

FAST-NU FLP / Mock Exam

Detailed Answer Key with Explanations, Wrong Option Analysis and Short Tricks

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This PDF provides a student-friendly explanation for each MCQ from the uploaded FAST-NU FLP Mock Exam. It also highlights MCQs where the source paper has incomplete wording, duplicate correct options, or wrong/missing options.

How to use this key: First check the compact answer table. Then read the detailed explanation for every wrong or confusing MCQ. For timed practice, pay special attention to the “Short trick” lines.

Compact Answer Key

Important: A few questions in the source PDF contain issues. They are marked in the detailed section: Basic Math Q6, Q7, Q11; Advance Math Q2, Q15, Q43, Q45, Q47; and Bonus Q8/Q12.

English

Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans
1	b)	2	c)	3	c)	4	d)	5	c)
6	a)	7	b)	8	a)	9	b)	10	a)
11	b)	12	b)	13	c)	14	c)	15	e)
16	d)	17	b)	18	e)	19	d)	20	c)
21	a)	22	e)	23	d)	24	b)	25	c)
26	a)	27	e)	28	b)	29	b)	30	e)

IQ & Analytical

Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans
1	c)	2	b)	3	b)	4	e)	5	e)
6	e)	7	b)	8	b)	9	e)	10	a)
11	a)	12	d)	13	b)	14	b)	15	d)
16	b)	17	d)	18	d)	19	c)	20	d)

Basic Math

Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans
1	c)	2	c)	3	a)	4	d)	5	a)
6	No exact; ~7.02s	7	30 degrees	8	d)	9	a)	10	e)
11	33 1/3%	12	b)	13	b)	14	d)	15	c)
16	b)	17	a)	18	a)	19	a)	20	d)

Advance Math

Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans
1	c)	2	c)	3	d)	4	e)	5	e)
6	c)	7	e)	8	b)	9	d)	10	d)
11	e)	12	d)	13	c)	14	b)	15	Incomplete
16	b)	17	b)	18	e)	19	d)	20	c)
21	e)	22	e)	23	b)	24	c)	25	a)
26	b)	27	b)	28	b)	29	a)	30	e)
31	a)	32	e)	33	d)	34	d)	35	b)
36	a)	37	c)	38	c)	39	a)	40	b)
41	a)	42	a)	43	a/d	44	b)	45	d)
46	b)	47	e)	48	e)	49	c)	50	e)

Bonus

Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans	Q#	Ans
1	a)	2	a)	3	a)	4	b)	5	d)
6	e)	7	b)	8	c)	9	d)	10	b)
11	c)	12	e)	13	a)	14	b)		

Section 1: English

Q1. Correct Answer: b) scatter

Why this is correct: Diffuse means to spread out or scatter. It can also mean wordy/unclear in writing, but among the given options the closest direct meaning is scatter.

Why the other options are wrong: a incomprehensible and d difficult describe being hard to understand, not the main vocabulary match here. c unplug is unrelated.

Short trick: Synonym MCQs: first think of the common root meaning. Diffuse = spread out.

Q2. Correct Answer: c) off

Why this is correct: The phrasal verb is “pay off” when workers or debts are completely paid. “All the workers were paid off” means they received their due payment.

Why the other options are wrong: a through, b over, d away, and e out do not form the correct phrasal verb in this sentence.

Q3. Correct Answer: c) yet they will attack if they feel threatened

Why this is correct: The first clause says rattlesnakes are not malicious; the second clause contrasts this by saying they still attack when threatened. “Yet” gives the correct contrast.

Why the other options are wrong: a uses the awkward phrase “at feeling threatened.” b “and” is too weak for contrast. d needs a comma after however and “at feeling” is wrong. e is wordy and illogical.

Q4. Correct Answer: d) from

Why this is correct: The correct preposition is “excluded from the team.”

Why the other options are wrong: a by would name the person who excluded him. b for gives a reason. c on is not used with excluded in this structure.

Short trick: Common pair: excluded from, included in.

Q5. Correct Answer: c) are made

Why this is correct: Active: “They make these tools of plastic.” Passive present simple: “These tools are made of plastic.”

Why the other options are wrong: a lacks the helping verb. b were being made is past continuous passive. d were made is past simple passive, but the original tense is present simple.

Short trick: Passive trick: object + is/am/are + past participle for present simple.

Q6. Correct Answer: a) vary

Why this is correct: The timing can “vary greatly” means it can be very different from one species or stage to another.

Why the other options are wrong: b accelerate means speed up; c endure means last/suffer; d proceed means continue; e coincide means happen at the same time. None fit “greatly in regard to beginning and duration” as well as vary.

Q7. Correct Answer: b) also by the

Why this is correct: The structure is parallel: “not only by the growth of business but also by the psychological effect...”

Why the other options are wrong: a it has a breaks parallelism. c as well in the is awkward. d misses “by,” so it is not parallel. e is unnecessarily wordy.

Short trick: For not only questions, look for “but also” and keep both parts grammatically parallel.

Q8. Correct Answer: a) compete

Why this is correct: After “learn to,” the base form of the verb is required: learn to compete.

Why the other options are wrong: b competition is a noun, so “learn to competition” is ungrammatical.

Q9. Correct Answer: b) In 1989, the space probe Voyager 2 flew by the planet Neptune.

Why this is correct: A completed event in a specific past year needs the simple past “flew.”

Why the other options are wrong: a was flying suggests an ongoing action and is less suitable for the historical event. c fly has wrong tense. d is a fragment. e is wrong because option b is correct.

Q10. Correct Answer: a) prolong

Why this is correct: Advance and retreat are opposites. Curtail means shorten/reduce, so its opposite is prolong.

Why the other options are wrong: b damage, c discard, and d consume are not opposites of curtail.

Short trick: Analogy trick: identify the relationship first: antonym, synonym, part-whole, degree, function.

Q11. Correct Answer: b) Illogical

Why this is correct: Valid means logically sound or acceptable. Its antonym in this context is illogical/invalid.

Why the other options are wrong: a sound is a synonym of valid. c empty and d noisy are unrelated.

Q12. Correct Answer: b) Previous

Why this is correct: Subsequent means following or coming after. The opposite is previous.

Why the other options are wrong: a definitive means final/clear. c following is a synonym. d related is not an antonym.

Q13. Correct Answer: c) octagon : eight

Why this is correct: A binomial name contains two name-parts; an octagon contains eight sides. The relation is a term connected with a number.

Why the other options are wrong: a entreat/gift, b normal/mean, d centennial/year, and e benediction/church do not match the number-based relation as directly.

Short trick: Look for hidden number prefixes: bi=2, octa=8, cent=100.

Q14. Correct Answer: c) hoax

Why this is correct: A ruse is a trick or deceptive plan. Hoax is the closest synonym.

Why the other options are wrong: a modern, b fact, d orthodox, and e leader do not mean trick/deception.

Q15. Correct Answer: e) recanted

Why this is correct: To recant a statement is to take it back or withdraw it. Officers who previously denied involvement could later recant those denials.

Why the other options are wrong: a justified means defended. b protracted means lengthened. c repeated and d supported mean they maintained the statements, not withdrew them.

Q16. Correct Answer: d) cool : gelid

Why this is correct: Warm to torrid shows increase in intensity: warm is moderately hot; torrid is extremely hot. Cool to gelid similarly moves from moderately cold to extremely cold.

Why the other options are wrong: a removed is not an intense form of calm. b timid/brave are opposites. c tepid/caring are unrelated. e casual/costly are unrelated.

Q17. Correct Answer: b) delay

Why this is correct: Conceal and obscure are close synonyms. Procrastinate means delay.

Why the other options are wrong: a pretend, c anticipate, and d relinquish do not mean procrastinate.

Q18. Correct Answer: e) weaken

Why this is correct: Fortify means strengthen. Its antonym is weaken.

Why the other options are wrong: a component is a part. b pacify means calm. c increase is not opposite. d defy means resist.

Q19. Correct Answer: d) peculiar

Why this is correct: Eccentric means unusual, odd, or peculiar.

Why the other options are wrong: a frugal means economical. b selective means choosing carefully. c normal is the opposite.

Q20. Correct Answer: c) idle

Why this is correct: "I cannot remember the last time she did a day's work" means she is lazy or idle.

Why the other options are wrong: a hardworking, b conscientious, and d diligent all mean careful/hard-working and are opposite to the idea.

Q21. Correct Answer: a) disaster

Why this is correct: A fiasco is a complete failure or disaster.

Why the other options are wrong: b happenstance means chance event. c ceremony and d festival are events, not failures.

Q22. Correct Answer: e) collecting the equal of thirty inches annually in some places

Why this is correct: This option gives a participial phrase that logically describes the trees' collection of water. It also fixes "area" to "places."

Why the other options are wrong: a repeats "per year" and "annually." b is awkward and "which" has an unclear reference. c has wrong singular "area." d is ungrammatical/awkward.

Short trick: Eliminate redundancy first: "per year annually" is automatically weak.

Q23. Correct Answer: d) with

Why this is correct: The correct collocation is "collaborate with a person."

Why the other options are wrong: a from, b on, c of, and e for do not fit after collaborate when naming the person.

Q24. Correct Answer: b) If two pieces of rope are of different thickness the weaver's knot can be used to join them.

Why this is correct: This is the only complete conditional sentence. A comma after "thickness" would improve it, but the grammar is still clear.

Why the other options are wrong: a cannot be correct because b is correct. c "Two of pieces" is wrong. d is a run-on without "if/when." e "What two pieces..." is wrong.

Q25. Correct Answer: c) The medical directors of the clinic believe that as patients, you...

Why this is correct: The original wrongly suggests the medical directors are the patients. Option c correctly says the patients are "you."

Why the other options are wrong: a is wordy. b has a dangling modifier. d is awkward passive. e is incomplete because it does not connect properly to "are entitled."

Short trick: Modifier trick: the phrase "As patients" must describe "you," not "medical directors."

Q26. Correct Answer: a) was

Why this is correct: The subject is singular: "the light." Past tense is needed because the sentence begins "When they entered."

Why the other options are wrong: b is present tense. c and d are plural verbs.

Q27. Correct Answer: e) To develop film at home requires only three types of chemicals...

Why this is correct: The infinitive phrase "To develop film at home" correctly acts as the subject of the sentence.

Why the other options are wrong: b, c, and d all create sentence fragments or faulty openings. a is wrong because option e is correct.

Q28. Correct Answer: b) had left

Why this is correct: This is a third conditional sentence: would not have been late if he had left earlier.

Why the other options are wrong: a hadn't left gives the opposite meaning. c leave and d left do not fit the past perfect requirement.

Short trick: Third conditional pattern: If + had + V3, would have + V3.

Q29. Correct Answer: b) us to keep an eye on your house when you are

Why this is correct: The idiom is "keep an eye on" something, meaning watch it carefully.

Why the other options are wrong: a of, c at, d off, and e out do not complete the idiom correctly.

Q30. Correct Answer: e) silence

Why this is correct: Chat means informal talk; the opposite is silence.

Why the other options are wrong: a deceive, b conserve, c surprise, and d utterance are not antonyms. Utterance is closer to speech, not silence.

Section 2: IQ & Analytical Skills

Q1. Correct Answer: c) odd figure

Why this is correct: In options a, b, and d there are two circles and three lines. In option c there are three circles and only two lines, so it breaks the pattern.

Why the other options are wrong: a, b, and d share the same count pattern: 2 circles + 3 straight lines.

Short trick: In figure odd-one-out questions, first count objects before looking for complex patterns.

Q2. Correct Answer: b) Distance

Why this is correct: Walk, ride, fly, and drive are actions or modes of movement. Distance is a measurement, not an action.

Why the other options are wrong: a, c, d, and e all describe ways of moving.

Q3. Correct Answer: b) 18

Why this is correct: A is equally far from B and C in age, so A is the average of B and C. Let $B=x$, $C=2x$, $A=(x+2x)/2=1.5x$. Total: $x+2x+1.5x=4.5x=54$, so $x=12$ and $A=18$.

Why the other options are wrong: a, c, and d do not satisfy both "C twice B" and total age 54.

Short trick: Shortcut: If A is as much older than B as younger than C, A is exactly the average of B and C.

Q4. Correct Answer: e) Most public policy questions require moral/value judgment, not much technical understanding.

Why this is correct: The candidate worries that judges lack technical expertise. Option e weakens the worry by saying many such cases do not need deep technical expertise.

Why the other options are wrong: a, b, c, and d mostly explain why technical experts are absent; they do not show the situation is less serious.

Q5. Correct Answer: e) Some new scientific discoveries do not represent a variation on previous themes.

Why this is correct: The passage says every new discovery is always a variation of previous themes. Option e says some are not, so it is the EXCEPT answer.

Why the other options are wrong: a, b, c, and d follow from the passage's claim that creativity and discovery involve variations on previous ideas.

Q6. Correct Answer: e) If crop yields drop by more than 50%, then crop protection products have not been used.

Note: This item is slightly ambiguous because option c is also too strong if read very strictly. The intended answer is e because it commits the classic converse fallacy.

Why this is correct: The NAAS statement is: no products $\rightarrow$ yields drop more than 50%. Option e reverses this into drop $\rightarrow$ no products, which is the invalid converse.

Why the other options are wrong: a and b follow from today's aerial applicator description. d is the contrapositive of the NAAS statement. c is also not perfectly guaranteed by strict wording, but e is the standard/intended logical error.

Q7. Correct Answer: b) Grandmother

Why this is correct: The husband's only daughter is the woman's daughter. The boy is the son of that daughter, so the woman is the boy's grandmother.

Why the other options are wrong: a mother would be the husband's only daughter, not the woman herself. c aunt and d sister do not fit the relation.

Q8. Correct Answer: b) 56

Why this is correct: Differences are 1, 4, 9, 16, which are 1^2 , 2^2 , 3^2 , 4^2 . Next difference is 25, so $31+25=56$.

Why the other options are wrong: 44, 58, and 49 do not continue the square-difference pattern.

Short trick: Series trick: check differences; if differences are 1,4,9,16, think squares.

Q9. Correct Answer: e) Nash's history book is among best-sellers, so 9-to-1 fiction.

Why this is correct: George applies a general statistic to a particular case while ignoring relevant specific information. Option e similarly applies a general 9-out-of-10 fiction statistic to a specific book even though "history of World War II"

strongly indicates nonfiction.

Why the other options are wrong: a, b, and c use different probability mistakes. d is closer to valid base-rate reasoning and lacks the same ignored-specific-evidence flaw.

Q10. Correct Answer: a) Sister

Why this is correct: The only son of Hamza's grandfather is Hamza's father. The daughter of Hamza's father is Hamza's sister.

Why the other options are wrong: b daughter would require the only son to be Hamza himself. c cousin and d niece do not follow under the usual test assumption.

Short trick: Blood relation trick: replace phrases step by step: grandfather's only son = father.

Q11. Correct Answer: a) Father

Why this is correct: P is Q's mother. Q and R are siblings. R is daughter of S; since P is already the mother, S is taken as the father of Q and R.

Why the other options are wrong: b mother conflicts with P already being mother. c brother and d uncle are not parents of R.

Q12. Correct Answer: d) 8

Why this is correct: Let present ages be $5x$ and $3x$. Eight years ago: $(5x-8)/(3x-8)=3/1$. So $5x-8=9x-24$, $16=4x$, $x=4$. Ages are 20 and 12; difference=8.

Why the other options are wrong: 2, 4, 6, and 10 do not satisfy the past ratio.

Short trick: Age ratio trick: convert ratio to variables, then apply the time change to both ages.

Q13. Correct Answer: b) 13

Why this is correct: The series is Fibonacci type: each term is the sum of the previous two: 1,2,3,5,8,13.

Why the other options are wrong: 11, 8, and 5 do not equal 5+8.

Short trick: Look for "sum of previous two" in short growing series.

Q14. Correct Answer: b) S

Note: The wording "added to each word" does not specify position. This type normally means the same letter can be inserted/attached to form new words; S is the intended choice.

Why this is correct: Adding S makes meaningful words: STICK, SHEATHE/HEATS depending placement, BUSTS, FISTS. The intended common added letter is S.

Why the other options are wrong: A, Y, E, and R do not consistently create four common meaningful words from all given words.

Q15. Correct Answer: d) next figure

Why this is correct: The small line segment moves around the corners and alternates its slant. After the fourth figure, the next returns to the upper-right style shown in option d.

Why the other options are wrong: a repeats the second-type position too early. b and c introduce vertical segments, breaking the slant pattern.

Q16. Correct Answer: b) 32

Why this is correct: Differences are +1, +3, +5, +7. Next difference is +9, so $23+9=32$.

Why the other options are wrong: 30, 39, and 28 do not follow consecutive odd differences.

Short trick: Odd-difference pattern: 1,3,5,7,...

Q17. Correct Answer: d) 134

Why this is correct: BOAT -> 1234 means B=1, O=2, A=3, T=4. Therefore BAT = B A T = 1 3 4.

Why the other options are wrong: a, b, c, and e assign at least one letter the wrong digit.

Q18. Correct Answer: d) TWO

Why this is correct: Each letter is shifted two positions forward: MLC -> ONE and BME -> DOG. Apply the same: R->T, U->W, M->O, so RUM -> TWO.

Why the other options are wrong: BAT, DOC, CAT, and EYE do not match the +2 letter shift.

Short trick: Coding trick: compare first pair letter by letter to find the shift.

Q19. Correct Answer: c) Pregnant women without prenatal care are more likely to experience health problems.

Why this is correct: This explains the saving: prenatal care prevents health problems, and healthier people cost society less.

Why the other options are wrong: a talks about infant benefits but not why prenatal care saves three dollars. b would make the program seem costly. d contradicts the saving logic. e only says who pays, not why savings occur.

Q20. Correct Answer: d) It is wrong for doctors to lie about their patients' illnesses.

Why this is correct: The passage asks whether lying is wrong and concludes "this is clearly wrong." That final claim is the conclusion.

Why the other options are wrong: a and c are supporting comparisons. b is not claimed as a general fact. e is a premise supporting why it is wrong.

Short trick: Argument trick: conclusion is the main point the author wants you to accept; premises give reasons.

Section 3: Basic Math

Q1. Correct Answer: c) 2M - N

Why this is correct: Average of two numbers = $(N + \text{other})/2 = M$. So $N + \text{other} = 2M$, hence $\text{other} = 2M - N$.

Why the other options are wrong: a, b, and d do not satisfy the average formula.

Short trick: For two-number average: $\text{total} = 2 \times \text{average}$.

Q2. Correct Answer: c) 3 cm

Why this is correct: Let radii be R and r . External touch gives $R+r=14$. Areas give $R^2+r^2=130$. Then $2Rr=(R+r)^2-(R^2+r^2)=196-130=66$, so $Rr=33$. The radii solve $t^2-14t+33=0$, giving 11 and 3. Smaller radius=3 cm.

Why the other options are wrong: 5, 4, and 2 do not pair with another radius to give sum 14 and square-sum 130.

Short trick: Use $(R+r)^2 = R^2+r^2+2Rr$.

Q3. Correct Answer: a) 28

Why this is correct: Angles around a point sum to 360 degrees: $33 + 2x + 75 + 7x = 360$. So $9x + 108 = 360$, $9x = 252$, $x = 28$.

Why the other options are wrong: 152, 60, and 27 do not satisfy the full angle-around-point sum.

Short trick: Around a point = 360 degrees.

Q4. Correct Answer: d) 15

Why this is correct: Two forwards scored total $2 \times 21 = 42$. Remaining three scored total $3 \times 11 = 33$. Total = 75, average for 5 players = $75/5 = 15$.

Why the other options are wrong: 15.5, 14.5, 5, and 16 come from averaging averages without weights or arithmetic mistakes.

Short trick: Weighted average trick: multiply each average by its number of items first.

Q5. Correct Answer: a) 50

Why this is correct: The path forms a right triangle with legs 14 and 48. Distance $RT = \sqrt{14^2 + 48^2} = \sqrt{196 + 2304} = \sqrt{2500} = 50$.

Why the other options are wrong: 25, 60, and 35 do not satisfy Pythagoras.

Short trick: Recognize 14-48-50 as a multiple of 7-24-25.

Q6. Correct Answer: No exact option; correct time ≈ 7.02 s. Closest option: c) 8 seconds

Note: The paper has wrong options for this MCQ. The mathematically correct answer is about 7.02 seconds.

Why this is correct: Total length to be crossed = $114 + 116 = 230$ m. Relative speed = $58 + 60 = 118$ km/h = $118 \times 5/18 = 32.78$ m/s. Time = $230/32.78 \approx 7.02$ s.

Why the other options are wrong: 11, 10, 8, and 9 are not exact. 8 is only the nearest option.

Short trick: For trains in opposite directions: $\text{time} = \text{total length} / \text{sum of speeds}$.

Q7. Correct Answer: 30 degrees

Why this is correct: Since $AB=AD$, triangle ABD is isosceles, so angle ABD = angle BDA = 50 degrees. Therefore angle BAD = $180 - 50 - 50 = 80$ degrees. In triangle ABC, angle BAC = $180 - 50 - 20 = 110$ degrees. Hence angle CAD = $110 - 80 = 30$ degrees.

Why the other options are wrong: The options are not visible in the extracted text/PDF page, but the solved answer is 30 degrees.

Short trick: Isosceles triangle trick: equal sides face equal angles.

Q8. Correct Answer: d) 15

Why this is correct: Same as Q4. Total score = $2 \times 21 + 3 \times 11 = 42 + 33 = 75$. Average = $75/5 = 15$.

Why the other options are wrong: Other options repeat the same weighted-average mistakes.

Q9. Correct Answer: a) Rs. 200

Why this is correct: Let A's cost be x . After 5% profit: $1.05x$. After B's 10% profit: $1.10(1.05x) = 1.155x$. Given $1.155x = 231$, $x = 200$.

Why the other options are wrong: 250, 150, and 100 do not give 231 after two successive profits.

Short trick: Successive percentage trick: multiply factors, do not add percentages directly unless approximate.

Q10. Correct Answer: e) 10800 meters

Why this is correct: x equals number of seconds in a minute, so speed=60 m/s. Time=3 minutes=180 s.
Distance=60x180=10800 m.

Why the other options are wrong: 180, 18, 1080, and 3 use either the wrong speed or wrong time conversion.

Short trick: Always convert minutes to seconds when speed is m/s.

Q11. Correct Answer: Correct value: 33 1/3%. If option a was intended as 33 1/3%, choose a.

Note: The paper seems to contain a typo: the correct answer should be 33 1/3%, not 33 1/2%.

Why this is correct: If B=100, A is 25% less, so A=75. B is more than A by 25. Percentage more relative to A = $\frac{25}{75} \times 100 = 33 \frac{1}{3}\%$.

Why the other options are wrong: 33%, 30%, and 35% are approximations/wrong. The printed option a appears as 33 1/2%, which is not exact.

Short trick: When asked "B is how much more than A," divide by A, not by B.

Q12. Correct Answer: b) 107 : 89

Why this is correct: Women=11570. Men=25480-11570=13910. Ratio men:women =13910:11570. Divide both by 130 gives 107:89.

Why the other options are wrong: 207:90, 108:89, and 208:90 do not reduce the actual counts correctly.

Short trick: Simplify ratios by dividing both sides by a common factor.

Q13. Correct Answer: b) 2/3

Why this is correct: $8^{(2/3)} = (\text{cube root of } 8)^2 = 2^2 = 4$. So $\sqrt[3]{24x} = 4$. Squaring gives $24x = 16$, $x = 16/24 = 2/3$.

Why the other options are wrong: 1/6, 3, and 1/2 do not satisfy $\sqrt[3]{24x} = 4$.

Short trick: Fractional exponent trick: $a^{(2/3)} = (\text{cube root of } a)^2$.

Q14. Correct Answer: d) 130

Why this is correct: Assuming there are 5 numbers: original sum=5x90=450. After removing the 5th number, 4-number average=80, so remaining sum=4x80=320. Removed number=450-320=130.

Why the other options are wrong: 150, 140, 170, and 160 do not make the remaining average 80.

Short trick: Removed value = old total - new total.

Q15. Correct Answer: c) m^8

Why this is correct: $m = \sqrt[n]{n} \rightarrow n = m^2$. $n = \sqrt[q]{q} \rightarrow q = n^2 = m^4$. $q = \sqrt[p]{p} \rightarrow p = q^2 = m^8$.

Why the other options are wrong: m^2 and m^4 stop too early. m^{16} and m^{32} square too many times.

Short trick: Unwrap square roots by squaring step by step.

Q16. Correct Answer: b) 8W

Why this is correct: W weeks = 7W days. Add W days: 7W+W=8W days.

Why the other options are wrong: 7 ignores the variable. 7W ignores the extra W days. 14W doubles weeks incorrectly.

Q17. Correct Answer: a) Rs. 25,600

Why this is correct: Expense is directly proportional to persons and months. New expense = $4800 \times \frac{24}{9} \times \frac{16}{8} = 4800 \times \frac{8}{3} \times 2 = 25,600$.

Why the other options are wrong: 26,000, 25,000, and 26,600 are arithmetic errors.

Short trick: Direct proportion: multiply by new/old for each factor.

Q18. Correct Answer: a) 7.5 cm^2

Why this is correct: Area of sector using arc length L and radius r is $(1/2)rL$. Thus area = $(1/2)(3)(5) = 7.5 \text{ cm}^2$.

Why the other options are wrong: 7.5 m^2 has wrong unit. 75 cm^2 and 75 m^2 are 10 times too large.

Short trick: Sector area shortcut: $A = 1/2 rL$ when arc length is given.

Q19. Correct Answer: a) 648

Why this is correct: Convert bin to inches: 4 ft=48 in, 3 ft=36 in, 2 ft=24 in. Bin volume=48x36x24. Brick volume=8x4x2=64. Number=41472/64=648.

Why the other options are wrong: 54, 640, 1298, and 5 do not match the volume ratio.

Short trick: Same units first; then divide volumes.

Q20. Correct Answer: d) 36

Why this is correct: If 200% of number is 90, then $2N=90$, so $N=45$. 80% of 45 $=0.8 \times 45=36$.

Why the other options are wrong: 72, 54, and 144 use the wrong base number.

Short trick: 200% means double.

Section 4: Advance Math

Q1. Correct Answer: c) Commutative law for addition

Why this is correct: The expression changes $a+2b$ to $2b+a$. That is changing the order of addition, so it uses the commutative law of addition.

Why the other options are wrong: a and b involve multiplication order/grouping. d closure only says results stay real. e distribution is not being used.

Q2. Correct Answer: c) $(-\infty, -2] \cup [2, \infty)$

Note: If the test treats brackets at infinity loosely, option a may be intended. Formal notation makes option c the best answer.

Why this is correct: For $\sqrt{x^2-4}$ to be real, $x^2-4 \geq 0$, so $x^2 \geq 4$. Hence $x \leq -2$ or $x \geq 2$.

Why the other options are wrong: b, d, and e wrongly exclude endpoints. a has the right idea but uses square brackets with infinity, which is not formal notation.

Short trick: Square-root domain: inside must be ≥ 0 .

Q3. Correct Answer: d) $3/\sqrt{74}$, $7/\sqrt{74}$, $-4/\sqrt{74}$

Why this is correct: Magnitude of $[3, 7, -4]$ is $\sqrt{3^2+7^2+(-4)^2}=\sqrt{74}$. Direction cosines are components divided by magnitude.

Why the other options are wrong: a has the wrong sign for the third component. b, c, and e have wrong signs for one or more components.

Short trick: Direction cosines = vector components / magnitude.

Q4. Correct Answer: e) $x + y = 1$

Why this is correct: For $3x^2-4y^2=12$, tangent at (x_1, y_1) is $3xx_1 - 4yy_1 = 12$. At $(4, -3)$: $12x-12y=12$, so $x+y=1$.

Why the other options are wrong: Other equations do not satisfy the tangent formula at the given point.

Short trick: For conics, use $T=0$ form for tangent at a point.

Q5. Correct Answer: e) $\cos^2 \theta$

Why this is correct: $(\cos^2 \theta - \sin^2 \theta)/(1 - \tan^2 \theta)$. Since $1 - \tan^2 \theta = (\cos^2 \theta - \sin^2 \theta)/\cos^2 \theta$, the expression becomes $\cos^2 \theta$.

Why the other options are wrong: $\sin^2$, $\csc^2$, $\cot^2$, and $\tan^2$ do not result after simplifying.

Short trick: Convert tan to sin/cos.

Q6. Correct Answer: c) $1 + 1/(3t)$

Why this is correct: $dy/dt=6t+2$ and $dx/dt=6t$. Therefore $dy/dx=(dy/dt)/(dx/dt)=(6t+2)/(6t)=1+1/(3t)$.

Why the other options are wrong: a and b are not divided by dx/dt . d and e have wrong sign/power.

Short trick: Parametric derivative: $dy/dx = (dy/dt)/(dx/dt)$.

Q7. Correct Answer: e) $-\infty < x < \infty$

Why this is correct: $\cos x$ is defined for every real x .

Why the other options are wrong: a, b, c, and d restrict x unnecessarily.

Q8. Correct Answer: b) Angle of elevation

Why this is correct: Looking upward from a horizontal line to a higher point forms an angle of elevation.

Why the other options are wrong: a angle of depression is downward. c/d are generic terms. e right angle is specifically 90 degrees.

Q9. Correct Answer: d) $\{(3,1), (5,1), (5,3)\}$

Why this is correct: From S, choose only ordered pairs where first component is greater than second: $(3,1)$, $(5,1)$, and $(5,3)$.

Why the other options are wrong: a is wrong because a valid set exists. b contains $(3,-3)$ not in S and equal pairs. c contains equal pairs. e has $x < y$ pairs and an equal pair.

Q10. Correct Answer: d) $C(n,r)a^{n-r}x^r$

Why this is correct: In $(a+x)^n$, the $(r+1)$ th term is $T_{r+1} = C(n,r)a^{n-r}x^r$.

Why the other options are wrong: a uses $n+1$. b and c shift r incorrectly.

Short trick: Binomial term shortcut: T_{r+1} uses r .

Q11. Correct Answer: e) $x + C$

Why this is correct: $\csc^2(3x) - \cot^2(3x) = 1$ by identity. Therefore $\sqrt{1} = 1$ and integral of 1 dx is $x + C$.

Why the other options are wrong: a, b, c, and d ignore the identity or mishandle the square root/integration.

Short trick: Identity: $\csc^2 u - \cot^2 u = 1$.

Q12. Correct Answer: d) 8

Why this is correct: $(x^2 - 16)/(x - 4) = ((x - 4)(x + 4))/(x - 4) = x + 4$ for $x \neq 4$. Limit at $x = 4$ is 8.

Why the other options are wrong: 18, 9, and 4 are not obtained after cancellation.

Short trick: Factor first in 0/0 limits.

Q13. Correct Answer: c) 2

Why this is correct: For $x^2/a^2 - y^2/b^2 = 1$, focus distance $c = \sqrt{a^2 + b^2}$. A circle centered at a focus with radius c intersects the hyperbola in two symmetric points.

Why the other options are wrong: 4 is too many for this focus-centered circle; 3 and 1 are not possible by symmetry here; 0 is false because intersections exist.

Short trick: Hyperbola symmetry often makes intersections occur in pairs.

Q14. Correct Answer: b) $S = -6/7$, $P = -5/7$

Why this is correct: For $ax^2 + bx + c = 0$, sum of roots $= -b/a = -6/7$ and product $= c/a = -5/7$.

Why the other options are wrong: a and e have wrong sign for sum/product. d uses wrong values. c is wrong because b matches exactly.

Short trick: Vieta shortcut: Sum $= -b/a$, Product $= c/a$.

Q15. Correct Answer: No valid answer - expression missing in the paper

Note: This MCQ is incomplete in the source PDF.

Why this is correct: The question only says "The value of" and then lists matrix options. The actual expression to evaluate is missing, so the answer cannot be determined from the PDF.

Why the other options are wrong: Any option would be a guess because the required expression is absent.

Q16. Correct Answer: b) 1

Why this is correct: $n! = n(n-1)!$. If $n! = (n-1)!$, then $n(n-1)! = (n-1)!$, so $n = 1$ for valid factorials.

Why the other options are wrong: 2 gives $2!$ not equal $1!$. n is not a value. -1 factorial is undefined. 0 would require $(-1)!$ which is undefined.

Short trick: Use $n! = n(n-1)!$.

Q17. Correct Answer: b) $x > -5$

Why this is correct: $(1-x)/3 < 2 \rightarrow 1-x < 6 \rightarrow -x < 5$. Multiplying by -1 reverses the sign: $x > -5$.

Why the other options are wrong: a is too restrictive. c is a bounded interval not required. d and e have wrong inequality direction/range.

Short trick: When multiplying/dividing by a negative, reverse the inequality.

Q18. Correct Answer: e) $b \int f(x) dx + C$

Why this is correct: A constant factor can be taken outside the integral: $\int b f(x) dx = b \int f(x) dx + C$.

Why the other options are wrong: a, c, and d invent incorrect formulas. b is wrong because e is a valid property.

Short trick: Constant multiple rule.

Q19. Correct Answer: d) $8/3$

Why this is correct: In the first quadrant, $y = 4x^2$ meets $y = 4$ at $x = 1$. Area $= \int_0^1 (4 - 4x^2) dx = [4x - (4/3)x^3]_0^1 = 8/3$.

Why the other options are wrong: 16, 8, and 4 are too large; $-8/3$ has wrong sign for area.

Short trick: Area between curves = top function - bottom function.

Q20. Correct Answer: c) 3 109/144

Why this is correct: $|7/4 + (5/6)i|^2 = (7/4)^2 + (5/6)^2 = 49/16 + 25/36 = 541/144 = 3 \frac{109}{144}$.

Why the other options are wrong: Other options do not equal the sum of squares of real and imaginary parts.

Short trick: Modulus square of $a+bi$ is a^2+b^2 .

Q21. Correct Answer: e) 90 degrees

Why this is correct: Sides are 3,4,5. Since $5^2=3^2+4^2$, the angle opposite side 5 is 90 degrees. Alpha is opposite $a=5$, so $\alpha=90$ degrees.

Why the other options are wrong: 60, 0, 45, and 30 do not match the 3-4-5 right triangle.

Short trick: Recognize 3-4-5 triangle.

Q22. Correct Answer: e) $|A|=0$

Why this is correct: In the matrix, row 1 is 2 times row 2. If two rows are proportional, determinant is zero.

Why the other options are wrong: 1, 9, 19, and 4 cannot be determinant values when rows are proportional.

Short trick: Determinant shortcut: proportional rows $\rightarrow$ determinant 0.

Q23. Correct Answer: b) c

Why this is correct: From the Cayley table, b acts as identity. Inverse of a is the element that gives b when combined with a. $a*c=b$ and $c*a=b$, so inverse of a is c.

Why the other options are wrong: a gives c, not identity. d b is identity, not inverse of a. c and e are false.

Short trick: In a group table, first identify the identity row/column.

Q24. Correct Answer: c) $a^2/2$

Why this is correct: The shaded region is under $y=x$ from $x=0$ to $x=a$. Area = $\int_0^a x \, dx = a^2/2$.

Why the other options are wrong: 0 is no area. $x^2/2$ is not the final area at $x=a$. $-a^2/2$ has wrong sign.

Short trick: Area under $y=x$ from 0 to a is a triangle with base a and height a: area = $1/2 a^2$.

Q25. Correct Answer: a) -384

Why this is correct: nth term of G.P. is $ar^{(n-1)}$. With $a=-3$, $r=2$, $n=8$: $-3 \times 2^7 = -384$.

Why the other options are wrong: 384 has wrong sign. 279936, 29736, and 54325 use wrong powers/formulas.

Short trick: G.P. term: $a_n = ar^{(n-1)}$.

Q26. Correct Answer: b) $3x + y - 7 = 0$

Why this is correct: Line with slope -3 through (2,1): $y-1=-3(x-2)$. This gives $y=-3x+7$, or $3x+y-7=0$.

Why the other options are wrong: Other lines either do not have slope -3 or do not pass through (2,1).

Short trick: Point-slope form is fastest.

Q27. Correct Answer: b) $x=0$

Why this is correct: Ordinate $y=3$ on $x^2/4 + y^2/9=1$ gives $x=0$. This is the top vertex; the normal is the vertical axis $x=0$.

Why the other options are wrong: $y=3$ is the tangent, not the normal. c, d, and e are not the normal at the top vertex.

Short trick: At ellipse vertices, normal lies along the axis.

Q28. Correct Answer: b) (2,-1,7)

Why this is correct: For vector $2i - j + 7k$ from the origin, the terminal point coordinates are its components: (2,-1,7).

Why the other options are wrong: a has all signs reversed. c is generic. d is the initial point. e lists unit vectors, not coordinates.

Q29. Correct Answer: a) $(x^2 e^x - e^x(2x))/x^4$

Why this is correct: Use quotient rule for $y=e^x/x^2$: $y'=(x^2 e^x - e^x(2x))/x^4$.

Why the other options are wrong: b has plus instead of minus. c and d are not quotient rule. e is wrong because a is correct.

Short trick: Quotient rule: $(v u' - u v')/v^2$.

Q30. Correct Answer: e) 60 degrees

Why this is correct: $2\cos^2(\alpha/2) - 1 = \cos \alpha$. So $\cos \alpha = 1/2$. In $0 \leq \alpha \leq 90$ degrees, $\alpha = 60$ degrees.

Why the other options are wrong: 90 gives 0, 30 gives $\sqrt{3}/2$, 0 gives 1, and 45 gives $\sqrt{2}/2$.

Short trick: Use identity $\cos \alpha = 2\cos^2(\alpha/2) - 1$.

Q31. Correct Answer: a) 1/3

Why this is correct: A die shows ≥ 5 for outcomes $\{5, 6\}$. Probability $= 2/6 = 1/3$.

Why the other options are wrong: 0, $1/2$, $1/4$, and 1 are not equal to 2 favorable outcomes out of 6.

Short trick: Probability = favorable/total.

Q32. Correct Answer: e) 1

Why this is correct: $x - \sqrt{x} = 0$. Let $u = \sqrt{x}$. Then $u^2 - u = 0$, so $u(u-1) = 0$. Since $x > 0$, $u = 1$ and $x = 1$.

Why the other options are wrong: -1 and -2 violate $x > 0$. 1.41 and 2 do not satisfy $x = \sqrt{x}$.

Short trick: Substitute $u = \sqrt{x}$.

Q33. Correct Answer: d) $2 \sin 11\theta \cos \theta$

Why this is correct: Using $\sin A + \sin B = 2\sin((A+B)/2)\cos((A-B)/2)$: $\sin 12\theta + \sin 10\theta = 2\sin 11\theta \cos \theta$.

Why the other options are wrong: a has wrong sign and factor. b/c/e use wrong angle combinations.

Short trick: Sum-to-product identity.

Q34. Correct Answer: d) 0

Why this is correct: If $f'(c)$ exists and $f(c)$ is a local maximum/minimum, then Fermat's theorem gives $f'(c) = 0$. This is a necessary condition.

Why the other options are wrong: Negative or positive slopes mean the function is increasing/decreasing. 1 is not necessary. "never equals zero" is opposite of the theorem.

Short trick: Differentiable extremum $\rightarrow$ derivative zero.

Q35. Correct Answer: b) $-\tan x$

Why this is correct: $d/dx[\ln \cos x] = (1/\cos x)(-\sin x) = -\tan x$.

Why the other options are wrong: $\tan x$ misses the negative sign. $\cot^2$, $\csc^2$, and $\sec x$ are unrelated derivatives.

Short trick: Derivative $\ln u = u'/u$.

Q36. Correct Answer: a) $2\sec^2 x \tan x$

Why this is correct: If $y = \tan x$, $y' = \sec^2 x$. Then $y'' = 2\sec x(\sec x \tan x) = 2\sec^2 x \tan x$.

Why the other options are wrong: b is missing $\tan x$. c is for cot-type expressions. d/e have wrong powers/factors.

Short trick: Know derivative of $\sec x$: $\sec x \tan x$.

Q37. Correct Answer: c) -12

Why this is correct: Parallel vectors have proportional components. Let $(\lambda, -4, 4) = k(3, 1, -1)$. From $-4 = k$, and $4 = -k$ confirms $k = -4$. Thus $\lambda = 3k = -12$.

Why the other options are wrong: 12, -4, and 4 fail the component ratio test.

Short trick: Use any easy component to find the multiplier.

Q38. Correct Answer: c) 18

Why this is correct: Three arithmetic means between 2 and 10 create 5 terms: 2, $_$, $_$, $_$, 10. Common difference $= (10-2)/4 = 2$. Means are 4, 6, 8; sum = 18.

Why the other options are wrong: 15, 6, 12, and 30 are not the sum of 4, 6, 8.

Short trick: If inserting k means, total gaps $= k+1$.

Q39. Correct Answer: a) -2

Why this is correct: Differentiate $3x^2 + 5y^2 = 57$: $6x + 10y y' = 0$, so tangent slope at (2,3) is $-2/5$. Normal slope $= 5/2$. Normal: $y-3 = (5/2)(x-2)$, so y-intercept $= -2$.

Why the other options are wrong: 4, 2, -1, and 1 are not the intercept of the normal line.

Short trick: Normal slope = negative reciprocal of tangent slope.

Q40. Correct Answer: b) 1

Why this is correct: $\log_{10}(10^x)=x$, so derivative is 1.

Why the other options are wrong: $1/x$ is derivative of $\ln x$ style. $1/10$, $\ln 10$, and $1/10^x$ are not correct after simplifying first.

Short trick: Simplify logarithms before differentiating.

Q41. Correct Answer: a) $5x < 5y$

Why this is correct: The negative integer between -2 and -4 is $x=-3$. The positive integer between 2 and 4 is $y=3$. Then $5x=-15$ and $5y=15$, so $5x < 5y$.

Why the other options are wrong: Equality or greater-than options are false.

Short trick: Multiplying by a positive number keeps inequality direction.

Q42. Correct Answer: a) (-1,-2) and (7,-2)

Why this is correct: A horizontal segment has constant $y=-2$. Length 8 means each endpoint is 4 units from midpoint $x=3$. Endpoints: $(3-4,-2)=(-1,-2)$ and $(3+4,-2)=(7,-2)$.

Why the other options are wrong: b and e have midpoint $x=4$ or 5. c and d are vertical, not horizontal.

Short trick: Half of length goes on each side of midpoint.

Q43. Correct Answer: a) and d) both equivalent

Note: This MCQ has duplicate correct forms: options a and d are mathematically the same.

Why this is correct: $x=a^t$ gives $dx/dt=a^t \ln a$. $y=t^a$ gives $dy/dt=a t^{(a-1)}$. Thus $dy/dx = a t^{(a-1)}/(a^t \ln a)$. Option d shows this directly. Option a is equivalent because $t^{(a-1)}/(a^{(t-1)} \ln a) = a t^{(a-1)}/(a^t \ln a)$.

Why the other options are wrong: b, c, and e miss required factors or use the wrong denominator.

Short trick: Parametric derivative again: $dy/dx=(dy/dt)/(dx/dt)$.

Q44. Correct Answer: b) $1/9$

Why this is correct: For H.P., reciprocals are in A.P. Reciprocals of $1/5$ and $1/13$ are 5 and 13. Middle A.P. term $=(5+13)/2=9$. So middle H.P. term $=1/9$.

Why the other options are wrong: 18, $1/8$, 9, and 4 confuse the reciprocal step.

Short trick: H.P. shortcut: take reciprocals, use A.P., then invert back.

Q45. Correct Answer: d) It can have any measure between 0 and 180

Note: More precise wording: the third angle can be any positive angle less than 180 degrees, subject to the first two acute angles summing with it to 180.

Why this is correct: If two angles are acute, their sum can be small or close to 180. The third angle can therefore be acute, right, or obtuse depending on the first two. It must only be between 0 and 180 degrees.

Why the other options are wrong: a, c, and e each force only one type, which is not always true. b is false because such triangles are possible.

Q46. Correct Answer: b) $(1/4)x^x(\ln x + 1)$

Why this is correct: $y=(1/4)x^x$. Since $d/dx(x^x)=x^x(\ln x + 1)$, $dy/dx=(1/4)x^x(\ln x + 1)$.

Why the other options are wrong: a $x/4$, c $1/4$, d $2/3$, and e $3/2$ are not derivatives of $x^x/4$.

Short trick: For x^x , use logarithmic differentiation: derivative $= x^x(\ln x + 1)$.

Q47. Correct Answer: e) $-1/(n^2+n)$

Note: If $n=1$, the expression becomes $0/0$ and the limit is $-1/4$, not listed. The MCQ clearly intends the general simplified answer e.

Why this is correct: Substitute $x=n$ if denominator is not zero: $(n-n^2)/(n^4-n^2)=n(1-n)/[n^2(n^2-1)] = -1/[n(n+1)] = -1/(n^2+n)$.

Why the other options are wrong: a, b, c, and d do not simplify from the expression.

Short trick: Factor $n^2-1=(n-1)(n+1)$.

Q48. Correct Answer: e) 50 degrees

Why this is correct: From the figure, AC passes through the center, so AC is a diameter and arc AC is 180 degrees. Angle EAC=20 degrees gives arc EC=40 degrees. Therefore arc AE on the lower semicircle is $180-40=140$ degrees. Angle ADE, formed by tangent DE and secant DCA, equals half the difference of intercepted arcs: $(140-40)/2=50$ degrees.

Why the other options are wrong: 70, 30, 60, and 40 do not follow the tangent-secant theorem with the given arcs.

Short trick: External tangent-secant angle = $1/2(\text{far arc} - \text{near arc})$.

Q49. Correct Answer: c) $\sqrt{3}/2$

Why this is correct: $\cos^{-1}x = \pi/2 - \sin^{-1}x$. So $\sin^{-1}x - \cos^{-1}x = \pi/6$ becomes $2\sin^{-1}x - \pi/2 = \pi/6$. Thus $2\sin^{-1}x = 2\pi/3$, $\sin^{-1}x = \pi/3$, $x = \sqrt{3}/2$.

Why the other options are wrong: $2/\sqrt{3} > 1$ is impossible for sine inverse input. $\sqrt{9}/2 = 3/2$ is impossible. d is false because c works. $-\sqrt{3}/2$ has wrong sign.

Short trick: Use $\sin^{-1}x + \cos^{-1}x = \pi/2$.

Q50. Correct Answer: e) $-1/6 \ln(1-2x^3)+C$

Why this is correct: Let $u=1-2x^3$. Then $du=-6x^2 dx$. So $\int x^2/(1-2x^3) dx = -1/6 \int du/u = -1/6 \ln|1-2x^3|+C$.

Why the other options are wrong: a has wrong sign/factor. b has an extra x^2 . c and d have wrong constants.

Short trick: If denominator derivative is a constant multiple of numerator, use u-substitution quickly.

Bonus Advance Math MCQs

Q1. Correct Answer: a) $-1/[x^2(1+1/x^2)]$

Why this is correct: For $y=\tan^{-1}(1/x)$, $dy/dx = [1/(1+(1/x)^2)]*(-1/x^2)$. This is option a.

Why the other options are wrong: b misses derivative of $1/x$. c and d do not match the chain rule result.

Short trick: Chain rule: derivative of $\tan^{-1} u$ is $u'/(1+u^2)$.

Q2. Correct Answer: a) 1:2:3

Why this is correct: In an equilateral triangle, circumradius $R=2r$ and exradius $r_1=3r$. Hence $r:R:r_1 = 1:2:3$.

Why the other options are wrong: Other ratios place R or exradius in the wrong order.

Short trick: Standard equilateral result: $r:R:r_{ex} = 1:2:3$.

Q3. Correct Answer: a) $1/36$

Why this is correct: For $6x^2+5x+1=0$, $\alpha+\beta=-5/6$ and $\alpha\beta=1/6$. Then

$(\alpha-\beta)^2=(\alpha+\beta)^2-4\alpha\beta = 25/36-24/36=1/36$.

Why the other options are wrong: $2/7$, $1/4$, $3/5$, and $8/9$ do not follow Vieta's formulas.

Short trick: Use $(a-b)^2=(a+b)^2-4ab$.

Q4. Correct Answer: b) zero only

Why this is correct: $a*b=a+b/2$ and $a\#b=\sqrt{ab}$. The equality $a+b/2=\sqrt{ab}$ is satisfied by $a=b=0$. For positive values, $2a+b=2\sqrt{ab}$ leads to a sum of squares form that cannot be zero except at 0; negative values cannot match a nonnegative square root.

Why the other options are wrong: All real numbers is false. $a=b$ is not enough except 0. No real numbers is false because 0 works. 1 only is false.

Short trick: When a square root appears, remember the right side is nonnegative.

Q5. Correct Answer: d) 360

Why this is correct: Seat 4 different persons in 6 seats: $6P_4 = 6 \times 5 \times 4 \times 3 = 360$.

Why the other options are wrong: 363, 361, and 362 are not permutation values.

Short trick: Arrangement of people in seats = permutation, not combination.

Q6. Correct Answer: e) $\ln x + x + C$

Why this is correct: $(1+x)/x = 1/x + 1$. Integral = $\ln x + x + C$.

Why the other options are wrong: a has wrong sign. b is not an integral. c is just the original type. d misses $+x$.

Short trick: Split the fraction first.

Q7. Correct Answer: b) 2, $4/3$

Why this is correct: $f(x)=(x-2)^2(x-1)$. $f'(x)=2(x-2)(x-1)+(x-2)^2=(x-2)(3x-4)$. Critical points: $x=2$ and $x=4/3$.

Why the other options are wrong: Other pairs are not zeros of f' .

Short trick: For local extrema, solve $f'(x)=0$.

Q8. Correct Answer: c) scalar triple product is negative

Note: The option says "scalar product," but the concept should be scalar triple product.

Why this is correct: The intended concept is cyclic order of vectors in a scalar triple product. If vectors are not in cyclic/right-handed order, the scalar triple product changes sign and becomes negative.

Why the other options are wrong: a and b say positive; d is dimensionally wrong; e zero would mean coplanar/perpendicular-type condition, not merely non-cyclic order.

Q9. Correct Answer: d) $1+8x$

Why this is correct: For small x , $(1-3x)^{-2} \approx 1+6x$. Then $(1+2x)(1+6x) \approx 1+8x$, ignoring x^2 and higher powers.

Why the other options are wrong: $1+3x$, $1-8x$, and $1+6x$ miss part of the first-order multiplication.

Short trick: Binomial approximation: $(1+u)^n \approx 1+nu$ for small u .

Q10. Correct Answer: b) 2

Why this is correct: If $r=2$, last term $7 \times 2^6 = 448$, so there are 7 terms. $\text{Sum} = 7(2^7 - 1)/(2 - 1) = 7 \times 127 = 889$. Therefore $r=2$.

Why the other options are wrong: 3, 1, and 4 do not satisfy both the last term and sum.

Short trick: Try small integer ratios from the options.

Q11. Correct Answer: c) $34x^2 + 24x + 16$

Why this is correct: $f(x) = 3x + 4$. $g(x) = x/5$, so $g^{-1}(x) = 5x$. Then $[f(x)]^2 + [g^{-1}(x)]^2 = (3x + 4)^2 + (5x)^2 = 34x^2 + 24x + 16$.

Why the other options are wrong: Other options have wrong square expansion or wrong inverse of g .

Short trick: Inverse of $x/5$ is $5x$.

Q12. Correct Answer: e) 0 degrees

Note: If $\alpha = 90$ degrees, both sides become 0 for any β , so the printed conditions are not perfectly restrictive. The intended MCQ answer is $\beta = 0$ degrees.

Why this is correct: $\cos(\alpha + \beta) + \cos(\alpha - \beta) = 2\cos \alpha \cos \beta$. So $2\cos \alpha = 2\cos \alpha \cos \beta$. If $\cos \alpha$ is not zero, $\cos \beta = 1$, hence $\beta = 0$ degrees.

Why the other options are wrong: 45, 60, 30, and 90 do not generally satisfy the equation.

Short trick: Use identity $\cos(A+B) + \cos(A-B) = 2\cos A \cos B$.

Q13. Correct Answer: a) $\frac{29}{90} (3x+4)^{(30/29)} + C$

Why this is correct: The integrand is the 29th root of $3x+4$, i.e. $(3x+4)^{(1/29)}$. $\text{Integral} = (3x+4)^{(30/29)} / [3 \cdot (30/29)] = \frac{29}{90} (3x+4)^{(30/29)} + C$.

Why the other options are wrong: b, c, d, and e have wrong powers or constants.

Short trick: Power rule with chain: add 1 to exponent and divide by derivative of inside.

Q14. Correct Answer: b) $-\cot 25$ degrees

Why this is correct: $\tan 295^\circ = \tan(360^\circ - 65^\circ) = -\tan 65^\circ$. Since $\tan 65^\circ = \cot 25^\circ$, the answer is $-\cot 25^\circ$.

Why the other options are wrong: a uses 25 instead of 65. c and d have wrong sign/form. e is positive and wrong.

Short trick: Use $\tan(360^\circ - \theta) = -\tan \theta$ and $\tan(90^\circ - \theta) = \cot \theta$.