to be trained in low wage jobs.
- C. The income gap between men and women continues to grow in low-income nations as well as in some developing nations.
- D. High-income nations are importing poor women to their countries to provide them better paying jobs and marketable training.

10. The system by which groups of people are ranked in a society on the basis of power and economic wealth is known as

- A. status
- B. hypergamy
- C. social mobility

D. stratification

11. What do sociologists term a group that is advantaged and has superior resources and rights within a society?

- A. Majority
- B. Minority
- C. Superior
- D. Powerful

12. The culturally and socially constructed differences between females and males found in the meanings, beliefs, and practices associated with “femininity” and “masculinity” are known as

- A. gender
- B. sex
- C. primary sexual identifiers
- D. secondary sexual identifiers

13. All of the following are shared by members of the same ethnic groups, EXCEPT

- A. unique cultural traits
- B. a feeling of ethnocentrism
- C. a common educational level
- D. territoriality

14. The subfield of sociology that examines population size, composition, and distribution is

- A. social ecology
- B. social psychology
- C. social dynamics

D. demography

15. Under which of the following conditions can inhibition or interference occur?

- A. When the old and new learning concepts are very similar
- B. When the old and new learning concepts are the exact opposite
- C. When the old and new learning concepts are very dissimilar
- D. When the new and old learning concepts are taught at the same time

16. "Proper" attitudes toward education, socially approved dress and manners, knowledge about books, art, music, and other forms of high and popular culture are all examples of

- A. cultural mystique
- B. the proper social grace
- C. accumulated social wisdom
- D. cultural capital

17. Private ownership of the means of production, from which personal profits can be derived through market competition and without government intervention, is characteristic of

- A. capitalism
- B. socialism
- C. imperialism
- D. mercantilism

18. The means through which power is acquired and exercised by some people and groups is

- A. government

- B. the economy
- C. politics
- D. the military

19. The type of social arrangement in which people are able to gain higher positions based on their intellectual and educational credentials rather than through the influence of personal contacts is

- A. a tracking orientation
- B. a credentialist orientation
- C. a meritocracy
- D. an educational bureaucracy

20. George is on a date with Pat. He tries to behave in a way that will make Pat like him and want to go out again. George is engaging in

- A. face-work
- B. instrumental deception
- C. ambassador socialization
- D. impression management

21. According to urban sociologists, a city is

- A. a metropolitan region
- B. a relatively dense and permanent settlement of people
- C. a census category
- D. a suburban or rural area

22. Tangible objects that are necessary or desired are referred to as

- A. products

- B. materials
- C. goods
- D. assets

23. A group of people who live in a specified geographic area are referred to as

- A. nomads
- B. clients
- C. a sample
- D. a population

24. Any physical or social attribute or sign that so devalues a person's social identity that it disqualifies that person from full social acceptance is a

- A. norm
- B. value
- C. status
- D. stigma

25. Traditions, beliefs, language, and philosophies are all examples of

- A. material culture
- B. cultural universals
- C. cultural values
- D. nonmaterial culture

26. An advantage of group therapy over individual therapy is that group therapy

- A. requires less commitment from the client

- B. achieves results more quickly
- C. produces a significantly higher recovery rate
- D. enables clients to realize that their problems are not unique

27. A family unit that is composed of relatives in addition to parents and children who live in the same household is

- A. a disjointed kinship
- B. an extended family
- C. a nuclear family
- D. a conjugal family

28. At birth, male and female infants are distinguished by the genitalia used in the reproductive process, which are referred to as

- A. gonads and fallopian tubes
- B. primary sex characteristics
- C. secondary sex characteristics
- D. biological tendencies

29. A negative attitude based on faulty generalizations about members of selected racial, ethnic, or other groups is referred to as

- A. redlining
- B. discrimination
- C. prejudice
- D. racism

30. Sam, an American, assumes that the American culture and way of life are the norm and superior to all others. This is an example of

- A. culture shock
- B. stereotyping

- C. ethnocentrism
- D. endogamy

31. What is Charles Horton Cooley's term for the way in which a person's sense of self is derived from the perceptions of others?

- A. Development of personality
- B. The "looking-glass" self
- C. The "I" and the "me"
- D. The human psyche

32. According to sociologist C. Wright Mills, the ability to see the relationship between individual experiences and the larger society is referred to as

- A. the conflict perspective
- B. symbolic interaction
- C. reality perception
- D. the sociological imagination

33. According to Max Weber, individual power depends on a person's position within

- A. primary groups
- B. bureaucracies
- C. family structures
- D. kinship networks

34. Karl Marx's term for government, schools, churches, and all other social institutions that produce and disseminate ideas that perpetuate the existing system of exploitation is society's

- A. substructure

- B. superstructure
- C. ecostructure
- D. basic structure

35. Which of the following categories of people has the highest net worth overall?

- A. Divorced persons
- B. Separated persons
- C. Single persons
- D. Married persons

36. Richard can give you a step by step account of the game last Friday. He can describe the various plays and the players' reactions. Richard has a good

- A. episodic memory
- B. procedural memory
- C. semantic memory
- D. athletic memory

37. Movements seeking to bring about a total change in society are referred to as

- A. revolutionary
- B. reform
- C. religious
- D. alternative

38. According to Karl Marx, which of the following statements about capitalists is NOT true?

- A. They own the means of production.

- B. They control the means of production.
- C. They exploit the workers.
- D. They are vulnerable to displacement by machines or cheap labor.

39. The statement "*The greater the degree of social harm, the more the offender should be punished*" reflects the principle of

- A. retribution
- B. social protection
- C. rehabilitation
- D. deterrence

40. The hierarchical arrangement of large social groups based on their control over basic resources is

- A. social distinction
- B. invidious distinctiveness
- C. social stratification
- D. social layering

41. The area of the brain stem that is important in controlling breathing is the

- A. suprachiasmatic nucleus
- B. cerebellum
- C. limbic system
- D. medulla

42. The subfield of sociology that examines social relationships and political and economic structures in the city is

- A. urban planning

- B. zoning
- C. urban sociology
- D. urban psychology

43. Which of the following system produces, circulates, and regulates levels of hormones in the body?

- A. Circulatory System
- B. Endocrine System
- C. Limbic System
- D. Sympathetic Nervous System

44. According to Robert Merton's strain theory, what occurs when people accept society's goals but adopt disapproved means for achieving them?

- A. Conformity
- B. Innovation
- C. Rebellion
- D. Ritualism

45. Belief in a single supreme being or God who is responsible for significant events such as the creation of the world is

- A. transcendent idealism
- B. monotheism
- C. polytheism
- D. unit theism

46. The process by which a person mentally assumes the role of another person in order to understand the world from that person's point of view is referred to as

- A. generalized others
- B. role-taking
- C. significant others
- D. self-concept

47. Who are the working poor?

- A. People who live from just above to just below the poverty line
- B. Seldom-employed individuals who are caught in long-term deprivation because of low education, low employability, low income, and low self-esteem
- C. Skilled and semi-skilled machine operators who work in factories and elsewhere
- D. Those who live on the margins of society, are frequently homeless, and have little hope for the future

48. A continuous concentration of two or more cities and their suburbs that have grown until they form an interconnected urban area is a

- A. megalopolis
- B. central metropolitan area
- C. census district
- D. suburban complex

49. The study of the causes and distribution of health, disease, and impairment throughout a population is

- A. social epidemiology
- B. social welfare
- C. social engineering
- D. social biology

50. A person with obsessive-compulsive disorder is best described as an individual who experiences

- A. memory loss
- B. intense mood swings
- C. persistent anxiety-provoking thoughts
- D. physical symptoms with no known cause

9

Chemistry

Directions: Choose the letter that corresponds to the correct answer.

1. Which of these is an example of a chemical change?

- A. Methane is burned in air.
- B. Solid gold is melted to make jewelry.
- C. A bar of copper is stretched into a long copper wire.
- D. Iron is coated with bronze to prevent rusting

2. Which particles are found in the nucleus of an atom?

- A. protons and neutrons
- B. neutrons and electrons
- C. protons and electrons
- D. protons

3. What is the approximate mass of 1.50 moles of ammonia (NH_3)?

- A. 10.0 grams
- B. 15.0 grams

- C. 17.0 grams
- D. 25.5 grams

4. One of the most important properties of mixtures is that they

- A. are very reactive and unstable
- B. may have different proportions of their components
- C. have fixed proportions of their components
- D. can be separated only by chemical means

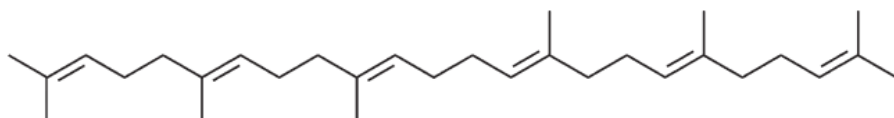
5. What is the percent composition by mass of sulfur in ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$?

- A. 6.7%
- B. 24%
- C. 28%
- D. 32%

6. Which of these is a base?

- A. LiOH
- B. BaCl_2
- C. KI
- D. KNO_3

7. The compound shown below is a



- A. triglyceride
- B. trinucleotide
- C. tripeptide
- D. trisaccharide
- E. triterpene

8. Which one of the following is a strong acid?

- A. HNO_3
- B. CaSO_4
- C. NH_3
- D. NaOH

9. Which of the following terms used as a measure of the average kinetic energy of the particles in a sample?

- A. temperature
- B. chemical energy
- C. volume
- D. pressure

10. Which characteristic of an exothermic reaction differs from that of an endothermic reaction?

- A. An exothermic reaction absorbs heat as the reaction progresses.
- B. The activation energy is higher in an exothermic reaction.
- C. An exothermic reaction releases heat as the reaction progresses.
- D. The products in exothermic reactions have more potential energy than the reactants.

11. Chlorine atom is in an excited state. When an electron in this atom jumps from the fourth to the third shell, energy is

- A. absorbed
- B. converted to electricity
- C. released
- D. disappeared

12. Which element has the highest electronegativity?

- A. nitrogen
- B. iodine
- C. fluorine
- D. selenium

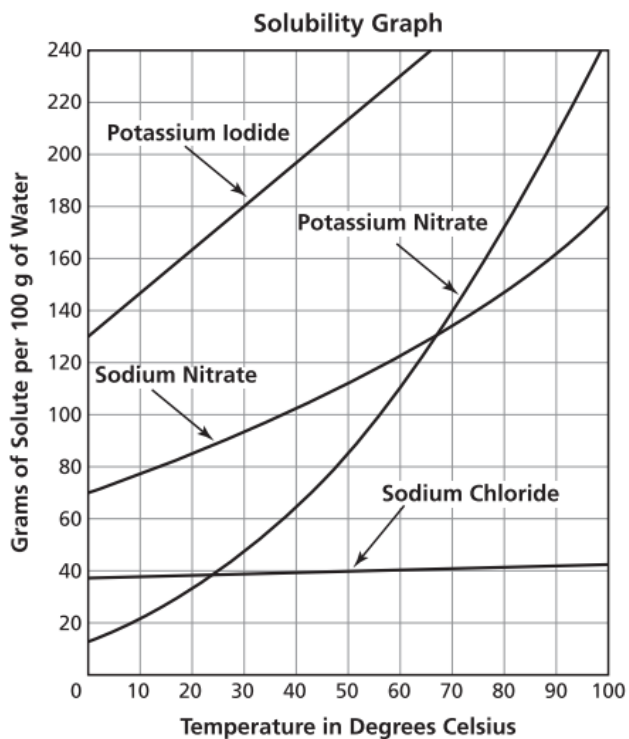
13. If the formula for potassium chlorate is KClO_3 and the formula for magnesium fluoride is MgF_2 , then what is the formula for magnesium chlorate?

- A. MgClO_3
- B. Mg_2ClO_3
- C. $\text{Mg}(\text{ClO}_3)_2$
- D. $\text{Mg}_2(\text{ClO}_3)_3$

14. Which part of an atom is most directly involved in chemical bonding?

- A. nucleus
- B. electron
- C. proton
- D. neutron

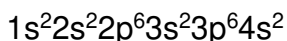
15. The graph below shows the solubilities of four compounds.



A supersaturated solution at 50 degrees Celsius contains 41 g of solute in 100 g of water. Which compound does the supersaturated solution contain?

- A. Potassium Iodide
- B. Potassium Nitrate
- C. Sodium Nitrate
- D. Sodium Chloride

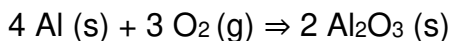
16. The electron configuration of a neutral atom of calcium is shown.



How many valence electrons are in the atom?

- A. 2
- B. 4
- C. 8
- D. 20

For questions 17 and 18, consider the following reaction:



17. The reaction can be classified as which one of the following types?

- A. precipitation
- B. decomposition
- C. synthesis
- D. double displacement

18. How many moles of Al_2O_3 can be produced from the reaction of 10.0 g of Al and 19.0 g of O_2 ? _____

- A. 0.581 mol
- B. 0.371 mol
- C. 0.185 mol
- D. 0.396 mol

19. Isotopes of an element have different numbers of

- A. protons
- B. neutrons
- C. electrons
- D. positrons

20. Which of the following equations represents sublimation?

- A. $\text{CH}_4(\text{l}) \rightarrow \text{CH}_4(\text{g})$
- B. $\text{CH}_3\text{OH}(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{l})$
- C. $\text{Hg}(\text{l}) \rightarrow \text{Hg}(\text{s})$
- D. $\text{CO}_2(\text{s}) \rightarrow \text{CO}_2(\text{g})$

21. For elements in the left-most column of the periodic table, properties that have increasing values as the atomic number increases include which of the following?

- I. Ionization energy (potential)
- II. Atomic radius
- III. Atomic mass

- A. I only
- B. III only
- C. I and II only
- D. II and III only
- E. I, II, and III

22. A student conducting a titration by adding 12.0 mL of NaOH(aq), of unknown concentration to 16.0 mL of 0.15 M HCl(aq). What is the molar concentration of the NaOH(aq)?

- A. 2.0 M
- B. 2.4 M
- C. 0.2 M
- D. 0.15 M

23. The reaction of nitrogen dioxide with water yields

- A. HNO₃ only
- B. HNO₂ only
- C. HNO₃ and NO
- D. NH₃ and H₂O₂
- E. NH₃ and O₂

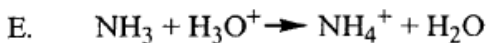
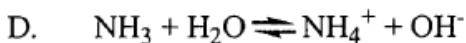
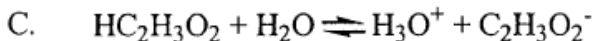
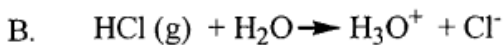
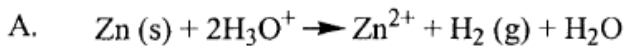
24. Which of these is an example of a homogenous mixture?

- A. a bowl of noodle soup
- B. a container of water and sand.
- C. a glass of salt water.
- D. a bottle of oil and vinegar.

25. The half-life of cobalt-60 is 5.27 years. Approximately how much of a 199 g sample will remain after 20 years?

- A. 10.0 g
- B. 12.5 g
- C. 40.0 g
- D. 50.0 g

26. In which of the following reactions is water considered to be acting as an acid?



27. A 2135 cm³ sample of dry air has a pressure of 98.4 kPa at 127 degrees Celsius. What is the volume of the sample if the temperature is increased to 206 degrees Celsius when the pressure is kept constant?

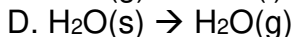
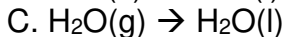
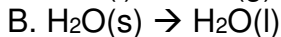
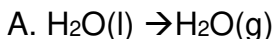
A. 1320 cm³

B. 1780 cm³

C. 2560 cm³

D. 3460 cm³

28. Which of these represents a release of energy?



29. During the production of aspirin, 2.6 g of aspirin can be formed from 2.0 g of salicylic acid. What is the percent yield if only 1.7 g of aspirin is produced?

- A. 35%
- B. 65%
- C. 77%
- D. 85%

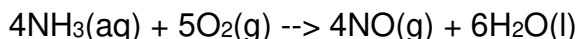
30. Analysis by mass of a certain compound shows that it contains 14 percent hydrogen and 86 percent carbon. Which of the following is the most informative statement that can properly be made about the compound on the basis of these data?

- A. It is a hydrocarbon.
- B. Its empirical formula is CH_2
- C. Its molecular formula is C_2H_4 .
- D. Its molar mass is 28 g/mol.
- E. It contains a triple bond.

31. Which characteristic is more similar in liquids and solids as compared to gases?

- A. the masses of particles.
- B. the distance between particles.
- C. the degree to which particles are organized.
- J. the strength of chemical bonds within particles.

32. The reaction shown below represents the oxidation of ammonia (NH_3).



How many grams of water (H_2O) will be formed when 34 grams of ammonia reacts with an excess of oxygen (O_2)?

- A. 51 grams
- B. 54 grams
- C. 64 grams
- D. 110 grams

33. Which of these describes how gallium forms a 3+ ion?

- A. The gallium loses 3 electrons.
- B. The gallium loses 3 protons.
- C. The gallium gains 3 electrons.
- D. The gallium gains 3 protons.

34. In which two compounds does nitrogen have the same oxidation number?

- A. N_2O_3 and HNO_3
- B. N_2O_5 and HNO_3
- C. NO_2 and N_2O_3
- D. N_2O_4 and HNO_2
- E. HNO_2 and NH_3

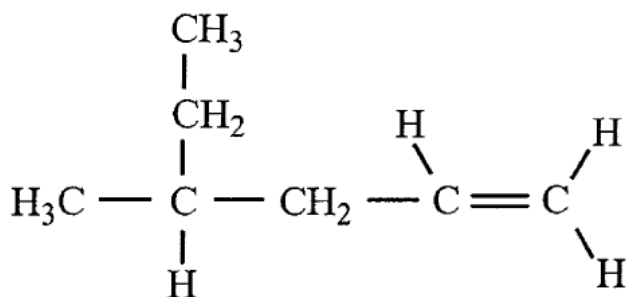
35. A student fills a flask with 5.0 moles of nitrogen gas and then seals the flask. Which change will happen when the student warms the flask?

- A. The temperature of the nitrogen gas will decrease.
- B. The pressure inside the flask will increase.
- C. The volume inside the flask will decrease.
- D. The molar mass of the nitrogen gas will increase.

36. How many atoms are in 3.50 moles of calcium (Ca)?

- A. 4.00×10^1
- B. 1.40×10^2
- C. 6.02×10^{23}
- D. 2.10×10^{24}

37. Which of the following is the IUPAC name for this compound?



- A. 4-methyl-1-hexene
- B. 4-ethyl-1-pentene
- C. 2-ethyl-4-pentene
- D. sec-butyl propylene
- E. 3-methyl-5-hexene

38. The equation below represents an incomplete chemical reaction.



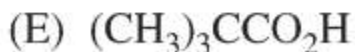
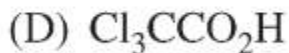
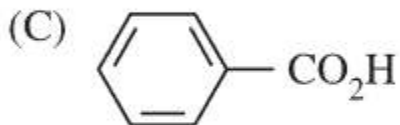
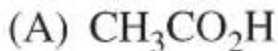
What is the product of the chemical reaction?

- A. Al_2Cl_3
- B. AlCl
- C. AlCl_2
- D. AlCl_3

39. Which information about a solution is required to calculate its molarity?

- A. number of moles of solute and atomic mass of solute
- B. number of moles of solvent and atomic mass of solute
- C. number of particles of solvent and the volume of solvent
- D. number of moles of solute and number of liters of solution.

40. Of the following carboxylic acids, which is the most acidic?



41. Which one of the following processes is accompanied by a decrease in entropy?

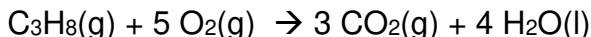
- A. Sublimation of carbon dioxide.
- B. Evaporation of water.
- C. Freezing of water.
- D. Shuffling a deck of cards.
- E. Heating a balloon filled with a gas.

42. Which of the following is the pH of a solution obtained by mixing 50.0 mL of 0.100 *M* HA and 50.0 mL of 0.100 *M* NaOH?

- I. Neutral if HA is a strong acid
- II. Basic if HA is a weak acid
- III. Neutral if HA is a weak acid

- A. I only
- B. II only
- C. III only
- D. I and II
- E. I and III

43. The combustion of propane, $C_3H_8(g)$, proceeds according to the equation below:



How many grams of water will be formed in the complete combustion of 44.0 grams of propane?

- A. 4.50 g
- B. 18.0 g
- C. 44.0 g
- D. 72.0 g
- E. 176 g

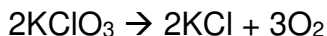
44. Which of the following is NOT accompanied by an increase in the entropy of the system?

- A. Discharging a battery
- B. Boiling water at atmospheric pressure
- C. Very slow mixing of hot and cold water in a well-insulated container
- D. Very slow expansion of a gas into an evacuated flask
- E. Rapid expansion of a gas and recompression to its original temperature, pressure, and volume

45. A student sets up an experiment to investigate the effect of temperature on the volume of 50 grams of gas inside a balloon. Which statement correctly describes the design of the experiment?

- A. The temperature is an experimental control, and the volume is the independent variable.
- B. The volume is an experimental control, and the temperature is the dependent variable.
- C. The mass of the gas is an experimental control, and the temperature is the independent variable.
- D. The temperature is an experimental control, and the mass of the gas is the dependent variable.

46. The equation below represents the breakdown of potassium chlorate (KClO_3).



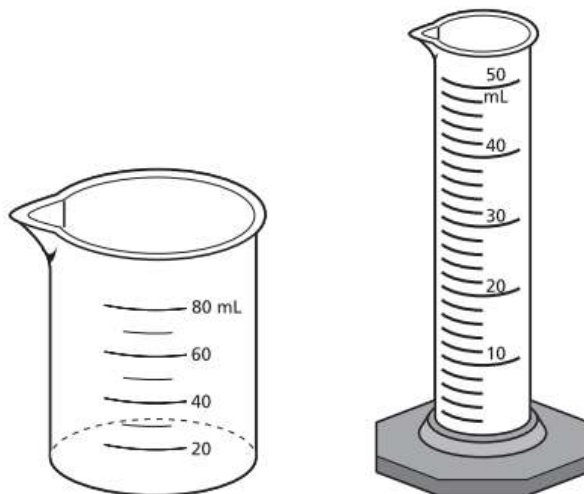
What volume of oxygen gas (O_2) does 20.0 grams of potassium chlorate (KClO_3) produce at STP based on the equation shown?

- A. 5.48 liters
- B. 7.80 liters

- C. 67.3 liters
- D. 72.9 liters

47. Two measuring tools are shown.

Measuring Tools



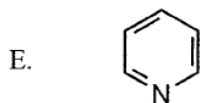
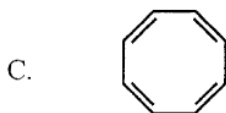
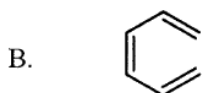
What is the most appropriate tool for measuring 30.0 mL of a sodium chloride solution?

- A. the beaker because it is more stable and the liquid is less likely to spill.
- B. the beaker because it is calibrated to hold large amounts of liquid
- C. the graduated cylinder because it is calibrated to measure the liquid more precisely.
- D. the graduated cylinder because it will be nearly filled with liquid.

48. Which of the following compounds produces H_2 gas when added to water?

- A. LiH
- B. CH_4
- C. NH_3
- D. PH_3
- E. H_2S

49. Which of the following is aromatic?



50. An engine cylinder contains 250 mL of gas at a pressure of 1.0 atm. As the engine runs, it compresses the cylinder, reducing the volume of the gas to 25 mL. What is the new pressure of the gas at this volume?

- A. 0.10 atm
- B. 10.0 atm
- C. 25 atm
- D. 250 atm

10

Verbal Answer Key

1. A.

To follow is less intense than to chase, and to nudge is less intense than to thrust.

2. D.

A marathon is a long race and hibernation is a lengthy period of sleep. The answer is not choice a or b because even though a bear and winter are related to hibernation, neither completes the analogy. (Choice c) is incorrect because sleep and dream are not synonymous.

3. A.

This is a classic function/purpose bridge—the purpose of MEDICINE is to prevent or cure ILLNESS in the same way that the purpose of LAW is to prevent or cure ANARCHY in the society.

4. C.

Scruff is the back of the neck, and stern is the back of a boat.

5. D.

A principle is another word for a doctrine, and a living is another word for livelihood.

6. D.

Something PALTRY lacks SIGNIFICANCE. Does something BANAL lack ORIGINALITY? Well, if something is BANAL it is predictable, so yes. That pair has the same relation as the stem pair.

7. D.

To chatter is to talk rapidly, and to flutter is to flap rapidly.

8. A.

To conjugate means to pair, and to partition means to divide.

9. B.

Chagrin can be the result of criticism, and sag is the result of pressure

10. B.

When you EXTORT something, you obtain it by force or threats. To EXTORT is to OBTAIN dishonestly. Plagiarism is borrowing material from another writer without giving him or her acknowledgment. That would fit the description of borrowing dishonestly.

11. D.

Pallid means lacking in color, and tactless means lacking diplomacy.

12. B.

To vaunt means to boast, and to skewer means to criticize.

13. C.

A kennel houses dogs, and an aerie houses birds

14. A.

Something SODDEN is very wet, so it is, by definition, extremely MOIST. This is a bridge of DEGREE. Similarly, something MAUDLIN is, by definition, extremely SENTIMENTAL.

15. D.

A group of lions is called a pride. A group of fish swim in a shoal. Teacher (choice a) and student (choice b) refer to another meaning of the word school. The answer is not (choice c) because self-

respect has no obvious relationship to this particular meaning of school.

16. B.

A hilt is part of a sword, and a needle is part of the compass.

17. D.

By definition, a MAVEN, meaning expert, has expertise. Likewise, a SUPPLICANT, or humble beggar, by definition has HUMILITY.

18. B.

To defer is a synonym of to postpone, and to proffer is a synonym of to tender.

19. B.

To gall is to vex, and to hex is to jinx.

20. A.

A mercenary performs a task for wages, and a dilettante does for enjoyment.

21. A.

Meridians are imaginary geographical circles intersecting the poles. Imaginary lines parallel to the equator (B) are latitudes. The

International Date Line is a specific meridian, not an area (C). It is not a land mass (D) as it crosses both water and land.

22. B.

The passage was found near 50 degrees S latitude. Latitudes are measured horizontally, in relation to the equator or central imaginary line, equidistant between the North and South Poles. Longitudes are measured vertically. Greenwich (A), the location of zero degrees longitude, adopted as the global standard, is both incorrect and never named in the passage. Spain (C) and Portugal (D) are also incorrect.

23. C.

A peninsula is a piece of land connected to the mainland by an isthmus and projecting into the ocean such that it is surrounded on three sides by water. A peninsula is not a coast (A); it is not found inland (B); and it is not a border (D).

24. C.

Topography means the physical features of a land mass. It does not mean coastline (A), mountain range (B), or islands (D).

25. A.

Longitudes are imaginary geographical lines running north and south. Latitudes run east and west. The other choices do not equal either latitude or longitude in direction.

26. A.

"Quagmire" means literally a bog or marsh, and figuratively an involved situation difficult to escape; entanglement is a synonym, more specifically similar than the other choices.

27. B.

"Terrestrial" means land. No choice here offers a synonym for "marine," e.g. nautical/naval/water/seagoing, and no other choices match either marine or terrestrial.

28. B.

29. C.

30. B.

31. A.

32. B.

33. D.

34. B.

35. C.

36. C.

37. B.

38. A.

39. C.

40. D.



Inductive Reasoning Answer Key

- | | | |
|--------|--------|--------|
| 1. D. | 13. B. | 25. D. |
| 2. E. | 14. D. | 26. D. |
| 3. A. | 15. C. | 27. A. |
| 4. A. | 16. E. | 28. A. |
| 5. D. | 17. B. | 29. A. |
| 6. D. | 18. C. | 30. D. |
| 7. A. | 19. C. | 31. A. |
| 8. A. | 20. B. | 32. B. |
| 9. D. | 21. A. | 33. D. |
| 10. C. | 22. B. | 34. C. |
| 11. B. | 23. A. | 35. C. |
| 12. D. | 24. B. | 36. D. |

37. D.

40. C.

39. B.

38. A.

12

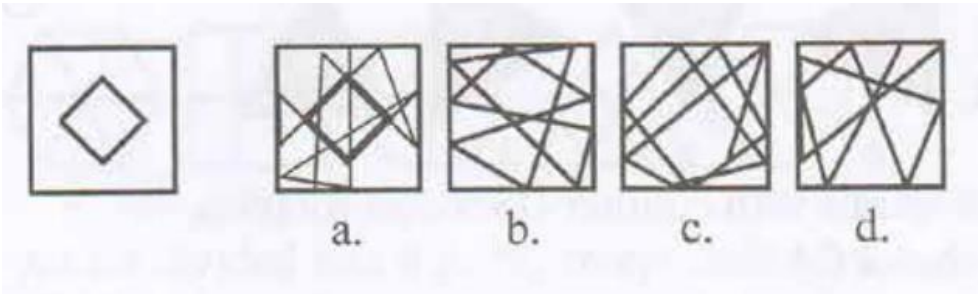
Quantitative Answer Key

- | | | |
|--------|--------|--------|
| 1. B. | 15. D. | 29. C. |
| 2. D. | 16. A. | 30. A. |
| 3. C. | 17. B. | 31. B. |
| 4. A. | 18. A. | 32. C. |
| 5. C. | 19. C. | 33. B. |
| 6. A. | 20. B. | 34. B. |
| 7. D. | 21. B. | 35. D. |
| 8. C. | 22. D. | 36. B. |
| 9. C. | 23. C. | 37. B. |
| 10. A. | 24. C. | 38. C. |
| 11. D. | 25. A. | 39. A. |
| 12. B. | 26. C. | 40. B. |
| 13. A. | 27. B. | |
| 14. D. | 28. B. | |

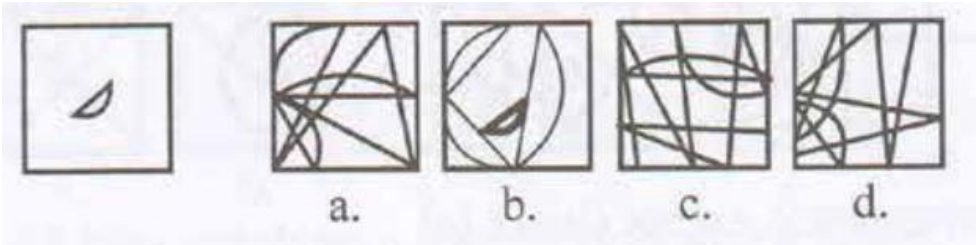
13

Perceptual Acuity Answer Key

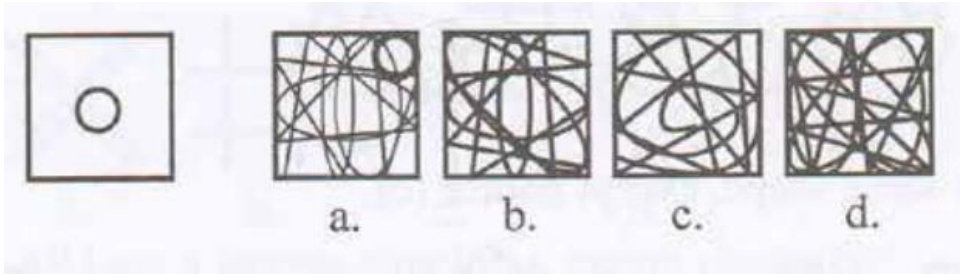
1. A.



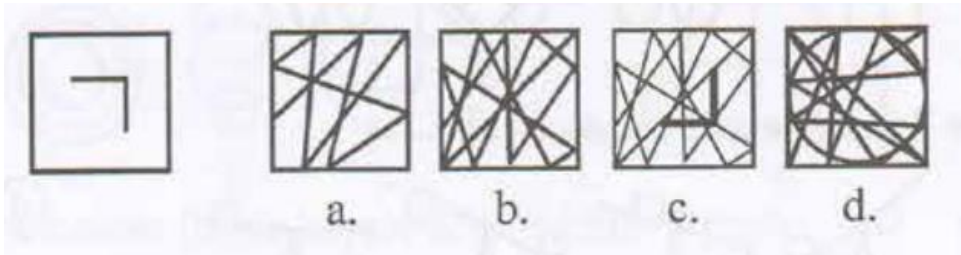
2. B.



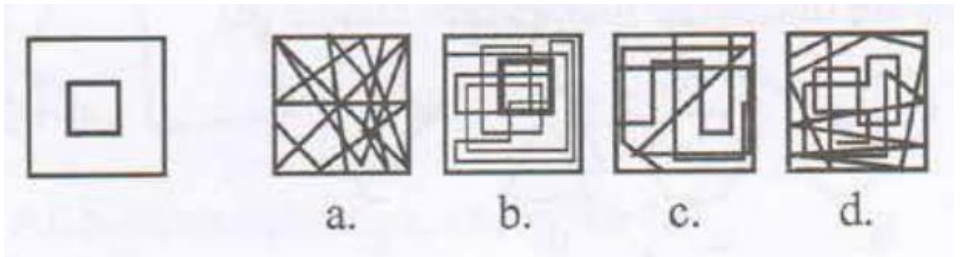
3. A.



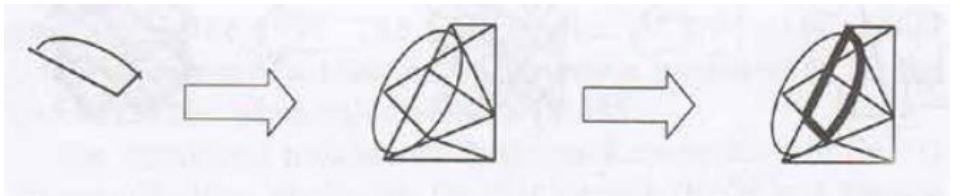
4. C.



5. B.



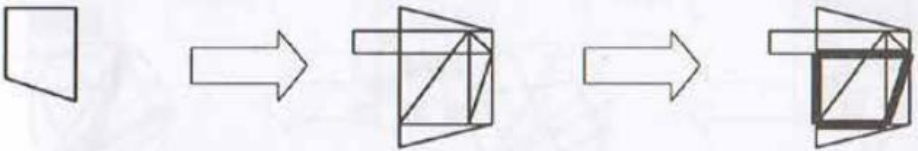
6. E.



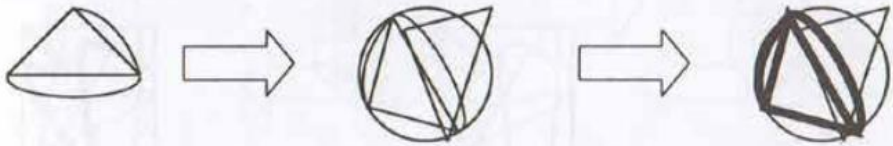
7. E.



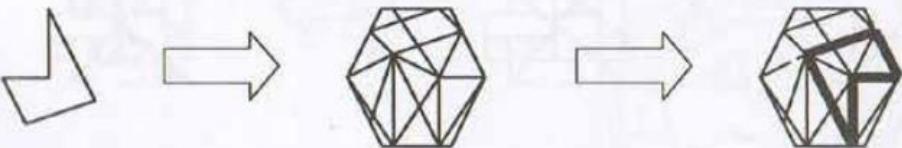
8. D.



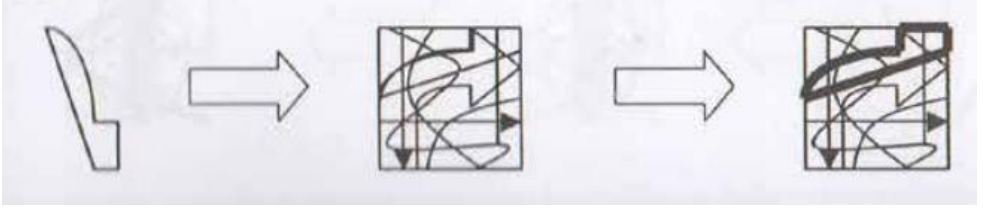
9. A.



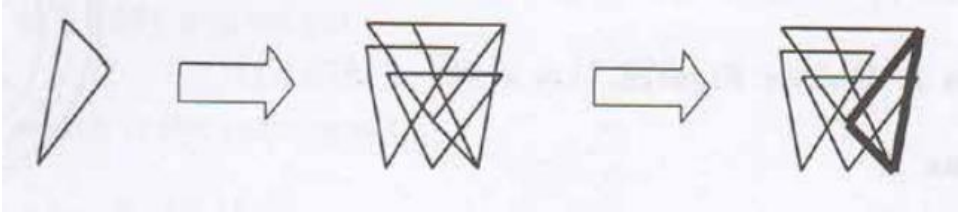
10. A.



11. B.



12. C.



13. C.

23. E.

32. D.

14. B.

24. A.

33. C.

15. C.

25. B.

34. B.

16. C.

26. B.

35. D.

17. D.

27. A.

36. A.

18. B.

28. C.

37. B.

19. C.

29. D.

38. D.

20. C.

30. C.

39. A.

21. A.

31. D.

40. B.

22. C.

14

Biology Answer Key

- | | | |
|--------|-------|-------|
| 1. D | 14. D | 27. D |
| 2. A. | 15. B | 28. A |
| 3. A | 16. C | 29. E |
| 4. B. | 17. C | 30. C |
| 5. D | 18. C | 31. A |
| 6. D | 19. A | 32. C |
| 7. B | 20. A | 33. C |
| 8. C | 21. E | 34. A |
| 9. B | 22. E | 35. D |
| 10. E | 23. D | 36. E |
| 11. C | 24. A | 37. C |
| 12. C. | 25. A | 38. A |
| 13. C | 26. B | 39. B |

40. A

44. D

48. D

41. C

45. D

49. C

42. B

46. E

50. E

43. D

47. A

15

Physics Answer Key

1. B	15. D	29. C
2. B	16. D	30. C
3. C	17. C	31. B
4. B	18. D	32. B
5. B	19. D	33. C
6. C	20. A	34. C
7. B	21. D	35. C
8. C	22. B	36. B
9. B	23. A	37. C
10. B	24. A	38. C
11. C	25. A	39. D
12. A	26. B	40. D
13. D	27. C	41. C
14. B	28. A	42. A

43. C

44. D

45. C

46. B

47. B

48. A

49. D

50. D

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Social Science Answer Key

- | | | |
|-------|-------|-------|
| 1. A | 14. D | 27. B |
| 2. B | 15. A | 28. B |
| 3. B | 16. D | 29. C |
| 4. A | 17. A | 30. C |
| 5. A | 18. C | 31. B |
| 6. C | 19. C | 32. D |
| 7. D | 20. D | 33. B |
| 8. C | 21. B | 34. B |
| 9. D | 22. C | 35. D |
| 10. D | 23. D | 36. A |
| 11. A | 24. D | 37. A |
| 12. A | 25. D | 38. D |
| 13. C | 26. D | 39. A |

40. C

41. D

42. C

43. B

44. B

45. B

46. B

47. A

48. A

49. A

50. C

17

Chemistry Answer Key

- | | | |
|--------|--------|--------|
| 1. A. | 15. D. | 29. B. |
| 2. A. | 16. A. | 30. B. |
| 3. D. | 17. C. | 31. B. |
| 4. B. | 18. C. | 32. B. |
| 5. B. | 19. B. | 33. A. |
| 6. A. | 20. D. | 34. B. |
| 7. E. | 21. D. | 35. B. |
| 8. A. | 22. C. | 36. D. |
| 9. A. | 23. C. | 37. A. |
| 10. C. | 24. C. | 38. D. |
| 11. C. | 25. B. | 39. D. |
| 12. C. | 26. D. | 40. D. |
| 13. C. | 27. C. | 41. C. |
| 14. B. | 28. C. | |

42. D.

45. C.

48. A.

43. D.

46. A.

49. E.

44. E.

47. C.

50. B.