

Sample Algebra Proficiency Exam

Please do not use a calculator. Answer the questions in the spaces provided. Write your answers in the simplest form possible. Please give yourself two hours to complete the exam.

1. Order the following numbers from least to greatest: $0, -574, 3, 8, -20$.
2. Order the following numbers from greatest to least: $e, 2.719, 2.717$. (The value of e is $2.71828 \dots$).
3. Evaluate $5.000 + 0.0012 + (-0.2)$.
4. Evaluate $\sqrt{25}$.
5. What is one-fifth of five-sixths?

6. Write as a decimal and as a percentage: $20/50$.

7. Simplify: $2(3^2 + 4)$.

8. Simplify: $\sqrt{4x^4}$.

9. Simplify: $\sqrt{9x^2 - 6x + 1}$.

10. Expand: $(2x - 3)(x^2 - 2)$

11. Simplify (assuming $z \neq 0, z \neq \pm 2$):

$$\frac{4z^6 - 16z^4}{z^3(4z^2 - 2^4)}$$

12. Simplify (assuming $x \neq 1$):

$$\frac{x^2 - 1}{x - 1}$$

13. Simplify:

$$\frac{\left(\frac{4}{3x}\right)}{\left(\frac{3}{4x}\right)}$$

14. Solve for S : $999 + S = 99$

15. Solve for x and y :

$$\begin{aligned} 9y &= 108 \\ 3x &= (y + 6)/2. \end{aligned}$$

16. Let $x = 50$, solve for y : $y - 50 = (x/10)^2 - 2$.

17. Solve for u and v :

$$5u + 6v = 10$$

$$2u - 6v = 4.$$

18. Solve for a and b :

$$a + b/2 = 11$$

$$2a + 2b = 25.$$

19. Solve for x : $x^2 - 81 = 0$.

20. Solve for x : $6x^2 - 54 = 0$.

21. Solve for x : $5x^2 - 15x - 50 = 0$.

22. Find the values of a , b and c : $(3x - 2)^2 = ax^2 + bx + c$.

23. Let $y = 2x^2 + 4x - 5$

(a) Find y when $x = 2$.

(b) Find y when $x = -3$.

24. True or False:

(a) $-2x > -5x$ when $x < 0$.

(b) $x^2 = |x|^2$ for any real number x .

(c) $(x - 1)(x - 1) = x^2 - 2x - 1$.

(d) $x - y = y - x$ if $x = -y$.

(e) $x^2 < x$ if $x < 0$

(f) $(-4)^2 \neq 4^2$.

25. Write an equation of the line with slope equal to -3 and intercept equal to 10.

26. In the equation $2y = mx + b$.

(a) What is the intercept equal to?

(b) What is the slope?

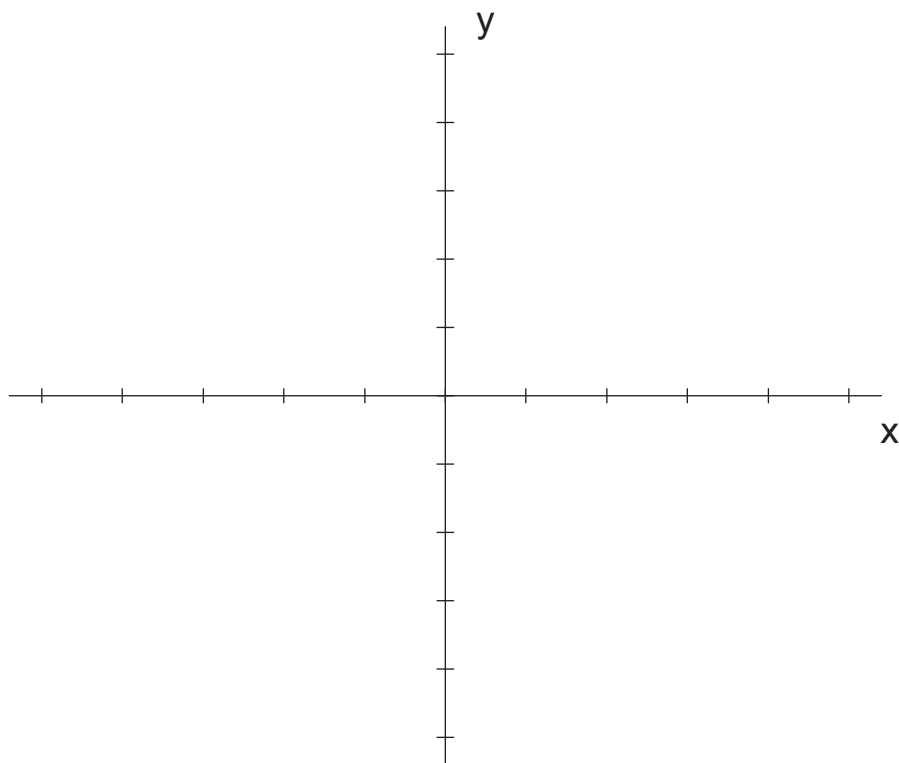
27. Simplify: $2^{-2}, 2^4, 4^2$

28. Suppose that you buy four ball point pens that cost \$0.41 each, one eraser that costs \$1.28, and a dozen pencils. Suppose that the total cost is \$4.00.

(a) How much does one pencil cost?

(b) Michigan sales tax is 6%. How much tax do you owe on the \$4.00?

29. Graph the line described by $y = 1.5x + (-3)$.



**Sample Algebra Proficiency Examination
Answer Key**

Please grade yourself using this answer key. Score $\frac{1}{2}$ point for each correct true/false question in problem 24, and 1 point for every other question, so that the total possible score is 31. If you score 26.5 or more points, then you are likely to be prepared for taking Biostatistics 503. If you score between 22 and 26 points, you may find Biostatistics 503 difficult unless you review elementary algebra before enrolling in the course. Several review books are recommended at the end of this answer key. If you score less than 22 points, then you probably do not have adequate preparation for taking Biostatistics 503. We strongly urge you to study algebra using one of the books listed below or to enroll in an algebra course at a local community college.

1. Order the following numbers from least to greatest: 0, -574 , 3, 8, -20 .
 $-574, -20, 0, 3, 8$.
2. Order the following numbers from greatest to least: e , 2.719, 2.717. (The value of e is 2.71828... \dots).
 $2.719, e, 2, 717$.
3. Evaluate $5.000 + 0.0012 + (-0.2)$.
 4.8012 .
4. Evaluate $\sqrt{25}$.
5. (\pm OK)
5. What is one-fifth of five-sixth?
 $\frac{1}{6}$.
6. Write as a decimal and as a percentage: $\frac{20}{50}$.
.4 and 40%.
7. Simplify: $2(3^2 + 4)$.
26.
8. Simplify: $\sqrt{4x^4}$.
 $2x^2$. (\pm OK)
9. Simplify: $\sqrt{9x^2 - 6x + 1}$.
 $(3x - 1)$. (\pm OK)
10. Expand: $(2x - 3)(x^2 - 2)$
 $2x^3 - 3x^2 - 4x + 6$.

11. Simplify (assuming $z \neq 0$):

$$\frac{4z^6 - 16z^4}{z^3(4z^2 - 2^4)}$$

z .

12. Simplify (assuming $x \neq 0$):

$$\frac{x^2 - 1}{x - 1}$$

$x + 1$.

13. Simplify:

$$\frac{\left(\frac{4}{3x}\right)}{\left(\frac{3}{4x}\right)}$$

$16/9$ or $1\frac{7}{9}$.

14. Solve for S : $999 + S = 99$

$S = -900$.

15. Solve for x and y :

$$\begin{aligned} 9y &= 108 \\ 3x &= (y + 6)/2. \end{aligned}$$

$y = 12$, $x = 3$.

16. Let $x = 50$, solve for y : $y - 50 = (x/10)^2 - 2$.

$y = 73$.

17. Solve for u and v :

$$\begin{aligned} 5u + 6v &= 10 \\ 2u - 6v &= 4. \end{aligned}$$

$u = 2$, $v = 0$.

18. Solve for a and b :

$$\begin{aligned} a + b/2 &= 11 \\ 2a + 2b &= 25. \end{aligned}$$

$a = 19/2$ or $9\frac{1}{2}$, $b = 3$.

19. Solve for x : $x^2 - 81 = 0$.

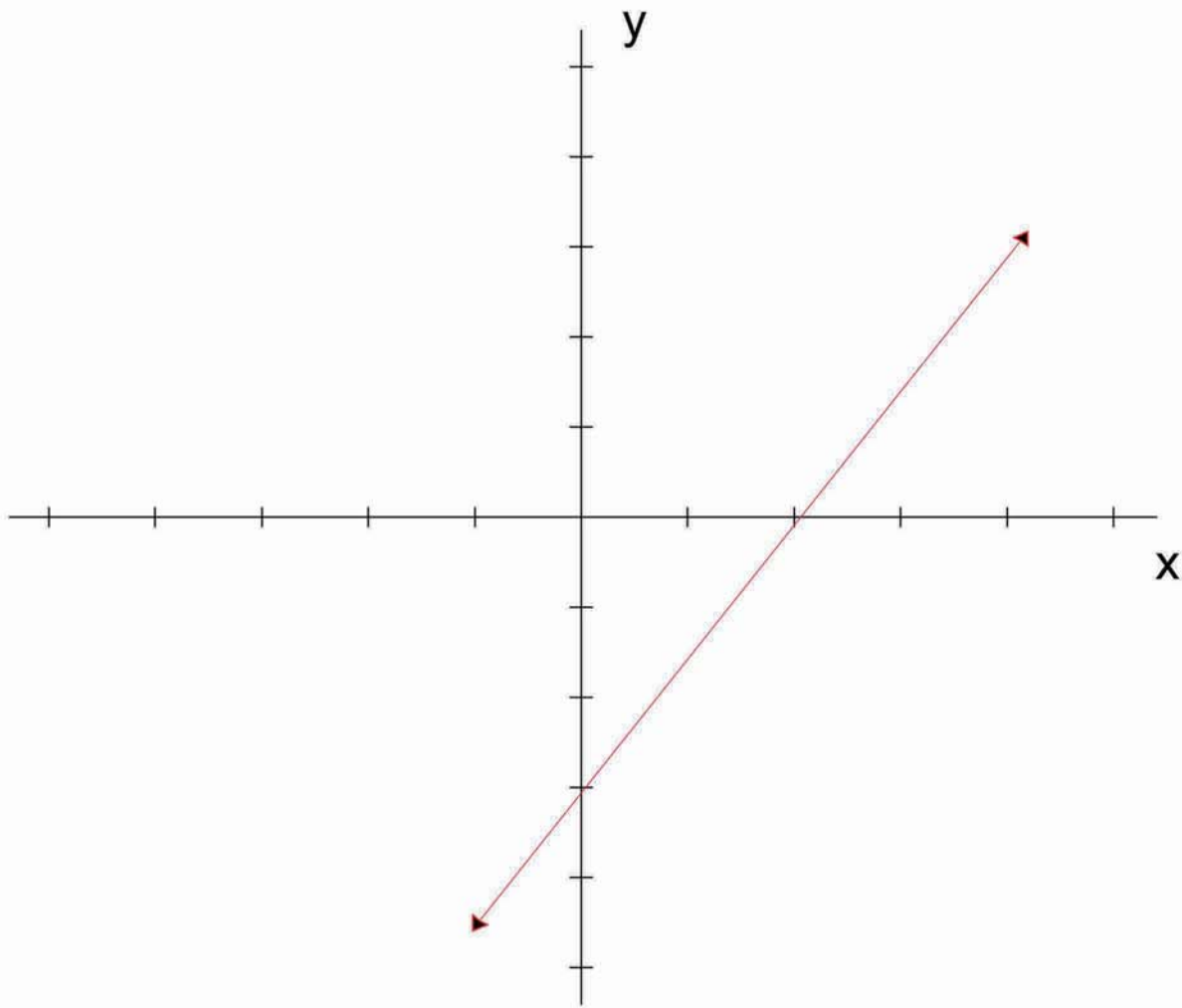
$x = \pm 9$. (\pm required)

20. Solve for x : $6x^2 - 54 = 0$.

$x = \pm 3$. (\pm required)

21. Solve for x : $5x^2 - 15x - 50 = 0$.
 $x = -2, 5$.
22. Find the values of a , b and c : $(3x - 2)^2 = ax^2 + bx + c$.
 $a = 9, b = -12, c = 4$.
23. Let $y = 2x^2 + 4x - 5$ (2 pts)
(a) Find y when $x = 2$. $y = 11$.
(b) Find y when $x = -3$. $y = 1$.
24. True or False: (6 pts)
(a) $-2x > -5x$ when $x < 0$. **F**.
(b) $x^2 = |x|^2$ for any real number x . **T**.
(c) $(x - 1)(x - 1) = x^2 - 2x - 1$. **F**.
(d) $x - y = y - x$ if $x = -y$. **F**.
(e) $x^2 < x$ if $x < 0$. **F**.
(f) $(-4)^2 \neq 4^2$. **F**.
25. Write an equation of the line with slope equal to -3 and intercept equal to 10.
 $y = -3x + 10$.
26. In the equation $2y = mx + b$. (2 pts)
(a) What is the intercept equal to? $b/2$.
(b) What is the slope? $m/2$.
27. Simplify: $2^{-2}, 2^4, 4^2$ (3 pts)
 $1/4, 16, 16$.
28. Suppose that you buy four ball point pens that cost \$0.41 each, one eraser that costs \$1.28, and a dozen pencils. Suppose that the total cost is \$4.00. (2 pts)
(a) How much does one pencil cost? **\$0.09**.
(b) Michigan sales tax is 6%. How much tax do you owe on the \$4.00?
\$0.24.

29. Graph the line described by $y = 1.5x + (-3)$.



Recommended Tutorial Reviews

- Downing, Douglas. Algebra the Easy Way, Second Edition. Barron's Educational Series, Inc., Woodbury, NY (1989).
- Slavin, Steven. Practical Algebra. Self-Teaching Guides. Second Edition, John Wiley and Sons, NY (1991).

Score: _____