

# placement test

## FOR STUDENTS NEW TO THE SAXON PROGRAM upper grades math

### Saxon's Upper Grades Placement Test

This placement guide is designed to place students in the appropriate level of the Saxon secondary mathematics series. This placement guide should not be used as the sole basis for deciding what textbook a student should use. Ideally, the exam will be used in conjunction with other information, including the student's record of achievement in prior mathematics courses.

To complete this test, a student will require only scratch paper and a pencil. Calculator use is strongly discouraged. Graph paper may be used but is not required. This is a four-part test.

Part I determines students' readiness for Saxon's *Algebra 1* textbook.

Part II determines students' readiness for Saxon's *Algebra 2* textbook.

Part III determines students' readiness for Saxon's *Advanced Mathematics* textbook.

Part IV determines students' readiness for Saxon's *Calculus* textbook.

For Parts I–III, solving 8, 9, or 10 problems correctly indicates readiness for the specified textbook. Students who solve 5, 6, or 7 problems correctly may also be ready for the specified textbook, but further assessment of the student's knowledge and skills is needed. Performance in prior mathematics courses would be a most helpful indicator in this situation. Solving fewer than five questions correctly indicates the student is not ready for the specified textbook. If a student answers fewer than five questions correctly in Part I, consider using Saxon's *Algebra  $\frac{1}{2}$*  or *Math 87*.

For Part IV, solving 10, 11, or 12 problems correctly indicates readiness for Saxon's *Calculus*. A student who solves 7, 8, or 9 problems correctly may also be ready for *Calculus*, but only if that student has performed well in Saxon's *Advanced Mathematics* or some other pre-calculus course.

To get a full picture of the student's knowledge and ability, a student taking this test should complete as many of the parts as possible and stop when he or she cannot answer any more problems. For example, even if the student believes he or she belongs in the Saxon's *Calculus* textbook, he or she should begin working the test from Part I. This way, the student will be able to pinpoint difficult areas.

Students who have not taken an algebra course will likely be able to solve only through Part I. Students who have completed a first year algebra course will likely be able to complete through Part II. Students who have completed two years of algebra should be able to complete through Part III. Finally, students who have completed geometry and trigonometry in addition to two years of algebra should be able to complete through Part IV.

Please note that in the Saxon secondary series, what is traditionally covered in four years of high school mathematics (that is, two years of algebra, one year of geometry, and one year of trigonometry and pre-calculus) is covered in just three textbooks, *Algebra 1*, *Algebra 2*, and *Advanced Mathematics*. There is no separate Saxon textbook on geometry. The study of geometry is fully integrated into the three books. This is a more efficient and effective way of teaching mathematics, which is why we cover the same amount of material in fewer textbooks and in less time. It should be noted that the Saxon *Advanced Mathematics* textbook usually is completed in three semesters; however, accelerated students can complete *Advanced Mathematics* in two semesters, and students with weaker preparation may take up to four semesters to cover the textbook.

Call us at **(800) 284-7019** to request copies of the middle grades placement tests. We can also be contacted at **2600 John Saxon Blvd., Norman, OK 73071**; or by e-mail at **info@saxonhomeschool.com**. If you have Internet access please visit our web site at **<http://www.saxonhomeschool.com>**.

## Part I: Readiness Test for Saxon's Algebra 1

The purpose of this section is to determine readiness for Saxon's *Algebra 1* textbook. Answering 8 or more problems correctly indicates readiness for Saxon's *Algebra 1* textbook.

1. Express  $\frac{3}{8} + \frac{5}{6}$  as a fraction reduced to lowest terms.
2. Find the area of a circle of radius 2. (Area =  $\pi r^2$ ) Express your answer in terms of  $\pi$ .
3. Draw a number line that shows at least the integers from  $-3$  to  $3$ . Graph the numbers  $2$ ,  $3$ , and  $5\frac{1}{2}$ .
4. Multiply. Express the product as a fraction reduced to its lowest terms.

$$\frac{3}{8} \times \frac{4}{5}$$

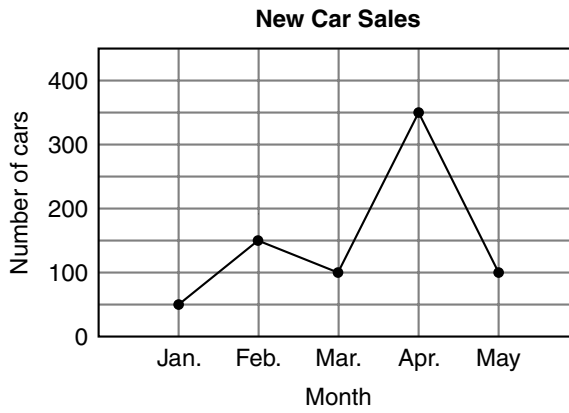
5. Express mathematically "five added to twice a number." Use  $N$  to represent the unknown number.
6. The ratio of boys to girls in the class was 4 to 6. If there were 8 boys in the class, how many girls were in the class?
7. The original price of the pants was \$40.00; during the Presidents' Day Sale, the price of the pants was reduced by 20%. What was the sale price of the pants?
8. Compute:  $3^2 - 2^3 + \sqrt{16}$

9. Complete the table by converting the fraction to a decimal and a percent. An example is shown on the left:

fraction	decimal	percent
$\frac{1}{2}$	0.50	50%

fraction	decimal	percent
$\frac{3}{8}$		

10. Use the information in the graph below to calculate the average monthly new car sales for the five months shown on the graph.



## Part II: Readiness Test for Saxon's Algebra 2

The purpose of this section is to determine readiness for Saxon's *Algebra 2* textbook. Answering 8 or more problems correctly indicates readiness for Saxon's *Algebra 2* textbook.

1. Evaluate  $x^2y - y^3 + x^{1/2}$  if  $x = 3$  and  $y = 4$ .

2. Simplify:

$$\frac{-2 - 2(1 - 5)}{-2 - 3}$$

3. Simplify and write the answer with all variables in the numerator.

$$\frac{(xm^{-1})^{-3} x^2 m^2}{(x^0 y^2)^{-2} xy}$$

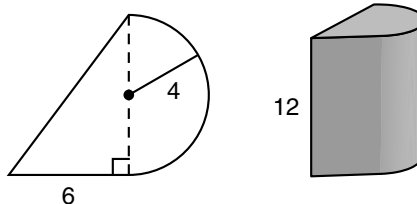
4. Solve for  $x$ :

$$3\left(\frac{5}{6} - \frac{5}{3}x\right) = -\left(-\frac{1}{2} + x\right)$$

5. The total value of the pennies and nickels was \$14.50. Hala counted the coins and found there were 450 coins in all. How many of each type of coin did she have?

6. Graph  $y = 3x + 5$ . Determine the slope of the line and its y-intercept.

7. (a) Find the perimeter of the figure shown on the left below. Dimensions are in meters. (b) Find the area of the figure. (c) The figure shown is the base of a geometric solid whose sides are perpendicular to the base and whose height is 12 meters. A depiction of the solid is shown on the right. Find its volume. Leave  $\pi$  as  $\pi$ .



8. The scores that Frank achieved on his five tests were 90, 70, 70, 85, and 95. Find the range, mean, median, and mode of the five test scores.
9. Twice a number is decreased by 7, and this quantity is multiplied by 3. The result is 9 less than 10 times the number. What is the number?
10. Solve by factoring:  $x^2 - 15 = 2x$

### Part III: Readiness Test for Saxon's *Advanced Mathematics*

The purpose of this section is to determine readiness for Saxon's *Advanced Mathematics* textbook. Answering 8 or more problems correctly indicates readiness for Saxon's *Advanced Mathematics* textbook.

1. Use the quadratic formula to solve this equation:  $3x^2 - 2x + 1 = 0$ .
2. (a) Graph the equation  $y = x^2 - 2x + 1$ . (b) Find the coordinates of the points of intersection between  $y = x^2 - 2x + 1$  and  $y = 4$ . (c) Shade the region determined by  $y > x^2 - 2x + 1$  and  $y < 4$ .
3. Find all pairs  $(x, y)$  that satisfy both of the following equations simultaneously:

$$\begin{aligned}2x + 3y &= 5 \\ x - 2y &= 8\end{aligned}$$

4. Simplify:

$$\sqrt{\frac{3}{2}} + 4\sqrt{\frac{2}{3}} + \sqrt{24}$$

5. Solve for  $x$ :

$$x^{2/3} = 4$$

6. Solve for  $x$ :

$$\frac{5}{6} + \frac{3}{x+2} = \frac{2}{3}$$

7. Simplify:

$$\frac{x^3 - 16x - 6x^2}{x^2 - 8x - 20} \times \frac{-50 - 5x + x^2}{x^3 - 5x^2 - 24x}$$

8. Find three consecutive integers such that the product of the first and the second is equal to the product of  $-6$  and the third.
  
9. How many different ways can all four of the letters A, B, C, and D be ordered if no repetition is allowed?
  
10. Find the equation of the line that passes through  $(2, 1)$  and is perpendicular to  $2x - 3y = 6$ .

## Part IV: Readiness Test for Saxon's *Calculus*

The purpose of this section is to determine readiness for Saxon's *Calculus* textbook. Answering 10 or more problems correctly indicates readiness for Saxon's *Calculus* textbook. Answering 7 to 10 questions correctly indicates possible readiness for *Calculus*.

1. Given  $f(x) = x^2$ , find  $f(x + h)$ .
2. What are the exact values of (a)  $\sin \frac{\pi}{6}$  and (b)  $\cos \frac{\pi}{6}$ ?

3. Simplify:

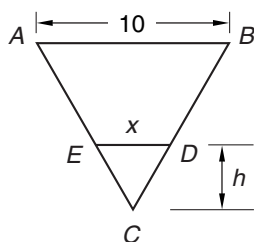
$$\frac{\frac{1}{x+h} - \frac{1}{x}}{h}$$

4. Graph the function

$$y = \sin\left(x - \frac{\pi}{4}\right)$$

5. Graph the set  $\{x \in \mathbb{R} : |x - 3| < 4\}$  on a number line. Note that  $\mathbb{R}$  denotes the set of real numbers.
6. Graph the circle whose equation is given by  $x^2 + y^2 + 6x - 6y + 2 = 0$ . Indicate the coordinates of the center of the circle and the length of the radius of the circle.
7. Solve for  $x$ :  $\log(1 + x) + \log(2 + x) = 2$

8. Triangle  $ABC$  is an equilateral triangle and segment  $ED$  is parallel to segment  $AB$  as shown in the figure below. Express  $x$  in terms of  $h$ .





9. Find all pairs  $(x, y)$  that simultaneously satisfy the following two equations:

$$x^2 + y^2 = 9$$

$$y - x = 1$$

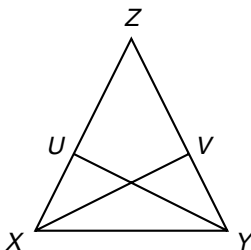
Graph the two equations, and show the points of intersection of the graphs.

10. Prove the following trigonometric identity:

$$\frac{\cos^3(x) + \sin^3(x)}{\cos(x) + \sin(x)} = 1 - \sin(x) \cos(x)$$

11. Write an algebraic equation that expresses the following statement: the sum of the distance between point  $(x, y)$  and point  $(1, 2)$  and the distance between point  $(x, y)$  and point  $(3, 4)$  is equal to 10.

12. Given:  $\overline{XZ} \cong \overline{YZ}$ ,  $\overline{XV} \perp \overline{YZ}$ ,  $\overline{YU} \perp \overline{XZ}$ . Write a two-column proof to show that  $\overline{XV} \cong \overline{YU}$ .

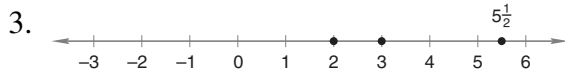


# Homeschool Placement Test Answers

## PART I

1.  $1\frac{5}{24}$

2. Area =  $4\pi$  units<sup>2</sup>



4.  $\frac{3}{10}$

5.  $2N + 5$

6. 12 girls

7. \$32.00

8. 5

9. [from left to right] 0.375, 37.5%

10. 150 new cars per month

## PART II

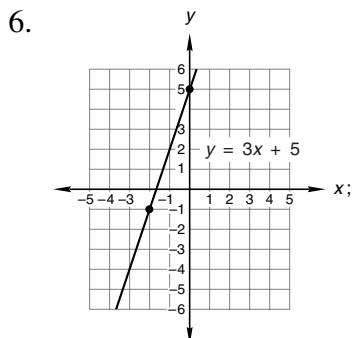
1.  $-28 + \sqrt{3}$

2.  $-\frac{6}{5}$

3.  $m^5x^{-2}y^3$

4.  $x = \frac{1}{2}$

5. 200 pennies, 250 nickels



slope = 3; y-intercept = 5

7. (a) Perimeter =  $(16 + 4\pi)$  meters;  
 (b) Area =  $(24 + 8\pi)$  meters<sup>2</sup>;  
 (c) Volume =  $(288 + 96\pi)$  meters<sup>3</sup>

8. range = 25; mean = 82; median = 85;  
 mode = 70

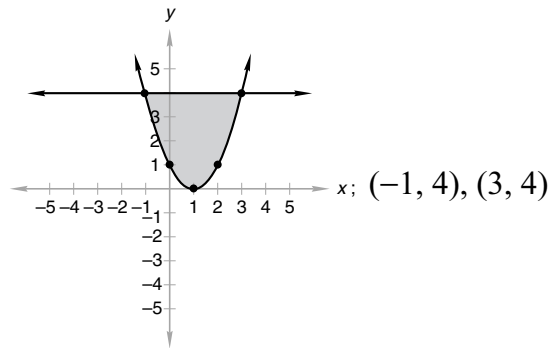
9.  $N = -3$

10.  $x = -3, 5$

## PART III

1.  $\frac{1}{3} \pm \frac{\sqrt{2}}{3}i$

2.



3.  $\left(\frac{34}{7}, \frac{-11}{7}\right)$

4.  $\frac{23\sqrt{6}}{6}$

5.  $x = 8$

6.  $x = -20$

7.  $\frac{x + 5}{x + 3}$

8.  $-4, -3, -2$  or  $-3, -2, -1$

9. 24 ways

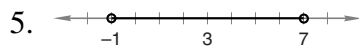
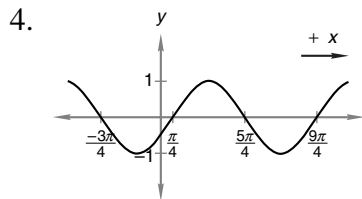
10.  $y = \frac{-3}{2}x + 4$

**PART IV**

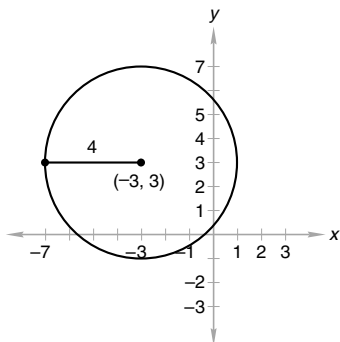
1.  $x^2 + 2xh + h^2$

2.  $\frac{1}{2}; \frac{\sqrt{3}}{2}$

3.  $\frac{-1}{x(x+h)}$

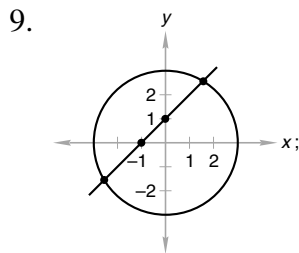


6. radius = 4; center = (-3, 3);



7.  $x = \frac{-3}{2} + \frac{\sqrt{401}}{2}$

8.  $x = \frac{2\sqrt{3}}{3}h$



$$\left( \frac{-1}{2} + \frac{\sqrt{17}}{2}, \frac{1}{2} + \frac{\sqrt{17}}{2} \right),$$

$$\left( \frac{-1}{2} - \frac{\sqrt{17}}{2}, \frac{-1}{2} - \frac{\sqrt{17}}{2} \right)$$

10.  $\frac{\cos^3 x + \sin^3 x}{\cos x + \sin x}$   
 $= \frac{(\cos x + \sin x)(\cos^2 x - \cos x \sin x + \sin^2 x)}{\cos x + \sin x}$   
 $= \cos^2 x - \cos x \sin x + \sin^2 x$   
 $= 1 - \sin x \cos x$

11.  $\sqrt{(x-1)^2 + (y-2)^2}$   
 $+ \sqrt{(x-3)^2 + (y-4)^2} = 10$

12.

STATEMENTS	REASONS
1. $\overline{XZ} \cong \overline{YZ}$	1. Given
2. $\triangle XYZ$ is isosceles	2. Definition of isosceles triangle
3. $\angle ZXY \cong \angle ZYX$	3. Base angles of an isosceles triangle are congruent.
4. $\angle XUY$ is a right angle; $\angle YVX$ is a right angle	4. Given
5. $\angle XUY \cong \angle YVX$	5. Right angles are congruent.
6. $\angle UYX \cong \angle VXY$	6. AA $\rightarrow$ AAA
7. $\overline{XY} \cong \overline{XY}$	7. Reflexive axiom
8. $\triangle XUY \cong \triangle YVX$	8. AAAS congruency postulate
9. $\overline{XV} \cong \overline{YU}$	9. CPCTC



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