INDEPENDENT CAT PREPARATION / ORIGINAL MOCK

CAT 2026 Prediction Paper 03

Question paper

68 questions · 120 minutes · Maximum 204 marks

This is an original practice paper informed by recent CAT patterns and the forecast in this study. It is not the official CAT 2026 paper and does not claim to reproduce unreleased questions. Its difficulty has not been calibrated on a candidate cohort.

SECTION	QUESTIONS	TIME	MARKS
Verbal Ability & Reading Comprehension	24	40 minutes	72
Data Interpretation & Logical Reasoning	22	40 minutes	66
Quantitative Ability	22	40 minutes	66

Correct answer: +3. Incorrect MCQ: –1. Incorrect TITA or unanswered question: 0. Each MCQ has exactly one correct option. TITA answers are whole numbers.

Design reference: IMS CAT 2025 exam analysis and the instructions of the official CAT 2026 mock (released 6 November 2026). The 24/22/22 structure, four-question RC passages and four- or five-question DILR sets inform this mock. Original contexts and exact question allocations are authoring choices. Method and source limitations: validation.html. Practice profile: Patterns & inference.

VARC · 24 questions

RC 1 · The unfinished exchange

A gift can be valuable precisely because its return is unspecified. When a neighbour helps repair a roof, neither party may calculate an hourly price or name a date for repayment. The absence of these terms does not necessarily remove obligation. It can extend the relationship into an indefinite future in which assistance is expected, remembered and interpreted. The transaction remains open in a way that a fully settled purchase ordinarily does not.

This openness helps explain why gifts cannot always be placed on the opposite side of a moral divide from economic exchange. A gift can express affection, but it can also create a claim that the recipient finds difficult to refuse. Its generosity may be sincere and its consequence unequal at the same time. A wealthy patron who repeatedly provides help can acquire influence without ever announcing a bargain. Indeed, announcing the bargain might weaken the influence by making its terms available for challenge.

Recipients are not necessarily passive. They may return a different kind of favour, distribute the gift among others or reinterpret it as recognition of something already owed. Such responses can prevent a relationship from becoming one-sided. But their availability depends on the social setting. A return that counts as generous in one context may look inadequate or insulting in another. The freedom to decide what a gift means is itself unevenly distributed.

The timing of return is especially revealing. An immediate repayment may communicate a wish to end the relationship: the recipient treats the help as a debt to be cleared. A delayed return can acknowledge a continuing bond, although delay can also signal neglect. There is no code in which a fixed interval always has one meaning. Participants read the interval alongside their history, relative positions and expectations. What appears from outside to be inefficient settlement may be part of the very relationship the exchange sustains.

None of this requires abandoning the distinction between gifts and purchases. Stated prices and enforceable terms often make a purchase different in consequential ways. The point is that specifying terms can sometimes protect the weaker party, while leaving them unstated can sometimes permit generosity that a contract would narrow. Neither form monopolises freedom or domination. To understand an exchange, one must ask not only what changes hands but also what can subsequently be asked, refused or redefined. The object transferred is a visible event; the range of future relations it opens is part of the exchange as well.

V01. Which proposition best captures the passage? MCQ

A. Gifts conceal commercial bargains that would be more honestly expressed through prices.
B. Unspecified returns can sustain gifts as relationships while creating both generous possibilities and unequal obligations.
C. The distinction between gifts and purchases disappears once recipients offer anything in return.
D. Delayed repayment is the clearest available evidence that a gift was freely accepted.

V02. Why might explicitly announcing a patron's expected return weaken the patron's influence? MCQ

A. It would legally cancel any assistance the patron had already supplied.
B. It would establish that the recipient had contributed nothing to the relationship.
C. It would necessarily convert the recipient into an equal negotiating partner.
D. It could make the terms contestable instead of leaving the obligation diffuse.

V03. Which response most clearly illustrates a recipient redefining rather than simply repaying a gift? MCQ

A. Treating assistance as acknowledgement of an earlier contribution for which recognition had been overdue.
B. Returning an identical object on the exact date required by a signed agreement.
C. Refusing to discuss the gift because every recipient lacks interpretive agency.
D. Estimating the giver's expenses to determine the same monetary amount.

V04. Which statement would the author most strongly reject? MCQ

A. A recipient can sometimes reinterpret what a gift acknowledges.
B. An immediate return can communicate a wish to end continuing obligation.
C. Leaving the terms of return unstated invariably gives the recipient greater freedom.
D. An exchange can have unequal effects even when generosity is sincere.

RC 2 · Experiments without moving the planet

An astronomer cannot move a distant planet closer, change its atmosphere or repeat its formation. This lack of experimental control might seem to make the study of planets fundamentally weaker than sciences whose objects fit on a laboratory bench. Yet the contrast overlooks how much inference in every science depends on effects rather than direct access. A laboratory instrument also translates an interaction into a trace. The relevant question is how well competing accounts of that trace can be distinguished.

Imagine that a planet's passage across its star produces a small change in the light received by a telescope. One model attributes part of the change to a substance in the planet's atmosphere. Another attributes it to variation on the star's surface. Both might fit a short series of observations. Choosing the first because it tells a more exciting planetary story would mistake interest for evidence. More useful would be to identify circumstances under which the models predict different patterns, and then seek observations in those circumstances.

The opportunities need not resemble intervention in a laboratory. A later passage may occur when the star is in a different state; measurements in another range of wavelengths may separate effects that overlap in the first range. Several telescopes can help establish whether an apparent signal belongs to the object or to a particular instrument. What matters is not simply multiplying observations but changing the evidential relation among the alternatives. Many repetitions of an ambiguous measurement can leave the same ambiguity intact.

There is also no requirement that every component of a model be independently established before the model can be useful. Investigators often work with assumptions that are provisionally accepted because they connect otherwise isolated findings. Such assumptions should remain visible, especially when an apparently firm conclusion depends heavily on one of them. A result can be robust to several uncertainties and fragile with respect to another. Describing it merely as either proved or speculative erases that structure.

The absence of direct intervention therefore changes the strategies of inquiry without eliminating disciplined comparison. An astronomical explanation becomes persuasive through the combination of discriminating observations, cross-checks and an explicit account of dependence on assumptions. Its strength does not come from pretending that a telescope is a laboratory with a very long corridor. It comes from using the opportunities the remote object actually provides, while keeping clear the distinction between what has been observed and what has been inferred from those observations.

V05. The author’s main claim is that remote astronomy: MCQ

A. must remain speculative because its objects cannot be manipulated under controlled conditions.
B. is equivalent to laboratory science in every relevant methodological respect.
C. can support disciplined explanations through discriminating observations even without direct intervention.
D. becomes reliable once enough repetitions of the same measurement have been collected.

V06. When would additional observations contribute least to resolving the two models in the example? MCQ

A. When both models predict the same repeated signal under unchanged observational conditions.
B. When a different wavelength range produces predictions that diverge between the models.
C. When another telescope allows investigators to test an instrument-specific explanation.
D. When a later passage occurs under stellar conditions relevant to the competing accounts.

V07. The discussion of laboratory instruments primarily serves to: MCQ

A. demonstrate that telescope measurements are always more accurate than laboratory measurements.
B. argue that laboratories should abandon intervention in favour of passive observation.
C. show that all recorded traces support an equally wide range of explanations.
D. challenge an overly sharp contrast between direct laboratory knowledge and indirect astronomical inference.

V08. Which description of a model-dependent finding would best satisfy the author? MCQ

A. It is proved because several assumptions were independently confirmed.
B. It survives specified uncertainties but would change substantially if one identified assumption failed.
C. It is speculative because at least one assumption remains provisional.
D. It is robust because its interpretation is the most scientifically interesting.

RC 3 · The room in which a joke is told

A joke is often explained by identifying the expectation it overturns. This account can illuminate its construction, but it says little about why the same words provoke amusement in one room and hostility in another. Expectations concern more than how a sentence will end. Listeners also have expectations about who may speak, whose experience is being invoked and whether the speaker is inviting shared recognition or demanding submission to a judgement.

Consider an employee joking about a rule that everyone quietly ignores. Among colleagues, the joke may acknowledge a practical compromise that official language excludes. If a manager repeats it during an inspection, the same wording can become an accusation, or a warning that the compromise is no longer tolerated. Nothing in the sentence alone determines which act is being performed. The social relation changes what the apparent exaggeration permits listeners to admit.

This does not mean that audiences are always right about a speaker's intentions. A joke can be misunderstood, and an audience can be unwilling to grant a speaker a freedom it readily grants others. Nor does a statement become harmless simply because the speaker declares it a joke. That declaration identifies a proposed frame for interpretation; it cannot compel others to accept the frame. Its success depends partly on a history of trust that a single performance cannot manufacture on demand.

Humour can also bring an unfamiliar audience into a temporary community. A carefully developed routine may supply the background its listeners initially lack, allowing a surprising comparison to become intelligible. Shared context is therefore not only a prerequisite brought into the room; it can be produced within the performance. But the production takes work. Repeating a private joke before strangers often fails because the speaker reproduces the punchline without recreating the relations that made it funny.

The critical task is thus neither to excuse every utterance labelled humorous nor to translate every joke into a literal assertion and judge that assertion alone. Both approaches discard part of the event. One must attend to wording, delivery, relations of authority and the audience's available knowledge, while allowing for the possibility that these elements are being altered during the performance. Humour exploits a gap between what is said and what can be understood, but that gap is inhabited by people with histories. Explaining the verbal mechanism is useful; explaining how the mechanism works among those particular people requires more.

V09. Which statement best represents the argument? MCQ

A. Understanding humour requires both its verbal construction and the changing social relations of its performance.
B. A joke's meaning is determined entirely by the audience's response rather than the speaker's intention.
C. Humorous statements should be judged as literal assertions whenever they concern authority.
D. A shared social background must exist before any successful comic performance can begin.

V10. The manager's repetition of the employee's joke illustrates that: MCQ

A. employees find jokes funny only when those jokes conceal a breach of formal rules.
B. humour ceases to involve exaggeration once it is used by someone with authority.
C. identical wording can perform a different social act when the speaker's authority and occasion change.
D. managers necessarily intend to punish whenever they repeat an employee's remark.

V11. What follows from the claim that a comic routine can produce shared context? MCQ

A. A successful performer can require an audience to accept any utterance as harmless.
B. An initially unfamiliar audience may understand a later joke because the performance has supplied needed background.
C. Trust between speaker and audience becomes irrelevant once the routine is long enough.
D. A punchline from a private exchange will succeed publicly if its wording is reproduced exactly.

V12. Why does the author note that audiences can misunderstand intentions? MCQ

A. To establish that speakers alone should decide whether their jokes are acceptable.
B. To show that humour has no meaning that can be discussed publicly.
C. To argue that hostile reactions are usually caused by insufficient linguistic skill.
D. To prevent contextual interpretation from becoming a claim that audience judgement is always correct.

RC 4 · When money stays nearby

Local currencies are sometimes promoted as a way to keep spending within a community. A token accepted by nearby shops may be less likely than ordinary money to leave the area immediately. Advocates expect one purchase to support another, giving local trade additional momentum. The reasoning identifies a possible effect, but the restriction that produces it also creates the currency's principal difficulty: a holder must want something that another participant can supply.

Suppose a grocer accepts many tokens but buys most stock from wholesalers who refuse them. The grocer may then accumulate claims that cannot meet the business's most pressing expenses. A nominally successful scheme, with customers enthusiastically spending tokens, can therefore become burdensome for particular traders. The problem is not simply that participants lack community spirit. Their positions in supply chains give them different opportunities to receive and use the local currency.

Convertibility offers one response. If tokens can be exchanged freely for ordinary money, a trader need not remain trapped with unusable balances. Yet easy conversion can also weaken the tendency for spending to circulate locally, which was the scheme's original purpose. A conversion fee or waiting period

may encourage recirculation while retaining an exit, but it distributes a cost that someone must bear. There is no adjustment that removes the trade-off simply by renaming the restriction an incentive.

Another response is to widen the network of accepted uses. A municipality might accept tokens for certain charges, or more suppliers might join. This can make balances more useful without changing the conversion rule. However, adding participants is not sufficient if they all occupy similar positions, receiving tokens from the same customers while needing ordinary money for the same external purchases. Complementarity among participants can matter more than their number.

These difficulties do not prove that local currencies cannot support useful exchanges. A scheme can connect underused local skills with unmet local needs, especially when ordinary money is scarce. It may also make economic relationships more visible to participants. But its success should be judged against feasible alternatives, including direct local purchasing commitments or improved access to ordinary payment systems. The currency is an institutional arrangement with particular costs and possibilities, not a device that creates prosperity merely by slowing money's departure. What needs to circulate is not only a token but a workable sequence of reciprocal uses.

V13. The central argument is that local currencies: MCQ

A. create prosperity whenever they prevent money from leaving a neighbourhood.
B. are inferior to ordinary money because participants lack sufficient community spirit.
C. work only if conversion into ordinary money is prohibited permanently.
D. need complementary opportunities for use and must manage trade-offs between local circulation and usable balances.

V14. Why might adding more participating shops fail to solve the grocer's difficulty? MCQ

A. More participants necessarily lower the value of every existing token.
B. The newcomers may also need external suppliers who refuse tokens, offering little additional outlet for balances.
C. The grocer will stop receiving tokens once other shops join.
D. Membership growth makes the currency legally identical to ordinary money.

V15. A proposal permits immediate costless conversion of every token. Which concern follows most directly? MCQ

A. It will make the token useless to any trader who purchases externally.
B. It will necessarily eliminate all local purchasing that ordinary money previously supported.
C. It may ease unwanted balances while weakening the intended retention of spending within the network.
D. It prevents the scheme from recruiting participants with complementary needs.

V16. The author would most likely approve of evaluating a scheme by asking: MCQ

A. Whether it enables useful exchanges at costs justified relative to feasible alternative arrangements.
B. Whether every token remains local indefinitely, regardless of its usefulness to holders.
C. Whether members express enthusiasm about the idea of community solidarity.
D. Whether total membership exceeds that of every neighbouring currency scheme.

V17. Choose the best summary.

A scientific name lets researchers discuss organisms across languages, but it does not freeze the group of organisms to which the name applies. New evidence can lead specialists to divide a previously recognised species or combine populations once treated as distinct. Such revision may inconvenience users of older records, yet refusing revision would preserve familiarity at the expense of an improved account of biological relationships. The practical response is to document the change and make earlier usage traceable. Stability in communication need not require permanent stability in classification; it can instead depend on maintaining clear links between successive ways of drawing the boundaries. MCQ

A. Scientific names are useful only when they refer to permanently fixed biological groups.
B. Scientific classification can change while communication remains reliable if changes and earlier usage remain traceable.
C. Researchers should avoid revising species boundaries because older records would otherwise become unusable.
D. Every taxonomic revision improves biological understanding and should replace all earlier terminology without qualification.

V18. Choose the best summary.

A long queue outside a restaurant can be evidence of demand, but it can also be produced by slow service or a deliberate restriction of available tables. Observers who treat the queue as a recommendation may then add themselves to it, making the original explanation increasingly difficult to recover from the visible crowd. The queue is both an outcome of earlier choices and information affecting later choices. This feedback does not make it meaningless: patient diners may still be revealing something about their preferences. It means that inferring quality requires more than treating the current crowd as a collection of independent endorsements. MCQ

A. Queues can reflect several causes and influence later demand, so they cannot be treated as independent evidence of restaurant quality.
B. Long queues show that diners value social participation more than the quality of their food.
C. Restaurants can improve food quality by limiting tables and thereby creating visible demand.
D. Because crowd behaviour is self-reinforcing, waiting diners reveal nothing about their preferences.

V19. Choose the best position for the missing sentence.

Sentence: The translated version therefore preserves the instruction while removing the ambiguity on which the original scene depends.

At a moment of considerable confusion, a character in a play is told to “leave the drawing”. (1) In the original language, the expression can mean abandoning a sketch or departing from a room whose name sounds the same. The character follows the unintended meaning, creating the next complication. (2) A translator replaces the expression with a phrase that unambiguously means putting down the sketch. (3) What looks accurate at the level of practical instruction has changed the dramatic machinery. (4) A different wording, perhaps involving another object or room, may be needed if the misunderstanding is to remain possible for the new audience. MCQ

A. Position (1)
B. Position (2)
C. Position (4)
D. Position (3)

V20. Choose the best position for the missing sentence.

Sentence: That second record captured the cooling of the instrument rather than the temperature of the room.

(1) An investigator compared readings from two thermometers placed in a room with a stable temperature. The first instrument had already been there for an hour. The second had just been carried in from a much warmer cupboard, and its readings fell steadily for several minutes. (2) Treating both records as descriptions of changing room conditions would therefore create an apparent disagreement that the room itself did not produce. (3) The comparison becomes meaningful only after the instruments have had time to adjust to their surroundings. (4) Before interpreting differences as evidence about the object being studied, investigators must consider how each measurement was generated. MCQ

A. Position (1)
B. Position (3)
C. Position (2)
D. Position (4)

V21. Arrange the sentences and enter their numbers without spaces.

1. Those new documentary requirements and penalties can redirect movement without any physical barrier being built.
2. People crossing the newly drawn border may need documents or face penalties for journeys they once made freely.
3. A government may redefine a region's administrative border on a map.
4. This redirection shows how the map becomes consequential through practices attached to its lines, rather than through a wall on the ground. TITA

V22. Arrange the sentences and enter their numbers without spaces.

1. A later reader who overlooks that convention may diagnose the omission as ignorance.
2. That diagnosis would mistake an expectation about the original audience for a limit of the writer's knowledge.
3. An instruction manual sometimes omits a step that its intended users are expected to know.
4. For those users, the omission reflects a shared convention that makes spelling out the step unnecessary. TITA

V23. Four sentences form a coherent paragraph. Enter the odd sentence number.

1. A committee may publicly announce a decision without disclosing how individual members voted.
2. The public record then establishes the collective result but not the distribution of support behind it.
3. Inferring unanimity from that record would add information the record does not contain.
4. Committee rooms are often designed to accommodate visitors as well as members.
5. Further evidence is needed to distinguish agreement from a majority decision reached despite objections. TITA

V24. Four sentences form a coherent paragraph. Enter the odd sentence number.

1. A copied tune can remain recognisable even when performers change its rhythm or instrumentation.
2. The persistence of the melody thus need not imply the repetition of an identical performance.
3. Some musical instruments are transported in cases lined with soft fabric.
4. Recognising the tune involves attending to relations that survive those changes.
5. Musical continuity can consequently depend on selective transformation rather than perfect duplication. TITA

DILR · 22 questions

Four days of factory inventory

A factory opens Day 1 with 20 units in stock. Output on Days 1–4 is x, x + 10, 2x and x + 20 respectively, where x is a positive integer. Each day's output is available before that day's sales. Sales are 30 on Day 1, exactly half the available stock on Day 2, 40 on Day 3 and 60 on Day 4. Day 4 closes with 100 units. Stock is never negative and nothing is lost or returned.

Any additional condition or change in a question applies only to that question.

D01. What is x? TITA

D02. How many units are sold on Day 2? MCQ

A. 45
B. 40
C. 35
D. 55

D03. What is the closing stock on Day 3? TITA

D04. Which day has the greatest closing stock? MCQ

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

D05. If only Day 4 sales are reduced by one third, what is the revised closing stock? MCQ

A. 140
B. 130
C. 120
D. 110

The five-digit identification system

A, B, C, D and E represent five distinct digits from 1 to 9. They satisfy A + B = C, C + D = E and A × D = B + C. E is odd and B > A. A two-letter expression such as AD means the two-digit number with tens digit A

and units digit D; products are always written with ×.

Any additional condition or change in a question applies only to that question.

D06. What digit does C represent? TITA

D07. What is the two-digit number AD? MCQ

A. 25
B. 34
C. 24
D. 14

D08. What is E − A? TITA

D09. What is A + B + C + D + E? TITA

D10. What is $C^2 - A \times E$? MCQ

A. 11
B. 5
C. 9
D. 7

The chemical production frontier

A laboratory makes whole batches of products X, Y and Z. X consumes 2 units of resource R and 1 of S; Y consumes 1 of R and 2 of S; Z consumes 3 of R and 1 of S. Exactly 40 units of R and 30 of S must be used, with no waste. At least five X batches must be made. Revenue per batch is ₹7 for X, ₹6 for Y and ₹9 for Z. Batch counts may otherwise be zero.

Any additional condition or change in a question applies only to that question.

D11. How many feasible production mixes are possible? TITA

D12. Which mix maximises revenue? Counts are X, Y, Z. MCQ

A. 15, 7, 1
B. 5, 9, 7
C. 20, 6, 0
D. 10, 8, 4

D13. Among mixes earning at least ₹154, what is the greatest number of Z batches? TITA

D14. If the revenue per Y batch rises to ₹10, how many Y batches occur in the revenue-maximising mix? MCQ

A. 9
B. 7
C. 6
D. 8

Ages inferred from pair totals

Six researchers A through F have distinct integer ages 21, 22, 23, 24, 25 and 26, one each. A and B together are 49 years old; C and D together are 47; E and F together are 45. A is older than D, and B is younger than E.

Any additional condition or change in a question applies only to that question.

D15. What is F's age? TITA

D16. Who is necessarily the oldest? MCQ

A. C
B. E
C. D
D. A

D17. If C is younger than D, what is their age difference? TITA

D18. Which pair of people is not individually identifiable from the original information? MCQ

A. E and F
B. A and B
C. B and E
D. C and D

A league with an unresolved triangle

Five teams A–E play each other once. A win earns 3 points, a draw 1 per team and a loss 0. Final points are A = 10, B = 7, C = 4, D = 4, E = 3. A drew with B; C drew with D; C defeated E. No penalties or bonuses apply.

Any additional condition or change in a question applies only to that question.

D19. How many games ended in draws? TITA

D20. Which statement must be true? MCQ

A. E defeated D
B. D defeated B
C. B lost exactly one game
D. B defeated E

D21. How many complete sets of game results satisfy all the data? TITA

D22. If E defeated B, what was the result of D against E? MCQ

A. D won
B. Draw
C. Cannot be determined
D. E won

QA · 22 questions

Q01. In an election with two candidates, 20% of registered voters do not vote. Of the votes cast, 10% are invalid. The winner receives 60% of valid votes and wins by 1,440 votes. How many registered voters are there? MCQ

A. 8000
B. 9000
C. 12000
D. 10000

Q02. A car travels 120 km at 60 km/h, stops for 30 minutes, and then covers another 180 km at a constant speed. Its average speed for the entire journey, including the halt, is 60 km/h. Find its speed over the last 180 km, in km/h. TITA

Q03. A invests ₹90,000 in a business for a full year. B invests ₹1,20,000 exactly three months after A starts, and C invests ₹1,50,000 exactly six months after A starts. Profit is shared in proportion to capital multiplied by months invested. If the year's profit is ₹85,000, what is C's share? MCQ

A. 20000
B. 25000
C. 30000
D. 35000

Q04. A town initially has men and women in the ratio 3:2. Over a year, the number of men increases by 20% and the number of women by 10%. What is the percentage increase in the total population? MCQ

A. 14
B. 15
C. 16
D. 18

Q05. An inlet fills an empty tank in 8 hours and an outlet empties a full tank in 12 hours, each at a constant rate. Both are opened on an empty tank. After 4 hours the outlet is closed, while the inlet continues until the tank is full. How many minutes elapse in total? TITA

Q06. 60 kg of a 20% salt mixture is blended with 40 kg of a 35% salt mixture. After thorough mixing, 20 kg of the resulting mixture is removed. How many kilograms of pure salt must be added to the remainder to make it 40% salt by mass? MCQ

A. 56/3
B. 16
C. 18
D. 64/3

Q07. A takes five fewer days than B to complete a job alone. A works alone for three days, after which B joins. Together they finish the remaining job in another 4.2 days. Both rates are constant. How many days would B take alone? MCQ

A. 12
B. 15
C. 18
D. 20

Q08. For every positive integer k for which $||x - 2| - 3| = k$ has four distinct real roots, take the sum of its positive roots. Add these sums over all such k. What is the result? A root is counted separately for each value of k. TITA

Q09. A real number x satisfies the equation $2^x + 2^{x+1} = 96$. What is the value of x? MCQ

A. 4
B. 6
C. 7
D. 5

Q10. Real numbers x and y satisfy $x + y = 7$ and $x^3 + y^3 = 133$. Find $x^2 + y^2$. TITA

Q11. What is the value of $1/(\sqrt{1} + \sqrt{2}) + 1/(\sqrt{2} + \sqrt{3}) + 1/(\sqrt{3} + \sqrt{4}) + \ldots + 1/(\sqrt{24} + \sqrt{25})$? MCQ

A. 5
B. 4
C. 3
D. 4.5

Q12. For how many positive integers a does $x^4 - (a + 2)x^2 + 2a = 0$ have four distinct real roots, all strictly between −3 and 3? MCQ

A. 6
B. 8
C. 7
D. 9

Q13. Define $f(t) = t + 2$ for $t < 3$, and $f(t) = 2t - 1$ for $t \geq 3$. Find the real number x satisfying $f(f(x)) = 17$. TITA

Q14. How many integers x satisfy $\sqrt{(x + 5)} > x - 1$ over the real numbers? MCQ

A. 9
B. 7
C. 8
D. 10

Q15. Positive real numbers x and y satisfy $x + 2y = 12$. What is the largest possible value of xy^2? MCQ

A. 48
B. 64
C. 54
D. 72

Q16. Rectangle ABCD has AB = 10 cm and BC = 6 cm. A circle passes through A and B and is tangent to side CD. What is the circle's diameter, in centimetres? MCQ

A. 10
B. 31/6
C. 61/6
D. 37/6

Q17. In triangle ABC, AB = AC = 10 cm and BC = 12 cm. Point D lies on BC with BD = 4 cm. The circle through A, B and D meets segment AC again at E, distinct from A. Find AE, in millimetres. TITA

Q18. A closed right circular cylinder has radius 3 cm and height 4 cm. What is the ratio of its total surface area, in square centimetres, to its volume, in cubic centimetres? MCQ

A. 7/6
B. 3/2
C. 6/7
D. 5/3

Q19. What is the smallest positive integer n such that $360n$ is a perfect cube? TITA

Q20. Consider all four-digit numbers of the form 3a5b, where a and b are decimal digits. What is the sum of those numbers that are divisible by 45? MCQ

A. 6255
B. 6600
C. 6705
D. 7155

Q21. Let S_n be the sum of the first n terms of 3, 7, 11, 15, ... Find the smallest positive integer n for which S_n exceeds 1,000. TITA

Q22. A box contains four red, three blue and two green balls. Four balls are drawn uniformly without replacement. Balls of the same colour are distinct physical balls. What is the probability that exactly two colours appear? MCQ

A. 53/126
B. 5/12
C. 4/9
D. 1/2