

# Honors Mathematics 3 Practice Exam (Sample)

## Study Guide



**Everything you need from our exam experts!**

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# Table of Contents

<b>Copyright</b> .....	<b>1</b>
<b>Table of Contents</b> .....	<b>2</b>
<b>Introduction</b> .....	<b>3</b>
<b>How to Use This Guide</b> .....	<b>4</b>
<b>Questions</b> .....	<b>5</b>
<b>Answers</b> .....	<b>8</b>
<b>Explanations</b> .....	<b>10</b>
<b>Next Steps</b> .....	<b>15</b>

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# 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

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1. For the parametric curve  $x = t^2$ ,  $y = t$ , what is  $dy/dx$  when  $t = 3$ ?
  - A.  $1/4$
  - B.  $1/5$
  - C.  $1/7$
  - D.  $1/6$
  
2. For ellipse  $x^2/16 + y^2/9 = 1$ , identify the major axis length, minor axis length, and the coordinates of the vertices and co-vertices.
  - A. Major axis length 8 (along x); minor axis length 6 (along y); vertices  $(\pm 4, 0)$ ; co-vertices  $(0, \pm 3)$
  - B. Major axis length 6 along y; minor axis length 8 along x; vertices  $(0, \pm 4)$ ; co-vertices  $(\pm 3, 0)$
  - C. Major axis length 4 along x; minor axis length 6 along y; vertices  $(\pm 2, 0)$ ; co-vertices  $(0, \pm 3)$
  - D. Major axis length 8 along y; minor axis length 6 along x; vertices  $(0, \pm 4)$ ; co-vertices  $(\pm 3, 0)$
  
3. Solve the quadratic equation  $2x^2 - 3x + 5 = 0$ . Find the roots.
  - A.  $x = (3 \pm i\sqrt{31})/4$
  - B.  $x = (3 \pm \sqrt{31})/4$
  - C.  $x = (-3 \pm i\sqrt{31})/4$
  - D.  $x = (3 \pm i\sqrt{7})/4$
  
4. What best defines an experiment?
  - A. A procedure carried out to verify, refute, or establish the validity of a hypothesis
  - B. A guess about the outcome of an event
  - C. A casual observation without testing a hypothesis
  - D. A detailed narrative of a completed study
  
5. The sum of the interior angles of a triangle equals 180 degrees.
  - A. 180 degrees
  - B. 90 degrees
  - C. 360 degrees
  - D. 270 degrees

6. For two parallel lines cut by a transversal, the alternate exterior angles are congruent.
- A. They are supplementary
  - B. They are congruent
  - C. They are interior angles
  - D. They are adjacent angles
7. In AAS congruence, which parts are congruent?
- A. Two angles and the included side
  - B. Two angles and the non-included side
  - C. Two sides and the included angle
  - D. All three sides
8. In an isosceles triangle, which angles are congruent?
- A. The vertex angle
  - B. The base angles
  - C. All three angles
  - D. The angles adjacent to the base
9. What is  $\det(AB)$  for  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & -1 \\ 2 & 3 \end{bmatrix}$ ?
- A. -6
  - B. -4
  - C. 0
  - D. 4
10. Which expression gives the surface area of a cone in terms of radius  $r$  and slant height  $s$ ?
- A.  $\pi r s + \pi r^2$
  - B.  $\pi r s$
  - C.  $2\pi r s + \pi r^2$
  - D.  $\pi r (s + r)$

## Answers

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

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## Explanations

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1. For the parametric curve  $x = t^2$ ,  $y = t$ , what is  $dy/dx$  when  $t = 3$ ?
- A.  $1/4$
  - B.  $1/5$
  - C.  $1/7$
  - D.  $1/6$**

To find the slope of a parametric curve, use  $dy/dx = (dy/dt)/(dx/dt)$ . Here  $y = t$  gives  $dy/dt = 1$ , and  $x = t^2$  gives  $dx/dt = 2t$ . So  $dy/dx = 1/(2t)$ . At  $t = 3$ , that becomes  $1/(2 \cdot 3) = 1/6$ . Since  $dx/dt \neq 0$  at  $t = 3$ , the slope is well-defined.

2. For ellipse  $x^2/16 + y^2/9 = 1$ , identify the major axis length, minor axis length, and the coordinates of the vertices and co-vertices.
- A. Major axis length 8 (along x); minor axis length 6 (along y); vertices  $(\pm 4, 0)$ ; co-vertices  $(0, \pm 3)$
  - B. Major axis length 6 along y; minor axis length 8 along x; vertices  $(0, \pm 4)$ ; co-vertices  $(\pm 3, 0)$**
  - C. Major axis length 4 along x; minor axis length 6 along y; vertices  $(\pm 2, 0)$ ; co-vertices  $(0, \pm 3)$
  - D. Major axis length 8 along y; minor axis length 6 along x; vertices  $(0, \pm 4)$ ; co-vertices  $(\pm 3, 0)$

In this ellipse in standard form,  $x^2/a^2 + y^2/b^2 = 1$ , the major axis is along the axis with the larger denominator, and the lengths are  $2a$  and  $2b$ . Here  $a^2 = 16$  and  $b^2 = 9$ , so  $a = 4$  and  $b = 3$ . Since  $16 > 9$ , the major axis runs along the x-axis. The major axis length is  $2a = 8$ , and the minor axis length is  $2b = 6$ . The vertices lie on the major axis at  $(\pm a, 0) = (\pm 4, 0)$ , and the co-vertices lie on the minor axis at  $(0, \pm b) = (0, \pm 3)$ . This matches the description: major axis length 8 along x; minor axis length 6 along y; vertices  $(\pm 4, 0)$ ; co-vertices  $(0, \pm 3)$ .

3. Solve the quadratic equation  $2x^2 - 3x + 5 = 0$ . Find the roots.
- A.  $x = (3 \pm i\sqrt{31})/4$**
  - B.  $x = (3 \pm \sqrt{31})/4$
  - C.  $x = (-3 \pm i\sqrt{31})/4$
  - D.  $x = (3 \pm i\sqrt{7})/4$

This question tests solving a quadratic using the quadratic formula and recognizing when the discriminant is negative, which leads to complex roots. For  $2x^2 - 3x + 5 = 0$ ,  $a = 2$ ,  $b = -3$ ,  $c = 5$ . The discriminant is  $\Delta = b^2 - 4ac = (-3)^2 - 4 \cdot 2 \cdot 5 = 9 - 40 = -31$ , which is negative, so the roots are complex. Using the quadratic formula  $x = (-b \pm \sqrt{\Delta}) / (2a)$ , we get  $x = (3 \pm \sqrt{-31}) / 4 = (3 \pm i\sqrt{31}) / 4$ . This is the root pair, matching the correct form with an imaginary part. The other options would either give real roots (which isn't possible here due to the negative discriminant) or alter the sign or the radical (e.g., using  $\sqrt{7}$  instead of  $\sqrt{31}$ ), which would not satisfy the equation.

#### 4. What best defines an experiment?

- A. A procedure carried out to verify, refute, or establish the validity of a hypothesis**
- B. A guess about the outcome of an event**
- C. A casual observation without testing a hypothesis**
- D. A detailed narrative of a completed study**

The defining idea is that an experiment is a systematic procedure used to test a hypothesis by collecting data under controlled conditions, with the aim of verifying, refuting, or establishing the hypothesis's validity. This means designing steps that isolate variables, often including a control, so observations can show whether the hypothesis holds up. The option that fits this best describes performing a procedure to verify, refute, or establish the validity of a hypothesis. In contrast, a guess about the outcome isn't testing, casual observations stop short of systematic testing, and a detailed narrative of a completed study is about reporting results rather than the act of testing the hypothesis.

#### 5. The sum of the interior angles of a triangle equals 180 degrees.

- A. 180 degrees**
- B. 90 degrees**
- C. 360 degrees**
- D. 270 degrees**

The total of the three interior angles in any triangle forms a straight angle, measuring 180 degrees. A clear way to see this is to draw a line through one vertex parallel to the opposite side. The angles at the other two vertices become equal to the two angles formed with that line, so when you place all three interior angles along this straight line, they fill the 180-degree straight angle. Therefore,  $A + B + C$  equals 180 degrees. The other options don't fit because 90, 360, or 270 degrees don't correspond to a straight-line sum of these three angles.

#### 6. For two parallel lines cut by a transversal, the alternate exterior angles are congruent.

- A. They are supplementary**
- B. They are congruent**
- C. They are interior angles**
- D. They are adjacent angles**

When a transversal crosses two parallel lines, the exterior angles on opposite sides of the transversal have equal measures. This is a direct consequence of parallel lines: angles in corresponding positions created by a transversal are equal, and the alternate exterior angles occupy those corresponding positions on opposite sides. So the exterior angle outside the lines on one side of the transversal has the same measure as the exterior angle outside the lines on the other side, making them congruent. They're not interior angles, not adjacent, and the familiar supplementary relationship applies to interior angles on the same side, not to these exterior, opposite-side angles.

7. In AAS congruence, which parts are congruent?

- A. Two angles and the included side
- B. Two angles and the non-included side**
- C. Two sides and the included angle
- D. All three sides

Two angles fix a triangle's shape because the sum of angles in a triangle is always the same, so once two angles are known, the third is determined. If two angles in one triangle match two angles in another, the triangles are similar. The extra piece of information—the corresponding side that is not between the two equal angles—sets the size, turning similarity into congruence since the scale factor is fixed to 1. In other words, two angles plus a non-included side uniquely determines the triangle, so the triangles are congruent. (If the side given were the included side, that would be the ASA case, which is a different valid criterion.)

8. In an isosceles triangle, which angles are congruent?

- A. The vertex angle
- B. The base angles**
- C. All three angles
- D. The angles adjacent to the base

Two equal sides in an isosceles triangle imply the angles opposite those sides are equal. Those two equal angles are the base angles—the angles at the ends of the base. The angle between the two equal sides is the vertex angle, and it isn't generally equal to the base angles. Only in the special case where all three sides are equal would every angle be equal. So, the base angles are congruent.

9. What is  $\det(AB)$  for  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & -1 \\ 2 & 3 \end{bmatrix}$ ?

- A. -6
- B. -4**
- C. 0
- D. 4

The determinant of a product equals the product of the determinants, because applying two linear transformations in sequence scales volumes by the product of each transformation's scaling factor. For  $2 \times 2$  matrices,  $\det(\begin{bmatrix} a & b \\ c & d \end{bmatrix}) = ad - bc$ . Compute  $\det(A)$ :  $1 \cdot 4 - 2 \cdot 3 = 4 - 6 = -2$ . Compute  $\det(B)$ :  $0 \cdot 3 - (-1) \cdot 2 = 0 + 2 = 2$ . Multiply the determinants:  $\det(AB) = (-2) \cdot 2 = -4$ . So the determinant of  $AB$  is  $-4$ .

**10. Which expression gives the surface area of a cone in terms of radius  $r$  and slant height  $s$ ?**

**A.  $\pi r s + \pi r^2$**

**B.  $\pi r s$**

**C.  $2\pi r s + \pi r^2$**

**D.  $\pi r (s + r)$**

The surface area of a cone includes the base and the curved surface. The base is a circle with area  $\pi r^2$ , and the curved (lateral) surface area is  $\pi r s$ . Adding them gives the total surface area:  $\pi r s + \pi r^2$ . That matches the given expression. You can also see it by factoring:  $\pi r (s + r)$ , which is the same value. The other options don't add the base area or double the lateral area, so they don't represent the cone's total surface area.

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## 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](mailto:hello@examzify.com).**

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

**<https://honorsmathematics3.examzify.com>**

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

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