

Scholastic Aptitude Test, 2017 EC, natural science, entrance exam, round 1

Grade 12 · Aptitude · 2017 E.C.

MARKING KEY: CONFIDENTIAL

Time allowed: 120 minutes

Questions: 50

Total marks: 50

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1. KEY: LOCK; _____ : Computer (1)

- A. Monitor
B. ✓ Password
C. Server
D. Screen

Answer: B

A key is used to unlock a lock, just as a password is used to access or unlock a computer.

2. PHYSICIAN: HOSPITAL; _____ : School (1)

- A. Supervisor
B. ✓ Teacher
C. Administrator
D. Student

Answer: B

A physician is a professional who works in a hospital, and a teacher is a professional who works in a school.

3. NEST: BIRD; _____ : Lion (1)

- A. Hive
B. Cave
C. Backyard
D. ✓ Den

Answer: D

A nest is the natural dwelling or home of a bird, whereas a den is the natural home of a lion.

4. AUTOMOBILE: GARAGE; _____ : Hangar (1)

- A. Train
B. ✓ Airplane
C. Deck
D. Truck

Answer: B

An automobile is stored in a garage, while an airplane is stored in a hangar.

5. PHONEY (1)

- A. Genuine
B. Authentic
C. ✓ Fake
D. Funny

Answer: C

The word 'phoney' means not genuine or fraudulent, which is synonymous with 'fake'.

6. THEFT (1)
- A. Gossip B. Suspicion
C. ✓ **Burglary** D. Hypocrisy
- Answer: C**
Theft is the act of stealing, and burglary is a specific type of theft involving illegal entry into a building.
7. HUMOROUS (1)
- A. ✓ **Amusing** B. Doubting
C. Satiating D. Satisfying
- Answer: A**
Humorous means causing lighthearted laughter or amusement, making 'amusing' its closest synonym.
8. INVINCIBLE (1)
- A. Visible B. ✓ **Conquerable**
C. Breakable D. Debatable
- Answer: B**
Invincible means incapable of being defeated or overcome, so its antonym is 'conquerable'.
9. FONDLY (1)
- A. ✓ **Hatred** B. Agreeable
C. Affectionate D. Sociable
- Answer: A**
Fondly means with affection or liking; the antonym among the choices representing an opposite feeling is 'hatred'.
10. SUBORDINATE (1)
- A. Soldier B. Inferior
C. ✓ **Superior** D. Retainer
- Answer: C**
Subordinate means lower in rank or position, and its antonym is 'superior'.
11. The government has just repealed the law segregating public facilities so that there will be no longer discrimination (1)
- A. signed B. ✓ **cancelled**
C. approved D. renewed
- Answer: B**
To 'repeal' a law means to officially revoke or cancel it, making 'cancelled' the correct choice.
12. The man was killed in a car accident. His body was dragged from the burning wreckage of his car. (1)
- A. backseats B. wheels
C. ✓ **remains** D. fire
- Answer: C**
The 'wreckage' refers to the remains of something that has been severely damaged or destroyed.

13. Harvard is one of the most prestigious universities in the USA. (1)

- A. furnished
- B. expensive
- C. privileged
- D. ✓ **admired**

Answer: D

'Prestigious' means inspiring respect and admiration, making 'admired' the best synonym here.

14. Identify the correct sentence: (1)

- A. One of all-time greatest payer has recently retired from football.
- B. One of all-time greatest payers have recently retired from football.
- C. One of all-time greatest payer have recently retired from football.
- D. ✓ **One of all-time greatest payers has recently retired from football.**

Answer: D

'One of' must be followed by a plural noun ('payers') and a singular verb ('has'). Option D is grammatically correct.

15. Identify the correct sentence: (1)

- A. I wanted to first take shower and then ate snack.
- B. I wanted to first take shower and then eating snack.
- C. ✓ **I wanted to first take shower and then eat snack.**
- D. I wanted first take shower and then eat snack.

Answer: C

Option C maintains a parallel structure with the infinitive forms 'to take' and '[to] eat' connected by the coordinating conjunction 'and'.

16. Identify the correct sentence: (1)

- A. ✓ **Their school takes only twenty minutes on foot.**
- B. They're school takes only twenty minutes on foot.
- C. There school takes only twenty minutes on foot.
- D. Theirs school takes only twenty minutes on foot.

Answer: A

The possessive determiner 'Their' is needed to modify 'school'. Options B, C, and D use homophones or incorrect pronoun forms.

17. Identify the correct sentence: (1)

- A. If you'll not feel well, you better go to clinic.
- B. ✓ **If you're not feeling well, you'd better go to clinic.**
- C. If you'll not feel well, you'd better go to clinic.
- D. If you're not feeling well, you better go to clinic.

Answer: B

Option B correctly uses the present continuous tense in the condition ('If you're not feeling well') and the correct idiomatic advice construct 'you'd better' (you had better).

18. The main intent of the writer in the text is to imply that _____. (1)
- A. most successful employers are those who have achieved their dreams through trade-off.
 - B. ✓ **there are steps that one needs to undergo in the transition from employee to employer.**
 - C. the transition from employee to employer does not require much effort except having the interest.
 - D. smooth transition from being an employer to employee is more of a matter of destiny than hard work.

Answer: B

The text discusses the process of transitioning from working for someone else to being a business owner, implying there are distinct steps one must undergo.

19. What does the sentence most successful employers today have risen through the ranks, relying on their ability to manage and direct others effectively imply? (1)
- A. All successful employers today have reached their level passing through lots of ups and downs.
 - B. ✓ **Most successful employers have proven their leadership ability through their journey.**
 - C. Every successful employer is the result of his/her hard work and diligence.
 - D. Having different ranks and rewards is the real manifestation of successful employers.

Answer: B

Relying on the ability to manage and direct others effectively directly translates to demonstrating and proving leadership capability during their professional journey.

20. In Paragraph 2, the phrase these two individuals refers to _____. (1)
- A. the employer and the employee.
 - B. people and the community as a whole.
 - C. ✓ **John Smith & the person in movie industry.**
 - D. the grocery store and the movie theatre.

Answer: C

The phrase 'these two individuals' refers back to the specific examples mentioned in Paragraph 2, namely John Smith and the person working in the movie industry.

21. According to the passage, what does the word vices most likely denote? (1)
- A. ✓ **weaknesses**
 - B. ambitions
 - C. deputies
 - D. strengths

Answer: A

In most contexts involving personal character and professional transitions, 'vices' refers to moral faults or personal weaknesses.

22. Why does the author emphasize the act of reflection? (1)
- A. To improve intellectual superiority.
 - B. To make reading more enjoyable.
 - C. ✓ **To complete the reading process.**
 - D. To simplify the ideas encountered.

Answer: C

The author emphasizes reflection because reading is not complete until the ideas have been contemplated and digested.

23. Which of the ideas is used as evidence for your answer to question number 28? (1)
- A. Line 4 (tired after reading... not in us.)
 - B. Line 1 (What is the ... preoccupation.)
 - C. Line 10 (The assumption ... absurdity.)
 - D. ✓ **Line 12 (Reading without... ridiculous.)**

Answer: D

Line 12 supports this by directly stating that reading without reflection is 'ridiculous' (or incomplete/meaningless).

24. Which of the following can be rearranged into a 5-letter English word? (1)
- A. GOFAT
 - B. ✓ **PASEH**
 - C. PYRIO
 - D. DWAEP

Answer: B

The letters in 'PASEH' can be rearranged to spell the common 5-letter English word 'SHAPE'.

25. If two days after tomorrow is four days before Saturday, what day is it today? (1)
- A. Sunday
 - B. Monday
 - C. Friday
 - D. ✓ **Saturday**

Answer: D

If today is Saturday, tomorrow is Sunday. Two days after tomorrow is Tuesday, which is exactly four days before Saturday.

26. Aki is Bali's sister. Yaya is Bali's mother. Lema is Yaya's father. Gette is Lema's mother. Then how is Aki related to Lema? (1)
- A. grandson
 - B. grandmother
 - C. daughter
 - D. ✓ **granddaughter**

Answer: D

Yaya is the mother of Bali and Aki, and Lema is the father of Yaya. Therefore, Lema is Aki's maternal grandfather, making Aki his granddaughter.

27. Statement I: All football players are sportspersons. Statement II: All sportspersons are fit. Conclusion: Some football players are not fit. This conclusion is: (1)
- A. reasonably correct
 - B. appropriate
 - C. ✓ **incorrect**
 - D. can't be determined

Answer: C

From the statements, all football players are sportspersons, and all sportspersons are fit, which logically means all football players are fit. Thus, the conclusion that some are not fit is incorrect.

28. How many months have a twenty-eighth day? (1)
- A. one month
 - B. two months
 - C. seven months
 - D. ✓ **twelve months**

Answer: D

Every single month in the calendar (all 12 months) has at least 28 days, and therefore contains a 28th day.

29. Gad is older than Dan and Dan is older than Betti. With Senni being older than Dan and younger than Gad, who is the youngest? (1)
- A. Gad
B. Dan
C. ✓ Betti
D. Senni

Answer: C

The given age relationships establish that Gad is older than Senni, Senni is older than Dan, and Dan is older than Betti, making Betti the youngest.

30. Which one of the following statements is true? (1)
- A. Every non-negative integer is a natural number.
B. ✓ Every integer number can be numerator of a rational number.
C. The sum of two irrational numbers is irrational number.
D. The intersection of the set of integers and the set of irrational numbers is non-empty set.

Answer: B

Any integer n can be written as the numerator of a rational number, such as $n/1$. Option A is false because 0 is non-negative but not a natural number in the standard Ethiopian curriculum.

31. Which one of the following is the largest number? (1)
- A. $\sqrt[3]{2}$
B. $\sqrt[6]{5}$
C. ✓ $\sqrt[4]{3}$
D. $\sqrt[12]{11}$

Answer: C

By converting the roots to a common index of 12, we compare $\sqrt[12]{2^4} = \sqrt[12]{16}$, $\sqrt[12]{5^2} = \sqrt[12]{25}$, $\sqrt[12]{3^3} = \sqrt[12]{27}$, and $\sqrt[12]{11}$. The largest value is $\sqrt[12]{27}$, which is $\sqrt[4]{3}$.

32. A ball is shot into the air from the top of the building. The height in meter is given by $h(t) = kt - t^2 + 30$, where t is the time taken in second. What is the possible value of k if the maximum value of height from the ground is 34? (1)
- A. ✓ 4
B. $\sqrt{2}$
C. 2
D. 5

Answer: A

The maximum of the quadratic function $h(t) = -t^2 + kt + 30$ occurs at $t = k/2$. Setting the maximum height $h(k/2) = k^2/4 + 30 = 34$ yields $k^2 = 16$, so the positive value of k is 4.

33. If $f(x) = \sin \pi x + e^{x^2} + |x| + x^3$ and $g(x) = \cos \pi x + \ln(x+1) + x$, then what is the value of $f(1) - 2g(0)$? (1)
- A. $\ln 2$
B. ✓ e
C. $e + 2$
D. 0

Answer: B

Calculating $f(1) = \sin(\pi) + e^1 + 1 + 1 = e + 2$ and $g(0) = \cos(0) + \ln(1) + 0 = 1$. Thus, $f(1) - 2g(0) = (e + 2) - 2 = e$.

34. Which one of the following is the domain of $g(x) = \ln(1 - x) + \ln x$? (1)
- A. $\mathbb{R} \setminus \{-1, 0\}$ B. $(0, \infty)$
C. $(1, \infty)$ D. $\checkmark (0, 1)$

Answer: D

For the function $g(x) = \ln(1 - x) + \ln x$ to be defined, both arguments must be positive: $1 - x > 0 \implies x < 1$ and $x > 0$. The intersection of these intervals is $(0, 1)$.

35. If $-x + 2y = 4$, then what is the value of $\frac{25^y}{5^x}$? (1)
- A. $\checkmark 625$ B. 125
C. 25 D. 5

Answer: A

We can rewrite the expression as $\frac{(5^2)^y}{5^x} = 5^{2y-x}$. Given that $-x + 2y = 4$, we substitute $2y - x = 4$ to get $5^4 = 625$.

36. A farmer has ten cows. Every day, he receives the same amount of milk in liters from each cow. One day, due to the food supply, he received half of the daily amount of milk from the four cows; he received three-fourth of the daily amount of milk from the three cows, and no milk from the other three cows. In total, he didn't receive ninety-two liters of milk on that day. How many liters of milk did he receive on that particular day? (1)
- A. 16 B. 92
C. $\checkmark 68$ D. 160

Answer: C

Let x be the daily milk per cow. The unreceived milk is $4(0.5x) + 3(0.25x) + 3x = 5.75x = 92 \implies x = 16$ liters. Thus, he received $10(16) - 92 = 68$ liters on that day.

37. A woman burns 416 calories in an hour exercise at a fitness center. If she burns 10 calories per minute swimming in the water and 6 calories per minute pedaling on the stationary bike, then how many minutes of the hour does she spend exercising in the water? (1)
- A. $\checkmark 14$ B. 56
C. 46 D. 60

Answer: A

Let w be swimming minutes and b be biking minutes. Solving the system $w + b = 60$ and $10w + 6b = 416$ gives $4w = 56$, which means $w = 14$ minutes.

38. A daily profit earned by a T-shirt factory is modeled by the formula $p(x) = -x^2 + 1,400x - 80,000$, where p is the profit and x is the price for each T-shirt sold. What range of prices will yield a profit of at least Birr 400,000? (1)
- A. $x \geq 800$ B. $\checkmark 600 \leq x \leq 800$
C. $x \leq 600$ D. $x \leq 600$ or $x \geq 800$

Answer: B

Setting $p(x) \geq 400,000$ leads to $-x^2 + 1,400x - 80,000 \geq 400,000 \implies x^2 - 1,400x + 480,000 \leq 0$. The roots of this quadratic are 600 and 800, meaning the profit is at least 400,000 for $600 \leq x \leq 800$.

39. Which one of the following is true about the function $f(x) = x^{\frac{2}{5}}$? (1)

- A. ✓ The range of f is $\{y \in \mathbb{R} \mid y \geq 0\}$ B. The domain of f is $\{x \in \mathbb{R} \mid x \geq 0\}$
C. The domain of f is $\{x \in \mathbb{R} \mid x \leq 0\}$ D. The range of f is $\{y \mid y \in \mathbb{R}\}$

Answer: A

The function $f(x) = x^{2/5} = \sqrt[5]{x^2}$ has a domain of all real numbers because it is an odd root. Since $x^2 \geq 0$, the range is restricted to non-negative real numbers, $y \geq 0$.

40. What is the value of z in the sequence 1, 2, 4, 8, 10, 20, 22, z , ...? (1)

- A. 24 B. ✓ 44
C. 40 D. 32

Answer: B

The pattern alternates between multiplying by 2 and adding 2: $1 \times 2 = 2$, $2 + 2 = 4$, $4 \times 2 = 8$, $8 + 2 = 10$, $10 \times 2 = 20$, $20 + 2 = 22$. Following this, $z = 22 \times 2 = 44$.

41. What is the possible value of the missing term x in the sequence $-1, 0, 1, 2, -1.8, 1, 26, -1, x, 1, 242, -1, 728, 1, \dots$? (1)

- A. 36 B. 54
C. 34 D. ✓ 80

Answer: D

The odd terms form the sequence $-1, 1, -1, 1, \dots$, while the even terms follow the formula $3^n - 1$ for $n = 0, 1, 2, 3, 4, \dots$ which gives 0, 2, 8, 26, x , 242, 728. Thus, $x = 3^4 - 1 = 80$.

42. How many days are there from the first day of March to the last day of May? (1)

- A. ✓ 92 B. 89
C. 90 D. 91

Answer: A

March has 31 days, April has 30 days, and May has 31 days. The sum of the days is $31 + 30 + 31 = 92$ days.

43. Consider the lengths of the sides of a triangle x, y, z , and the quantities given below: Quantity P $3x + y - z$ Quantity Q $4x$ (1)

- A. Quantity P is greater than Quantity Q. B. ✓ Quantity P is less than Quantity Q.
C. The two quantities are equal. D. The two quantities cannot be compared.

Answer: B

The difference is $P - Q = y - z - x$. By the triangle inequality, any side of a triangle is less than the sum of the other two sides, so $y < x + z \implies y - z - x < 0$, which means $P < Q$ always.

44. A corporation pays ten employees a total of Birr 100,000 every month. Six out of ten employees receives less than Birr 10,000 per month. Quantity P The average of the monthly payment of the corporation The median of the monthly payment of the corporation (1)

- A. Quantity P is less than Quantity Q. B. ✓ Quantity P is greater than Quantity Q.
C. The two quantities are equal. D. The two quantities cannot be compared.

Answer: B

The average (Quantity P) is $100,000/10 = 10,000$. Since 6 out of 10 employees earn less than 10,000, both the 5th and 6th values must be less than 10,000, meaning their median (Quantity Q) is also strictly less than 10,000.

45. An engineer is putting black and white colored ceramics on a square floor of area 36m^2 . Each ceramic has area 1m^2 . The engineer places the black ones along both diagonals and the rest is covered by white colored ceramics. In what ratio is black to white ceramic used? (1)

A. ✓ 1:2
B. 1:6
C. 4:5
D. 1:5

Answer: A

The floor is a 6×6 grid of 1m^2 tiles. Because 6 is an even number, the two diagonals do not share a common center tile, so there are exactly $6 + 6 = 12$ black tiles and $36 - 12 = 24$ white tiles, representing a ratio of 1:2.

46. A person makes a glass of juice and used half of the glass with avocado, one third of the remaining half with mangoes and the rest is filled by banana of bananas to avocados in the glass? (1)

A. 1:2
B. 1:6
C. ✓ 2:3
D. 1:3

Answer: C

Avocado represents $1/2$ of the glass, mango represents $1/3 \times (1/2) = 1/6$, and the rest is banana: $1 - 1/2 - 1/6 = 1/3$. The ratio of bananas to avocados is $(1/3) : (1/2) = 2 : 3$.

47. Two pipes A and B are used to fill a water tank. Pipe A can fill the tank in 3 hours, and pipe B can fill the same tank in 6 hours. How long will it take in hours to fill the tank if both pipes are opened at the same time? (1)

A. 4
B. 5
C. ✓ 2
D. 9

Answer: C

The combined rate of both pipes is $1/3 + 1/6 = 1/2$ of the tank per hour, meaning it will take 2 hours to fill the tank together.

48. A milk factory has only two pipe machines used to fill bottles for market. The old and new machines can fill 35 and 50 bottles per hour, respectively, and a total of 590 bottles are filled every day. One day the old machine was broken after working for 4 hours. How long will it take in hours for the new machine to fill the remaining bottles on that day? (1)

A. ✓ 5
B. 8
C. 7
D. 13

Answer: A

In the first 4 hours, both machines together fill $4 \times (35 + 50) = 340$ bottles. The remaining $590 - 340 = 250$ bottles are filled by the new machine alone, which takes $250/50 = 5$ hours.

49. If a spherical soccer ball has a volume of $36\pi \text{ cm}^3$, then which one of the following is the surface area of the ball in square centimeter? (1)

A. 12π
B. $\frac{16\pi}{3}$
C. $\frac{32\pi}{3}$
D. ✓ 36π

Answer: D

Using the volume formula of a sphere, $V = \frac{4}{3}\pi r^3 = 36\pi$, we solve for the radius to find $r = 3$ cm. Substituting this into the surface area formula, $A = 4\pi r^2$, yields $4\pi(3^2) = 36\pi \text{ cm}^2$.

50. Points A, B and C are located on a circle with center O and radius 2 units long. If A, B and C are joined to form an equilateral triangle, then what is the area of triangle ABC in square units? (1)
- A. $\sqrt{3}$ B. 3
C. $3\sqrt{3}$ D. 1

Answer: C

The side length s of an equilateral triangle inscribed in a circle of radius R is given by $s = R\sqrt{3}$. Since $R = 2$, we have $s = 2\sqrt{3}$, and the area of the triangle is $\frac{\sqrt{3}}{4}s^2 = \frac{\sqrt{3}}{4}(12) = 3\sqrt{3}$.

END OF THE MARKING KEY

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