INDEPENDENT CAT PREPARATION / ORIGINAL MOCK

CAT 2026 Prediction Paper 10

Answer key & worked solutions

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: Equations take the lead.

Quick answer key

V01 B	**V02** A	**V03** D	**V04** C	**V05** C	**V06** D
V07 A	**V08** B	**V09** A	**V10** B	**V11** C	**V12** D
V13 D	**V14** C	**V15** B	**V16** A	**V17** B	**V18** A
V19 D	**V20** C	**V21** 2413	**V22** 3142	**V23** 4	**V24** 2
D01 87	**D02** C	**D03** 35	**D04** A	**D05** A	**D06** 1530
D07 A	**D08** 4350	**D09** 270	**D10** C	**D11** 7	**D12** D
D13 2	**D14** C	**D15** 25	**D16** A	**D17** 2	**D18** A
D19 8	**D20** B	**D21** 2	**D22** C	**Q01** C	**Q02** B
Q03 5	**Q04** A	**Q05** D	**Q06** B	**Q07** 36	**Q08** 24
Q09 676	**Q10** A	**Q11** C	**Q12** 8	**Q13** D	**Q14** D
Q15 C	**Q16** 116	**Q17** 30	**Q18** B	**Q19** A	**Q20** 4
Q21 D	**Q22** B				

VARC · 24 questions

RC 1 · What a census sees

A census looks like the most neutral of government activities. Officials count the people living in a territory and record a few facts about each of them: age, sex, occupation, household. Yet every census rests on decisions that shape what can be seen. Someone must decide who counts as a resident, which categories will be offered, and whether a person may choose more than one.

Categories are the most contested of these decisions. When a census asks people to state their ethnicity, religion or language, it does not simply record identities that exist independently of the question. It offers a list, and the list influences how people describe themselves. Groups that appear on the list become visible to planners and politicians; groups that do not may be absorbed into a residual category labelled other and find their needs overlooked. Over time, communities learn that being counted is a form of recognition, and they campaign to be included or to be counted separately.

The consequences are practical as well as symbolic. Population figures determine how seats in a legislature are divided, how funds are allocated to regions and where schools and clinics are built. A district that is undercounted may lose representation and money for a decade. Undercounting is not random: people who move often, who live in informal housing or who distrust officials are harder to reach, and they are often the people who most need public services.

Census designers have tried to address these problems. Some allow respondents to choose several categories or to write in their own descriptions. Many use follow-up surveys to estimate how many people were missed and where. Some countries have replaced the traditional census with registers that are updated continuously from administrative records. Each method has costs. Write-in answers are hard to compare across years, registers depend on everyone being registered, and estimates of the undercount are themselves uncertain.

None of this makes counting futile. A census remains one of the few sources that attempts to describe an entire population rather than a sample. But it is better understood as an act of description than as a photograph. It describes a population through the questions a state chooses to ask, and those questions reveal as much about the state’s concerns as about the people who answer them.

V01. The passage primarily argues that a census MCQ

A. is a neutral record that simply reflects identities existing independently of it.
B. is shaped by decisions about whom and what to count, and these decisions affect both recognition and practical outcomes.
C. should be replaced by continuously updated registers in every country.
D. is futile because the undercount can never be estimated.

Answer: B. is shaped by decisions about whom and what to count, and these decisions affect both recognition and practical outcomes.

The passage traces how residency rules and categories shape what a census shows and why that matters for seats, funds and services. It denies neutrality, notes costs of registers, and explicitly says counting is not futile.

V02. A community campaigning to be listed as a separate census category is most likely seeking MCQ

A. visibility to planners and politicians, and so attention to its needs.
B. exemption from being counted at all.
C. a reduction in the number of legislative seats for its region.
D. the replacement of the census by sample surveys.

Answer: A. visibility to planners and politicians, and so attention to its needs.

The second paragraph says listed groups become visible while unlisted ones may have their needs overlooked, so communities campaign for recognition. The other aims run against that motive.

V03. According to the passage, people who are harder to count include those who MCQ

A. own large houses in established neighbourhoods.
B. choose more than one category.
C. live in districts with many schools and clinics.
D. move often or distrust officials.

Answer: D. move often or distrust officials.

The third paragraph lists people who move often, live in informal housing or distrust officials. The other options are not described as hard to reach.

V04. The contrast between “an act of description” and “a photograph” suggests that a census

MCQ

A. is less accurate than a sample survey.
B. should present its results in pictures.
C. reflects the questions a state chooses to ask rather than capturing reality mechanically.
D. describes only part of the population.

Answer: C. reflects the questions a state chooses to ask rather than capturing reality mechanically.

A photograph suggests a mechanical copy; the author says instead that the census describes people through chosen questions. The passage calls the census one of the few sources covering a whole population, and pictures are not the point.

RC 2 · Cooking with microbes

Fermentation is one of the oldest ways of preserving food. Bread, cheese, yogurt, pickles, soy sauce and many drinks depend on microbes that transform sugars and other compounds into acids, gases or alcohol. The products of fermentation make conditions hostile to many organisms that cause spoilage or disease. A cabbage left in brine becomes sour as harmless bacteria multiply and produce acid, and that acid keeps harmful microbes at bay for months.

For most of history, fermentation was practised without any knowledge of microbes. Cooks and brewers learned which conditions produced good results: the right temperature, the right amount of salt, a portion of the previous batch added to the new one. Adding part of an old batch, a practice found in many cultures, effectively transferred a community of microbes that had already proven itself. Households and regions developed distinctive versions of the same food, partly because their microbial communities differed.

Industrial production changed this. Factories needed products that were identical from batch to batch and safe on a large scale. They isolated a small number of microbial strains, grew them in pure cultures and controlled conditions tightly. Strains were chosen for speed and predictability as much as for taste. The result was greater reliability and safety, but also a narrowing of flavours. A commercial yogurt or bread made with a few selected strains may be pleasant and consistent, yet it lacks the variation that a mixed community produces.

Recent interest in traditional fermentation reflects both curiosity and nostalgia. Some cooks see in it a way to recover lost flavours; some researchers see a reservoir of microbial diversity that might be useful in medicine or industry. Health claims have also multiplied, some supported by evidence and many not. The microbes in fermented foods are not all alike, and most do not survive digestion in large numbers, so claims that any fermented food will improve health are difficult to sustain.

What the history shows most clearly is that fermentation is a partnership. The cook does not make the

food alone but manages conditions under which microbes do much of the work. Industrial methods made that partnership predictable by narrowing it; traditional methods kept it broad at the cost of occasional failure. The current revival is, in part, an attempt to decide how much predictability is worth giving up for the sake of variety.

V05. Which of the following best captures the passage? MCQ

A. Fermented foods always improve health because they contain living microbes.
B. Traditional fermentation was safer and more reliable than industrial production.
C. Fermentation depends on microbes; industry gained reliability by narrowing them, and the current revival weighs that gain against lost variety.
D. Fermentation was invented after scientists discovered microbes.

Answer: C. Fermentation depends on microbes; industry gained reliability by narrowing them, and the current revival weighs that gain against lost variety.

The passage moves from traditional practice to industrial narrowing and the present weighing of predictability against variety. It doubts sweeping health claims, credits industry with greater reliability and safety, and says fermentation long preceded knowledge of microbes.

V06. Adding part of a previous batch to a new one most likely worked because it MCQ

A. removed all the microbes from the new batch.
B. allowed cooks to measure acidity precisely.
C. made every household's product identical.
D. carried over a community of microbes that had already produced good results.

Answer: D. carried over a community of microbes that had already produced good results.

The second paragraph says the practice transferred a community of microbes that had proven itself. It did not remove microbes, involved no measurement, and households' products differed.

V07. According to the passage, one cost of industrial fermentation is that MCQ

A. flavours become narrower because only a few strains are used.
B. products become less safe on a large scale.
C. batches differ unpredictably from one another.
D. factories must add part of the previous batch.

Answer: A. flavours become narrower because only a few strains are used.

The third paragraph names the narrowing of flavours as the price of reliability. Industrial methods made products safer and more consistent, and adding old batches is the traditional practice.

V08. The author's attitude towards health claims about fermented foods is best described as

MCQ

A. fully supportive, since all fermented foods contain beneficial microbes.
B. sceptical of sweeping claims, since microbes differ and most do not survive digestion in large numbers.
C. indifferent, since the passage does not discuss health.
D. hostile to all research on microbes in food.

Answer: B. sceptical of sweeping claims, since microbes differ and most do not survive digestion in large numbers.

The fourth paragraph accepts that some claims are supported but calls general claims difficult to sustain. The passage does discuss health, and it describes research interest without hostility.

RC 3 · The hidden parts of a program

Software engineers sometimes describe their work as a craft, and the comparison is revealing. A craftsperson cares not only whether an object works but how it is made: whether the joints are sound, whether the hidden parts are finished as carefully as the visible ones. In software, the hidden parts are the code that users never see. Two programs can behave identically on the screen while one is clear and easy to change and the other is tangled and fragile.

Why should the hidden parts matter? Unlike a chair, a program is rarely finished. It is modified for years as requirements change, errors are found and new features are requested. Code that is easy to understand allows those changes to be made quickly and safely. Code that is hard to understand slows every later change and increases the chance of introducing new errors. Engineers call the accumulated cost of such shortcuts technical debt, because, like a loan, it allows faster progress now in exchange for repayments later.

The metaphor helps explain why craftsmanship is often neglected. The costs of careless code arrive later and are spread across many people, while the benefits of speed arrive now and are visible to managers. A team that spends time improving the structure of working code may appear to produce nothing, since users see no change. When deadlines press, that work is the first to be cut.

Advocates of craftsmanship are sometimes accused of perfectionism, and the charge is not always unfair. Not every program will be maintained for years; a prototype built to test an idea may be thrown away within weeks, and polishing its internals would waste effort. Good engineers judge how long code is likely to live and how often it will change, and invest accordingly. Craftsmanship, in this view, is not a fixed standard but a judgement about where care will repay itself.

The deeper value of the craft comparison may lie in what it says about responsibility. A craftsperson who finishes the back of a cabinet does so partly out of respect for whoever will repair it later. Programmers who write clear code are, in a similar way, considering colleagues they may never meet. The quality that users cannot see is often the quality that matters most to the people who will keep the software working.

V09. The passage mainly argues that MCQ

A. care over the hidden structure of software matters because programs keep changing, though how much care to invest depends on how long code will live.
B. all code should be polished to the highest standard whatever its purpose.
C. users can easily tell whether software is well made.
D. technical debt is a financial loan taken out by software companies.

Answer: A. care over the hidden structure of software matters because programs keep changing, though how much care to invest depends on how long code will live.

The passage explains why hidden quality matters for changeable programs, qualifies this with the judgement about code lifetime, and ends with responsibility. The other options contradict the perfectionism paragraph, the point that users see no difference, or the metaphorical use of debt.

V10. The author would most likely regard extensive polishing of a prototype that will be discarded within two weeks as MCQ

A. an essential mark of good craftsmanship.
B. wasted effort, given the code's short expected life.
C. a way of reducing the technical debt of future products.
D. the work most likely to impress managers.

Answer: B. wasted effort, given the code's short expected life.

The fourth paragraph says polishing the internals of a short-lived prototype would waste effort. Craftsmanship is described as a judgement, not a fixed standard, and nothing links such polishing to future products or to impressing managers.

V11. According to the passage, work that improves the structure of working code is often cut first because MCQ

A. it introduces new errors into the program.
B. users complain when the code changes.
C. its benefits come later and are invisible to users, while deadlines demand visible progress.
D. it is more expensive than writing new features.

Answer: C. its benefits come later and are invisible to users, while deadlines demand visible progress.

The third paragraph says the costs of careless code arrive later while restructuring shows users no change, so it is cut under deadline pressure. The other reasons are not given.

V12. Which of the following best illustrates technical debt as the passage describes it? MCQ

A. A company borrows money to hire more programmers.
B. A program crashes because the computer runs out of memory.
C. A designer changes the colour of a button at a user's request.
D. A team copies the same block of code into ten places to meet a deadline, so every later change must be made ten times.

Answer: D. A team copies the same block of code into ten places to meet a deadline, so every later change must be made ten times.

Technical debt is a shortcut that speeds progress now and makes later changes slower and riskier. Duplicated code fits exactly; an actual loan, a memory failure and a requested design change do not.

RC 4 · More than a probability

People are often said to be bad at judging risk. They fear flying more than driving, though driving kills far more people per kilometre travelled; they worry about rare dramatic dangers and ignore common quiet ones. The usual explanation is that the mind relies on shortcuts. Events that are vivid, recent or widely reported come easily to mind, and what comes easily to mind seems likely. News coverage strengthens the effect, since unusual events are newsworthy precisely because they are rare.

This explanation captures something real, but it can make people's judgements seem more foolish than they are. Risk is not only a matter of probability. A danger that strikes many people at once, such as a plane crash, may be feared more than one that kills the same number of people in separate incidents, partly because a large disaster disrupts communities and institutions in ways that scattered deaths do not. People also distinguish between risks they choose and risks imposed on them, and between risks they can control and those they cannot. A driver feels in control; a passenger in an aircraft does not.

These distinctions are not errors of calculation. They reflect values about fairness, consent and responsibility that a simple count of deaths leaves out. When experts dismiss public concerns as irrational, they sometimes assume that the only relevant question is how many people will be harmed. The public may be asking other questions as well: who decided to accept this risk, who benefits from it, and who will be blamed if it goes wrong.

None of this means that all fears are reasonable. Vivid but rare dangers do attract attention and resources out of proportion to the harm they cause, while common risks, such as those from poor diet or air pollution, receive less than they deserve. Policies driven by fear of the dramatic can make people less safe, as when travellers avoid flying after a crash and drive longer distances instead.

Better communication about risk therefore requires more than correcting numbers. It requires acknowledging the values that shape people's reactions and explaining how a proposed policy treats them. A public that feels its concerns about consent and fairness have been heard is more likely to accept

evidence about probabilities. A public that feels lectured may simply stop listening, even when the numbers are on the side of the experts.

V13. The author's main point is that MCQ

A. people are irrational about risk and should defer to experts.
B. driving is safer than flying for most travellers.
C. all public fears about risk are justified.
D. public reactions to risk reflect values as well as probabilities, so communication must address both, even though some fears remain disproportionate.

Answer: D. public reactions to risk reflect values as well as probabilities, so communication must address both, even though some fears remain disproportionate.

The passage defends some public reactions as value judgements, admits that rare dramatic dangers are over-weighted, and recommends communication that addresses values. The second and fourth options are the extremes it rejects; the third is a detail it contradicts.

V14. According to the passage, a person who drives instead of flying after a plane crash MCQ

A. is correctly responding to the higher risk of flying.
B. is expressing a concern about consent rather than safety.
C. may increase the risk he or she faces, because driving is more dangerous per kilometre.
D. avoids dramatic dangers at no cost.

Answer: C. may increase the risk he or she faces, because driving is more dangerous per kilometre.

The first and fourth paragraphs say driving kills more people per kilometre and that switching to driving after a crash can make people less safe. The other options contradict this.

V15. Which of the following is NOT mentioned in the passage as something that shapes people's reactions to a risk? MCQ

A. Whether the risk was chosen or imposed.
B. How expensive it would be to eliminate the risk entirely.
C. Whether the risk can be controlled.
D. Who will be blamed if something goes wrong.

Answer: B. How expensive it would be to eliminate the risk entirely.

Choice versus imposition and control appear in the second paragraph, and blame in the third. The cost of eliminating a risk is never mentioned.

V16. Which approach would the author most likely recommend to an agency proposing to build a waste-processing plant near a town? MCQ

A. Explain the probabilities of harm and also how residents' concerns about who decided and who benefits have been taken into account.
B. Present only the statistics on expected harm and dismiss other objections as irrational.
C. Avoid discussing probabilities, since the public cannot understand them.
D. Build the plant without consultation so as not to create fear.

Answer: A. Explain the probabilities of harm and also how residents' concerns about who decided and who benefits have been taken into account.

The final paragraph calls for correcting numbers and also acknowledging values such as consent and fairness. Dismissing objections is the approach the passage criticises, and avoiding probabilities or consultation contradicts its recommendations.

V17. Choose the best summary.

Reports of microplastics in water, food and human tissue have multiplied, and so have alarming headlines. Part of the increase reflects a real spread of plastic fragments through the environment. Part reflects better instruments that can detect smaller particles than before, and part reflects methods that differ from one laboratory to another, making figures hard to compare. Contamination during sampling is also a known problem, since plastic is present in laboratories, clothing and air. None of this suggests that microplastics are harmless; it suggests that their effects on health are still poorly measured. Until methods are standardised, rising numbers should be read as a call for better measurement as much as evidence of rising danger. MCQ

A. Microplastics are harmless, because their measurements are unreliable.
B. Rising microplastic counts reflect both real spread and changing, inconsistent measurement, so they call for better methods as much as they show increasing danger.
C. Laboratories are the main source of microplastic pollution.
D. New instruments have shown that microplastics are rapidly destroying human health.

Answer: B. Rising microplastic counts reflect both real spread and changing, inconsistent measurement, so they call for better methods as much as they show increasing danger.

The paragraph separates real spread from measurement effects and draws the conclusion about better methods. It explicitly denies that microplastics are harmless, treats laboratory contamination as a sampling problem, and says health effects are poorly measured.

V18. Choose the best summary.

When cities convert a car lane into a protected bicycle lane, local businesses often object that they will lose customers who arrive by car. Studies of such changes frequently find the opposite: spending in the area holds steady or rises. Cyclists and pedestrians tend to spend less per visit but visit more often, and shopkeepers commonly overestimate how many of their customers drive. Results vary, however, with the kind of street and the kind of shop. A furniture store whose customers carry bulky purchases may genuinely suffer. The evidence therefore does not show that bicycle lanes help every business, but it does show that fears of a general decline are often exaggerated. MCQ

A. Bicycle lanes rarely cause the general loss of trade that businesses fear, though effects vary and some shops may genuinely lose.
B. Bicycle lanes increase the sales of every business on a street.
C. Cyclists spend more on each visit than drivers do.
D. Shopkeepers estimate accurately how their customers travel.

Answer: A. Bicycle lanes rarely cause the general loss of trade that businesses fear, though effects vary and some shops may genuinely lose.

The correct summary keeps both the general finding and the qualification. The second option is what the paragraph says the evidence does not show, and the third and fourth contradict stated details.

V19. Choose the best position for the missing sentence.

Sentence: A thermometer left in the sun, for instance, reports the warmth of its own casing rather than that of the air.

Measuring air temperature accurately is harder than it seems. (1) The instrument must be shielded from direct sunlight and placed where air moves freely around it. (2) Otherwise it measures something other than what it is meant to measure. (3) Weather stations therefore house thermometers in ventilated boxes painted white, mounted at a standard height above grass, and their readings are compared with those of neighbouring stations to catch faults. (4) Even then, the surroundings matter: a station that once stood in open fields may later be surrounded by buildings and roads, and its readings will rise for reasons that have nothing to do with the wider climate.

MCQ

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

Answer: D. Position (3)

The sentence illustrates the claim that an exposed instrument measures something else, so it follows that claim at (3) and precedes the standard housing that solves the problem. At (1) and (2) the claim it illustrates has not been made; at (4) it would interrupt the move to surroundings.

V20. Choose the best position for the missing sentence.

Sentence: In both cases the target was being met on paper while patients waited just as long.

A health service set a target that emergency patients should be seen within four hours of arrival. (1) Reported waiting times improved sharply in the first year. (2) Investigators later found that some hospitals had met the target by changing when the clock started, for example by keeping patients in ambulances outside until staff were ready to admit them. (3) Others moved patients into corridors labelled as wards, so that they no longer counted as waiting. (4) The service responded by measuring time from the moment an ambulance arrived, a rule that was harder to manipulate though more costly to monitor. Waiting times reported under the new rule were longer, but they were closer to the truth. MCQ

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

Answer: C. Position (4)

"In both cases" needs two examples: the ambulance delays and the corridor relabelling. Only at (4) have both been described, and the sentence then leads into the service's response.

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

1. The colder layer beneath cannot rise through it, so the lake's two layers stay apart all summer.
2. In summer the sun warms the surface water of a deep lake, making it lighter than the colder water below.
3. In autumn, as the surface cools and becomes as heavy as the water below, the layers mix again.
4. That warm layer floats on top like oil on water. TITA

Answer: 2413

2 introduces the warm, light surface water; 4's "That warm layer" refers to it; 1 explains why the layers stay apart; 3 describes the autumn mixing that ends the summer state.

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

1. Texts were often written without spaces between words, which made reading aloud almost necessary.
2. Silent reading, once unusual enough to be remarked upon, slowly became the norm.
3. Medieval readers usually read aloud, even when they were alone.
4. Once scribes began to separate words, readers could take in a page with their eyes alone.
TITA

Answer: 3142

3 states the medieval practice; 1 gives its cause; 4 describes the change that removed the cause; 2 states the long-term result.

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

1. A tidal power station uses the rise and fall of the sea to turn turbines.
2. Unlike wind or sunshine, tides can be predicted years in advance.
3. That predictability makes tidal power easier to plan around than many other renewable sources.
4. Some coastal towns hold festivals to celebrate the highest tides of the year.
5. Suitable sites are rare, however, because large tidal ranges occur only in certain bays and estuaries. TITA

Answer: 4

Sentences 1, 2, 3 and 5 assess tidal power: how it works, its predictability and its limited sites. Festivals celebrating tides are unrelated to that assessment.

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

1. In timed chess games, each player has a fixed amount of time for all of his or her moves.
2. Chess sets were once carved from bone and ivory.
3. A clock with two faces counts down only the time of the player whose turn it is.
4. Pressing a button after moving stops one face and starts the other.
5. A player who runs out of time loses, however strong the position on the board. TITA

Answer: 2

Sentences 1, 3, 4 and 5 explain how the chess clock governs timed games. The materials of old chess sets are unrelated.

DILR · 22 questions

Changing buses

Three bus routes serve towns A, B, C and D.
Route 1 runs A → B → C. Buses leave A every 20 minutes from 7:00 a.m. to 8:40 a.m.; they take 25 minutes from A to B and 15 more minutes from B to C.
Route 2 runs B → D. Buses leave B at 7:10 a.m. and then every 25 minutes; the trip takes 30 minutes.
Route 3 runs C → D. Buses leave C at 7:30, 8:15 and 9:00 a.m.; the trip takes 12 minutes.
A passenger can board any bus that leaves a town at or after the time the passenger reaches it.

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

D01. A passenger leaves A on the 7:20 a.m. bus. How many minutes after 7:00 a.m. is the earliest time the passenger can reach D? TITA

Answer: 87

For each departure from A, compare reaching D by changing at B (next Route 2 bus) with continuing to C (next Route 3 bus).
Leave A | Reach B | Reach C | Best arrival at D | Change at
7:00 | 7:25 | 7:40 | 8:05 | B
7:20 | 7:45 | 8:00 | 8:27 | C
7:40 | 8:05 | 8:20 | 8:55 | B
8:00 | 8:25 | 8:40 | 8:55 | B
8:20 | 8:45 | 9:00 | 9:12 | C
8:40 | 9:05 | 9:20 | 9:45 | B

Changing at C: reach C at 8:00, leave at 8:15, reach D at 8:27, which is 87 minutes after 7:00. Changing at B gives 8:30.

D02. What is the latest departure from A that still reaches D by 8:30 a.m.? MCQ

A. 7:40
B. 7:00
C. 7:20
D. 8:00

Answer: C. 7:20

For each departure from A, compare reaching D by changing at B (next Route 2 bus) with continuing to C (next Route 3 bus).
Leave A | Reach B | Reach C | Best arrival at D | Change at
7:00 | 7:25 | 7:40 | 8:05 | B
7:20 | 7:45 | 8:00 | 8:27 | C
7:40 | 8:05 | 8:20 | 8:55 | B
8:00 | 8:25 | 8:40 | 8:55 | B
8:20 | 8:45 | 9:00 | 9:12 | C
8:40 | 9:05 | 9:20 | 9:45 | B

The 7:20 bus reaches D at 8:27; the 7:40 bus cannot reach D before 8:55.

D03. A passenger on the 7:00 a.m. bus from A stays on to C. How many minutes must the passenger wait at C for a Route 3 bus? TITA

Answer: 35

For each departure from A, compare reaching D by changing at B (next Route 2 bus) with continuing to C (next Route 3 bus).
Leave A | Reach B | Reach C | Best arrival at D | Change at
7:00 | 7:25 | 7:40 | 8:05 | B
7:20 | 7:45 | 8:00 | 8:27 | C
7:40 | 8:05 | 8:20 | 8:55 | B
8:00 | 8:25 | 8:40 | 8:55 | B
8:20 | 8:45 | 9:00 | 9:12 | C
8:40 | 9:05 | 9:20 | 9:45 | B

The bus reaches C at 7:40 and the next Route 3 bus leaves at 8:15: a wait of 35 minutes.

D04. How many of the buses leaving A at or before 8:00 a.m. allow a passenger to reach D before 9:00 a.m.? MCQ

A. 4
B. 8
C. 6
D. 5

Answer: A. 4

For each departure from A, compare reaching D by changing at B (next Route 2 bus) with continuing to C (next Route 3 bus).
Leave A | Reach B | Reach C | Best arrival at D | Change at
7:00 | 7:25 | 7:40 | 8:05 | B
7:20 | 7:45 | 8:00 | 8:27 | C
7:40 | 8:05 | 8:20 | 8:55 | B
8:00 | 8:25 | 8:40 | 8:55 | B
8:20 | 8:45 | 9:00 | 9:12 | C
8:40 | 9:05 | 9:20 | 9:45 | B

Best arrivals at D: 7:00 bus 8:05 (via B), 7:20 bus 8:27 (via C), 7:40 bus 8:55 (via B) and 8:00 bus 8:55 (via B, catching the 8:25 at B). All four arrive before 9:00.

D05. For a passenger who leaves A at 7:40 a.m. and wants the earliest arrival at D, where should the passenger change buses? MCQ

A. At B
B. At C
C. Either B or C; both arrive together
D. No change is needed

Answer: A. At B

For each departure from A, compare reaching D by changing at B (next Route 2 bus) with continuing to C (next Route 3 bus).
Leave A | Reach B | Reach C | Best arrival at D | Change at
7:00 | 7:25 | 7:40 | 8:05 | B
7:20 | 7:45 | 8:00 | 8:27 | C
7:40 | 8:05 | 8:20 | 8:55 | B
8:00 | 8:25 | 8:40 | 8:55 | B
8:20 | 8:45 | 9:00 | 9:12 | C
8:40 | 9:05 | 9:20 | 9:45 | B

From the 7:40 bus, changing at B (leave 8:25) reaches D at 8:55; changing at C (leave 9:00) reaches D at 9:12.

Electricity bills

A town charges for electricity as follows each month: a fixed charge of ₹50, plus ₹4 per unit for the first 100 units, ₹6 per unit for the next 100 units (units 101 to 200) and ₹8 per unit for every unit above 200. Five households used the following numbers of units last month.

Household | Units used
H1 | 80
H2 | 150
H3 | 210
H4 | 260
H5 | 120

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

D06. What was H4's bill, in rupees? TITA

Answer: 1530

Bill = ₹50 fixed + ₹4 per unit for the first 100 units + ₹6 per unit for units 101 to 200 + ₹8 per unit above 200.
Household | Units | Bill (₹) | ₹ per unit
H1 | 80 | 370 | 4.62
H2 | 150 | 750 | 5.0
H3 | 210 | 1130 | 5.38
H4 | 260 | 1530 | 5.88
H5 | 120 | 570 | 4.75

50 + 400 + 600 + 60 × 8 = ₹1,530.

D07. Whose bill was closest to ₹1,000? MCQ

A. H3
B. H5
C. H2
D. H4

Answer: A. H3

Bill = ₹50 fixed + ₹4 per unit for the first 100 units + ₹6 per unit for units 101 to 200 + ₹8 per unit above 200.
Household | Units | Bill (₹) | ₹ per unit
H1 | 80 | 370 | 4.62
H2 | 150 | 750 | 5.0
H3 | 210 | 1130 | 5.38
H4 | 260 | 1530 | 5.88
H5 | 120 | 570 | 4.75

Bills were 370, 750, 1,130, 1,530 and 570; H3's ₹1,130 is closest.

D08. What was the total of the five bills, in rupees? TITA

Answer: 4350

Bill = ₹50 fixed + ₹4 per unit for the first 100 units + ₹6 per unit for units 101 to 200 + ₹8 per unit above 200.
Household | Units | Bill (₹) | ₹ per unit
H1 | 80 | 370 | 4.62
H2 | 150 | 750 | 5.0
H3 | 210 | 1130 | 5.38
H4 | 260 | 1530 | 5.88
H5 | 120 | 570 | 4.75

370 + 750 + 1,130 + 1,530 + 570 = ₹4,350.

D09. If the rate for units 101 to 200 rises from ₹6 to ₹7, by how many rupees does the total of the five bills rise? TITA

Answer: 270

Bill = ₹50 fixed + ₹4 per unit for the first 100 units + ₹6 per unit for units 101 to 200 + ₹8 per unit above 200.
Household | Units | Bill (₹) | ₹ per unit
H1 | 80 | 370 | 4.62
H2 | 150 | 750 | 5.0
H3 | 210 | 1130 | 5.38
H4 | 260 | 1530 | 5.88
H5 | 120 | 570 | 4.75

Units in that slab: 50 + 100 + 100 + 20 = 270, each ₹1 dearer.

D10. Which household paid the most per unit used, counting the fixed charge? MCQ

A. H1
B. H3
C. H4
D. H2

Answer: C. H4

Bill = ₹50 fixed + ₹4 per unit for the first 100 units + ₹6 per unit for units 101 to 200 + ₹8 per unit above 200.
Household | Units | Bill (₹) | ₹ per unit
H1 | 80 | 370 | 4.62
H2 | 150 | 750 | 5.0
H3 | 210 | 1130 | 5.38
H4 | 260 | 1530 | 5.88
H5 | 120 | 570 | 4.75

Per-unit amounts: H1 4.63, H2 5.00, H3 5.38, H4 5.88, H5 4.75.

Archery totals

A target has four rings worth 10, 7, 5 and 3 points. An arrow that misses the target scores 0. In a round, an archer shoots exactly six arrows, and the score is the sum of the six arrows. Two rounds are considered the same if the same number of arrows land in each ring.

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

D11. In how many different ways can an archer score exactly 40 in a round? TITA

Answer: 7

Write a, b, c and d for the arrows in the 10, 7, 5 and 3 rings; misses are the rest of the six arrows. Totals are checked over all such splits.
Ways to score 40: 0×10 5×7 1×5 0×3 0 miss; 2×10 0×7 4×5 0×3 0 miss; 2×10 1×7 2×5 1×3 0 miss; 2×10 2×7 0×5 2×3 0 miss; 3×10 0×7 2×5 0×3 1 miss; 3×10 1×7 0×5 1×3 1 miss; 4×10 0×7 0×5 0×3 2 miss

Enumerating every split of six arrows gives the listed ways.

D12. Which of these round totals is impossible? MCQ

A. 52
B. 44
C. 48
D. 59

Answer: D. 59

Write a, b, c and d for the arrows in the 10, 7, 5 and 3 rings; misses are the rest of the six arrows. Totals are checked over all such splits.
Ways to score 40: 0×10 5×7 1×5 0×3 0 miss; 2×10 0×7 4×5 0×3 0 miss; 2×10 1×7 2×5 1×3 0 miss; 2×10 2×7 0×5 2×3 0 miss; 3×10 0×7 2×5 0×3 1 miss; 3×10 1×7 0×5 1×3 1 miss; 4×10 0×7 0×5 0×3 2 miss

The top two totals are 60 (six 10s) and 57 (five 10s and a 7); 59 cannot be reached. 52, 48 and 44 are all possible.

D13. Raju scored 42 in a round and hit each of the four rings at least once. How many of his arrows hit the 10 ring? TITA

Answer: 2

Write a, b, c and d for the arrows in the 10, 7, 5 and 3 rings; misses are the rest of the six arrows. Totals are checked over all such splits.
Ways to score 40: 0×10 5×7 1×5 0×3 0 miss; 2×10 0×7 4×5 0×3 0 miss; 2×10 1×7 2×5 1×3 0 miss; 2×10 2×7 0×5 2×3 0 miss; 3×10 0×7 2×5 0×3 1 miss; 3×10 1×7 0×5 1×3 1 miss; 4×10 0×7 0×5 0×3 2 miss

One arrow in each ring scores 10 + 7 + 5 + 3 = 25 with four arrows. The other two arrows must add 17, and only 10 + 7 does that. So two arrows hit the 10 ring (and two the 7 ring).

D14. What is the highest possible score in a round in which exactly one arrow misses? MCQ

A. 54
B. 51
C. 50
D. 52

Answer: C. 50

Write a, b, c and d for the arrows in the 10, 7, 5 and 3 rings; misses are the rest of the six arrows. Totals are checked over all such splits.
Ways to score 40: 0×10 5×7 1×5 0×3 0 miss; 2×10 0×7 4×5 0×3 0 miss; 2×10 1×7 2×5 1×3 0 miss; 2×10 2×7 0×5 2×3 0 miss; 3×10 0×7 2×5 0×3 1 miss; 3×10 1×7 0×5 1×3 1 miss; 4×10 0×7 0×5 0×3 2 miss

Five arrows in the 10 ring score 50.

Choosing a committee

A committee of five is to be chosen from five men M1, M2, M3, M4 and M5 and four women W1, W2, W3 and W4.
The committee must include at least two women.
M1 and W1 cannot both be on the committee.
If M2 is on the committee, W2 must also be on it.
M3 and M4 are either both on the committee or both off it.

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

D15. How many different committees can be formed? TITA

Answer: 25

Enumerate all 126 five-person groups from the nine people and keep those meeting every rule: 25 committees.

Checking all 126 groups leaves 25.

D16. How many of the possible committees include M2? MCQ

A. 10
B. 14
C. 12
D. 11

Answer: A. 10

Enumerate all 126 five-person groups from the nine people and keep those meeting every rule: 25 committees.

10 of the committees include M2 (and therefore W2).

D17. How many of the possible committees include all four women? TITA

Answer: 2

Enumerate all 126 five-person groups from the nine people and keep those meeting every rule: 25 committees.

With all four women, the fifth member must be a man who is not M1 (W1 is present), not M3 or M4 (they come as a pair), so M2 or M5: 2 committees.

D18. How many of the possible committees have exactly three men? MCQ

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

Answer: A. 14

Enumerate all 126 five-person groups from the nine people and keep those meeting every rule: 25 committees.

Three men means M3 and M4 together with one of M1, M2 or M5, or else M1, M2 and M5; adding two women under the other rules gives 14 committees.

A number square

The numbers 1 to 9 are written in a 3 × 3 grid, one number per cell, so that the three numbers in every row, every column and each of the two diagonals add up to the same total.

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

D19. How many such grids are possible? TITA

Answer: 8

Every row, column and diagonal of a 3 × 3 square using 1 to 9 must total 15 (the full total 45 split into three rows). Checking all 362,880 fillings leaves the eight rotations and reflections of one square; the centre is always 5.

There are eight: one square and its rotations and reflections.

D20. Which number is always in the centre cell? MCQ

A. 1
B. 5
C. 4
D. 9

Answer: B. 5

Every row, column and diagonal of a 3 × 3 square using 1 to 9 must total 15 (the full total 45 split into three rows). Checking all 362,880 fillings leaves the eight rotations and reflections of one square; the centre is always 5.

The four lines through the centre add to 60 and include every other cell once and the centre four times: 45 + 3 × centre = 60, so the centre is 5.

D21. If the top-left cell holds 8 and the top-middle cell holds 1, what number is in the bottom-right cell? TITA

Answer: 2

Every row, column and diagonal of a 3 × 3 square using 1 to 9 must total 15 (the full total 45 split into three rows). Checking all 362,880 fillings leaves the eight rotations and reflections of one square; the centre is always 5.

That fixes the square 8 1 6 / 3 5 7 / 4 9 2, so the bottom-right cell holds 2.

D22. What is the sum of the four corner cells? MCQ

A. 24
B. 18
C. 20
D. 16

Answer: C. 20

Every row, column and diagonal of a 3 × 3 square using 1 to 9 must total 15 (the full total 45 split into three rows). Checking all 362,880 fillings leaves the eight rotations and reflections of one square; the centre is always 5.

The corners are always the four even numbers 2, 4, 6 and 8, which total 20.

QA · 22 questions

Q01. In an examination, 65% of students passed English, 55% passed Mathematics and 20% failed both. What percentage of students passed both subjects? MCQ

A. 35
B. 45
C. 40
D. 30

Answer: C. 40

Students passing at least one subject make up 100 − 20 = 80%. By inclusion–exclusion, both were passed by 65 + 55 − 80 = 40%.

Q02. If $x + 1/x = 5$, what is the value of $x^3 + 1/x^3$? MCQ

A. 125
B. 110
C. 115
D. 100

Answer: B. 110

Cube the given sum: $(x + 1/x)^3 = x^3 + 1/x^3 + 3(x + 1/x)$. So $x^3 + 1/x^3 = (x + 1/x)^3 − 3(x + 1/x) = 125 − 15 = 110$.

Q03. Walking at 5 km/h, a man reaches the station 6 minutes late; walking at 6 km/h, he arrives 4 minutes early. How far, in km, is the station? TITA

Answer: 5

The two journeys differ by 10 minutes, so $d/5 − d/6 = 1/6$ hour. That gives $d/30 = 1/6$, so $d = 5$ km.

Q04. Three bells toll at intervals of 12, 15 and 18 minutes. They toll together at 8:00 a.m. How many times do they toll together from 8:00 a.m. to 8:00 p.m., counting both of those times? MCQ

A. 5
B. 4
C. 6
D. 3

Answer: A. 5

They toll together every LCM(12, 15, 18) = 180 minutes, that is every 3 hours. Between 8 a.m. and 8 p.m. this happens at 8, 11, 2, 5 and 8, which is 5 times.

Q05. In how many years will ₹8,000 amount to ₹9,261 at 5% per annum compound interest? MCQ

A. 2
B. 4
C. 5
D. 3

Answer: D. 3

The amount must grow by the factor 9261/8000. Since $9261 = 21^3$ and $8000 = 20^3$, this factor is $(21/20)^3 = 1.05^3$, so the sum takes 3 years at 5% compound interest.

Q06. What is the ratio of the area of the circumcircle of an equilateral triangle to the area of its incircle? MCQ

A. 2:1
B. 4:1
C. 3:1
D. 9:4

Answer: B. 4:1

In an equilateral triangle the circumradius is twice the inradius, R = 2r. Areas scale with the square of the radius, so the ratio is 4 : 1.

Q07. A two-digit number is four times the sum of its digits, and reversing its digits increases it by 27. What is the number? TITA

Answer: 36

With digits a and b, $10a + b = 4(a + b)$ gives $b = 2a$, and $9(b - a) = 27$ gives $b - a = 3$. So $a = 3$, $b = 6$ and the number is 36.

Q08. A tap fills a tank in 6 hours, but because of a leak it takes 8 hours. How many hours would the leak alone take to empty the full tank? TITA

Answer: 24

The leak removes $1/6 - 1/8 = 1/24$ of the tank each hour. It empties a full tank in 24 hours.

Q09. What is the sum of all two-digit numbers that leave remainder 3 when divided by 7? TITA

Answer: 676

These numbers run 10, 17, ..., 94, an arithmetic progression with 13 terms. Their sum is $13 \times (10 + 94)/2 = 676$.

Q10. How many integers x satisfy both $(x - 2)/(x + 3) < 0$ and $|x| \geq 1$? MCQ

A. 3
B. 4
C. 2
D. 5

Answer: A. 3

The fraction is negative exactly when $x - 2$ and $x + 3$ have opposite signs, that is when $-3 < x < 2$. The integers there are -2, -1, 0 and 1. The condition $|x| \geq 1$ removes 0, leaving -2, -1 and 1: three integers.

Q11. A sum of ₹7,200 is divided among A, B and C so that A gets 2/3 of B's share and B gets 3/4 of C's share. What is C's share, in rupees? MCQ

A. 2400
B. 1600
C. 3200
D. 3600

Answer: C. 3200

Let $C = 4x$. Then $B = 3x$ and $A = 2x$, so $9x = 7{,}200$ and $x = 800$. C's share is $4 \times 800 = ₹3{,}200$.

Q12. A 25 m ladder leans against a vertical wall with its foot 7 m from the wall. If the top slides down by 4 m, by how many metres does the foot slide outwards? TITA

Answer: 8

Initially the top is $\sqrt{(625 - 49)} = 24$ m high. After sliding it is 20 m high, so the foot is $\sqrt{(625 - 400)} = 15$ m from the wall. It moves out by 15 – 7 = 8 m.

Q13. One root of $x^2 - 6x + k = 0$ is twice the other. What is the value of k? MCQ

A. 9
B. 6
C. 12
D. 8

Answer: D. 8

Let the roots be r and 2r. Their sum is 3r = 6, so r = 2 and the roots are 2 and 4. Their product is k = 8.

Q14. What is the value of 81^(3/4) × 32^(−2/5) × 125^(1/3)? MCQ

A. 27
B. 30
C. 135
D. 33.75

Answer: D. 33.75

Evaluate each power separately: 81^(3/4) = $(3^4)^{(3/4)} = 27$, 32^(−2/5) = $(2^5)^{(-2/5)} = 1/4$, and 125^(1/3) = 5. The product is 27 × 1/4 × 5 = 135/4 = 33.75.

Q15. A shopkeeper sells two articles for ₹1,200 each, gaining 20% on one and losing 20% on the other. What is his overall loss percentage? MCQ

A. 0
B. 2
C. 4
D. 5

Answer: C. 4

The cost prices are 1,200/1.2 = ₹1,000 and 1,200/0.8 = ₹1,500, a total of ₹2,500 against sales of ₹2,400. The loss is 100 on 2,500, which is 4%.

Q16. Ten points lie in a plane, and exactly four of them are collinear; no other three are collinear. How many triangles have their vertices among these points? TITA

Answer: 116

Any three points form a triangle unless they are collinear. That gives C(10, 3) − C(4, 3) = 120 − 4 = 116 triangles.

Q17. How many litres of water must be added to 45 litres of a 20% acid solution to make it a 12% solution? TITA

Answer: 30

The solution contains 9 litres of acid. For acid to be 12% of the total, the total must be 9/0.12 = 75 litres, so 30 litres of water are added.

Q18. How many integers x satisfy both $2x - 3 > x + 4$ and $3x + 1 < 40$? MCQ

A. 4
B. 5
C. 6
D. 13

Answer: B. 5

The first inequality simplifies to $x > 7$ and the second to $3x < 39$, that is $x < 13$. The integers strictly between 7 and 13 are 8, 9, 10, 11 and 12: five values.

Q19. Taking $\pi = 22/7$, what is the area, in cm², of a sector of a circle of radius 14 cm with a central angle of 45°? MCQ

A. 77
B. 88
C. 66
D. 154

Answer: A. 77

The sector is 45/360 = 1/8 of the circle, whose area is 22/7 × 196 = 616 cm². One eighth of that is 77 cm².

Q20. For how many positive integers n is $(n^2 + 8)/(n + 2)$ an integer? TITA

Answer: 4

Division gives $n^2 + 8 = (n + 2)(n - 2) + 12$, so $n + 2$ must divide 12. With $n \geq 1$, $n + 2$ can be 3, 4, 6 or 12, giving $n = 1, 2, 4$ and 10.

Q21. A boat moves at 15 km/h in still water. It travels 30 km downstream and returns in 4½ hours in all. What is the speed of the stream, in km/h? MCQ

A. 4
B. 3
C. 6
D. 5

Answer: D. 5

With stream speed v, $30/(15 + v) + 30/(15 - v) = 4.5$, so $900/(225 - v^2) = 4.5$. Then $225 - v^2 = 200$ and $v = 5$ km/h.

Q22. A person saves ₹500 in the first month and increases the saving by ₹100 every month. How much has he saved in all after 2 years, in rupees? MCQ

A. 40800
B. 39600
C. 38400
D. 36000

Answer: B. 39600

The savings form an arithmetic progression with 24 terms, first term 500 and difference 100. The sum is $12 \times (1000 + 23 \times 100) = ₹39{,}600$.