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Welcome to OSU-OKC Testing and Assessment.

Taking the COMPASS placement test is an important step in beginning your college career. The results of your test will determine what courses are right for you to begin a successful path toward degree completion.

COMPASS is a computerized test that measures your readiness for college-level courses. The full COMPASS test assesses your skills in writing, reading comprehension, and mathematics. You may be required to take the full COMPASS or just one or two skills areas.

College-level General Education courses, like College Algebra and General College Math, require a proficiency placement level in mathematics. In order to enroll in these courses you will need to achieve the minimum COMPASS score required by OSU-OKC. Current cut-scores are available in Testing and Assessment, Student Center, Room 104.

In the following pages you will learn about COMPASS, tips for taking the test, and you will review study material that is similar to what you will see on the COMPASS skills test.

The test is untimed so please relax and work at your own pace.

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The following content is reprinted with permission from ACT/Sept. 2012
www.act.org/compass/sample/index.html
Things to Know About COMPASS

What Is COMPASS?

COMPASS is an untimed, computerized test that helps your college evaluate your skills and place you into appropriate courses. COMPASS offers tests in reading, writing, math, writing essay, and English as a Second Language (ESL). You will receive your COMPASS test results immediately upon completion of testing, and your score report will include placement messages informing you what courses you should take.

How Are COMPASS Scores Used?

COMPASS is not used like a traditional test. There is generally no "passing score." Rather, COMPASS scores indicate areas in which you are strong and areas in which you may need help. Thus, COMPASS can identify problems in major subject areas before they disrupt your educational progress, giving you the opportunity to prepare more effectively for needed courses. You and your institution can use scores from COMPASS tests to prepare a course of study that will be appropriate, relevant, and meaningful for you.

How Can I Arrange to Take the COMPASS Tests?

New students are provided a Placement Test Ticket by the Admissions office. Testing is provided on a walk-in basis and the first time to test is free. While you may test on the same day you are admitted, it is highly recommended you review this COMPASS Study Guide prior to testing. Make arrangements to take the COMPASS when you have plenty of time to devote to the test. The COMPASS test is not timed; however, taking the full test may take approximately three hours.

Students have the option of re-taking all or part of the COMPASS test. A fee of $5.00 per test subject is charged.
Be Prepared for COMPASS!

TIPS FOR SUCCESS

1. Relax! The COMPASS tests are designed to help you succeed in school. Your scores help determine which courses are most appropriate for your current level of knowledge and skills.

2. You will be able to concentrate better on the test if you get plenty of rest and eat properly before the test.

3. Be sure you read and understand the directions for each test before that test session begins.

4. Read each question carefully until you understand what the question is asking. If answering an item requires several steps, be sure you consider them all.

5. Be sure to answer every item. You are not penalized for guessing.

6. Don’t be afraid to change an answer if you believe that your first choice was wrong.

7. Pace yourself and don’t rush. The COMPASS test is not timed, so plan ahead and make sure to allow yourself plenty of time to test.

8. Keep a positive attitude throughout the whole test and try to stay relaxed. If you start to feel nervous take a few deep breaths to relax.

9. Stay focused; if noises distract you ear plugs are available in the testing rooms.

10. Review the study materials before you test!
COMPASS Mathematics Skills Tests

The COMPASS Mathematics Tests are organized around five principal content domains:

- numerical skills/pre-algebra
- algebra
- college algebra
- geometry
- trigonometry

To ensure variety in the content and complexity of items within each domain, COMPASS includes mathematics items of three general levels of cognitive complexity: basic skills, application, and analysis. A basic skills item can be solved by performing a sequence of basic operations. An application item involves applying sequences of basic operations to novel settings or in complex ways. An analysis item requires students to demonstrate a conceptual understanding of the principles and relationships relevant to particular mathematical operations. Items in each of the content domains sample extensively from these three cognitive levels:

- basic skills—performing a sequence of basic operations
- application—applying sequences of basic operations to novel settings or in complex ways
- analysis—demonstrating conceptual understanding of principles and relationships in mathematical operations

An online calculator is available for the mathematics skills test.
NUMERICAL SKILLS/PRE-ALGEBRA PLACEMENT

Questions in the numerical skills/pre-algebra placement test range in content from basic arithmetic concepts and skills to the knowledge and skills considered prerequisites for a first algebra course. The test includes items from more than a dozen content areas; however, a majority of the questions come from the following categories:

1) Operations with Integers
2) Operations with Fractions
3) Operations with Decimals
4) Positive Integer Exponents, Square Roots, and Scientific Notation
5) Ratios and Proportions
6) Percentages
7) Averages (Means, Medians, and Modes)

SAMPLE PROBLEMS

(Averages: Means, Medians, and Modes)

1. What is the average (arithmetic mean) of 8, 7, 7, 5, 3, 2, and 2?
   A) $3\frac{4}{7}$
   B) $4\frac{5}{6}$
   C) $4\frac{6}{7}$
   D) 5
   E) $6\frac{4}{5}$

(Basic Operations with Decimals)

2. Ben is making wooden toys for the next arts and crafts sale. Each toy costs Ben $1.80 to make. If he sells the toys for $3.00 each, how many will he have to sell to make a profit of exactly $36.00?
   A) 12
   B) 20
   C) 30
   D) 60
   E) 108
(Basic Operations with Fractions)

3. How many yards of material from a 24-yard length of cloth remain after 3 pieces, each $3\frac{1}{2}$ yards long, and 5 pieces, each $2\frac{1}{4}$ yards long, are removed?
   A) $2 \frac{1}{4}$
   B) $4 \frac{1}{4}$
   C) $4 \frac{5}{6}$
   D) $10 \frac{1}{4}$
   E) $10 \frac{5}{6}$

(Percentages)

4. Phillip charged $400 worth of goods on his credit card. On his first bill, he was not charged any interest, and he made a payment of $20. He then charged another $18 worth of goods. On his second bill a month later, he was charged 2% interest on his entire unpaid balance. How much interest was Phillip charged on his second bill?
   A) $8.76$
   B) $7.96$
   C) $7.60$
   D) $7.24$
   E) $6.63$

ANSWERS:
1) C
2) C
3) A
4) B
MORE NUMERICAL SKILLS/PRE-ALGEBRA EXAMPLES

1. $54 - 6 ÷ 2 + 6 = ?$
   
   A) 6 
   B) 24 
   C) 27 
   D) 30 
   E) 57 

2. The lowest temperature on a winter morning was $-8^\circ F$. Later that same day the temperature reached a high of $24^\circ F$. By how many degrees Fahrenheit did the temperature increase?
   
   A) 3 
   B) 8 
   C) 16 
   D) 24 
   E) 32 

3. If $(\frac{3}{4} - \frac{2}{3}) + (\frac{1}{2} + \frac{1}{3})$ is calculated and the answer reduced to simplest terms, what is the denominator of the resulting fraction?
   
   A) 24 
   B) 12 
   C) 6 
   D) 4 
   E) 3
4. \( \frac{1}{2} + \left( \frac{2}{3} \div \frac{3}{4} \right) - \left( \frac{4}{5} \times \frac{5}{6} \right) = ? \)

A) \( \frac{1}{16} \)  
B) \( \frac{17}{27} \)  
C) \( \frac{13}{18} \)  
D) \( \frac{7}{9} \)  
E) \( \frac{5}{6} \)

5. Mr. Brown went grocery shopping to buy meat for his annual office picnic. He bought 7\( \frac{3}{4} \) pounds of hamburger, 17.85 pounds of chicken, and 6\( \frac{1}{2} \) pounds of steak. How many pounds of meat did Mr. Brown buy?

A) 32.10  
B) 31.31  
C) 26.25  
D) 22.10  
E) 21.10

6. Four students about to purchase concert tickets for $18.50 for each ticket discover that they may purchase a block of 5 tickets for $80.00. How much would each of the 4 save if they can get a fifth person to join them and the 5 people equally divide the price of the 5-ticket block?

A) $ 1.50  
B) $ 2.50  
C) $ 3.13  
D) $10.00  
E) $12.50
7. In scientific notation, $20,000 + 3,400,000 = \, ?$

A) $3.42 \times 10^6$
B) $3.60 \times 10^6$
C) $3.42 \times 10^7$
D) $3.60 \times 10^7$
E) $3.60 \times 10^{12}$

8. Saying that $4 < \sqrt{x} < 9$ is equivalent to saying what about $x$?

A) $0 < x < 5$
B) $0 < x < 65$
C) $2 < x < 3$
D) $4 < x < 9$
E) $16 < x < 81$

9. What value of $x$ solves the following proportion? $\frac{9}{6} = \frac{8}{x}$

A) $5 \frac{1}{3}$
B) $6 \frac{3}{4}$
C) $10 \frac{1}{2}$
D) 11
E) 12
10. If the total cost of $x$ apples is $b$ cents, what is a general formula for the cost, in cents, of $y$ apples?

A) \( \frac{b}{xy} \)
B) \( \frac{x}{by} \)
C) \( \frac{xy}{b} \)
D) \( \frac{by}{x} \)
E) \( \frac{bx}{y} \)

11. On a math test, 12 students earned an A. This number is exactly 25% of the total number of students in the class. How many students are in the class?

A) 15
B) 16
C) 21
D) 30
E) 48

12. This year, 75% of the graduating class of Harriet Tubman High School had taken at least 8 math courses. Of the remaining class members, 60% had taken 6 or 7 math courses. What percent of the graduating class had taken fewer than 6 math courses?

A) 0%
B) 10%
C) 15%
D) 30%
E) 45%
13. Adam tried to compute the average of his 7 test scores. He mistakenly divided the correct sum of all of his test scores by 6, which yielded 84. What is Adam’s correct average test score?

A) 70
B) 72
C) 84
D) 96
E) 98

14. A total of 50 juniors and seniors were given a mathematics test. The 35 juniors attained an average score of 80 while the 15 seniors attained an average of 70. What was the average score for all 50 students who took the test?

A) 73
B) 75
C) 76
D) 77
E) 78
## Correct Answers for Sample Numerical Skills/Pre-Algebra Items

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<th>Correct Answer</th>
<th>Content Category</th>
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<tr>
<td>14</td>
<td>D</td>
<td>Averages</td>
</tr>
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</table>

Additional practice with **Numerical Skills/Pre-algebra**

http://www.math.com/students/practice.html

*Generate your own math worksheets*
The Algebra Placement Test is composed of items from three curricular areas:

- elementary algebra
- intermediate algebra
- coordinate geometry

Each of these three areas is further subdivided into a number of more specific content areas. Overall, the Algebra Placement Test includes items from more than 20 content areas; however, the majority of test questions fall within the following eight content areas:

1) Substituting Values into Algebraic Expressions
2) Setting Up Equations for Given Situations
3) Basic Operations with Polynomials
4) Factoring Polynomials
5) Linear Equations in One Variable
6) Exponents and Radicals
7) Rational Expressions
8) Linear Equations in Two Variables

SAMPLE PROBLEMS

ELEMENTARY ALGEBRA: Linear Equations in One Variable

1. A student has earned scores of 87, 81, and 88 on the first 3 of 4 tests. If the student wants an average (arithmetic mean) of exactly 87, what score must she earn on the fourth test?

A) 85
B) 86
C) 87
D) 92
E) 93
ELEMENTARY ALGEBRA: Basic Operations with Polynomials

2. Which of the following expressions represents the product of 3 less than twice $x$ and 2 more than the quantity 3 times $x$?

A) $-6x^2 + 25x + 6$
B) $6x^2 + 5x + 6$
C) $6x^2 - 5x + 6$
D) $6x^2 - 5x - 6$
E) E. $6x^2 - 13x - 6$

ELEMENTARY ALGEBRA: Substituting Values into Algebraic Expressions

3. If $x = -1$ and $y = 2$, what is the value of the expression $2x^3 - 3xy$?

A) 8
B) 4
C) -1
D) -4
E) -8

INTERMEDIATE ALGEBRA: Rational Expressions

4. For all $r \neq \pm 2$; $\frac{r^2 - 5r + 6}{r^2 - 4} = ?$

A) $\frac{r-3}{r+2}$
B) $\frac{r-2}{r+2}$
C) $\frac{r-2}{r+3}$
D) $\frac{r+3}{r-2}$
E) $\frac{r+3}{r+2}$
COORDINATE GEOMETRY: Linear Equations in Two Variables

5. What is the equation of the line that contains the points with \((x, y)\) coordinates \((-3, 7)\) and \((5, -1)\)?

A) \(y = 3x - 2\)
B) \(y = x + 10\)
C) \(y = -\frac{1}{3}x + 8\)
D) \(y = -\frac{3}{2}x + \frac{11}{4}\)
E) \(y = -x + 4\)

ANSWERS:
A) D
B) D
C) B
D) A
E) E
MORE ALGEBRA EXAMPLES

1. If \( x = -3 \), what is the value of \( \frac{x^2 - 1}{x+1} \)?
   A) \(-4\)
   B) \(-2\)
   C) 2
   D) \(3\frac{2}{3}\)
   E) 5

2. Doctors use the term *maximum heart rate* (MHR) when referring to the quantity found by starting with 220 beats per minute and subtracting 1 beat per minute for each year of a person’s age. Doctors recommend exercising 3 or 4 times each week for at least 20 minutes with your heart rate increased from its *resting heart rate* (RHR) to its *training heart rate* (THR), where

   \[ THR = RHR + .65(MHR - RHR) \]

Which of the following is closest to the THR of a 43-year-old person whose RHR is 54 beats per minute?

   A) 197
   B) 169
   C) 162
   D) 134
   E) 80

3. When getting into shape by exercising, the subject’s maximum recommended number of heartbeats per minute (h) can be determined by subtracting the subject’s age (a) from 220 and then taking 75% of that value. This relation is expressed by which of the following formulas?

   A) \( h = .75(220 - a) \)
   B) \( h = .75(220) - a \)
   C) \( h = 220 - .75a \)
   D) \(.75h = 220 - a\)
   E) \(220 = .75(h - a)\)

4. An airplane flew for 8 hours at an airspeed of \( x \) miles per hour (mph), and for 7 more hours at 325 mph. If the average airspeed for the entire flight was 350 mph, which of the following equations could be used to find \( x \)?
A)  \( x + 325 = 2(350) \)  
B)  \( x + 7(325) = 15(350) \)  
C)  \( 8x - 7(325) = 350 \)  
D)  \( 8x + 7(325) = 2(350) \)  
E)  \( 8x + 7(325) = 15(350) \)

5. Which of the following is equivalent to \( 3a + 4b - (-6a - 3b) \)?

A)  \( 16ab \)  
B)  \( -3a + b \)  
C)  \( -3a + 7b \)  
D)  \( 9a + b \)  
E)  \( 9a + 7b \)

6. What is the sum of the polynomials \( 3a^2b + 2a^2b^2 \) and \( -ab^2 + a^2b^2 \)?

A)  \( 3a^2b - ab^2 + 3a^2b^2 \)  
B)  \( 3a^2b - ab^2 + 2a^2b^2 \)  
C)  \( 2a^2b + 3a^2b^2 \)  
D)  \( 2a^2b^3 + 2a^4b^4 \)  
E)  \( -3a^3b^3 + 2a^4b \)

7. Which of the following is a factor of the polynomial \( x^2 - x - 20 \)?

A)  \( x - 5 \)  
B)  \( x - 4 \)  
C)  \( x + 2 \)  
D)  \( x + 5 \)  
E)  \( x + 10 \)
8. Which of the following is a factor of $x^2 - 5x - 6$?

A) $(x + 2)$
B) $(x - 6)$
C) $(x - 3)$
D) $(x - 2)$
E) $(x - 1)$

9. If $2(x - 5) = -11$, then $x = ?$

A) $-\frac{21}{2}$
B) $-8$
C) $-\frac{11}{2}$
D) $-3$
E) $-\frac{1}{2}$

10. If $\frac{4}{5} + (-\frac{3}{10}) = x + 1\frac{1}{2}$, then $x = ?$

A) $2$
B) $1$
C) $-1$
D) $-2$
E) $-10$
11. For all nonzero \( r, t, \) and \( z \) values,\[
\frac{16r^3tz^5}{-4rt^3z^2} = ?
\]
A) \( -\frac{4z^3}{r^2t^2} \)
B) \( -\frac{4r^2z^3}{t^2} \)
C) \( -\frac{4rz}{t} \)
D) \( -4r^4t^4z^7 \)
E) \( -4r^2t^2z^3 \)

12. For all \( x > 0 \) and \( y > 0 \), the radical expression \( \frac{\sqrt{x}}{3\sqrt{x} - \sqrt{y}} \) is equivalent to:
A) \( \frac{3x - \sqrt{xy}}{9x + y} \)
B) \( \frac{3x - \sqrt{xy}}{3x + y} \)
C) \( \frac{3x + \sqrt{xy}}{9x - y} \)
D) \( \frac{3x + \sqrt{xy}}{3x - y} \)
E) \( \frac{x}{3x - y} \)

13. For all \( x \neq -4 \), which of the following is equivalent to the expression below?
\[
\frac{x^2 + 12x + 32}{x + 4}
\]
A) \( x + 3 \)
B) \( x + 8 \)
C) \( x + 11 \)
D) \( x + 16 \)
E) \( x + 28 \)
14. Which of the following is a simplified expression equal to \( \frac{9-x^2}{x-3} \); for all \( x < -3 \)?

A) \( 3x \)
B) \( x + 3 \)
C) \( x - 3 \)
D) \( -x + 3 \)
E) \( -x - 3 \)

15. What is the slope of the line with the equation \( 2x + 3y + 6 = 0 \)?

A) \( -6 \)
B) \( -3 \)
C) \( -2 \)
D) \( -\frac{2}{3} \)
E) \( \frac{2}{3} \)

16. Point \( A \) \((-4,1)\) is in the standard \((x,y)\) coordinate plane. What must be the coordinates of point \( B \) so that the line \( x = 2 \) is the perpendicular bisector of \( AB \)?

A) \((-6, 1)\)
B) \((-4,-1)\)
C) \((-4, 3)\)
D) \((-2, 1)\)
E) \((8, 1)\)
# CORRECT ANSWERS FOR SAMPLE ALGEBRA ITEMS

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Additional practice with **Algebra**

http://www.algebrahelp.com/

*Check out the lessons and worksheets*
COLLEGE ALGEBRA, GEOMETRY, AND TRIGONOMETRY PLACEMENT TEST

College Algebra Placement Test
Items in the College Algebra Test focus on algebra knowledge and skills in a variety of content areas. The majority of items come from the following content areas:
- Functions
- Exponents
- Complex Numbers
- Arithmetic and Geometric Sequences and Series
- Matrices (basic operations, equations, and determinants)

Geometry Placement Test
Primary content areas included in the Geometry Placement Test include:
- Triangles (perimeter, area, Pythagorean theorem, etc.)
- Circles (perimeter, area, arcs, etc.)
- Angles (supplementary, complementary, adjacent, vertical, etc.)
- Rectangles (perimeter, area, etc.)
- Three-dimensional concepts
- Hybrid (composite) shapes

Trigonometry Placement Test
The primary content areas assessed by the Trigonometry Placement Test include:
- Trigonometric functions and identities
- Right-triangle trigonometry
- Trigonometric equations and inequalities
- Graphs of trigonometric functions
- Special angles (multiples of 30 and 45 degrees)

SAMPLE PROBLEMS

COLLEGE ALGEBRA: Complex Numbers

1. For \( i = \sqrt{-1} \); if \( 3i (2 + 5i) = x + 6i \), then \( x =? \)
   A) \(-15\)
   B) \(5\)
   C) \(5i\)
   D) \(15i\)
   E) \(27i\)
COLLEGE ALGEBRA: Functions

2. If \( f(4) = 0 \) and \( f(6) = 6 \), which of the following could represent \( f(x) \)?

A) \( \frac{2}{3}x - 4 \)
B) \( x + 2 \)
C) \( x - 4 \)
D) \( \frac{3}{2}x + 6 \)
E) \( 3x - 12 \)

ANSWERS:
1) A
2) E

GEOMETRY: Angles

1. In the figure below \( AB, CD, \) and \( EF \) are parallel, and \( FQ \) intersects all 3 lines at points R, S, and T, respectively. If the measure of \( \angle QTF \) is 33°, what is the measure of \( \angle PRB \)?

A) 33°
B) 57°
C) 66°
D) 123°
E) 147°
GEOMETRY: Triangles

2. In $\triangle MPB$ below, $\overline{LA} \parallel \overline{MB}. \text{If } \frac{PL}{LM} = \frac{5}{3}, \text{then } \frac{PB}{PA} = ?$

   A) $\frac{5}{8}$
   B) $\frac{2}{3}$
   C) $\frac{8}{5}$
   D) $\frac{5}{3}$
   E) $\frac{8}{3}$

ANSWERS:
1) E
2) C

TRIGONOMETRY: Trigonometric Functions and Identities

1. Which of the following is equivalent to $\frac{1 - \cos^2 \theta}{\cos^2 \theta}$?

   A) $\sec^2 \theta$
   B) $(\csc^2 \theta) - 1$
   C) $\tan^2 \theta$
   D) $\sin^2 \theta$
   E) $-\frac{1}{\sin^2 \theta}$
TRIGONOMETRY: Right-Triangle Trigonometry

2. From a point on the ground the angle of elevation to a ledge on a building is 27°, and the distance to the base of the building is 45 meters. How many meters high is the ledge?

A) \( \frac{45}{\sin 27°} \)

B) \( \frac{45}{\tan 27°} \)

C) 45 \( \sin 27° \)

D) 45 \( \cos 27° \)

E) 45 \( \tan 27° \)

ANSWERS:

1) C

2) E
MORE COLLEGE ALGEBRA EXAMPLES

1. What is the next term in the geometric sequence $16, -4, 1, -\frac{1}{4}, \ldots$?

   A) $-\frac{1}{8}$
   B) 0
   C) $\frac{1}{16}$
   D) $\frac{1}{8}$
   E) $\frac{1}{2}$

2. A manufacturing company processes raw ore. The number of tons of refined material the company can produce during $t$ days using Process $A$ is $A(t) = t^2 + 2t$ and using Process $B$ is $B(t) = 10t$. The company has only 7 days to process ore and must choose 1 of the processes. What is the maximum output of refined material, in tons, for this time period?

   A) 8
   B) 10
   C) 51
   D) 63
   E) 70

3. For the 2 functions, $f(x)$ and $g(x)$, tables of values are shown below. What is the value of $g(f(3))$?

   A) $-5$
   B) $-3$
   C) $-1$
   D) 2
   E) 7
4. For positive real numbers $x$, $y$, and $z$, which of the following expressions is equivalent to $\frac{1}{x^2y^3z^6}$?

A) $\sqrt[3]{xy^2z^3}$

B) $\sqrt[6]{xy^2z^5}$

C) $\sqrt[6]{x^3y^2z^5}$

D) $\sqrt[6]{x^3y^4z^5}$

E) $\sqrt[11]{xy^2z^5}$

5. If $A = \begin{bmatrix} 2 & -4 \\ 6 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 4 \\ 6 & 0 \end{bmatrix}$, then $A - B = ?$

A) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

B) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

C) $\begin{bmatrix} 0 & -8 \\ 0 & 0 \end{bmatrix}$

D) $\begin{bmatrix} -4 & 0 \\ -12 & 0 \end{bmatrix}$

E) $\begin{bmatrix} 4 & -8 \\ 12 & 0 \end{bmatrix}$

6. Listed below are 5 functions, each denoted $g(x)$ and each involving a real number constant $c > 1$. If $f(x) = 2x$, which of these 5 functions yields the greatest value for $f(g(x))$, for all $x > 1$?

A) $g(x) = cx$

B) $g(x) = \frac{c}{x}$

C) $g(x) = \frac{x}{c}$

D) $g(x) = x - c$

E) $g(x) = \log_c x$
7. If the function \( f \) satisfies the equation \( f(x + y) = f(x) + f(y) \) for every pair of real numbers \( x \) and \( y \), what are the possible values of \( f(0) \)?

A) Any real number
B) Any positive real number
C) 0 and 1 only
D) 1 only
E) 0 only

8. The imaginary number \( i \) is defined such that \( i^2 = -1 \). What does \( i + i^2 + i^3 + \ldots + i^{23} \) equal?

A) \( i \)
B) \(-i\)
C) \(-1\)
D) 0
E) 1

9. In an arithmetic series, the terms of the series are equally spread out. For example, in

\[ 1 + 5 + 9 + 13 + 17, \]

consecutive terms are 4 apart. If the first term in an arithmetic series is 3, the last term is 136, and the sum is 1,390, what are the first 3 terms?

A) 3, 10, 17
B) 3, 23, 43
C) 3, 36 \( \frac{1}{3} \) 70
D) 3, 69 \( \frac{1}{2} \) 136
E) 3, 139, 1, 251
### Correct Answers for Sample College Algebra Items

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**Additional practice with College Algebra**

http://www.mathtv.com/videos_by_topic

*Check out the videos*
MORE GEOMETRY EXAMPLES

1. In the figure below, line $m$ is parallel to line $n$, and line $t$ is a transversal crossing both $m$ and $n$. Which of the following lists has 3 angles that are all equal in measure?

   A) $\angle a$, $\angle b$, $\angle d$
   B) $\angle a$, $\angle c$, $\angle d$
   C) $\angle a$, $\angle c$, $\angle e$
   D) $\angle b$, $\angle c$, $\angle d$
   E) $\angle b$, $\angle c$, $\angle e$

2. As shown in the figure below, $\triangle ABC$ is isosceles with the length of $AB$ equal to the length of $AC$. The measure of $\angle A$ is $40^\circ$ and points $B$, $C$, and $D$ are collinear. What is the measure of $\angle ACD$?

   A) $70^\circ$
   B) $80^\circ$
   C) $110^\circ$
   D) $140^\circ$
   E) $160^\circ$

3. The diagram below shows a pasture which is fenced in. All but 1 section of fence run straight north-south or east-west. Consecutive fence posts are 10 feet apart except for the 1 diagonal section. Which of the following statements best describes $P$, the perimeter of the pasture, in feet?

   A) $P > 210$
   B) $P = 210$
   C) $P < 210$
   D) $P > 230$
   E) $P = 240$
4. A person had a rectangular-shaped garden with sides of lengths 16 feet and 9 feet. The garden was changed into a square design with the same area as the original rectangular-shaped garden. How many feet in length are each of the sides of the new square-shaped garden?

A) 7  
B) 9  
C) 12  
D) $5\sqrt{7}$  
E) 16

5. In the figure below, $\triangle ABC$ is a right triangle. The length of $AB$ is 6 units and the length of $CB$ is 3 units. What is the length, in units, of $AC$?

A) 5  
B) $3\sqrt{3}$  
C) $3 + \sqrt{5}$  
D) $3\sqrt{5}$  
E) $3\sqrt{6}$

6. If a central angle of measure $30^\circ$ is subtended by a circular arc of length 6 meters, as is illustrated below, how many meters in length is the radius of the circle?

A) $\frac{\pi}{36}$  
B) $\frac{1}{5}$  
C) $\pi$  
D) $\frac{36}{\pi}$  
E) 180
7. A rectangular box with a base 2 inches by 6 inches is 10 inches tall and holds 12 ounces of breakfast cereal. The manufacturer wants to use a new box with a base 3 inches by 5 inches. How many inches tall should the new box be in order to hold exactly the same volume as the original box? (Note: The volume of a rectangular box may be calculated by multiplying the area of the base by the height of the box.)

A) 8
B) 9
C) 10
D) 11
E) 12

8. In the figure below, the circle centered at $B$ is internally tangent to the circle centered at $A$. The smaller circle passes through the center of the larger circle and the length of $AB$ is 5 units. If the smaller circle is cut out of the larger circle, how much of the area, in square units, of the larger circle will remain?

A) $10\pi$
B) $25\pi$
C) $75\pi$
D) $100\pi$
E) $300\pi$

9. In the figure below, $AB$ and $CD$ are parallel, and lengths are given in units. What is the area, in square units, of trapezoid $ABCD$?

A) 36
B) 52
C) 64
D) 65
E) 104
10. A 6-foot spruce tree is planted 15 feet from a lighted streetlight whose lamp is 18 feet above the ground. How many feet long is the shadow of that tree?

A) 5.0
B) 7.5
C) 7.8
D) 9.6
E) 10.0

11. In the figure below, the lengths of $DE$, $EF$, and $FG$ are given, in units. What is the area, in square units, of $\triangle DEG$?

A) 29
B) 47.5
C) 60
D) $6\sqrt{149}$
E) 120
Check Your Answers!

**CORRECT ANSWERS FOR SAMPLE GEOMETRY ITEMS**

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Additional practice with **Geometry**


*Check out the lessons and worksheets*
MORE TRIGONOMETRY EXAMPLES

1. In the right triangle shown below, the length of \( AB \) is 8 units, \( \angle A \) measures 60°, \( \sin 60° \approx 0.866 \), \( \cos 60° \approx 0.5 \), and \( \tan 60° \approx 1.73 \). Approximately how many units long is \( BC \), to the nearest hundredth of a unit?

A) 4.00  
B) 4.61  
C) 4.80  
D) 6.93  
E) 9.23

2. If \( \sin \alpha = \frac{12}{13} \), and \( \cos \alpha = \frac{5}{13} \), then \( \tan \alpha = ? \)

A) \( \frac{5}{12} \)  
B) \( \frac{7}{13} \)  
C) \( \frac{12}{5} \)  
D) \( \frac{17}{13} \)  
E) \( \frac{60}{13} \)

3. If \( 0° < x° < 90° \) and \( \sin x = \frac{1}{2} \), then \( \cos x = ? \)

A) \( \frac{1}{2} \)  
B) \( \frac{\sqrt{3}}{2} \)  
C) 2  
D) \( \frac{\sqrt{3}}{3} \)  
E) \( \frac{2 \sqrt{3}}{3} \)
4. From a hot air balloon, the angle between a radio antenna straight below and the base of the library downtown is 57°, as shown below. If the distance between the radio antenna and the library is 1.3 miles, how many miles high is the balloon?

A) \( \frac{1.3}{\sin 57°} \)

B) \( \frac{1.3}{\cos 57°} \)

C) \( \frac{1.3}{\tan 57°} \)

D) 1.3 \sin 57°

E) 1.3 \tan 57°

5. What is the smallest positive value for \( x \) where \( y = \sin 2x \) reaches its maximum?

A) \( \frac{\pi}{4} \)

B) \( \pi \)

C) \( \frac{3\pi}{2} \)

D) 2\pi

E) \( \frac{5\pi}{2} \)
6. One of the graphs below is that of \( y = A \sin \theta \) for \( \theta \) between 0 and 6.28 radians, where \( A \) is a constant. Which one?

A) 

\[
\begin{array}{c}
\includegraphics[width=0.3\textwidth]{graph1.png}
\end{array}
\]

B) 

\[
\begin{array}{c}
\includegraphics[width=0.3\textwidth]{graph2.png}
\end{array}
\]

C) 

\[
\begin{array}{c}
\includegraphics[width=0.3\textwidth]{graph3.png}
\end{array}
\]

D) 

\[
\begin{array}{c}
\includegraphics[width=0.3\textwidth]{graph4.png}
\end{array}
\]

E) 

\[
\begin{array}{c}
\includegraphics[width=0.3\textwidth]{graph5.png}
\end{array}
\]

7. In the right triangle below, the length of \( AB \) is 13 units and the length of \( CB \) is 12 units. What is the tangent of \( \angle A \)?

A) \( \frac{12}{5} \)

B) \( \frac{13}{12} \)

C) \( \frac{12}{13} \)

D) \( \frac{5}{12} \)

E) \( \frac{5}{13} \)
### CORRECT ANSWERS FOR SAMPLE TRIGONOMETRY ITEMS

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Additional practice with **Trigonometry**

http://www.webmath.com/index.html

*Help with solving math problems*
MATHEMATICS – DEFINITION OF TERMS

Co-efficient: The number before a variable; for 2x, 2 is the co-efficient and x is the variable.

Complex Number: Any number of the form a + bi, where a and b are real numbers and i is an imaginary number whose square equals -1; \( a + b\sqrt{-1} \).

Decimal: A decimal number is another way of representing a fraction. It is an amount that is not a whole number but that instead contains parts of a whole. The fractions or part of the whole are expressed by placing them on the right side of a period. When converted to fraction form, the denominator is always a power of 10, like 10, 100, 1000. For example, the decimal \( .25 \) written in fraction form is \( 25/100 \).

Exponent: A symbol placed above and to the right of a number or mathematical expression to indicate the power to which that number, symbol, or expression is to be raised. For example \( 3^4 \) represents \( 3 \times 3 \times 3 \times 3 \).

Fraction: A number that represents a part of a whole number -- \( \frac{1}{2}, \frac{3}{4} \).

Integer: Positive and negative ‘whole’ numbers -- contain NO fractions or decimals.

Linear Equation: An algebraic equation, such as \( y = 2x + 7 \) or \( 3x + 2y - z = 4 \), in which the highest degree term in the variable or variables is of the first degree (exponent is 1). The graph of such an equation is a straight line if there are two variables. If equal to a number such as \( x = 3 \), this is a vertical line crossing the x-axis at 3, and \( y = 3 \) is a horizontal line crossing the y-axis.

Mean: The average value of a set of numbers. To calculate the mean just add up all the numbers, then divide by how many numbers there are.

Median: The middle of a range of values. Always list the numbers in descending or in ascending order. For example, in the series \( 1, 4, 7, 16, 43 \), 7 is the median. If there are odd number of events, take the average of the two middle numbers.

Mode: The value, number, etc. that appears most frequently in a given series. For example, in the series \( 6, 3, 9, 6, 6, 5, 9, 3 \) 6 is the mode because it appears most frequently.

Percentage: A part of a whole expressed in hundredths; the result obtained by multiplying a number by a percent; the \textit{percentage} equals the rate times the base.

Polynomial: An expression made with constants, variables and exponents, which are combined using addition, subtraction and multiplication, and division. For example, \( a + bx + cx^2 \) is a polynomial expression.
Proportion: the relationship in quantity, amount, or size between two or more things.

Radical: of or relating to a mathematical root, such as square root.

Ratio: A relationship between two quantities, normally expressed as the quotient of one divided by the other. For example, the ratio of 7 to 4 is written as 7:4 or 7/4.

Reciprocal: The reciprocal of a number is an inverted fraction.

Root: a quantity taken an indicated number of times as an equal factor; 2 is a square root of 4, or a fourth root of 16.

Scientific Notation: Scientific notation is a mathematical expression used to represent a decimal number between 1 and 10 multiplied by ten, so you can write large numbers using fewer digits. The scientific notation of 10,492, for example, is $1.0492 \times 10^4$.

Square Root: A divisor of a quantity that when squared (multiplied by itself) gives the quantity. For example, the square roots of 25 are 5 and -5 because $5 \times 5 = 25$ and $(-5) \times (-5) = 25$.

**COMMON PROBLEM SOLVING**

1) **Adding Fractions**
   a. If the denominators (bottom number) are the same, simply add the numerators (top number).
      i. **Example**: $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$
   b. If the denominators are different, you must convert the fractions so they have a common denominator. Then, simply add the numerators.
      i. **Example**: $\frac{1}{2} + \frac{1}{3} = ?$; to find the common denominator identify a number that each denominator will divide into equally (the quickest way is to multiply the denominators). In the example, both the numbers 2 and 3 will equally divide into the number 6. To calculate the new numerators, multiply the original numerators by the same number you used to determine the new denominator. For example, $\left(\frac{1}{2} \times \frac{3}{3}\right) + \left(\frac{1}{3} \times \frac{2}{2}\right) = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$.
2) Subtracting Fractions
   a. If the denominators (bottom number) are the same, simply subtract the numerators (top number).
      i. **Example:** $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$
   b. If the denominators are different, you must convert the fractions so they have a common denominator. Then, simply subtract the numerators.
      i. **Example:** $\frac{2}{7} - \frac{1}{8} = ?$; the easiest way to do this is to simply select the opposite fraction's denominator to use as a top and bottom multiplier. For example, $\frac{2}{7} \times \frac{8}{8} = \frac{16}{56}$ and $\frac{1}{8} \times \frac{7}{7} = \frac{7}{56}$. Now you have a common denominator. Next, simply subtract; $\frac{16}{56} - \frac{7}{56} = \frac{9}{56}$

3) Multiplying Fractions
   a. Unlike adding and subtracting fractions, multiplying fractions does not require common denominators. To multiply fractions simply multiply the numerators (top numbers), and the denominators (bottom numbers), and place the resulting answers in their respective top/bottom location.
      i. **Example:** $\frac{3}{8} \times \frac{1}{2} = \frac{3}{16}$, numerator ($3 \times 1 = 3$) and denominator ($8 \times 2 = 16$).

4) Dividing Fractions
   a. Dividing fractions is a simple, 3-step process. First, turn the second fraction (the one you want to divide by) upside-down (this is now a reciprocal). Next, multiply the first fraction by the reciprocal of the second fraction (to multiply follow the steps in 3) Multiplying Fractions). Lastly, simplify the fraction.
      i. **Example:** $\frac{3}{8} \div \frac{1}{2}$, the reciprocal of $\frac{1}{2}$ is $\frac{2}{1}$. Next multiply the fractions; $\frac{3}{8} \times \frac{2}{1} = \frac{6}{8}$. The fraction $\frac{6}{8}$ can be simplified by dividing the numerator and the denominator by 2; your answer for the equation $\frac{3}{8} \div \frac{1}{2}$ is $\frac{3}{4}$. 
5) **Solving Linear Equations**

a. A **linear equation** is simply an algebraic equation, such as \(10 - 3x = 7\), in which the variables are of the first degree (that is, raised only to the first power). The graph of such an equation is a straight line. To solve an equation for a given variable (such as \(x\) or \(y\)), you need to get all your variables on one side or the other of the equal sign (=) and all your numbers on the other side. "Undo" whatever has been done to the variable. You do this in order to isolate the variable; the result is the **variable equals some number**, where **some number** is the answer you’re looking for.

i. **Steps**

1. Simplify each side, if needed. This involves adding like terms, removing parenthesis ( ), removing fractions, and removing decimals.
2. Use addition/subtraction to isolate the variable on one side of the equal sign and all other terms to the other side.
3. Use multiplication/division to remove any values that are in front of the variable.

ii. **Example:** \(10 - 3x = 7\)

1. **Step 1:** Not needed for this problem
2. **Step 2:** Subtract 10 from each side to isolate the variable
   a. \(10 - 3x - 10 = 7 - 10\)
   b. \(-3x = -3\)
3. **Step 3:** Divide by the co-efficient of the variable
   a. \(\frac{-3x}{-3} = \frac{-3}{-3}\)
   b. \(x = 1\)
6) **Solving a System of Equations - Two Unknowns**

a. A system of equations is simply a collection of two or more equations with a same set of unknowns. This may also be referred to as **simultaneous equations**.

i. **Steps – solve using the Substitution Method**

1. Solve one equation for one variable (put in \( x = \) or \( y = \) form).
2. Substitute this expression into the other equation and solve for the selected variable.
3. Substitute your answer into the first equation and solve.
4. **NOTE:** ALWAYS solve for both variables

ii. **Example:** \(-x + y = 1\)

\[ 2x + y = -2 \]

1. **Step 1:** Solve the first equation for the variable \( y \). In order to isolate the \( y \) variable add \( x \) to each side of the = sign.
   a. \(-x + y + x = 1 + x\)
   b. \( y = 1 + x\)

2. **Step 2:** Substitute this expression \((y = 1 + x)\) into the second equation to solve for the variable \( x \).
   a. \(2x + 1 + x = -2\)
   b. \(3x + 1 = -2; \ subtract \ 1 \ from \ each \ side \ of \ the \ equation\)
   c. \(3x = -3; \ divide \ each \ side \ of \ the \ equation \ by \ 3\)
   d. \(x = -1\)

3. **Step 3:** Substitute your answer into the **Step1b.** equation and solve for the variable \( y \).
   a. \( y = 1 + (-1)\)
   b. \( y = 0\)
7) **Quadratic Equations**

a. A quadratic equation is any equation that can be written in the form 
   \[ ax^2 + bx + c = 0. \]
   i. \( a \) and \( b \) are coefficients and \( c \) is a constant. The one factor that 
      identifies these expressions as **quadratic** is the exponent 2. The first 
      term must always be \( ax^2 \), and \( a \) cannot be 0.
   ii. These may be solved by **factoring**, **completing the square**, or the 
       **quadratic formula**.

b. Solving quadratic equations using the **quadratic formula**, \( x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \)

   i. **Steps**
      1. Substitute your known values (coefficients and constant) into 
         the quadratic formula.
      2. Simplify the formula.
      3. Check by substituting into the original equation.

   ii. **Example**: \( 6x^2 - x - 2 = 0 \)
      1. **Step 1**: Substitution of the known values \( (a = 6, b = -1, c = -2) \)
         \[ x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(6)(-2)}}{2(6)} \]
      2. **Step 2**: Simplify: \( x = \frac{1 \pm \sqrt{49}}{12} \)
         a. \(-(-1)\) is the same as \((-1)(-1)\) and a negative 
            multiplied by a negative makes a positive.
         b. \(-1^2\) is the same as \((-1)(-1) = 1\); 
            \(-4(6)(-2)\) is the 
            same as \(-4 \times 6 \times -2 = -24 \times -2 = 48\); 
            \(\sqrt{1 + 48} = \sqrt{49} \).
         c. \(2(6)\) is the same as \(2 \times 6 = 12\).
         d. Simplify further by calculating the square root of 49; 
            you now have \( x = \frac{1 \pm 7}{12} \).
         e. Because you are working with a + and − symbol in your 
            equation, write this out as two separate equations and 
            solve for \( x \).
            \[ x = \frac{1 + 7}{12} = \frac{8}{12} = \frac{2}{3} \]
            OR
            \[ x = \frac{1 - 7}{12} = \frac{-6}{12} = \frac{-1}{2} \]
3. **Step 3**: Check by substituting into the original equation,
   \[ 6x^2 - x - 2 = 0; \ x = \frac{2}{3}, \]
   a. \( 6 \left( \frac{2}{3} \right)^2 - \frac{2}{3} - 2 = 0 \)
   b. \( 6 \left( \frac{4}{9} \right) - \frac{2}{3} - 2 = 0 \)
   c. \( \frac{24}{9} - \frac{2}{3} - 2 = 0; \ simplify \ \frac{24}{9} \ to \ \frac{8}{3} \)
   d. \( \frac{8}{3} - \frac{2}{3} - 2 = 0 \)
   e. \( \frac{6}{3} - 2 = 0; \ simplify \ \frac{6}{3} \ to \ 2 \)
   f. \( 2 - 2 = 0 \)

**ADDITIONAL MATH HELP**

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