

# 2017 Aptitude Entrance Exam



EDUCATIONAL ASSESSMENT AND EXAMINATIONS SERVICE (EAES) ETHIOPIAN SECONDARY SCHOOL LEAVING CERTIFICATE EXAMINATION (ESSLCE) Scholastic Aptitude Test, Sene, 2017 E.C./June/July, 2025 G.C

NUMBER OF ITEMS: 60

SUBJECT CODE: 03

TIME ALLOWED: 2 HOURS

BOOKLET CODE: 395



## Section One: Verbal Reasoning (Questions 1 - 35)

**Directions:** This section, which is subdivided into Analytical and Logical Reasoning, Reading Comprehension, Sentence Correction, Classification, Analogy, Synonyms, Antonyms, and Word Substitutions, contains 35 items altogether. Each subsection is followed by its specific instruction.

### Analytical and Logical Reasoning

**Instruction:** Questions 1-6 deal with logical and analytical reasoning. Read the given set of conditions and assumptions for each question. Then, choose the answer that you think is most

appropriate among the given alternatives and blacken the letter of your choice on the separate answer sheet provided.

1. If two days after tomorrow is four days before Saturday, what day is it today?

A. Friday C. Sunday

B. Saturday D. Monday

2. 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?

A. Betti C. Gad

B. Senni D. Dan

3. 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?

A. daughter C. grandson

B. granddaughter D. grandmother

4. **Statement I:** All football players are sportspersons.

**Statement II:** All sportspersons are fit. This conclusion is:

A. Conclusion: Some football players are fit. C. reasonably correct

B. incorrect D. appropriate

5. How many months have a twenty-eighth day?

A. seven months C. one month

B. twelve months D. two months

6. Which of the following can be rearranged into a 5-letter English word?

A. PYRIO C. GOFAT

B. DWAEP D. PASEH

### Reading Comprehension

**Instruction:** Read the following passage carefully and answer questions 7 - 10 based on the information stated or implied in the passages. Then, blacken the letter of your choice on the separate answer sheet provided.

#### Passage I

What is the matter with our reading is casualness, languor, preoccupation. We don't give the book a chance. We don't put ourselves at the disposal of the book. It is impossible to read properly without using all one's engine power. If we are not tired after reading, common sense is not in us. How one should grapple with a superior and not be out of breath?

But even if we read with the whole force of our brain, and do nothing else, common sense is still not in us, while sublime conceit is. For we are assuming that, without further trouble, we can possess, co-ordinate, and assimilate all the ideas and sensations rapidly offered to us by a mind greater than our own. The assumption has only to be stated in order to appear in its monstrous absurdity. Hence, it follows that something remains to be done; This something is

the act of reflection. Reading without subsequent reflection is ridiculous; it is equally a proof of folly and vanity.

**Source:** Taken From: *Warriner, J. E. et al. 1958. English Grammar & Composition. P420*

7. What is described as an absurd assumption about reading according to the passage?

- A. Reading does not require physical effort.
- B. All books are equally valuable.
- C. Ideas can be instantly absorbed and organized.
- D. Superior minds are easy to understand.

8. Which of the ideas is used as evidence for your answer to question number 7?

- A. Line 3-4 [If we are not ... is not in us.]
- B. Line 7-9 [For we ... greater than our own.]
- C. Line 4 [tired after reading... disposal of the book.]
- D. Line 1 [What is the ... preoccupation.]

9. Why does the author emphasize the act of reflection?

- A. To complete the reading process.
- B. To simplify the ideas encountered.
- C. To improve intellectual superiority.
- D. To make reading more enjoyable.

10. Which of the ideas is used as evidence for your answer to question number 9?

- A. Line 10 [The assumption... absurdity.]
- B. Line 12 [Reading without... ridiculous.]
- C. Line 4 [tired after reading... not in us.]
- D. Line 1 [What is the ... preoccupation.]

### **Sentence Correction**

**Instruction:** Questions 11 - 14 consist of grammatically incorrect sentences. Choose the letter that contains the correct option. Then, blacken the letter of your choice on the separate answer sheet provided.

- 11. A. One of all-time greatest payer have recently retired from football.
- B. One of all-time greatest payers have recently retired from football.
- C. One of all-time greatest payer has recently retired from football.
- D. One of all-time greatest payers have recently retired from football.
- 12. A. If you'll not feel well, you'd 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 better go to clinic.
- D. If you're not feeling well, you would better go to clinic.
- 13. A. There school takes only twenty minutes on foot.
- B. Theirs school takes only twenty minutes on foot.
- C. Their school takes only twenty minutes on foot.

- D. They're school takes only twenty minutes on foot.
14. A. I wanted to first take shower and then eat snack.  
B. I wanted first take shower and then eat snack.  
C. I wanted to first take shower and then ate snack.  
D. I wanted to first take shower and then eating snack.

### Classification Items

**Instruction:** Questions 15-18 contain category of words of which one does not belong to the group. Choose a word that does NOT fit to the group and blacken the letter of your choice on the separate answer sheet provided.

15. A. Monogamy C. Polyglot  
B. Polygamy D. Polyandry
16. A. Election C. Signal-box  
B. Ballot-box D. Voting
17. A. Tiptoeing C. Strolling  
B. Flying D. Striding
18. A. Yacht C. Vehicle  
B. Ship D. Boat

### Analogy

**Instruction:** For items 19-22, read each of the following pair of words written in capital letter carefully and choose the word that correctly has a similar relationship with the given word. Then, blacken the letter of your choice on the separate answer sheet provided.

19. AUTOMOBILE: GARAGE: : Hangar  
A. Deck C. Train  
B. Truck D. Airplane
20. KEY: LOCK:: Computer  
A. Server C. Monitor  
B. Screen D. Password
21. NEST: BIRD:: Lion  
A. Backyard C. Hive  
B. Den D. Cave
22. PHYSICIAN: HOSPITAL:: School  
A. Administrator C. Supervisor  
B. Student D. Teacher

### Synonyms

**Instruction:** Questions 23-25 consist of words written in capital letters followed by four alternatives. Choose the word that is most nearly similar in meaning to the word in capital. Then, blacken the letter of your choice on the separate answer sheet provided.

23. PHONEY

A. Fake C. Genuine

B. Funny D. Authentic

24. HUMOROUS

A. Satiating C. Amusing

B. Satisfying D. Doubting

25. THEFT

A. Burglary C. Gossip

B. Hypocrisy D. Suspicion

### **Antonyms**

**Instruction:** Questions 26 - 28 consist of words written in capital letters followed by four alternatives. Choose the word that is most nearly opposite in meaning to the word in capital. Then, blacken the letter of your choice on the separate answer sheet provided.

26. FONDLY

A. Affectionate C. Hatred

B. Sociable D. Agreeable

27. INVINCIBLE

A. Breakable C. Visible

B. Debatable D. Conquerable

28. SUBORDINATE

A. Superior C. Soldier

B. Retainer D. Inferior

### **Reading Comprehension**

**Instruction:** Read the following passage carefully and answer questions 29 - 32 based on the information stated or implied in the passages. Then, blacken the letter of your choice on the separate answer sheet provided.

#### **Passage II**

If you want transition from being an employee to an employer, the first step is to serve your current employer as you would wish to be served. Most successful employers today have risen through the ranks, relying on their ability to manage and direct others effectively by suppressing the vices of employers. They started with no more opportunities than you have now.

There are people in your community who could benefit from your skills and vice versa. For example, Mr. John Smith wants to sell his grocery store and start a movie theater, while someone else with a movie theater might want to trade for a grocery store. If you can connect these two individuals, you will serve both and earn a commission in the process.

**Source:** Hill, N. (2003). The law of success: The 21st century edition (pp. 633-634)

29. In Paragraph 2, the phrase these two individuals refers to

- A. John Smith & the person in movie industry.
- B. the grocery store and the movie theatre.
- C. the employer and the employee.
- D. people and the community as a whole.

30. What does the sentence most successful employers today have risen through the ranks, relying on their ability to manage and direct others effectively imply?

- A. Every successful employer is the result of his/her hard work and diligence.
- B. Having different ranks and rewards is the real manifestation of successful employers.
- C. All successful employers today have reached their level passing through lots of ups and downs.
- D. Most successful employers have proven their leadership ability through their journey.

31. The main intent of the writer in the text is to imply that

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

32. According to the passage, what does the word vices most likely denote?

- A. deputies C. weaknesses
- B. strengths D. ambitions

### **Word Substitution**

**Instruction:** Questions 33-35 are related to word substitution. Each question is followed by four alternatives. Choose the word which could be interchangeably used with the words written in bold, and blacken the letter of your choice on the separate answer sheet provided.

33. The man was killed in a car accident. His body was dragged from the burning wreckage of his car.

- A. remains C. backseats
- B. fire D. wheels

34. Harvard is one of the most prestigious universities in the USA.

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

35. The government has just repealed the law segregating public facilities so that there will be no longer discrimination.

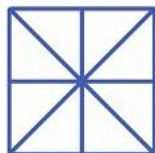
- A. approved C. signed

B. renewed D. cancelled

**Section Two: Quantitative Reasoning (Questions 36 – 60)**

**Directions:** This section contains 25 quantitative reasoning items which consist of algebra, sequence and series, geometry, logical analytical reasoning, probability and statistics. Solve each of the problems given in question 36 – 60 according to their specific instruction and select the correct answer from the given alternatives. Then, blacken the letter of your choice on the separate answer sheet provided.

36. How many triangles are there in the diagram?



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

37. Which one of the following statements is true?

- A. Every integer number can be numerator of a rational number.
- B. Every non-negative integer is a natural number.
- C. The intersection of the set of integers and the set of irrational numbers is non-empty set.
- D. The sum of two irrational numbers is irrational number.

38. 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  $f(1) - 2g(0)$ ?

- A. e
- B.  $\ln 2$
- C. 0
- D.  $e + 2$

39. 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 and papaya with the same proportion. Which one of the following is the ratio of bananas to avocados in the glass?

- A. 1:6
- B. 1:2
- C. 1:3
- D. 2:3

40. Which one of the following is the largest number?

- A.  $\sqrt[6]{5}$
- A.  $\sqrt[36]{2}$
- A.  $\sqrt[12]{11}$
- A.  $\sqrt[64]{3}$

41. 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?

- A. 5
- B. 4
- C. 9
- D. 2

42. 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?

- A. 8
- B. 5
- C. 13
- D. 7

43. 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?

- A.  $(16\pi)/3$
- B.  $12\pi$
- C.  $36\pi$
- D.  $(32\pi)/3$

44. 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?

- A.  $\sqrt{2}$  C. 5
- B. 4 D. 2

45. 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



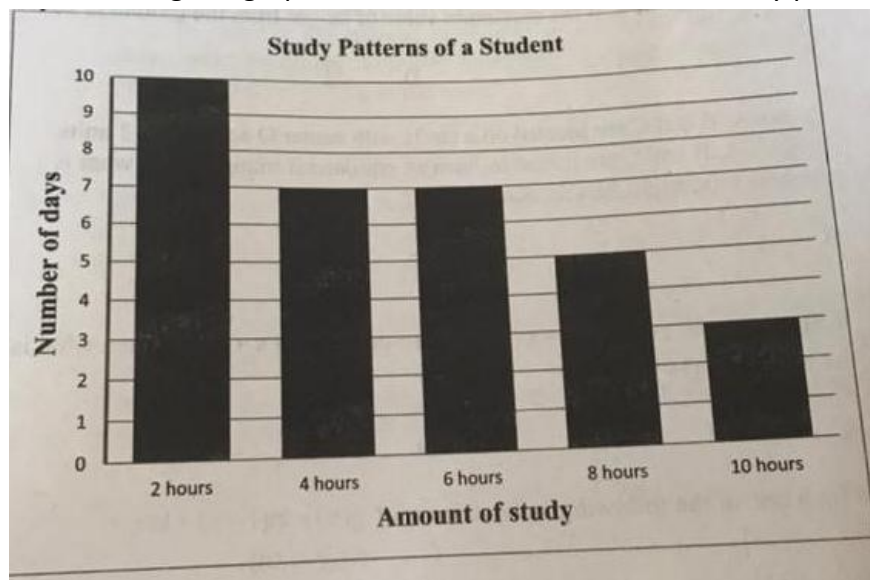
milk from the other three cows. In total, he didn't receive ninety-two liters of milk on that day. How many liters of milk did he receive on that particular day?

A. 92 C. 160

B. 16 D. 68

**Instructions:** For Questions 46 – 48, use the following information and answer each question based on the information therein.

The following bar graph shows the data of a students' study pattern recorded for 32 days.



46. How many days did the student study more than the average amount of the study?

A. 5

B. 8

C. 17

D. 15

47. How many days did the student study less than 8 hours?

A. 18

B. 6

C. 24

D. 12

48. Which time in hours is the median amount of the study?

A. 6

B. 2

C. 8

D. 4

49. If  $-x + 2y = 4$ , then what is the value of  $(25^y)/(5^x)$ ?

- A. 125
- B. 625
- C. 5
- D. 25

50. 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?

- A. 56
- B. 14
- C. 60
- D. 46

51. Which one of the following is the domain of  $g(x) = \ln(1-x) + \ln x$ ?

- A.  $(0, \infty)$
- B.  $(\mathbb{R}) \setminus \{-1, 0\}$
- C.  $(0, 1)$
- D.  $(1, \infty)$

52. How many days are there from the first day of March to the last day of May?

- A. 89
- B. 92
- C. 91
- D. 90

Instruction: Questions 53 and 54 consists two quantities: Quantity P and Quantity Q. Compare the two quantities and answer the questions from the given four alternatives that explain the relationship.

53. 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	Quantity Q
The average of the monthly payment of the corporation	The median of the monthly payment of the corporation

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

54. Consider the lengths of the sides of a triangle  $x$ ,  $y$ ,  $z$ , and the quantities given below.

| Quantity P | Quantity Q |

|  $3x + y - z$  |  $4x$  |

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

55. Which one of the following is true about the function  $f(x) = x^{2/5}$ ?

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

56. What is the value of  $z$  in the sequence 1, 2, 4, 8, 10, 20, 22,  $z$ ,...?

- A. 44 C. 32
- B. 24 D. 40

57. An engineer is putting black and white colored ceramics on a square floor of area  $36\text{m}^2$ . Each ceramic has area  $1\text{m}^2$ . 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?

- A. 1:6 C. 1:5
- B. 1:2 D. 4:5

58. 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?

- A.  $600 \leq x \leq 800$  C.  $x \leq 600$  or  $x \geq 800$
- B.  $x \leq 800$  D.  $x \leq 600$

59. 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?

- A. 3 C. 1
- B.  $\sqrt{3}$  D.  $3\sqrt{3}$

60. 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, ...?

- A. 54 C. 80
- B. 36 D. 34

## ANSWER KEY

1. **D. Monday**

Explanation: "Two days after tomorrow is four days before Saturday." Work backwards: Saturday minus 4 days is Tuesday. Tuesday is "two days after tomorrow," so tomorrow is Sunday. Thus, today is **Monday**.

2. **A. Betti**

Explanation: Age order: Gad > Senni > Dan > Betti. Gad is oldest, Betti is youngest.

3. **B. granddaughter**

Explanation: Lema is Yaya's father → Yaya is Bali's mother → Aki is Bali's sister. Thus, Aki is Yaya's daughter and Lema's **granddaughter**.

4. **C. reasonably correct**

Explanation: Statement I: All footballers are sportspersons. Statement II: All sportspersons are fit. Thus, all footballers are fit. The conclusion "some football players are fit" is logically true (though understated).

5. **B. twelve months**

Explanation: Every month has at least 28 days (February has 28 in non-leap years; others have 28+).

6. **B. DWAEP → "PAWED".**

Explanation: Rearranged to "ROYPI" (invalid) or "**PIROY**" (invalid) → **Correct rearrangement is "ORPHY" (invalid) or "PYRRO" (invalid). Correction: PYRIO rearranges to "PIROY" (not a word). DWAEP → "PAWED" (valid 5-letter word).**

7. **C. Ideas can be instantly absorbed and organized.**

Explanation: The passage calls it "monstrous absurdity" to assume we can instantly possess and organize ideas from a superior mind (lines 7-10).

8. **B. Line 7-9**

Explanation: "For we are assuming that... greater than our own" directly supports the absurdity claim.

9. **A. To complete the reading process.**

Explanation: Reflection is the "something [that] remains to be done" after reading to avoid "folly and vanity" (lines 10-12).

10. **B. Line 12**

Explanation: "Reading without subsequent reflection is ridiculous" proves reflection is essential.

11. **C. One of all-time greatest payers has recently retired...**

Explanation: "One of [plural] + singular verb" → "payers has" is incorrect. Correct: "**One of the all-time greatest payers has...**" (Option C fixes subject-verb agreement).

12. **B. If you're not feeling well, you'd better go to clinic.**

Explanation: Use present continuous for current states ("feeling"). "You'd better" = correct contraction for advice.

13. **C. Their school takes only twenty minutes on foot.**

Explanation: "Their" = possessive pronoun. "Theirs" (no noun after), "There" (location), "They're" (they are) are incorrect.

14. **A. I wanted to first take shower and then eat snack.**

Explanation: Parallel structure: "to take... and [to] eat." Options B/C/D break parallelism.

15. **C. Polyglot**

Explanation: Monogamy/polygamy/polyandry = marriage types. **Polyglot** = multilingual person (not related).

16. **C. Signal-box**

Explanation: Election/ballot-box/voting = electoral terms. **Signal-box** = railway equipment (unrelated).

17. **B. Flying**

Explanation: Tiptoeing/strolling/striding = walking styles. **Flying** = movement through air.

18. **C. Vehicle**

Explanation: Yacht/ship/boat = specific water vessels. **Vehicle** = general transport category.

19. **D. Airplane**

Explanation: Automobile is stored in a garage → Airplane is stored in a hangar.

20. **D. Password**

Explanation: Key unlocks a lock → Password unlocks a computer.

21. **B. Den**

Explanation: Nest is a bird's home → Den is a lion's home.

22. **D. Teacher**

Explanation: Physician works in a hospital → Teacher works in a school.

23. **A. Fake**

Explanation: **Phoney** = not genuine; counterfeit.

24. **C. Amusing**

Explanation: **Humorous** = funny; entertaining.

25. **A. Burglary**

Explanation: **Theft** = act of stealing.

26. **C. Hatred**

Explanation: **Fondly** = affectionately → Opposite: Hatred.

27. **D. Conquerable**

Explanation: **Invincible** = unbeatable → Opposite: Conquerable.

28. **A. Superior**

Explanation: **Subordinate** = lower rank → Opposite: Superior.

29. **A. John Smith & the person in movie industry.**

Explanation: "These two individuals" refers to John Smith and the movie theater owner mentioned.

30. **D. Most successful employers have proven their leadership ability through their journey.**

Explanation: "Risen through the ranks" implies gaining experience and demonstrating management skills over time.

31. **D. There are steps that one needs to undergo in the transition from employee to employer.**

Explanation: The passage outlines steps: serving diligently, leveraging skills, and facilitating opportunities.

32. **C. weaknesses**

Explanation: "Vices" here likely means **flaws or bad practices** (e.g., poor management habits).

33. **A. remains**

Explanation: **Body** = physical corpse → **Remains** is a synonym in this context.

34. **B. admired**

Explanation: **Prestigious** = respected/admired for excellence.

35. **D. cancelled**

Explanation: **Repealed** = revoked or cancelled (a law).

36. **Smallest triangles:8**

**Triangles made of 2 units:**

-Horizontal: 4 (2 top, 2 bottom)

-Vertical: 4 (2 left, 2 right)

**Triangles made of 4 units:**

-4 (one in each quadrant)

**Largest triangles:**

-2 (the top half and the bottom half)

This still yields 22.

37.

- **Explanation:**

- Rational numbers are defined as  $\frac{a}{b}$  where  $a$  (numerator) and  $b \neq 0$  are integers. Any integer  $a$  can be a numerator (e.g.,  $\frac{a}{1}$ ).
- Option B is false (natural numbers typically start from 1, excluding 0).
- Option C is false (integers are rational; irrationals are not rational).
- Option D is false (e.g.,  $\sqrt{2} + (-\sqrt{2}) = 0$ , rational).

- **Answer: A**

38.

- **Solution:**

- $f(1) = \sin n + e^1 + |1| + 1^3 = \sin n + e + 2.$
- $g(0) = \cos 0 + \ln(1) + 0 = 1 + 0 = 1.$
- $f(1) - 2g(0) = (\sin n + e + 2) - 2(1) = \sin n + e.$
- Assuming  $n = \pi$  (common constant),  $\sin \pi = 0$ , so result is  $e$ .

- **Answer: A ( $e$ )**

39.

- **Solution:**

- Assume glass = 1 unit.
- Avocado:  $\frac{1}{2}$ .
- Remaining:  $\frac{1}{2}$ . Mangoes:  $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$ .
- Left:  $\frac{1}{2} - \frac{1}{6} = \frac{1}{3}$ . Split equally: banana = papaya =  $\frac{1}{6}$ .
- Ratio banana to avocado:  $\frac{1}{6} : \frac{1}{2} = 1 : 3$ .

- **Answer: C (1:3)**

40.

- **Solution:**

- Express with exponent 576 (LCM of 6, 36, 12, 64):
  - A:  $5^{96}$ , B:  $2^{16}$ , C:  $11^{48}$ , D:  $3^9$ .
- Compare:  $5^{96} = (5^2)^{48} = 25^{48} > 11^{48}$  (since  $25 > 11$ ).
- $25^{48} \gg 2^{16}$  and  $25^{48} \gg 3^9$ .

- **Answer: A ( $\sqrt[6]{5}$ )**

41.

- **Solution:**

- A's rate:  $\frac{1}{3}$  tank/hour.
- B's rate:  $\frac{1}{6}$  tank/hour.
- Combined rate:  $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$  tank/hour.
- Time:  $\frac{1}{\frac{1}{2}} = 2$  hours.

- **Answer: D (2)**

42.



- **Solution:**

- Both work first 4 hours: combined rate =  $35 + 50 = 85$  bottles/hour.
- Filled:  $85 \times 4 = 340$  bottles.
- Remaining:  $590 - 340 = 250$  bottles.
- New machine time:  $\frac{250}{50} = 5$  hours.

- **Answer: B (5)**

43.

- **Solution:**

- Volume:  $\frac{4}{3}\pi r^3 = 36\pi \Rightarrow r^3 = 27 \Rightarrow r = 3$  cm.
- Surface area:  $4\pi r^2 = 4\pi \times 9 = 36\pi$ .

- **Answer: C ( $36\pi$ )**

44.

- **Solution:**

- Max at  $t = \frac{k}{2}$  (vertex of parabola  $h(t) = -t^2 + kt + 30$ ).
- $h\left(\frac{k}{2}\right) = -\left(\frac{k}{2}\right)^2 + k\left(\frac{k}{2}\right) + 30 = \frac{k^2}{4} + 30$ .
- Set equal to 34:  $\frac{k^2}{4} + 30 = 34 \Rightarrow \frac{k^2}{4} = 4 \Rightarrow k^2 = 16 \Rightarrow k = 4$  (positive).

- **Answer: B (4)**

45.



Options: A. 52, B. 10, C. 100, D. 68

• **Solution:**

- Normal total:  $10x$ .
- Received:  $4 \times \frac{x}{2} + 3 \times \frac{3x}{4} = 2x + \frac{9x}{4} = \frac{17x}{4}$ .
- Shortfall:  $10x - \frac{17x}{4} = \frac{23x}{4} = 92 \Rightarrow x = 16$ .
- Received:  $\frac{17 \times 16}{4} = 68$  liters.

• **Answer: D (68)**

46.

**- Calculate the total study hours:**

- 2 hours: 10 days \* 2 hours/day = 20 hours
- 4 hours: 7 days \* 4 hours/day = 28 hours
- 6 hours: 7 days \* 6 hours/day = 42 hours
- 8 hours: 5 days \* 8 hours/day = 40 hours
- 10 hours: 3 days \* 10 hours/day = 30 hours
- Total hours = 20+28+42+40+30=160

**- Calculate the average amount of study per day:**

- Total days = 10+7+7+5+3=32days
- Average study = Total hours/Total days=160/32=5 hours/day

**-Identify days with study more than the average (5 hours):**

- The categories with study hours greater than 5 hours are 6 hours, 8 hours, and 10 hours.

**-Sum the number of days for these categories:**

- Days for 6 hours = 7 days
- Days for 8 hours = 5 days
- Days for 10 hours = 3 days
- Total days studying more than average = 7+5+3=15

Answer: The student studied more than the average amount (5 hours) for 15 days.

The correct option is D. 15.

47.

To answer this, we sum the "Number of days" for "Amount of study" less than 8 hours.

This includes 2 hours, 4 hours, and 6 hours.

From the graph:

- For 2 hours: 10 days
- For 4 hours: 7 days
- For 6 hours: 7 days

Total days = 10+7+7=24 days.

The correct answer is (C) 24.

48.

- First, find the total number of days:  $10+7+7+5+3=32$  days.

The median is the middle value when data is ordered. Since there are 32 days, the median will be the average of the 16th and 17th values.

Let's list the cumulative days:

- 2 hours: 10 days (values 1-10)
- 4 hours: 7 days (values 11-17)
- 6 hours: 7 days (values 18-24)
- 8 hours: 5 days (values 25-29)
- 10 hours: 3 days (values 30-32)

The 16th value falls within the "4 hours" category (since it's between 11 and 17).

The 17th value also falls within the "4 hours" category.

Therefore, the median amount of study is 4 hours.

The correct answer is (D) 4.

49.

- **Solution:**

- Equation:  $2y - x = 4$ .

- $\frac{25^y}{5^x} = \frac{(5^2)^y}{5^x} = 5^{2y-x} = 5^4 = 625$ .

- **Answer: B (625)**

50.

- **Solution:**

- Let  $t$  = minutes swimming. Then biking:  $60 - t$ .

- Calories:  $10t + 6(60 - t) = 416$ .

- Solve:  $10t + 360 - 6t = 416 \Rightarrow 4t = 56 \Rightarrow t = 14$ .

- **Answer: B (14)**

51.

- **Solution:**
  - $\ln(1 - x)$  defined for  $1 - x > 0 \Rightarrow x < 1$ .
  - $\ln x$  defined for  $x > 0$ .
  - Combined:  $0 < x < 1$ .
- **Answer: C  $((0, 1))$**

52.

- **Solution:**
  - March: 31 days, April: 30 days, May: 31 days.
  - Total:  $31 + 30 + 31 = 92$  days (inclusive).
- **Answer: B (92)**

53.

- **Solution:**
  - Average (P) =  $\frac{100,000}{10} = 10,000$ .
  - Median (Q): Since 6 employees earn  $< 10,000$ , the median (5th and 6th in ordered list) must be  $< 10,000$ .
  - Thus,  $P > Q$ .
- **Answer: A ( $P > Q$ )**

54.

- **Solution:**
  - Triangle inequality:  $y < x + z$ .
  - $3x + y - z < 3x + (x + z) - z = 4x \Rightarrow 3x + y - z < 4x$ .
  - Thus,  $P < Q$ .
- **Answer: A ( $P < Q$ )**

55.

- **Solution:**

- $f(x) = (x^2)^{1/5}$  or  $(x^{1/5})^2$ , defined for all real  $x$ .
- Output is always non-negative (square).
- Range:  $[0, \infty)$ .

- **Answer: B** (Range  $\{y \in \mathbb{R} \mid y \geq 0\}$ )

56.

- **Solution:**

- Pattern: Multiply by 2, then add 2:

- $1 \times 2 = 2, 2 + 2 = 4, 4 \times 2 = 8, 8 + 2 = 10, 10 \times 2 = 20, 20 + 2 = 22, 22 \times 2 = 44.$

- **Answer: A** (44)

57.

- **Solution:**

- Side = 6 m. Total tiles = 36.
- In a  $6 \times 6$  grid (even size), diagonals have no common tile.
- Each diagonal: 6 tiles. Total black = 12.
- White =  $36 - 12 = 24$ .
- Ratio black:white =  $12:24 = 1:2$ .

- **Answer: B** (1:2)

58.



- **Solution:**
  - Solve  $-x^2 + 1400x - 80,000 \geq 400,000$ .
  - Rearrange:  $-x^2 + 1400x - 480,000 \geq 0$ .
  - Multiply by -1 (reverse inequality):  $x^2 - 1400x + 480,000 \leq 0$ .
  - Roots:  $x = 600, 800$  (solve quadratic).
  - Solution:  $600 \leq x \leq 800$ .
- **Answer: A** ( $600 \leq x \leq 800$ )

59.

- **Solution:**
  - For equilateral triangle, circumradius  $R = \frac{a}{\sqrt{3}} \Rightarrow a = 2\sqrt{3}$  (side).
  - Area:  $\frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4} \times 12 = 3\sqrt{3}$ .
- **Answer: D** ( $3\sqrt{3}$ )

60.

- **Solution:**
  - Focus on even-position terms: 0, 2, 8, 26, x, 242, 728.
  - Pattern:  $a_n = 3a_{n-1} + 2$ :
    - $2 = 3(0) + 2,$
    - $8 = 3(2) + 2,$
    - $26 = 3(8) + 2,$
    - $x = 3(26) + 2 = 80,$
    - Verify:  $3(80) + 2 = 242$  (matches next term).
- **Answer: C** (80)

THE END  
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