

# geo metry

placement  
test



## Welcome!

Thank you for your interest in Thinkwell. We know the curriculum selection process for your homeschool student can be challenging. This Placement Test was created to provide you with a tool to place your student in the appropriate level of math.

Please keep in mind, no placement test is perfect. If you have questions or concerns about the results of your student’s placement test, reach out to us at Thinkwell support: [support@thinkwell.com](mailto:support@thinkwell.com).

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## Instructions and Overview

This placement test consists of 25 free-response questions. There is no time-limit for the test, but it shouldn't take your student longer than an hour to an hour and a half to complete. Your student should work each problem to the best of their ability. If they are unable to answer an item, tell them to move on to the next item and leave the question unanswered.

The Geometry placement test will assess your student's aptitude for the following skill areas:

- Solving inequalities, absolute-value equations, and equations with variables on both sides.
- Solving systems of linear equations.
- Writing equations of lines.
- Identifying perpendicular lines.
- Multiplying and factoring polynomials.
- Solving quadratic equations.
- Classifying angles and understanding angle relationships.
- Finding the perimeter and area of polygons and composite figures.
- Finding the volume and surface area of cylinders, prisms, and spheres.
- Using the midpoint formula to find the midpoint between two points.
- Converting units of area.
- Using the properties of similarity to find unknown lengths.
- Identifying dilations.
- Solving percent problems.
- Classifying triangles.
- Using the Triangle Inequality Theorem.

We recommend you **print the question portion of this document (pages 4–7)** so your student can work out the problems with pencil and paper.

Please be aware that **the answer key for this test starts on page 10**. We advise you to share the answer key with your student only after they've completed the test in its entirety.

Instructional videos for all the question items on this test are available by clicking the solution link in the answer key. Questions? Concerns? Please reach out to us at [support@thinkwell.com](mailto:support@thinkwell.com).

# Thinkwell Placement Test: Geometry

1. Solve the equation.

$$2v - 9 = 3 + 5v$$

2. Solve the equation.

$$|x - 4| = 2$$

3. Solve the inequality.

$$5x - 4 \geq 2x + 11$$

4. Write an equation in slope-intercept form for the line passing through the two points.

(4, -5) and (0, 3)

5. Identify which lines are perpendicular.

$$y = -1, y = -\frac{1}{5}x + 1, y - 7 = 5(x - 1), x = 4$$

6. Factor the polynomial completely.

$$5y^4 - 25y^3 + 30y^2$$

7. Multiply.

$$(2m + n)(m - 3n)$$

8. Solve using square roots.

$$9x^2 - 49 = 0$$

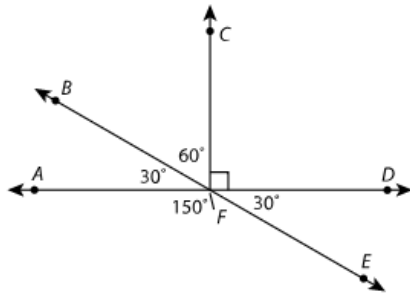
9. Solve the system using substitution.

$$y = 3x$$

$$y = x + 4$$

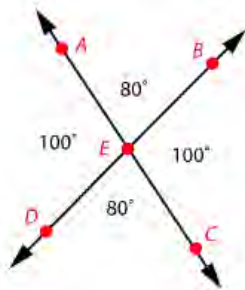
# Thinkwell Placement Test: Geometry

10. Classify each angle as acute, right, obtuse, or straight.



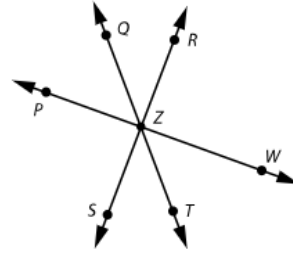
$\angle AFE$	
$\angle BFC$	
$\angle CFD$	
$\angle AFD$	
$\angle AFB$	

11. Name each angle pair.



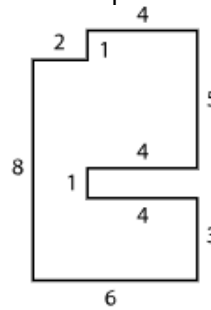
$\angle AEB$ and $\angle BEC$	
$\angle DEA$ and $\angle AEB$	
$\angle AEB$ and $\angle CED$	
$\angle DEA$ and $\angle BEC$	

12. Given that the measure of  $\angle PZQ$  is  $42^\circ$  and that  $\angle SZT$  and  $\angle TZW$  are complementary, find the measure of each unknown angle.



$\angle TZW$	
$\angle SZT$	
$\angle QZR$	
$\angle WZR$	

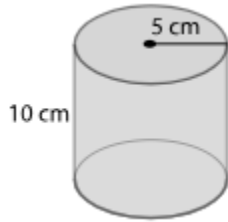
13. Find the perimeter and area of the figure.



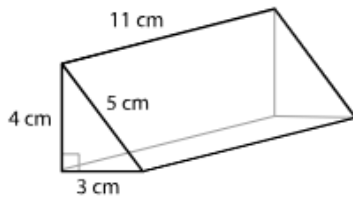
14. A gardener wants to fence a garden that is in the shape of a right triangle. She knows that the two shorter sides of the garden are 17 feet and 20 feet long. How long will the fence be to the nearest tenth of a foot?

# Thinkwell Placement Test: Geometry

15. Find the volume of the figure in cubic centimeters to the nearest tenth.



16. Find the surface area of the figure in square centimeters to the nearest tenth.



17. The ladder, slide, and ground form a triangle. The measure of  $\angle A$  is  $40^\circ$  and the measure of  $\angle B$  is  $80^\circ$ . Classify the triangle.

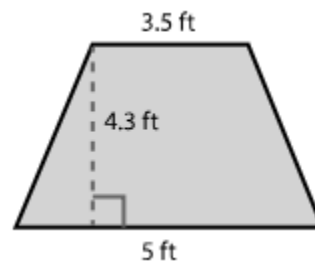


18. Find the coordinates of the midpoint of  $\overline{CD}$  with endpoints  $C(-3, 4)$  and  $D(1, -2)$ .

19. A company's logo is in the shape of an isosceles triangle with two sides that are 2.4 in. long and one side that is 1.8 in. long. On a billboard, the triangle in the logo has two sides that are each 8 ft long. If the triangles are similar, what is the length of the third side of the triangle on the billboard?

20. Frederick is a waiter who earns 15% in tips on all food sales. If he made \$75.39 in tips, how much were his total sales?

21. Find the area of the trapezoid in square meters to the nearest tenth.

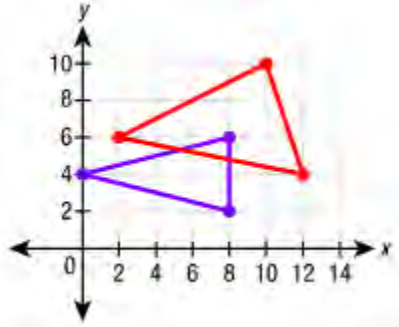


1 meter  $\approx$  3.2808 feet

# Thinkwell Placement Test: Geometry

22. Find the volume of a sphere with radius 7 ft, both in terms of  $\pi$  and to the nearest tenth. Use 3.14 for  $\pi$ .

23. Tell whether the transformation is a dilation.



24. A flagpole casts a 27 ft shadow, while a 5.5 ft tall man standing nearby casts a 4 ft shadow. How tall is the flagpole?

25. Tell whether a triangle can have sides with the given lengths.  
11 in., 16 in., 12 in.

## Scoring Guide

Use the scoring rubric below to help determine if Geometry is the appropriate course for your student.

Your placement test score and corresponding course recommendation should not be the only determining factor when deciding the appropriate course for your student. Your student's grade-level experience in previously completed math courses should also be considered.

Please feel free to contact a Thinkwell representative at [support@thinkwell.com](mailto:support@thinkwell.com) if you'd like to discuss your student's course placement in greater detail.

<u>Number of questions correct</u>	<u>Course recommendation</u>
7 or less	Algebra 1
8 – 20	Geometry
21 or more	Honors Geometry

See the Answer Key for explanations of all placement test questions. Click the blue video link to view instructional video explanations for all question items.

4. Write an equation in slope-intercept form for the line passing through the two points, (4, -5) and (0, 3)

Answer:  $y = -2x + 3$

[View Video Explanation: Point-Slope Form](#)

**Algebra 1**

**Using Two Points to Write an Equation**

Write an equation in slope-intercept form for the line through the two points.

(4, -5) and (0, 3)

**Step 1** Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-5)}{0 - 4} = \frac{8}{-4} = -2$$

**Step 2** Substitute the slope and one of the points into the point-slope form.

$$y - y_1 = m(x - x_1)$$

*Use the point-slope form.*

$$y - 3 = -2(x - 0)$$

*Substitute the slope and the x and y values from the point for  $m$ ,  $x_1$  and  $y_1$ .*

**Step 3** Write the equation in slope-intercept form.

$$y - 3 = -2(x - 0)$$

$$y - 3 = -2x - 0$$

*Distribute -2 on the right side.*

$$+ 3 \quad + 3$$

$$y = -2x + 3$$

*Add 3 to both sides.*

**Slope-Intercept Form**  $y = mx + b$

**Point-Slope Form**  $y - y_1 = m(x - x_1)$

Wondering about the difference between Regular and Honors Geometry? Read on to learn more.



## Regular vs Honors Geometry

Honors Geometry is a faster-paced, more rigorous course than our standard Geometry course. Both courses will prepare your student for success in Algebra 2 and beyond; however, if you anticipate your student going on to higher level mathematics, like Precalculus or Calculus, the Honors sequence will benefit your student.

In brief:

- The content in Honors Geometry covers a greater scope and includes more advanced concepts than the standard Geometry.
- Each of the 104 daily lessons in Honors Geometry includes an average of 9 minutes of video content, while each of the 83 daily lessons in the standard Geometry includes an average of 7 minutes of video content.
- The assessments in Honors Geometry provide students with questions that are a higher level of difficulty than those in the standard Geometry.

answer  
key



# Thinkwell Placement Test Answer Key: Geometry

1. Solve the equation.  
 $2v - 9 = 3 + 5v$

Answer:  $-4$

View Video Explanation: [Solving Equations with Variables on Both Sides](#)

2. Solve the equation.  
 $|x - 4| = 2$

Answer:  $x = 2$  or  $x = 6$

View Video Explanation: [Solving Absolute-Value Equations](#)

3. Solve the inequality.  
 $5x - 4 \geq 2x + 11$

Answer:  $x \geq 5$

View Video Explanation: [Solving Inequalities with Variables on Both Sides](#)

4. Write an equation in slope-intercept form for the line passing through the two points.  
 $(4, -5)$  and  $(0, 3)$

Answer:  $y = -2x + 3$

View Video Explanation: [Point-Slope Form](#)

5. Identify which lines are perpendicular.

$$y = -1, y = -\frac{1}{5}x + 1, y - 7 = 5(x - 1), x = 4$$

Answer:  $y = -1$  and  $x = 4$ ,

$$y = -\frac{1}{5}x + 1 \text{ and } y - 7 = 5(x - 1)$$

View Video Explanation: [Slopes of Parallel and Perpendicular Lines](#)

6. Factor the polynomial completely.  
 $5y^4 - 25y^3 + 30y^2$

Answer:  $5y^2(y - 2)(y - 3)$

View Video Explanation: [Choosing a Factoring Method](#)

7. Multiply.  
 $(2m + n)(m - 3n)$

Answer:  $2m^2 - 5mn - 3n^2$

View Video Explanation: [Multiplying Binomials](#)

8. Solve using square roots.  
 $9x^2 - 49 = 0$

Answer:  $x = \pm 7/3$

View Video Explanation: [Solving Quadratic Equations by Using Square Roots](#)

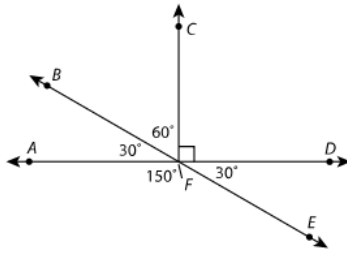
9. Solve the system using substitution.  
 $y = 3x$   
 $y = x + 4$

Answer:  $(2, 6)$

View Video Explanation: [Solving Systems by Substitution](#)

# Thinkwell Placement Test Answer Key: Geometry

10. Classify each angle as acute, right, obtuse, or straight.

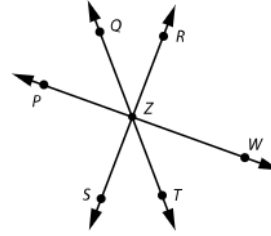


Answer:

$\angle AFE$	obtuse
$\angle BFC$	acute
$\angle CFD$	right
$\angle AFD$	straight
$\angle AFB$	acute

View Video Explanation: [Angles and Their Relationships](#)

12. Given that the measure of  $\angle PZQ$  is  $42^\circ$  and that  $\angle SZT$  and  $\angle TZW$  are complementary, find the measure of each unknown angle.

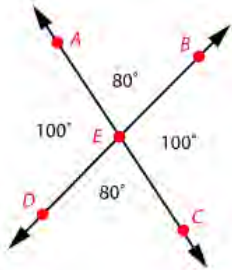


Answer:

$\angle TZW$	$42^\circ$
$\angle SZT$	$48^\circ$
$\angle QZR$	$48^\circ$
$\angle WZR$	$90^\circ$

View Video Explanation: [Angles and Their Relationships](#)

11. Name each angle pair.

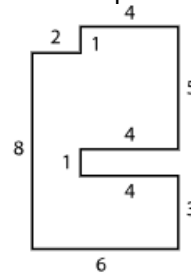


Answer:

$\angle AEB$ and $\angle BEC$	adjacent angles
$\angle DEA$ and $\angle AEB$	adjacent angles
$\angle AEB$ and $\angle CED$	vertical angles
$\angle DEA$ and $\angle BEC$	vertical angles

View Video Explanation: [Angle Relationships](#)

13. Find the perimeter and area of the figure.



Answer:  $P = 38$  units,  $A = 48$  units<sup>2</sup>

View Video Explanation: [Perimeter and Area of Rectangles and Parallelograms](#)

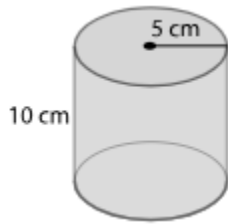
14. A gardener wants to fence a garden that is in the shape of a right triangle. She knows that the two shorter sides of the garden are 17 feet and 20 feet long. How long will the fence be to the nearest tenth of a foot?

Answer: 63.2

View Video Explanation: [Perimeter and Area of Triangles and Trapezoids](#)

# Thinkwell Placement Test Answer Key: Geometry

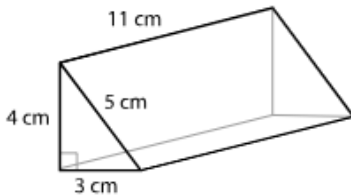
15. Find the volume of the figure in cubic centimeters to the nearest tenth.



Answer: 785.4

View Video Explanation: [Volume of Prisms and Cylinders](#)

16. Find the surface area of the figure in square centimeters to the nearest tenth.



Answer: 144

View Video Explanation: [Surface Area of Prisms and Cylinders](#)

17. The ladder, slide, and ground form a triangle. The measure of  $\angle A$  is  $40^\circ$  and the measure of  $\angle B$  is  $80^\circ$ . Classify the triangle.



Answer: acute

View Video Explanation: [Triangles](#)

18. Find the coordinates of the midpoint of  $\overline{CD}$  with endpoints  $C(-3, 4)$  and  $D(1, -2)$ .

Answer:  $(-1, 1)$

View Video Explanation: [Coordinate Geometry](#)

19. A company's logo is in the shape of an isosceles triangle with two sides that are 2.4 in. long and one side that is 1.8 in. long. On a billboard, the triangle in the logo has two sides that are each 8 ft long. If the triangles are similar, what is the length of the third side of the triangle on the billboard?

Answer: 6 ft

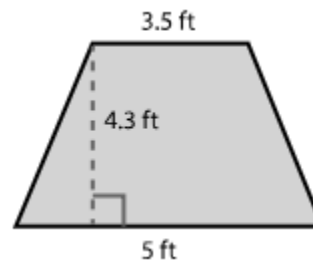
View Video Explanation: [Similar Figures](#)

20. Frederick is a waiter who earns 15% in tips on all food sales. If he made \$75.39 in tips, how much were his total sales?

Answer: \$502.60

View Video Explanation: [Applications of Percents](#)

21. Find the area of the trapezoid in square meters to the nearest tenth.



1 meter  $\approx$  3.2808 feet

Answer: 1.7

View Video Explanation: [Converting Units of Measurement](#)

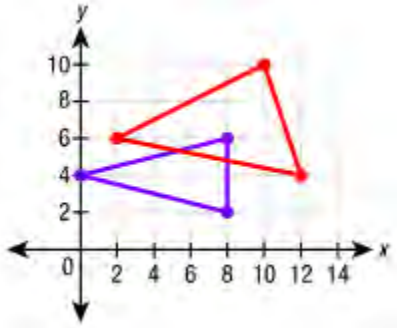
# Thinkwell Placement Test Answer Key: Geometry

22. Find the volume of a sphere with radius 7 ft, both in terms of  $\pi$  and to the nearest tenth. Use 3.14 for  $\pi$ .

Answer:  $\frac{1372}{3}\pi$  ft<sup>3</sup>, 1436 ft<sup>3</sup>

View Video Explanation: [Spheres](#)

23. Tell whether the transformation is a dilation.



Answer: no

View Video Explanation: [Dilations](#)

24. A flagpole casts a 27 ft shadow, while a 5.5 ft tall man standing nearby casts a 4 ft shadow. How tall is the flagpole?

Answer: 37.125 ft

View Video Explanation: [Indirect Measurement](#)

25. Tell whether a triangle can have sides with the given lengths.  
11 in., 16 in., 12 in.

Answer: yes

View Video Explanation: [Triangles](#)

## About Thinkwell Courses

Thinkwell offers the following core courses in our Homeschool Math series:

- 6th Grade Math
- 7th Grade Math
- 8th Grade Math
- Algebra 1
- Geometry
- Algebra 2
- Precalculus
- Trigonometry
- Calculus
- Honors 6th Grade Math
- Honors 7th Grade Math
- Honors 8th Grade Math
- Honors Algebra 1
- Honors Geometry
- Honors Algebra 2
- AP Calculus AB
- AP Calculus BC

*What's the difference between the standard Thinkwell courses and the honors courses?* In general, the Thinkwell Honors courses will be faster-paced and more rigorous than our standard courses. Our Honors courses will cover more material than the standard courses and the assessments will be more challenging. Unless you need the Honors recognition for your student's transcript, or unless your student is aiming to pursue a science or math-related course of study, we recommend sticking with the standard course sequence.

## Typical Sequence of Secondary Math Courses

A typical sequence of secondary math courses completed by a college-bound student is listed below. Most college-bound students will take seven or eight years of math between 6<sup>th</sup> and 12<sup>th</sup> grades, beginning with 6<sup>th</sup> Grade Math and ending with Precalculus or Calculus.

### Standard Sequence:

#### Middle school:

<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
6 <sup>th</sup> Grade Math	7 <sup>th</sup> Grade Math	8 <sup>th</sup> Grade Math

#### High School:

<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
Algebra 1	Geometry	Algebra 2	Precal or Trig

### Accelerated Sequence:

#### Middle school:

<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
7 <sup>th</sup> Grade Math	8 <sup>th</sup> Grade Math	Algebra 1

#### High School:

<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
Geometry	Algebra 2	Precal or Trig	Calculus

### Where Do You Begin?

If you wondering about where to start your student with the Thinkwell math course sequence, we recommend that you **begin with the end in mind**.

In other words, where do you want your student to be at the end of their course of study in high school? If your student is college-bound, and you want them to take Calculus before they go to college, then work backwards from the ‘accelerated sequence’ above to see where you need to be right now.

Unless your student is planning to pursue a science or math-related degree, Calculus doesn’t necessarily need to be the terminal course for your high school student.

Questions? Please reach out to us at [support@thinkwell.com](mailto:support@thinkwell.com). We’re here and happy to help.