

Sample Questions for Incoming Freshman Mathematics Assessment

General Comments on the Examination

The mathematics assessment is designed to cover a range of topics from basic arithmetic to more advanced algebra. While the typical incoming student will be familiar with the majority of the topics, it is likely that some questions will be unfamiliar. We do not expect for a student to answer every question.

Based on this assessment, students will be placed in one of the following three courses:

- (a) Algebra 1
- (b) Algebra 1 Honors
- (c) Algebra 2 Honors

A calculator is not permitted on this assessment.

Pre-Algebra Content:

- *Students seeking to test directly into Algebra 1 Honors should be able to answer at least 35 of the following questions correctly.*

1. Simplify each of the following rational expressions (without a calculator).

- | | | | |
|--------------------------------|--|---|--|
| a. $\frac{102}{70}$ | b. $\left(-\frac{6}{5}\right)\left(-\frac{11}{8}\right)$ | c. $\left(-\frac{13}{9}\right) \div 6$ | d. $\left(-\frac{1}{10}\right) \div \left(\frac{3}{2}\right) \cdot \left(-\frac{35}{9}\right)$ |
| e. $\frac{1}{5} + \frac{3}{4}$ | f. $6 - \frac{8}{7}$ | g. $\left(-\frac{5}{7}\right) - \frac{15}{8}$ | h. $\frac{3}{2} + \frac{9}{7} - \frac{1}{4}$ |
| i. $0.02 + 0.13497$ | j. $\frac{3}{8} - 0.02$ | k. $(0.1)(0.001)$ | l. $\frac{0.03}{0.0039}$ |

2. Simplify each of the following using order of operations (without a calculator).

- | | | |
|-------------------------------|------------------------------------|---|
| a. -4^2 and $(-4)^2$ | b. $(-6 \div 6)^3$ | c. $8 - 4 \cdot 2^3 + 10 \div 5$ |
| d. $4 - 2 \mid 3^2 - 16 \mid$ | e. $(-7 - 5) \div [-2 - 2 - (-6)]$ | f. $\frac{5 + 3^2 - 24 \div 6 \cdot 2}{[5 + 3(2^2 - 5)] + \mid 2^2 - 5 \mid^2}$ |

3. Answer each of the following percentage / proportion questions (without a calculator).

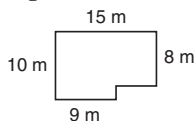
- a. What is 10% of 765?
- b. What is 31% of 250?
- c. If 200 is increased by 130 percent, what is the resulting number?
- d. What number is $\frac{7}{13}$ of 143?
- e. What percentage of 300 is 15?
- f. Originally there were only 13 states, but now there are 50 states. What percentage of the states are the original states?
- g. If a is 11% of 80 and b is double 10% of a , find b .

4. Simplify each of the following expressions.

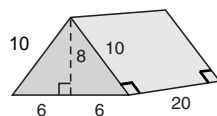
- | | | |
|--------------------------|-------------------------|-------------------------------|
| a. $n + n + 6 - 4n + 11$ | b. $1 - r - 6$ | c. $1 + 8m(5 - m)$ |
| d. $2y(5 - 6y)$ | e. $-4k^2 - 8k(8k + 1)$ | f. $-2r(1 + 4r) + 8r(-r + 4)$ |

5. Basic Geometry: You may omit units. Give answers in terms of π when appropriate.

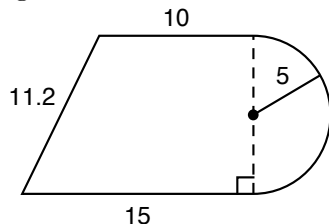
- a. Find the (i) area and (ii) perimeter of the figure.



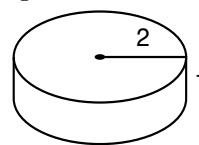
- b. Find the (i) surface area and (ii) volume of the figure below.



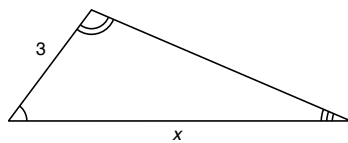
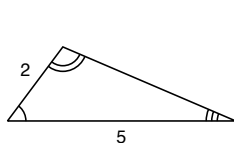
- c. Find the (i) area and (ii) perimeter of the figure below.



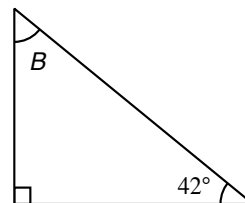
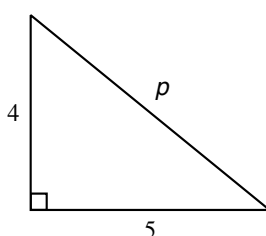
- d. Find the (i) volume and (ii) surface area of the figure below:



- e. Find the value of x .



- f. Find the values of (i) p and (ii) B .



6. Solve the following equations (without a calculator).

a. $4 - x = 8$

b. $3x - 5x + 2 = 8$

c. $5y - 6 = 4 - 10(y - 3)$

d. $-8b = 120$

e. $-15 = \frac{a}{9}$

f. $\frac{x-4}{7} = \frac{3}{5}$

g. $\frac{m}{4} - 1 = -2$

h. $2(x - 5) = 5(x - 2)$

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

Algebra One Content:

- Students seeking to test directly into Algebra 1 Honors should be able to answer at least 8 of the following questions correctly.
- Students seeking to test directly into Algebra 2 Honors should be able to answer at least 20 of the following questions correctly.

1. Simplify: $7x - 3(5x + 2) - 6(7 + 2x)$

2. Subtract $(14x^2 - x + 3)$ from $(3x^2 - 5x - 2)$.

3. Subtract: $1 - \frac{x+y}{x-y}$

4. Solve for x : $3bx - 5c = 7bx + 4c$

5. Solve for x : $-5|3x - 5| = -10$

6. Solve: $5(2 - 3x) \geq 4 - 3(4x + 7)$

7. Solve the system: $\begin{cases} 4x + 3y = 1 \\ 6x - 2y = 21 \end{cases}$
8. Find the slope, x -intercept, and y -intercept of the linear equation: $5x - 3y = 11$.
9. Write the equation of the line that passes through the points (6, -10) and (-3, 11) in slope-intercept form.
10. What is the equation of the vertical line that passes through (5, 8)?
11. Are these two lines parallel, perpendicular, or neither? $\begin{matrix} 4x = 5y + 10 \\ 15x - 36 = -12y \end{matrix}$
12. Multiply and simplify: $(2x + 3)(4x^2 - 9x - 13)$
13. Multiply and simplify: $(3x - 10)(4x + 7) + (2x + 5)(6x + 8)$
14. Simplify: $\frac{9x^{-6}y^{11}}{21x^{-4}y^{-5}}$
15. Find the missing factors: $(3x^3y^2)^2(?) (4xy^4) = (-180x^{11}y^{13})$
16. Factor completely: $40x^3 + 34x^2 - 20x$
17. Solve for x : $2x^2 + 7x = 15x$
18. Solve for x : $\frac{3}{x+2} = \frac{x-8}{13}$
19. Simplify: $\frac{3x^2 - 19x - 14}{6x^2 - 11x - 10}$
20. A school sold 300 tickets for a school play and collected a total of \$1150. Student tickets cost \$3.00 and adult tickets cost \$5.00. How many students attended the play?
21. The difference between two numbers is 29. If five times the smaller is subtracted from twice the larger, the result will be one. What is the larger number?
22. In the school election, votes were cast for Sam, Mary, and Bill in the ratio 4:3:2. If a total of 2178 votes were cast, how many votes did Mary receive?
23. A class has 24 boys and 16 girls. On a test the class mean was 75. The mean of the girls' score was 72. What was the mean of the boys' scores?
24. The measure of the second angle of a triangle is seven more than twice the measure of the first. The third angle is fifteen less than the first. Find the measures of all the angles.

Pre-Algebra Content:

1. Rational expressions
 - a. $51/35$
 - b. $33/20$
 - c. $-13/54$
 - d. $7/27$
 - e. $19/20$
 - f. $34/7$
 - g. $-145/56$
 - h. $71/28$
 - i. 0.15497
 - j. 0.355
 - k. 0.0001
 - l. $100/13$
2. Order of operations
 - a. $-16, 16$
 - b. -1
 - c. -22
 - d. -10
 - e. -6
 - f. 2
3. Percentages
 - a. 76.5
 - b. 77.5
 - c. 460
 - d. 77
 - e. 5%
 - f. 26%
 - g. 1.76

Pre-Algebra Content:

4. Simplify Expressions
 - a. $-2n + 17$
 - b. $-r - 5$
 - c. $1 + 40m - 8m^2$
 - d. $10y - 12y^2$
 - e. $-68k^2 - 8k$
 - f. $30r - 16r^2$
5. Basic Geometry
 - a. (i) 138; (ii) 50
 - b. (i) 736; (ii) 960
 - c. (i) $125 + 12.5\pi$;
(ii) $36.2 + 5\pi$
 - d. (i) 4π ; (ii) 12π
 - e. 7.5
 - f. (i) $\sqrt{41} \approx 6.403$;
(ii) 48°
6. Solve the equations
 - a. $x = -4$
 - b. $x = -3$
 - c. $y = 8/3$
 - d. $b = -15$
 - e. $a = -135$
 - f. $x = 41/5$
 - g. $m = -4$
 - h. $x = 0$
 - i. $x = 1$

Algebra One Content

1. $-20x - 48$
2. $-11x^2 - 4x - 5$
3. $-\frac{2y}{x-y}$

Algebra One Content

4. $-\frac{9c}{4b}$
5. $x_1 = \frac{7}{3}$ or $x_2 = 1$
6. $x \leq 9$
7. $x = \frac{5}{2}$ or $y = -3$
8. $m = \frac{5}{3}, \left(0, -\frac{11}{3}\right), \left(\frac{11}{5}, 0\right)$
9. $y = -\frac{7}{3}x + 4$
10. $x = 5$
11. perpendicular
12. $8x^3 - 6x^2 - 53x - 39$
13. $24x^2 + 27x - 30$
14. $\frac{3y^{16}}{7x^2}$
15. $-5x^4y^5$
16. $2x(4x+5)(5x-2)$
17. $x_1 = 0$ or $x_2 = 4$
18. $x_1 = -5$ or $x_2 = 11$
19. $\frac{x-7}{2x-5}$
20. 175
21. 48
22. 726
23. 77
24. $47^\circ, 101^\circ, 32^\circ$