INDEPENDENT CAT PREPARATION / ORIGINAL MOCK

CAT 2026 Prediction Paper 06

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: The central forecast.

Quick answer key

V01 B	**V02** D	**V03** A	**V04** C	**V05** C	**V06** A
V07 D	**V08** B	**V09** D	**V10** B	**V11** C	**V12** A
V13 A	**V14** C	**V15** B	**V16** D	**V17** B	**V18** D
V19 A	**V20** C	**V21** 2134	**V22** 2431	**V23** 4	**V24** 2
D01 10	**D02** A	**D03** 4	**D04** C	**D05** D	**D06** 196
D07 A	**D08** 140	**D09** 22	**D10** D	**D11** 2	**D12** D
D13 1	**D14** A	**D15** 4	**D16** A	**D17** 6	**D18** A
D19 25	**D20** B	**D21** 28	**D22** C	**Q01** C	**Q02** 10
Q03 A	**Q04** 30	**Q05** D	**Q06** B	**Q07** B	**Q08** D
Q09 6	**Q10** A	**Q11** 8	**Q12** 15	**Q13** C	**Q14** 16
Q15 24	**Q16** D	**Q17** B	**Q18** C	**Q19** A	**Q20** B
Q21 D	**Q22** 8				

VARC · 24 questions

RC 1 · Why old street plans return

When a city burns, floods or is bombed, its residents often expect the rebuilt city to look new. Yet the most durable part of an urban landscape is rarely its buildings. It is the pattern of streets and property lines beneath them. After great fires destroyed large parts of several cities, planners drew bold proposals for straight avenues and regular blocks. Most of these schemes were abandoned within a few years, and the old irregular plan reappeared, sometimes almost line for line.

The explanation is not mainly sentiment. A street plan is also a map of ownership. Each plot carries legal titles, debts, inheritance claims and expectations about access. To straighten a street is to take land from some owners and give frontage to others, and every such transfer must be negotiated, compensated or enforced. In the weeks after a disaster, when families need shelter and businesses need income, the fastest way to rebuild is to rebuild on the plot one already owns. The old plan survives because it is already agreed.

Infrastructure adds a second kind of inertia. Water pipes and drains run beneath streets, and they often survive damage that levels the buildings above them. Reusing those networks is cheaper than laying new ones, so the street tends to stay where the pipes are. Each later generation of cables and conduits follows the lines laid down by the previous one, and the plan becomes harder still to change.

None of this means that street plans never change. They change most when ownership itself has been reorganised: when land has been consolidated by a powerful state, cleared by war on an enormous scale, or held by a single developer. The grand boulevards of some nineteenth-century capitals were possible because governments were willing to expropriate thousands of owners and to absorb the political cost of doing so. Where that willingness was absent, even admired designs remained on paper.

For historians, this persistence is useful. A lane that still bends around a vanished wall, or a row of narrow plots that preserves the width of old market stalls, records decisions made centuries ago. For planners, the lesson is less comfortable. The moment after a disaster looks like a blank page, but it is crowded with claims. Proposals that ignore those claims tend to fail not because they are poorly drawn but because they ask too many people to give up something certain for something promised.

V01. Which of the following best expresses the main point of the passage? MCQ

A. Residents rebuild irregular streets mainly because they wish to preserve the memory of the city's past.
B. Street plans tend to survive destruction because they embody agreed ownership claims and buried networks that are costly to renegotiate.
C. Plans drawn after disasters usually fail because they are technically poorer than the old street patterns.
D. Only governments willing to override owners can rebuild a city quickly after a disaster.

Answer: B. Street plans tend to survive destruction because they embody agreed ownership claims and buried networks that are costly to renegotiate.

The passage explains persistence through ownership claims and reused infrastructure. Sentiment is explicitly set aside as the main cause. The final paragraph denies that failed plans were poorly drawn. Expropriation explains large redesigns, not speed of rebuilding.

V02. It can be inferred that a redesign of the streets after a fire would be most likely to be carried out when MCQ

A. the new design was widely admired by architects and historians.
B. the city had been destroyed and rebuilt several times before.
C. the city's population had grown rapidly in the years before the fire.
D. most of the burnt district had already been held by a single owner before the fire.

Answer: D. most of the burnt district had already been held by a single owner before the fire.

The fourth paragraph says plans change most when ownership has been reorganised, for example when land is held by a single developer. Admiration is shown to be insufficient. Repeated rebuilding and earlier population growth are not linked to redesign in the passage.

V03. The author mentions the grand boulevards of some nineteenth-century capitals in order to MCQ

A. show that large changes to a street plan depended on a willingness to override the claims of many owners.
B. argue that admired designs are usually carried out once the political cost has fallen.
C. illustrate how buried water pipes determine the routes of new streets.
D. suggest that historians overstate how long old street patterns persist.

Answer: A. show that large changes to a street plan depended on a willingness to override the claims of many owners.

The boulevards are the example of change made possible by expropriation, followed by the contrast that designs without that willingness stayed on paper. Pipes belong to the previous paragraph, and the passage neither predicts eventual success nor criticises historians.

V04. Which of the following situations is most similar to the persistence of street plans described in the passage? MCQ

A. A family repaints its house in the original colour out of affection for a grandparent who chose it.
B. A museum restores a damaged painting using notes left by the artist.
C. A firm keeps an awkward filing system because every department's records and procedures are already organised around it.
D. A town introduces a new traffic rule after an accident at a busy junction.

Answer: C. A firm keeps an awkward filing system because every department's records and procedures are already organised around it.

The passage attributes persistence to existing claims and systems built around a pattern, which make change costly. The filing system matches this. The repainting rests on sentiment, which the passage sets aside; restoration and a new rule are not examples of costly-to-change arrangements.

RC 2 · What the sleeping brain keeps

For a long time sleep was described as the time when the brain switches off. Laboratory work over the past century has made that description hard to defend. During sleep the brain is busy, and some of its activity appears to concern what was learned during the day.

A common experimental design is simple. Volunteers learn a task in the evening, such as a list of word pairs or a sequence of finger movements. Half of them sleep before being tested again; the others stay awake for a similar period. Repeatedly, those who slept perform better. For movement sequences, they are sometimes better than they were at the end of training, as if practice had continued without them. Comparisons that switch the timing, with learning in the morning and testing after a day awake, help rule out simple effects of the time of day.

Recordings help to explain why. In animals that have learned a route, cells that were active in a particular order during learning fire again in the same order during sleep, compressed into a fraction of the original time. The replay coincides with brief bursts of activity in the hippocampus, a structure involved in forming new memories, and with slower rhythms in the outer layers of the brain. Many researchers interpret this coordination as a transfer: information held temporarily in the hippocampus is gradually reorganised into the cortex, where it can last.

The interpretation is attractive, but it has limits. Sleeping people are not only replaying; they are also protected from new input that might interfere with what they learned. Some of the benefit of sleep might therefore come from the absence of interference rather than from active work. Researchers have tried to separate the two by comparing sleep with quiet waking rest, which also reduces interference. Rest helps, though usually less than sleep, which suggests that both explanations carry some weight.

A further complication is that sleep does not strengthen all memories equally. Material that people expect to need later tends to benefit more than material they believe is unimportant, and emotionally significant

events are often retained better than neutral ones. Sleep seems to select as well as store. That finding changes the question researchers ask. It is no longer enough to ask whether sleep helps memory. One must ask which memories it favours, by what rule, and whether that rule serves the sleeper well in a world that keeps changing.

V05. The passage is primarily concerned with MCQ

A. proof that the hippocampus permanently stores every memory formed during the day.
B. an argument that quiet rest is as effective as sleep for strengthening memories.
C. evidence that sleep contributes to memory and the open questions about how, and for which memories, it does so.
D. the experimental methods used to measure how long people sleep.

Answer: C. evidence that sleep contributes to memory and the open questions about how, and for which memories, it does so.

The passage moves from evidence of benefit to mechanisms, limits and selectivity, ending with new questions. The hippocampus is described as temporary storage, rest is said to help less than sleep, and sleep duration is never measured.

V06. Which finding would most directly support the view that sleep helps memory mainly by shielding it from interference? MCQ

A. People who rest quietly with no new tasks after learning remember almost as well as those who sleep.
B. Cells active during learning fire again in the same order during sleep.
C. People remember material better after sleep when they expect to need it later.
D. Movement sequences sometimes improve beyond the level reached during training.

Answer: A. People who rest quietly with no new tasks after learning remember almost as well as those who sleep.

If quiet rest, which also blocks new input, gives nearly the same benefit as sleep, the absence of interference explains most of the effect. Replay and post-sleep improvement point to active processing, and selectivity concerns which memories benefit.

V07. According to the passage, the replay of cell activity during sleep MCQ

A. has been recorded only in human volunteers who learned word pairs.
B. shows that memories move from the cortex into the hippocampus.
C. occurs only when the learned material was emotionally significant.
D. runs faster than the original activity and coincides with rhythms in other parts of the brain.

Answer: D. runs faster than the original activity and coincides with rhythms in other parts of the brain.

The third paragraph says the order is repeated in compressed time and coincides with hippocampal bursts and slower rhythms elsewhere. It was observed in animals, the proposed transfer runs from the hippocampus to the cortex, and emotion is discussed separately.

V08. The author's attitude towards the interpretation of replay as a transfer of memories is best described as MCQ

A. dismissive, because rest produces exactly the same benefit as sleep.
B. receptive but qualified: it is plausible, though other factors may account for part of the effect.
C. uncritical, since replay has been shown to be the sole cause of improvement.
D. indifferent, because the passage is concerned only with experimental design.

Answer: B. receptive but qualified: it is plausible, though other factors may account for part of the effect.

The author calls the interpretation attractive but limited and then credits the absence of interference with part of the benefit. Rest is said to help less than sleep, so dismissal is unwarranted; the passage does not claim replay is the only cause.

RC 3 · The power of the starting point

Many choices are made before anyone realises a choice exists. When employees are enrolled in a pension plan unless they opt out, far more of them end up saving than when they must sign up actively. When organ donation is the default, registration rates are much higher than when people must volunteer. In each case the options available are the same; only the starting point differs. Yet the outcomes can differ enormously.

Economists have offered several explanations. One is effort. Changing a default requires a form, a phone call or a visit, and small costs deter people who are busy or uncertain. Another is endorsement: people may read the default as a recommendation from those who designed the system and who presumably know more. A third is loss aversion. Once an option is presented as the starting point, giving it up can feel like a loss rather than a forgone gain.

These explanations matter because they lead to different judgements about whether defaults are fair. If inertia is the main force, a default exploits a weakness and should be set with great care, since many

people will never look at it. If endorsement drives the effect, the designer carries a responsibility like that of an adviser, and a poorly chosen default is a form of bad advice. If loss aversion is central, the default shapes not only what people choose but what they feel they own.

Critics of default design worry about this power. A default that serves the average person may harm those whose circumstances differ: an automatic savings rate suitable for a worker with a stable salary can burden someone with irregular income or heavy debts. Defenders reply that there is no neutral alternative. Every form has some starting point, and leaving the choice blank is itself a design, one that tends to favour those with the time and confidence to act.

The most careful proposals therefore do not ask whether to have defaults but how to make them accountable. They suggest choosing defaults that fit most people's interests as well as these can be judged, making it easy to change them, and reviewing the results to see who stays with the default and why. Such proposals accept that the designer influences outcomes. What they refuse is an influence that remains invisible to the people it affects.

V09. Which of the following best captures the position the passage ends with? MCQ

A. Defaults should be abolished because they exploit people's inertia.
B. Loss aversion is the only credible explanation of why defaults are powerful.
C. Leaving every choice blank is the fairest way to present options.
D. Because some starting point is unavoidable, defaults should be chosen carefully, made easy to change and reviewed in the open.

Answer: D. Because some starting point is unavoidable, defaults should be chosen carefully, made easy to change and reviewed in the open.

The last paragraph proposes accountable defaults: suited to most people, easy to change and reviewed. Abolition is impossible on the passage's own argument, loss aversion is one of three explanations, and a blank form is described as a design that favours some people.

V10. According to the passage, if people follow defaults mainly because they read them as recommendations, then MCQ

A. defaults would have little effect on people who are busy.
B. a badly chosen default resembles poor advice from someone expected to know better.
C. the default would mainly shape what people feel they own.
D. people would ignore defaults chosen by experts.

Answer: B. a badly chosen default resembles poor advice from someone expected to know better.

The third paragraph links the endorsement explanation to the designer's responsibility as an adviser and calls a poor default bad advice. Ownership belongs to loss aversion; the other options contradict the endorsement explanation.

V11. The example of a person with irregular income is used to MCQ

A. prove that automatic savings plans reduce total savings.
B. illustrate how much effort it takes to change a default.
C. show how a default that suits most people can impose costs on those whose circumstances differ.
D. argue that employees rather than employers should set defaults.

Answer: C. show how a default that suits most people can impose costs on those whose circumstances differ.

The example follows the critics' claim that a default serving the average person may harm others. It does not address total savings, the effort of switching or who should set defaults.

V12. Which observation, if true, would most weaken the effort explanation of default effects? MCQ

A. People keep a default even when switching takes a single click and they are reminded that they may switch.
B. Busier people are more likely than others to keep a default.
C. Defaults have a larger effect when the form needed to change them is long.
D. Registration rises when signing up requires fewer steps.

Answer: A. People keep a default even when switching takes a single click and they are reminded that they may switch.

If defaults persist when the cost of switching is almost zero and attention has been drawn to the choice, effort cannot be doing most of the work. The other observations are what the effort explanation predicts.

RC 4 · Untranslatable words

Lists of untranslatable words are a popular genre. A language, we are told, has a single word for the particular pleasure of a cool breeze after a hot day, or for the guilt of buying books one never reads. The lists are charming, and they encourage a pleasing thought: that each language contains experiences inaccessible to speakers of others.

Translators tend to be more sceptical. That a language has no single word for something does not mean its speakers cannot express or feel it. A phrase can do what a word does, and often does it more precisely; people describe the relief of an evening breeze perfectly well without a dedicated term. Nor does a single word guarantee a shared experience: speakers of the same language disagree about what its subtler words mean, and a word's range shifts across regions and generations. To call a word untranslatable usually means only that no single word in another language can replace it in every context.

The more serious difficulty lies elsewhere. Words carry associations built up through use: the songs in which they appear, the situations in which they are said, the jokes they make possible. A translation can supply the meaning of a sentence while losing its tone, its rhythm or its connection to other texts. A line

of poetry may depend on a sound that echoes another line, and no faithful paraphrase will reproduce the echo. Here what resists translation is not a concept but a web of relationships.

Good translators respond in different ways. Some keep a foreign word and let the context teach its sense; readers gradually learn it, as many have learned the names of foods and customs from other cultures. Others search for an equivalent effect rather than an equivalent word, accepting that a pun in one language may become a different pun in another. Each strategy involves a loss, and each also involves a gain, since the translated text enters a new web of associations of its own.

Seen this way, the popular lists mistake the problem. They treat a language as a collection of rare words, each a key to a locked experience. Translation suggests instead that meaning lives less in individual words than in the patterns that connect them, and those patterns can be partly rebuilt in another language even when they cannot be copied.

V13. The author's main purpose is to MCQ

A. argue that the real obstacles to translation lie in associations and patterns rather than in missing single words.
B. defend popular lists of untranslatable words as accurate guides to experience.
C. show that every word has an exact equivalent in some other language.
D. recommend that translators always keep foreign words in their original form.

Answer: A. argue that the real obstacles to translation lie in associations and patterns rather than in missing single words.

The passage rejects the single-word view and locates the difficulty in tone, rhythm and webs of association. It criticises the lists, never claims exact equivalents exist, and presents keeping foreign words as only one strategy.

V14. Which statement would the author most likely accept? MCQ

A. A word found in only one language names an experience that others cannot have.
B. A careful paraphrase can always reproduce the sound effects of a poem.
C. Speakers of a language that lacks a word for a feeling may still recognise and describe that feeling.
D. A foreign word kept in a translation never becomes familiar to readers.

Answer: C. Speakers of a language that lacks a word for a feeling may still recognise and describe that feeling.

The second paragraph says a missing word does not prevent expression or feeling, since phrases can do the same work. The other statements contradict the passage: the lists' claim is rejected, echoes are lost in paraphrase, and readers do learn kept words.

V15. According to the passage, a translator who looks for an equivalent effect rather than an equivalent word might MCQ

A. leave every culturally specific word untranslated.
B. replace a pun in the original with a different pun that works in the new language.
C. add notes explaining the history of each difficult word.
D. translate each sentence word for word to keep its rhythm.

Answer: B. replace a pun in the original with a different pun that works in the new language.

The fourth paragraph gives exactly this example. Leaving words untranslated is the other strategy, notes are not mentioned, and word-for-word translation is not described as preserving rhythm.

V16. The author regards the popular lists as MCQ

A. harmful because they discourage people from learning other languages.
B. accurate but too short to be of use to translators.
C. worth replacing with lists of words that have exact equivalents.
D. appealing but based on a misleading picture of where meaning lies in a language.

Answer: D. appealing but based on a misleading picture of where meaning lies in a language.

The author calls the lists charming and then says they mistake the problem by locating meaning in rare individual words. No harm to language learning, accuracy or replacement lists is suggested.

V17. Choose the best summary.

Repair cafés invite people to bring broken objects, such as lamps, toasters or torn clothes, to volunteers who help fix them. Their advocates often present them as a way to reduce waste, and they do keep some items out of landfills. But the more lasting effect may be on what participants learn. Watching a volunteer open a device that seemed sealed shows that products can be understood and that faults have causes. Participants begin to ask why spare parts are unavailable or why screws are hidden, questions they rarely asked as customers. A café that repairs a few hundred objects a year changes little by itself. A café that leaves its visitors expecting repairability may change what they demand from manufacturers and lawmakers. MCQ

A. Repair cafés eliminate household waste because their volunteers can fix almost every broken item.
B. Beyond rescuing some objects from waste, repair cafés may matter most by teaching people to expect products that can be understood and repaired.
C. Manufacturers hide screws and withhold spare parts to stop customers from repairing products.
D. Volunteers at repair cafés understand faults in products better than manufacturers do.

Answer: B. Beyond rescuing some objects from waste, repair cafés may matter most by teaching people to expect products that can be understood and repaired.

The paragraph grants a modest waste benefit and stresses the change in what participants expect and demand. The second option overstates the waste effect, the third turns a detail into the main point, and the fourth is unsupported.

V18. Choose the best summary.

Universities increasingly judge researchers by how often their papers are cited. Citations do say something: work that no one uses is unlikely to be important. Yet the count rewards particular kinds of work. Review articles collect citations because they summarise a field, and methods papers are cited by everyone who uses the method, however modest the original idea. Fields differ in size and citation habits, so a number that is modest in one discipline can be impressive in another. Most troubling, once researchers know they are being counted, some adjust their behaviour, citing colleagues in exchange or splitting results into several papers. A measure that once reflected how scholarship is used can then begin to shape it. MCQ

A. Citation counts are meaningless because review articles always receive more citations than original research.
B. Researchers who split their results into several papers produce less important work.
C. Universities should compare researchers only with others in the same discipline.
D. Citation counts say something about how work is used, but they favour some kinds of work, vary across fields and can distort behaviour once they become targets.

Answer: D. Citation counts say something about how work is used, but they favour some kinds of work, vary across fields and can distort behaviour once they become targets.

The correct summary keeps the concession, the three limitations and the final point about distortion. The second option denies the concession, the third and fourth narrow the paragraph to unstated conclusions.

V19. Choose the best position for the missing sentence.

Sentence: The same habit that protects a forager from poison can therefore make a newcomer slow to accept nourishing food.

Many animals are cautious about eating anything unfamiliar. (1) A rat that finds a new food usually takes only a small bite and waits; if it does not fall ill, it returns for more. (2) This caution makes sense where some plants and prey are toxic, because one large meal of the wrong thing could be fatal. (3) When animals are moved to a new habitat, they may ignore abundant food simply because they have never eaten it, and some lose weight in the midst of plenty. (4) Programmes that release animals into unfamiliar places now often introduce local foods before the release, so that caution does not turn into hunger. MCQ

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

Answer: A. Position (3)

At (3) the sentence follows the explanation of why caution protects against poison and introduces its cost for newcomers, which the next sentence illustrates. At (1) and (2) the protective reasoning is not yet complete; at (4) the illustration would precede the claim it supports.

V20. Choose the best position for the missing sentence.

Sentence: That is why the earliest sheets of a new edition were often the least reliable.

Before printing, a text existed only in the copies that scribes made by hand. (1) Every copy could introduce errors: a skipped line, a misread word, a correction that was itself mistaken. (2) Printing promised to end this drift, since every sheet pulled from the same type would be identical. (3) In practice, early printers corrected their type while the press was running, so sheets printed earlier and later in the same run could differ. Corrections usually responded to mistakes noticed in sheets that had already been printed. (4) Scholars today compare many copies of one edition to work out the order in which such changes were made. MCQ

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

Answer: C. Position (4)

The sentence draws a consequence from corrections made after mistakes were noticed in already printed sheets, so it belongs at (4). At the earlier positions there is no mention yet of corrections during the press run.

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

1. These pauses, it turns out, are not wasted.
2. Watch a skilled chess player and you will notice long periods in which nothing seems to happen on the board.
3. During them the player compares possible continuations, discarding most of them before a single piece moves.
4. What looks like hesitation is often the part of the game in which the real decisions are made.
TITA

Answer: 2134

2 introduces the periods of apparent inactivity; 1's "These pauses" refers to them. 3's "During them" explains what happens in the pauses, and 4 draws the conclusion about hesitation.

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

1. As the good cars leave, the average quality on sale falls, and buyers lower their offers again.
2. Buyers of used cars often cannot tell a reliable vehicle from one with hidden faults.
3. Sellers of good cars, unable to prove their quality, may withdraw rather than accept that price.
4. They therefore offer a price that reflects only the average quality they expect. TITA

Answer: 2431

2 states the buyers' problem; 4's "They therefore" gives their response. 3 refers to "that price" and describes good sellers withdrawing, and 1 follows with the consequence of their departure.

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

1. Some species of bamboo can grow tens of centimetres in a single day.
2. That speed makes bamboo attractive as a building material that can be replenished quickly.
3. Untreated bamboo, however, is vulnerable to insects and moisture and decays within a few years.
4. Many bamboo plants flower only once in several decades and die soon afterwards.
5. Builders therefore treat or protect it, which adds cost but allows structures to last for decades.
TITA

Answer: 4

Sentences 1, 2, 3 and 5 discuss bamboo as a building material: fast growth, a weakness and the remedy. Sentence 4 is about flowering and does not connect to construction.

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

1. A queue is fair when people are served in the order in which they arrived.
2. Some amusement parks sell passes that let buyers skip the line altogether.
3. In a crowd, however, the order of arrival is hard for anyone to observe.
4. Ticket systems solve the problem by giving each arrival a number that records their place.
5. Once the number is printed, no one needs to watch who came first. TITA

Answer: 2

The paragraph runs 1–3–4–5: fairness requires arrival order, which is hard to observe, and numbered tickets record it. Paid passes to skip the line concern a different arrangement.

DILR · 22 questions

Parcels on a shelf

Seven parcels A, B, C, D, E, F and G are placed in a single row in positions 1 to 7 from left to right, one parcel per position.
A is at one end of the row.
B is immediately to the right of C.
E is to the right of D, with exactly two parcels between them.
G is in an even-numbered position.
F is not in position 4.

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

D01. How many different arrangements satisfy all the conditions? TITA

Answer: 10

Place C and B as a block, then D and E three places apart, and keep A at an end, G in an even place and F out of place 4. Exhaustive checking leaves exactly ten orders (positions 1 to 7, left to right):
ACBDFGE
ADCBEGF
ADFGECB
AGDCBEF
AGFDCBE
CBDGFEA
DCBEFGA
DGFECBA
FDCBEGA
FGDCBEA

Counting the listed orders gives 10.

D02. Which parcel occupies position 2 in the largest number of possible arrangements? MCQ

A. G
B. D
C. B
D. C

Answer: A. G

Place C and B as a block, then D and E three places apart, and keep A at an end, G in an even place and F out of place 4. Exhaustive checking leaves exactly ten orders (positions 1 to 7, left to right):
ACBDFGE
ADCBEGF
ADFGECB
AGDCBEF
AGFDCBE
CBDGFEA
DCBEFGA
DGFECBA
FDCBEGA
FGDCBEA

Across the ten orders position 2 holds G four times, D three times, C twice and B once.

D03. If C is in position 6, what is the position number of G? TITA

Answer: 4

Place C and B as a block, then D and E three places apart, and keep A at an end, G in an even place and F out of place 4. Exhaustive checking leaves exactly ten orders (positions 1 to 7, left to right):
ACBDFGE
ADCBEGF
ADFGECB
AGDCBEF
AGFDCBE
CBDGFEA
DCBEFGA
DGFECBA
FDCBEGA
FGDCBEA

Only ADFGECB has C in position 6, and G is in position 4 there.

D04. If D is in position 1, which parcel is in position 7? MCQ

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

Answer: C. A

Place C and B as a block, then D and E three places apart, and keep A at an end, G in an even place and F out of place 4. Exhaustive checking leaves exactly ten orders (positions 1 to 7, left to right):
ACBDFGE
ADCBEGF
ADFGECB
AGDCBEF
AGFDCBE
CBDGFEA
DCBEFGA
DGFECBA
FDCBEGA
FGDCBEA

The orders starting with D are DCBEFGA and DGFECBA; both end with A.

D05. In how many of the possible arrangements is B next to A? MCQ

A. 2
B. 5
C. 3
D. 1

Answer: D. 1

Place C and B as a block, then D and E three places apart, and keep A at an end, G in an even place and F out of place 4. Exhaustive checking leaves exactly ten orders (positions 1 to 7, left to right):
ACBDFGE
ADCBEGF
ADFGECB
AGDCBEF
AGFDCBE
CBDGFEA
DCBEFGA
DGFECBA
FDCBEGA
FGDCBEA

Only DGFECBA places B immediately beside A.

Footfall at four museums

The table gives January visitors (in thousands) at four city museums, the percentage change in visitors from January to February, and the share of February visitors who were children.

Museum | January visitors (thousands) | Change, Jan to Feb | Children among Feb visitors
Aster | 40 | +25% | 30%
Birch | 55 | -20% | 25%
Cedar | 32 | +50% | 25%
Delta | 48 | +12.5% | one third

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

D06. What was the total number of February visitors, in thousands, across the four museums? TITA

Answer: 196

February visitors (thousands) = January × (1 + change). Children = February visitors × share.
Museum | Feb visitors | Feb children | Mar visitors at same change
Aster | 50 | 15 | 62.5
Birch | 44 | 11 | 35.2
Cedar | 48 | 12 | 72.0
Delta | 54 | 18 | 60.75

50 + 44 + 48 + 54 = 196 thousand.

D07. Which museum had the most child visitors in February? MCQ

A. Delta
B. Cedar
C. Birch
D. Aster

Answer: A. Delta

February visitors (thousands) = January × (1 + change). Children = February visitors × share.
Museum | Feb visitors | Feb children | Mar visitors at same change
Aster | 50 | 15 | 62.5
Birch | 44 | 11 | 35.2
Cedar | 48 | 12 | 72.0
Delta | 54 | 18 | 60.75

Child visitors were 15, 11, 12 and 18 thousand respectively; Delta is highest.

D08. What was the total number of adult visitors, in thousands, across the four museums in February? TITA

Answer: 140

February visitors (thousands) = January × (1 + change). Children = February visitors × share.
Museum | Feb visitors | Feb children | Mar visitors at same change
Aster | 50 | 15 | 62.5
Birch | 44 | 11 | 35.2
Cedar | 48 | 12 | 72.0
Delta | 54 | 18 | 60.75

Children total 15 + 11 + 12 + 18 = 56 thousand, so adults number 196 − 56 = 140 thousand.

D09. In February, by how many thousand did adult visitors at Birch exceed child visitors at Birch? TITA

Answer: 22

February visitors (thousands) = January × (1 + change). Children = February visitors × share.
Museum | Feb visitors | Feb children | Mar visitors at same change
Aster | 50 | 15 | 62.5
Birch | 44 | 11 | 35.2
Cedar | 48 | 12 | 72.0
Delta | 54 | 18 | 60.75

Birch had 44 thousand February visitors, of whom a quarter (11 thousand) were children and 33 thousand adults: a gap of 22 thousand.

D10. If each museum's visitors changed from February to March by the same percentage as from January to February, which museum would have the most visitors in March? MCQ

A. Aster
B. Birch
C. Delta
D. Cedar

Answer: D. Cedar

February visitors (thousands) = January × (1 + change). Children = February visitors × share.
Museum | Feb visitors | Feb children | Mar visitors at same change
Aster | 50 | 15 | 62.5
Birch | 44 | 11 | 35.2
Cedar | 48 | 12 | 72.0
Delta | 54 | 18 | 60.75

March visitors would be 62.5, 35.2, 72 and 60.75 thousand; Cedar is highest.

Round-robin chess

Five players A, B, C, D and E played a chess tournament in which every player met every other player exactly once. A win earned 2 points, a draw 1 point and a loss 0 points. Final points: A 6, B 5, C 4, D 3 and E 2.
Exactly three games were drawn, one of them between B and C.
A did not lose any game.
E won exactly one game.

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

D11. How many games did B win? TITA

Answer: 2

A has 6 points from 4 games with no loss, so A has 2 wins and 2 draws. With only 3 draws in all and B–C drawn, A's two draws are the other two. Checking all 3^10 result tables leaves two:
A>B, A=C, A=D, A>E, B=C, B>D, B>E, C>D, C<E, D>E
A>B, A=C, A=D, A>E, B=C, B>D, B>E, C<D, C>E, D<E
(X>Y means X won; X=Y a draw.)

In both possible tables B beat D and E, lost to A and drew with C: 2 wins.

D12. If C defeated D, whom did E defeat? MCQ

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

Answer: D. C

A has 6 points from 4 games with no loss, so A has 2 wins and 2 draws. With only 3 draws in all and B–C drawn, A's two draws are the other two. Checking all 3^10 result tables leaves two:
A>B, A=C, A=D, A>E, B=C, B>D, B>E, C>D, C<E, D>E
A>B, A=C, A=D, A>E, B=C, B>D, B>E, C<D, C>E, D<E
(X>Y means X won; X=Y a draw.)

C beating D leaves only the first table, in which E beat C.

D13. How many games did D win? TITA

Answer: 1

A has 6 points from 4 games with no loss, so A has 2 wins and 2 draws. With only 3 draws in all and B–C drawn, A's two draws are the other two. Checking all 3^10 result tables leaves two:
A>B, A=C, A=D, A>E, B=C, B>D, B>E, C>D, C<E, D>E
A>B, A=C, A=D, A>E, B=C, B>D, B>E, C<D, C>E, D<E
(X>Y means X won; X=Y a draw.)

D has 3 points with one draw (against A) in both tables, so D won exactly one game.

D14. Which of the following results is certain? MCQ

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

Answer: A. A defeated E

A has 6 points from 4 games with no loss, so A has 2 wins and 2 draws. With only 3 draws in all and B–C drawn, A's two draws are the other two. Checking all 3^10 result tables leaves two:
A>B, A=C, A=D, A>E, B=C, B>D, B>E, C>D, C<E, D>E
A>B, A=C, A=D, A>E, B=C, B>D, B>E, C<D, C>E, D<E
(X>Y means X won; X=Y a draw.)

Only the A–E result is the same in both tables among the options; the others hold in just one table.

A three-language club

A language club has 60 members, and each member studies at least one of French, German and Japanese. 32 members study French, 27 study German and 23 study Japanese. Exactly 14 members study exactly two of the languages.
The number studying French and German but not Japanese equals the number studying German and Japanese but not French.
More members study only French than only German, and more study only German than only Japanese.

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

D15. How many members study all three languages? TITA

Answer: 4

Let F only = a, G only = b, J only = c, F and G only = x, G and J only = y, F and J only = z and all three = t. Totals give a + x + z + t = 32, b + x + y + t = 27, c + y + z + t = 23 and x + y + z = 14 with 60 members in all. Adding the three language totals: 82 = (a + b + c) + 2 × 14 + 3t, while 60 = (a + b + c) + 14 + t, so t = 4. With x = y the conditions a > b > c leave:
F only | G only | J only | FG only | GJ only | FJ only | All three
18 | 15 | 9 | 4 | 4 | 6 | 4
19 | 13 | 10 | 5 | 5 | 4 | 4

Comparing the two totals forces t = 4.

D16. How many members study exactly one language? MCQ

A. 42
B. 44
C. 46
D. 43

Answer: A. 42

Let F only = a, G only = b, J only = c, F and G only = x, G and J only = y, F and J only = z and all three = t. Totals give a + x + z + t = 32, b + x + y + t = 27, c + y + z + t = 23 and x + y + z = 14 with 60 members in all. Adding the three language totals: 82 = (a + b + c) + 2 × 14 + 3t, while 60 = (a + b + c) + 14 + t, so t = 4. With x = y the conditions a > b > c leave:
F only | G only | J only | FG only | GJ only | FJ only | All three
18 | 15 | 9 | 4 | 4 | 6 | 4
19 | 13 | 10 | 5 | 5 | 4 | 4

60 – 14 – 4 = 42 in either case.

D17. If 9 members study only Japanese, how many study French and Japanese but not German? TITA

Answer: 6

Let F only = a, G only = b, J only = c, F and G only = x, G and J only = y, F and J only = z and all three = t. Totals give a + x + z + t = 32, b + x + y + t = 27, c + y + z + t = 23 and x + y + z = 14 with 60 members in all. Adding the three language totals: 82 = (a + b + c) + 2 × 14 + 3t, while 60 = (a + b + c) + 14 + t, so t = 4. With x = y the conditions a > b > c leave:
F only | G only | J only | FG only | GJ only | FJ only | All three
18 | 15 | 9 | 4 | 4 | 6 | 4
19 | 13 | 10 | 5 | 5 | 4 | 4

Only the first split has 9 Japanese-only members; there FJ-only is 6.

D18. What is the largest possible number of members who study German and Japanese but not French? MCQ

A. 5
B. 6
C. 9
D. 7

Answer: A. 5

Let F only = a, G only = b, J only = c, F and G only = x, G and J only = y, F and J only = z and all three = t. Totals give a + x + z + t = 32, b + x + y + t = 27, c + y + z + t = 23 and x + y + z = 14 with 60 members in all. Adding the three language totals: 82 = (a + b + c) + 2 × 14 + 3t, while 60 = (a + b + c) + 14 + t, so t = 4. With x = y the conditions a > b > c leave:
F only | G only | J only | FG only | GJ only | FJ only | All three
18 | 15 | 9 | 4 | 4 | 6 | 4
19 | 13 | 10 | 5 | 5 | 4 | 4

The two feasible splits give 4 and 5; the largest is 5.

Delivery routes

A courier van starts at depot P and serves hubs Q, R, S, T, U and V. The only roads are the two-way roads below, with travel times in minutes. Time spent at hubs is ignored.

Road | Minutes
P–Q | 7
P–R | 9
P–S | 11
Q–R | 10

Q–T | 15
R–S | 2
R–T | 11
S–U | 9
T–U | 6
T–V | 8
U–V | 5

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

D19. What is the minimum travel time, in minutes, from P to V? TITA

Answer: 25

Compute shortest times from P (Dijkstra's method):
Hub | Q | R | S | T | U | V
Minutes from P | 7 | 9 | 11 | 20 | 20 | 25
Two routes reach V in 25 minutes: P–S–U–V (11 + 9 + 5) and P–R–S–U–V (9 + 2 + 9 + 5).

The shortest routes take 25 minutes.

D20. If road R–S is closed, what is the minimum travel time, in minutes, from P to V? MCQ

A. 29
B. 25
C. 26
D. 27

Answer: B. 25

Compute shortest times from P (Dijkstra's method):
Hub | Q | R | S | T | U | V
Minutes from P | 7 | 9 | 11 | 20 | 20 | 25
Two routes reach V in 25 minutes: P–S–U–V (11 + 9 + 5) and P–R–S–U–V (9 + 2 + 9 + 5).

P–S–U–V still takes 11 + 9 + 5 = 25 minutes, so the minimum is unchanged.

D21. A van must travel from P to V passing through T. What is its minimum travel time, in minutes? TITA

Answer: 28

Compute shortest times from P (Dijkstra's method):
Hub | Q | R | S | T | U | V
Minutes from P | 7 | 9 | 11 | 20 | 20 | 25
Two routes reach V in 25 minutes: P–S–U–V (11 + 9 + 5) and P–R–S–U–V (9 + 2 + 9 + 5).

P to T takes at least 20 minutes (P–R–T) and T to V at least 8, so 28 minutes.

D22. How many different routes from P to V, visiting no hub twice, take the minimum time? MCQ

A. 4
B. 3
C. 2
D. 6

Answer: C. 2

Compute shortest times from P (Dijkstra's method):
Hub | Q | R | S | T | U | V
Minutes from P | 7 | 9 | 11 | 20 | 20 | 25
Two routes reach V in 25 minutes: P–S–U–V (11 + 9 + 5) and P–R–S–U–V (9 + 2 + 9 + 5).

P–S–U–V and P–R–S–U–V both take 25 minutes; no other route does.

QA · 22 questions

Q01. A shopkeeper marks an article 40% above its cost price and then allows successive discounts of 10% and 5% on the marked price. What is his profit as a percentage of the cost price? MCQ

A. 21.2
B. 18.6
C. 19.7
D. 20.5

Answer: C. 19.7

Take the cost price as 100. The marked price is 140. After a 10% discount the price is 126, and after a further 5% discount it is 126 × 0.95 = 119.7. The profit is therefore 19.7% of the cost price.

Q02. How many integer values of x satisfy |x − 3| + |x + 2| ≤ 9? TITA

Answer: 10

Between −2 and 3 the expression equals 5, so every integer there works. For x > 3 it is 2x − 1 ≤ 9, giving x ≤ 5. For x < −2 it is 1 − 2x ≤ 9, giving x ≥ −4. So x runs from −4 to 5 inclusive: 10 integers.

Q03. A triangle has sides 13 cm, 14 cm and 15 cm. What is the length, in cm, of the altitude drawn to the 14 cm side? MCQ

A. 12
B. 11.2
C. 12.6
D. 13

Answer: A. 12

The semi-perimeter is 21, so Heron's formula gives area $\sqrt{(21 \times 8 \times 7 \times 6)} = \sqrt{7056} = 84$ cm². The altitude to the 14 cm side is 2 × 84 / 14 = 12 cm.

Q04. A and B together can finish a job in 12 days, B and C together in 15 days, and A and C together in 20 days. In how many days can A alone finish the job? TITA

Answer: 30

Adding the three pair rates gives 2(A + B + C) = 1/12 + 1/15 + 1/20 = 12/60 = 1/5, so A + B + C = 1/10 of the job per day. Subtracting the B + C rate leaves A = 1/10 − 1/15 = 1/30. A alone needs 30 days.

Q05. What is the remainder when 7^100 is divided by 13? MCQ

A. 3
B. 1
C. 12
D. 9

Answer: D. 9

Since 13 is prime and does not divide 7, 7^12 leaves remainder 1. Write 100 = 12 × 8 + 4, so 7^100 leaves the same remainder as 7^4 = 2401. Because 2401 = 13 × 184 + 9, the remainder is 9.

Q06. What is the sum of all integers between 100 and 400 that are divisible by 7? MCQ

A. 10773
B. 10836
C. 10899
D. 10584

Answer: B. 10836

The multiples of 7 in the range run from 105 = 7 × 15 to 399 = 7 × 57, which is 43 terms of an arithmetic progression. Their sum is 43 × (105 + 399)/2 = 43 × 252 = 10,836.

Q07. Two trains of lengths 180 m and 120 m take 10 seconds to cross each other when moving in opposite directions and 30 seconds when moving in the same direction. What is the speed of the faster train in km/h? MCQ

A. 54
B. 72
C. 90
D. 64.8

Answer: B. 72

Crossing covers the combined length of 300 m. Opposite directions give a speed sum of 300/10 = 30 m/s; the same direction gives a difference of 300/30 = 10 m/s. The faster train therefore moves at (30 + 10)/2 = 20 m/s, which is 20 × 18/5 = 72 km/h.

Q08. Real numbers x and y satisfy $x + y = 5$ and $x^2 + y^2 = 17$. What is the value of $x^3 + y^3$? MCQ

A. 61
B. 73
C. 57
D. 65

Answer: D. 65

From $(x + y)^2 = x^2 + y^2 + 2xy$ we get $25 = 17 + 2xy$, so $xy = 4$. Then $x^3 + y^3 = (x + y)^3 - 3xy(x + y) = 125 - 3 \times 4 \times 5 = 65$.

Q09. How many divisors of 2^4 × 3^3 × 5 are perfect squares? TITA

Answer: 6

A square divisor needs an even exponent of every prime. The power of 2 can be 0, 2 or 4 (three choices), the power of 3 can be 0 or 2 (two choices), and the power of 5 must be 0. That gives $3 \times 2 \times 1 = 6$ square divisors.

Q10. Alloy P contains copper and zinc in the ratio 3 : 2, and alloy Q contains them in the ratio 1 : 3. In what ratio must P and Q be mixed by weight to obtain an alloy with equal amounts of copper and zinc? MCQ

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

Answer: A. 5:2

The copper fractions are 3/5 in P and 1/4 in Q, and the target is 1/2. By alligation the ratio P : Q is $(1/2 - 1/4) : (3/5 - 1/2) = 1/4 : 1/10 = 5 : 2$.

Q11. A chord AB of length 14 cm cuts a diameter CD of a circle at the point P, with AP = 6 cm and CP = 4 cm. What is the radius of the circle, in cm? TITA

Answer: 8

By the intersecting chords theorem, $AP \times PB = CP \times PD$. With $PB = 14 - 6 = 8$, this gives $6 \times 8 = 4 \times PD$, so $PD = 12$. The diameter $CD = 4 + 12 = 16$ cm and the radius is 8 cm.

Q12. Two fair dice are thrown. For how many of the 36 ordered outcomes is the product of the two numbers a multiple of 6? TITA

Answer: 15

Count the complement. The product misses a factor 2 when both numbers are odd (9 outcomes) and misses a factor 3 when neither number is a multiple of 3 (16 outcomes); both happen for numbers from {1, 5} only (4 outcomes). Outcomes that are not multiples of 6 number 9 + 16 − 4 = 21, so 36 − 21 = 15 qualify.

Q13. The average mark of 30 students is 52. Two students who scored 40 and 45 leave and one new student joins, after which the average of the 29 students is 53. What did the new student score? MCQ

A. 58
B. 64
C. 62
D. 60

Answer: C. 62

The original total is 30 × 52 = 1560. Removing 40 and 45 leaves 1475. The new total must be 29 × 53 = 1537, so the new student scored 1537 − 1475 = 62.

Q14. If $\log_2 x + \log_4 x + \log_{16} x = 7$, what is the value of x? TITA

Answer: 16

Write every term with base 2: $\log_4 x = (\log_2 x)/2$ and $\log_{16} x = (\log_2 x)/4$. The equation becomes $(7/4)\log_2 x = 7$, so $\log_2 x = 4$ and $x = 16$.

Q15. A sum of money doubles itself in 8 years at simple interest. In how many years will it become four times itself at the same rate? TITA

Answer: 24

Doubling means the interest equals the principal in 8 years, so the rate is 100/8 = 12.5% per year. Becoming four times requires interest of 300% of the principal, which takes 300/12.5 = 24 years.

Q16. The sum of the first n terms of an arithmetic progression is $3n^2 + 5n$ for every n. What is its 10th term? MCQ

A. 58
B. 65
C. 60
D. 62

Answer: D. 62

The 10th term equals $S_{10} - S_9$. Here $S_{10} = 300 + 50 = 350$ and $S_9 = 243 + 45 = 288$, so the 10th term is $350 - 288 = 62$.

Q17. ABCD is a square of side 10 cm. A point P inside it is equidistant from A and B, and the area of triangle PCD is 30 cm^2. What is PA^2, in cm^2? MCQ

A. 45
B. 41
C. 52
D. 34

Answer: B. 41

Place A(0, 0), B(10, 0), C(10, 10) and D(0, 10). PA = PB puts P on x = 5. Triangle PCD has base CD = 10 and height 10 − y, so $(1/2) \times 10 \times (10 - y) = 30$ and y = 4. Then $PA^2 = 5^2 + 4^2 = 41$.

Q18. Two numbers, each greater than 12, have HCF 12 and LCM 360. How many such unordered pairs of numbers exist? MCQ

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

Answer: C. 3

Write the numbers as 12m and 12n with m and n coprime. Then 12mn = 360, so mn = 30. Coprime splits of 30 with both factors above 1 are (2, 15), (3, 10) and (5, 6). That gives 3 pairs.

Q19. In a two-candidate election, 8% of registered voters did not vote and 10% of the votes cast were invalid. The winner received 55% of the valid votes and won by 2,070 votes. How many voters were registered? MCQ

A. 25000
B. 24000
C. 22500
D. 27500

Answer: A. 25000

Valid votes are 0.92 × 0.90 = 0.828 of the registered voters. The margin is 55% − 45% = 10% of the valid votes, that is 0.0828 of the registered voters. So the register has 2070 / 0.0828 = 25,000 voters.

Q20. Pens cost ₹12 each and notebooks ₹35 each. Ravi spent exactly ₹500 and bought at least one of each item. How many notebooks did he buy? MCQ

A. 6
B. 4
C. 8
D. 10

Answer: B. 4

We need 12p + 35n = 500 with positive integers. Modulo 12, 35n ≡ −n and 500 ≡ 8, so n ≡ 4 (mod 12). n = 4 gives 12p = 360 and p = 30; n = 16 already costs more than ₹500. So he bought 4 notebooks.

Q21. In a survey of 200 people, 110 read newspaper A, 90 read B and 70 read C. Forty read both A and B, 30 read both B and C and 35 read both A and C (each pair count includes those who read all three). Fifteen people read none of the three. How many read exactly two of the newspapers? MCQ

A. 40
B. 50
C. 55
D. 45

Answer: D. 45

At least one paper is read by 200 − 15 = 185 people. Inclusion–exclusion gives 185 = 270 − 105 + t, so t = 20 read all three. Each pair count includes those 20, so exactly two papers are read by 105 − 3 × 20 = 45 people.

Q22. A boat travels 30 km upstream and 44 km downstream in 10 hours. It travels 40 km upstream and 55 km downstream in 13 hours. What is the speed of the boat in still water, in km/h? TITA

Answer: 8

Let a and b be the times per kilometre upstream and downstream. Then 30a + 44b = 10 and 40a + 55b = 13. Multiplying by 4 and 3 and subtracting gives 11b = 1, so b = 1/11 and a = 1/5. The speeds are 5 km/h upstream and 11 km/h downstream, so the boat moves at (5 + 11)/2 = 8 km/h.