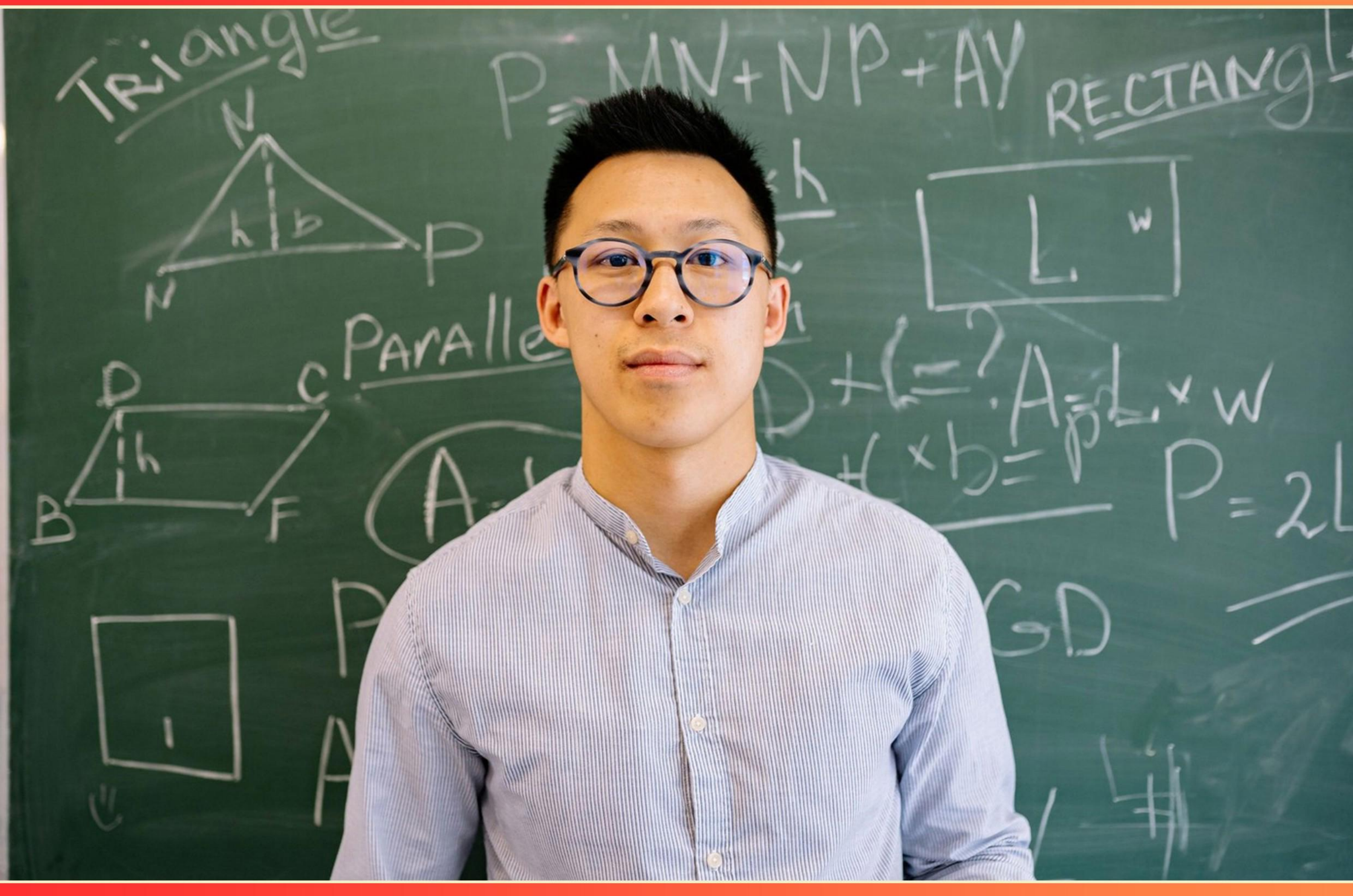
A LEVEL FURTHER MATHEMATICS CORE PURE PRACTICE TEST (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

Table of Contents

Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

• Practice answering questions under realistic conditions,

• Improve accuracy and speed,

• Review explanations to strengthen weak areas, and

• Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

1. **Which method correctly expresses the determinant of a 3x3 matrix by using 2x2 minors?**
   A. Sum of the products of the diagonals
   B. Expansion along a row into determinants of 2x2 minors
   C. Inversion of the matrix
   D. Product of the diagonal entries

2. **Express $z = 2[\cos(120°) + i \sin(120°)]$ in rectangular form.**
   A. $-1 + i\sqrt{3}$
   B. $-1 - i\sqrt{3}$
   C. $1 + i\sqrt{3}$
   D. $-2 + i$

3. **For A = [[4,1],[0,2]], which vector is an eigenvector corresponding to $\lambda = 2$?**
   A. (1,0)
   B. (0,1)
   C. (1,1)
   D. (1,-2)

4. **The Maclaurin expansion for ln(1+x) around 0 up to x^3 starts with which term?**
   A. x - x^2/2 + x^3/3 + ...
   B. x + x^2/2 + x^3/3 + ...
   C. x - x^2/2 - x^3/3 + ...
   D. x + x^2/2 - x^3/3 + ...

5. **Which expression equals α^n β^n γ^n δ^n?**
   A. α^n β^n + γ^n δ^n
   B. (αβγδ)^n
   C. α^n β^n γ^n δ
   D. α^n β^n γ^n / δ^n

6. The determinant of a 2x2 matrix [[a, b], [c, d]] is:

A. ab - cd

B. a + d - b - c

C. ad - bc

D. ad + bc

7. If b^2 - 4ac = 0, what is the nature of the roots?

A. b^2 - 4ac > 0

B. b^2 - 4ac = 0

C. a^2 + b^2 = c^2

D. b^2 - 4ac < 0

8. The product of the roots of z^2 - (α+β) z + αβ = 0 is:

A. α

B. αβ + α

C. α + β

D. αβ

9. The principal argument of z = 1 + 2i is which of the following?

A. -63.435° (-1.1071 rad)

B. 0°

C. 180°

D. 63.435° (1.1071 rad)

10. Which statement best describes a non-singular matrix?

A. It has a determinant equal to zero

B. It has an inverse

C. It has more rows than columns

D. It is symmetric

Answers

1. B
2. A
3. D
4. A
5. B
6. C
7. B
8. D
9. D
10. B

Explanations

1. Which method correctly expresses the determinant of a 3x3 matrix by using 2x2 minors?

A. Sum of the products of the diagonals

B. Expansion along a row into determinants of 2x2 minors

C. Inversion of the matrix

D. Product of the diagonal entries

The determinant of a 3×3 matrix can be computed by expanding along a row into determinants of 2×2 minors. This means you take each entry in a chosen row, multiply it by the determinant of the 2×2 submatrix you get when you remove the row and the column of that entry, and sum with alternating signs. For a matrix with rows [a b c], [d e f], [g h i], the expansion along the first row is det = a(ei − fh) − b*(di − fg) + c*(dh − eg). Each bracket is a determinant of a 2×2 minor. This is the method described: using 2×2 minors to form the determinant via expansion along a row (or a column). The other options don't express the determinant in terms of 2×2 minors: the product of diagonals is not generally correct for arbitrary 3×3 matrices, and inversion or a simple sum of diagonal products does not capture the full determinant in general.*

2. Express z = 2[cos(120°) + i sin(120°)] in rectangular form.

A. -1 + i√3

B. -1 - i√3

C. 1 + i√3

D. -2 + i

Converting from polar (trigonometric) form to rectangular form uses the relationships x = r cos θ and y = r sin θ, where z = r[cos θ + i sin θ] = x + iy. Here r = 2 and θ = 120°. Knowing cos 120° = -1/2 and sin 120° = √3/2, the real part is 2(-1/2) = -1 and the imaginary part is 2(√3/2) = √3. So z = -1 + i√3. This places z in the second quadrant, where cosine is negative and sine is positive, matching the given angle.

3. For A = [[4,1],[0,2]], which vector is an eigenvector corresponding to λ = 2?

A. (1,0)

B. (0,1)

C. (1,1)

D. (1,-2)

To find an eigenvector for a given eigenvalue, solve Av = λv, which is the same as (A − λI)v = 0. Here A − 2I = [[4−2, 1], [0, 2−2]] = [[2, 1], [0, 0]]. The equation (A − 2I)v = 0 gives 2x + y = 0, so y = −2x. Thus any nonzero vector of the form (x, −2x) is an eigenvector for λ = 2, i.e., multiples of (1, −2). The vector (1, −2) satisfies A(1, −2) = (2, −4) = 2(1, −2), confirming it is an eigenvector with eigenvalue 2. Other listed vectors don't satisfy Av = 2v.

4. The Maclaurin expansion for ln(1+x) around 0 up to x^3 starts with which term?

A. x - x^2/2 + x^3/3 + ...

B. x + x^2/2 + x^3/3 + ...

C. x - x^2/2 - x^3/3 + ...

D. x + x^2/2 - x^3/3 + ...

Start with the pattern of the Maclaurin expansion for ln(1+x). It comes from integrating the geometric series for 1/(1+x), which is 1 - x + x^2 - x^3 + ... for |x| < 1. Integrating term by term from 0 to x gives ln(1+x) = x - x^2/2 + x^3/3 - x^4/4 + ..., with the constant chosen so ln(1+0) = 0. So up to x^3, the expansion is x - x^2/2 + x^3/3. The x^2 term must be negative and the x^3 term positive, which is consistent with this pattern and rules out the other sign choices.

5. Which expression equals α^n β^n γ^n δ^n?

A. α^n β^n + γ^n δ^n

B. (αβγδ)^n

C. α^n β^n γ^n δ

D. α^n β^n γ^n / δ^n

Raising a product to a power distributes the power to each factor: (αβγδ)^n = α^n β^n γ^n δ^n. So the expression with α^n β^n γ^n δ^n is exactly the nth power of the product αβγδ. The other forms don't match in general: a sum α^n β^n + γ^n δ^n is not a single product and would not simplify to α^n β^n γ^n δ^n; α^n β^n γ^n δ has the δ exponent only 1, not n; and α^n β^n γ^n / δ^n is α^n β^n γ^n δ^{-n}, which puts δ with exponent -n.

6. The determinant of a 2x2 matrix [[a, b], [c, d]] is:

A. ab - cd

B. a + d - b - c

C. ad - bc

D. ad + bc

For a 2x2 matrix, the determinant is the difference between the product of the entries on one diagonal and the product on the other diagonal. This comes from the rule for 2x2 determinants and also reflects how the linear transformation scales areas. So for the matrix [[a, b], [c, d]], the determinant is ad − bc. It's the precise combination that measures how the area is stretched or compressed by the transformation. To see why this works, think of expanding along the first row: a times the determinant of [[d]] minus b times the determinant of [[c]], which gives ad − bc. Check with a quick example: a = 2, b = 3, c = 4, d = 5 yields 2×5 − 3×4 = 10 − 12 = −2. The other expressions don't match the determinant: ab − cd mixes the terms in a way that doesn't correspond to the area-scaling rule; a + d − b − c is just a different algebraic combination; ad + bc is the sum of the diagonal products, not their difference.

7. If $b^2 - 4ac = 0$, what is the nature of the roots?

A. $b^2 - 4ac > 0$

B. $b^2 - 4ac = 0$

C. $a^2 + b^2 = c^2$

D. $b^2 - 4ac < 0$

Discriminant concept: for a quadratic $ax^2 + bx + c = 0$, the value $b^2 - 4ac$ tells how many roots there are and what kind they are. If the discriminant is zero, there is exactly one real root, but it appears twice—a double root. Using the quadratic formula, the roots are $x = [-b \pm \sqrt{b^2 - 4ac}]/(2a)$. When the discriminant is zero, the square root term vanishes, giving $x = -b/(2a)$ as the single root, repeated. So the nature of the roots here is a single real root with multiplicity two. The other listed idea ($a^2 + b^2 = c^2$) is unrelated to the roots and comes from a different context.

8. The product of the roots of $z^2 - (\alpha+\beta) z + \alpha\beta = 0$ is:

A. α

B. $\alpha\beta + \alpha$

C. $\alpha + \beta$

D. $\alpha\beta$

For a monic quadratic, the product of the roots is the constant term. Here the constant term is $\alpha\beta$, so the product of the roots is $\alpha\beta$. You can also see this by factoring: $z^2 - (\alpha+\beta)z + \alpha\beta = (z-\alpha)(z-\beta)$, so the roots are α and β, whose product is $\alpha\beta$.

9. The principal argument of $z = 1 + 2i$ is which of the following?

A. -63.435° (-1.1071 rad)

B. 0°

C. 180°

D. 63.435° (1.1071 rad)

The principal argument is the angle that the complex number's position makes with the positive real axis, taken in the standard range $(-\pi, \pi]$. For $1 + 2i$, the point (1, 2) sits in the first quadrant, so the angle is $\arctan(2/1) = \arctan 2$. This evaluates to about 63.435 degrees, or 1.1071 radians. That is why this angle is the principal argument. The other angles would place the point in a different quadrant or on an axis (for example, −63.435° would correspond to a point with imaginary part negative, 0° is along the real axis, and 180° is the negative real axis), so they don't match $z = 1 + 2i$.

10. Which statement best describes a non-singular matrix?

A. It has a determinant equal to zero

B. It has an inverse

C. It has more rows than columns

D. It is symmetric

Non-singular means you can reverse what the matrix does. For a square matrix, that means there exists another matrix that undoes it, giving the identity—this is the inverse. Equivalently, a non-singular matrix has a nonzero determinant and its columns are linearly independent. So the statement that best describes it is that it has an inverse. If the determinant were zero, it would be singular and not invertible. Being non-square (more rows than columns) or being symmetric doesn't determine invertibility on its own.

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://alevelfurthermathcore.examzify.com

We wish you the very best on your exam journey. You've got this!