

## COMPASS Math Practice Test

**Directions:** The practice questions in this study guide are separated by mathematical level, similar to how the adaptive COMPASS placement test may ask you questions in different levels, depending on how accurately you answer each question.

To try and place into a college level Math class, **it is recommended that you focus most of your practice in the levels of College Algebra** (pg. 1-2) **and Geometry** (pg. 3-7). However, if you find these practice questions too difficult at first, some easier questions in Intermediate Algebra (pg. 8-9), Elementary Algebra (pg. 10-11), and Pre-Algebra (pg. 12-13) are provided for extra practice before moving on to College Algebra/Geometry.

**Tip:** You are not limited to this one study guide as a form of test practice. We also recommend [Khanacademy.org](https://www.khanacademy.org) and [Mathhelp.com](https://www.mathhelp.com) for online/interactive practice.

## College Algebra Placement Practice

- For  $i = \sqrt{-1}$ , if  $3i(2 + 5i) = x + 6i$ , then  $x =$  ?  
 A. -15      B. 5      C.  $5i$       D.  $15i$       E.  $27i$
- 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.  $3x - 12$
- What is the next term in the geometric sequence  $16, -4, 1, -\frac{1}{4}, \dots$ ?  
 A.  $-\frac{1}{8}$       B. 0      C.  $\frac{1}{16}$       D.  $\frac{1}{8}$       E.  $\frac{1}{2}$
- 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. 64      E. 70
- For the two functions,  $f(x)$  and  $g(x)$ , tables of values are shown below. What is the value of  $g(f(3))$ ?  

$x$	$f(x)$
-5	7
-2	-5
1	3
3	2

$x$	$g(x)$
-2	3
1	-1
2	-3
3	-5

- A. -5      B. -3      C. -1      D. 2      E. 7

- For positive real numbers  $x$ ,  $y$ , and  $z$ , which of the following expressions is equivalent to  $x^{1/2}y^{2/3}z^{5/6}$ ?

- 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.  $\sqrt[11]{xy^2z^5}$

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

8. Listed below are 5 functions, each denoted  $g(x)$  and each involving a real number constant  $c > 1$ . If  $f(x) = 2^x$ , 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.  $g(x) = \log_c x$
9. 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
10. The imaginary number  $i$  is defined such that  $i^2 = -1$ . What does  $i + i^2 + i^3 + \dots + i^{23}$  equal?
- A.  $i$       B.  $-i$       C.  $-1$       D.  $0$       E.  $1$
11. 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, and the last term is 136, and the sum is 1,390, what are the first three 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

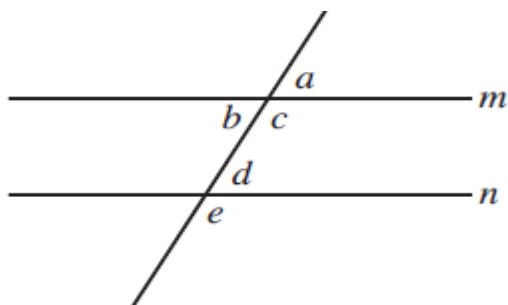
### Correct Answer Choices for Sample College Algebra Questions

1. A	2. E	3. C	4. E	5. B	6. D
7. E	8. A	9. E	10. C	11. A	

## Geometry Placement Practice

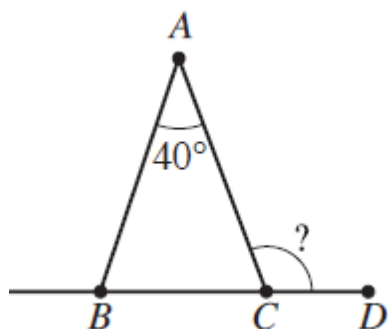
This document provides practice problems to complete as you prepare to take the placement test for Geometry at Heartland Community College. The questions are from the COMPASS website, © 2014 ACT, Inc.

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?



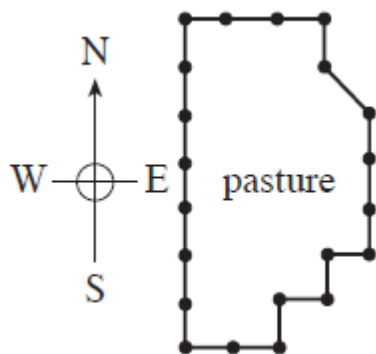
- A.  $\angle a$ ,  $\angle b$ ,  $\angle d$
- B.  $\angle a$ ,  $\angle c$ ,  $\angle d$
- C.  $\angle a$ ,  $\angle c$ ,  $\angle e$
- D.  $\angle b$ ,  $\angle c$ ,  $\angle d$
- E.  $\angle b$ ,  $\angle c$ ,  $\angle e$

2. As shown in the figure below,  $\triangle ABC$  is isosceles with the length of  $\overline{AB}$  equal to the length of  $\overline{AC}$ . 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 one section of fence run straight north-south or east-west. Consecutive fence posts are 10 feet apart except for the one diagonal section. Which of the following statements best describes P, the perimeter of the pasture, in feet?

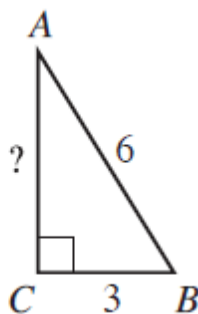


- A.  $P > 210$
- B.  $P = 210$
- C.  $P < 210$
- D.  $P > 230$
- E.  $P = 240$

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?

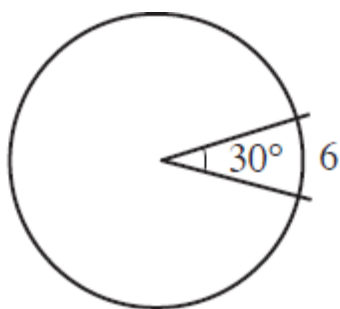
- A. 7
- B. 9
- C. 12
- D.  $5\sqrt{7}$
- E. 16

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



- 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?

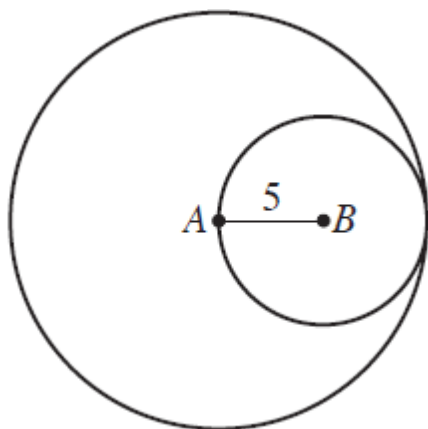


- A.  $\frac{\pi}{36}$   
 B.  $\frac{1}{5}$   
 C.  $\pi$   
 D.  $\frac{36}{\pi}$   
 E. 180

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.)

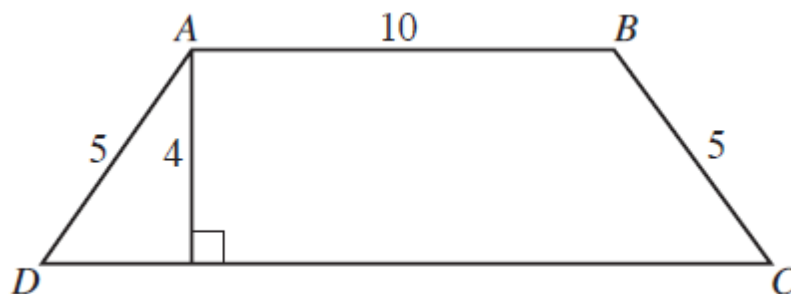
- A. 8  
 B. 9  
 C. 10  
 D. 11  
 E. 12

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  $\overline{AB}$  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?



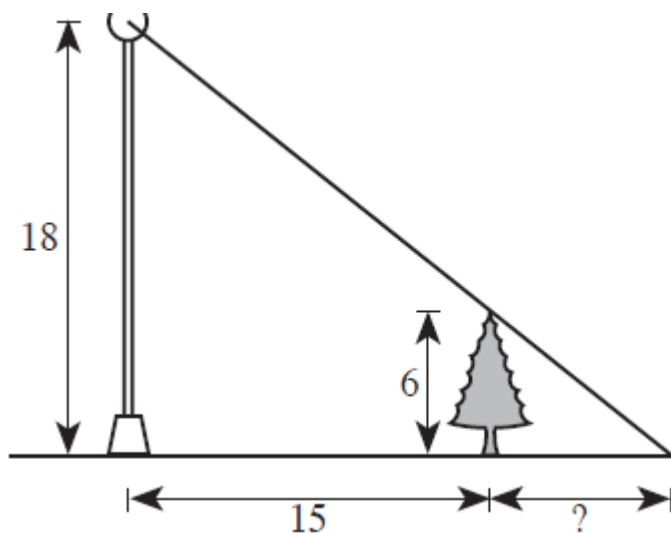
- A.  $10\pi$   
 B.  $25\pi$   
 C.  $75\pi$   
 D.  $100\pi$   
 E.  $300\pi$

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



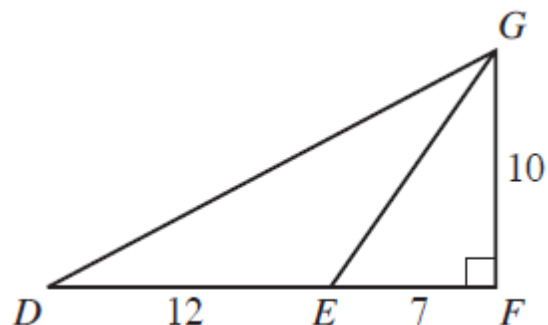
- A. 36
- B. 52
- C. 64
- D. 65
- E. 104

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

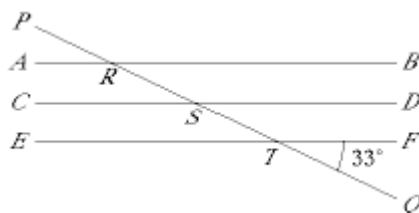
11. In the figure below, the lengths of  $\overline{DE}$ ,  $\overline{EF}$ , and  $\overline{FG}$  are given, in units. What is the area, in square units, of  $\triangle DEG$ ?



- A.** 29  
**B.** 47.5  
**C.** 60  
**D.**  $6\sqrt{149}$   
**E.** 120

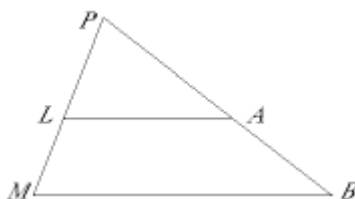
12. In the figure below  $\overline{AB}$ ,  $\overline{CD}$ , and  $\overline{EF}$  are parallel, and  $\overline{PQ}$  intersects all 3 lines at points R, S, and T, respectively. If the measure of  $\angle QTF$  is  $33^\circ$ , what is the measure of  $\angle PRB$ ?

- A.**  $33^\circ$   
**B.**  $57^\circ$   
**C.**  $66^\circ$   
**D.**  $123^\circ$   
**E.**  $147^\circ$



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

- A.**  $\frac{5}{8}$   
**B.**  $\frac{2}{3}$   
**C.**  $\frac{8}{5}$   
**D.**  $\frac{5}{3}$   
**E.**  $\frac{3}{5}$



**Answers:**

- |             |              |
|-------------|--------------|
| 1. <b>A</b> | 8. <b>C</b>  |
| 2. <b>C</b> | 9. <b>B</b>  |
| 3. <b>A</b> | 10. <b>B</b> |
| 4. <b>C</b> | 11. <b>C</b> |
| 5. <b>B</b> | 12. <b>E</b> |
| 6. <b>D</b> | 13. <b>C</b> |
| 7. <b>A</b> |              |



## Intermediate Algebra Placement Practice (MATH 093)

- For  $\neq -4$ , which of the following is equivalent to the expression  $\frac{x^2+12x+32}{x+4}$  ?  
 A.  $x + 3$       B.  $x + 8$       C.  $x + 11$       D.  $x + 16$       E.  $x + 28$
- Which of the following is a simplified expression equal to  $\frac{9-x^2}{x-3}$  ?  
 A.  $3x$       B.  $x + 3$       C.  $x - 3$       D.  $-x + 3$       E.  $-x - 3$
- 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.  $\frac{2}{3}$
- 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  $\overline{AB}$  ?  
 A.  $(-6, 1)$       B.  $(-4, -1)$       C.  $(-4, 3)$       D.  $(-2, 1)$       E.  $(8, 1)$
- 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.  $-3a^3b^3 + 2a^4b$
- For all nonzero  $r$ ,  $t$ , and  $z$  values,  $\frac{16r^3tz^5}{-4rt^3z^2} = ?$   
 A.  $-\frac{4z^3}{t^2r^2}$       B.  $-\frac{4r^2z^3}{t^2}$       C.  $-\frac{4rz}{t}$       D.  $-4r^4t^4z^7$       E.  $-4r^2t^2z^3$
- 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.  $5$
- 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.  $\frac{x}{3x-y}$

9. 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
10. 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 per 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,  

$$\text{THR} = \text{RHR} + 0.65(\text{MHR} - \text{RHR})$$
  
 Which of the following is the 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
11. 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
12. 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.  $\frac{r+3}{r+2}$
13. Write 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.  $y = -x + 4$

### Correct Answer Choices for Sample Intermediate Algebra Questions

1. B	2. E	3. D	4. E	5. A	6. B
7. C	8. A	9. D	10. B	11. A	12. E

## Elementary Algebra Placement Practice (MATH 092)

1. 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.  $3.60 \times 10^{12}$
2. 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.  $16 < x < 81$
3. What value of  $x$  solves the following proportion?  $\frac{9}{6} = \frac{x}{8}$   
A.  $5\frac{1}{3}$     B.  $6\frac{3}{4}$     C.  $10\frac{1}{2}$     D. 11    E. 12
4. 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.  $\frac{bx}{y}$
5. 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
6. 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%
7. 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
8. 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
9. 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.  $x + 10$

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

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

11. 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.  $h = 0.75(220 - a)$       B.  $h = 0.75(220) - a$       C.  $h = 220 - 0.75a$   
 D.  $0.75h = 220 - a$       E.  $220 = 0.75(h - a)$

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

- A.  $2$       B.  $1$       C.  $-1$       D.  $-2$       E.  $-10$

13. 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.  $8x + 7(325) = 15(350)$

14. 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.  $x - 1$

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

- A.  $16ab$       B.  $-3a + b$       C.  $-3a + 7b$       D.  $9a + b$       E.  $9a + 7b$

### Correct Answer Choices for Sample Elementary Algebra Questions

1. E	2. E	3. E	4. D	5. E	6. B	7. B	8. D
9. A	10. E	11. A	12. C	13. E	14. B	15. E	

## Prealgebra Placement Practice (MATH 091)

This document provides practice problems to complete as you prepare to take the placement test for Geometry at Heartland Community College. The questions are from the COMPASS website, © 2014 ACT, Inc. (<http://www.act.org/compass/sample/math.html>)

1.  $54 - 6 \div 2 + 6 = ?$   
A. 6                      B. 24                      C. 27                      D. 30                      E. 57
2. The lowest temperature on a winter morning was  $-8^{\circ}\text{F}$ . Later that same day the temperature reached a high of  $24^{\circ}\text{F}$ . By how many degrees Fahrenheit did the temperature increase?  
A.  $3^{\circ}$                       B.  $8^{\circ}$                       C.  $16^{\circ}$                       D.  $24^{\circ}$                       E.  $32^{\circ}$
3. If  $\left(\frac{3}{4} - \frac{2}{3}\right) + \left(\frac{1}{2} + \frac{1}{3}\right)$  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. 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.  $6\frac{4}{5}$

8. 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 in order to make a profit of \$36.00?
- A. 12                      B. 20                      C. 30                      D. 60                      E. 108
9. 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.  $10\frac{5}{6}$
10. 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

### Correct Answer Choices for Sample Pre-algebra Questions

16. E  
17. E  
18. B  
19. C  
20. A  
21. B  
22. C  
23. C  
24. A  
25. B