The following problems are examples involving the mathematics that you should know to answer the actual Math Skills Placement Test questions. The use of a calculator is not permitted.

Perform the indicated operations. Leave fractions as fractions or mixed number, in lowest terms. Leave decimals as decimals.

1. $5\frac{1}{3} - 3\frac{4}{7}$

2. $15 \times 3\frac{1}{3}$

3. Simplify $\frac{9}{0.06}$

4. 1.3×0.58

5. $\frac{5}{9} + \frac{2}{5} + \frac{1}{3}$

6. $\frac{5}{8} - \frac{1}{5}$

7. $7.4 - 12.38 + 0.167$

8. What is 84 divided by 0.42?

9. $0.47 + \frac{1}{5}$

10. $6\frac{3}{4} \div \frac{2}{3}$

11. What is 38% of 120?

12. 15 is what percent of 24?

13. 40% of what number is 11?

14. $5 - 8(7 - 4)$

15. $-7(-5) + 3(-2)$

16. $-39 - (-16) + 14$

17. Express $\frac{12}{65}$ as a decimal to the nearest thousandth (i.e., rounded to 3 decimal places).

18. $\dfrac{(-3)^2 - (-4)(2^4)}{5 \times 2 - (-2)^3}$

19. Simplify $\sqrt{0.0009}$

20. $\left(\sqrt{4}\right)(2)^{-1} - 8^0$

21. Express the number 1468 in scientific notation.

22. Express the number 12.78×10^{-3} as a decimal number.

Simplify the following algebraic expressions.

23. $(-2x^4y^3)^5$

24. $(3x - 6)(2x + 5)$

25. $2(x - 3y) - 3(2x + 4y)$

26. $(3x^2 - 4x + 5) - (2x^2 - 3x - 5)$

27. $(2x - 1)(3x^2 + 2x - 5)$

28. $(x + 2y)^2$

29. $(2x^2 - 7x - 15) \div (2x + 3)$

30. $\dfrac{18b^4}{6b^3}$

31. $\dfrac{x^2 + x - 6}{x^2 + 8x + 15}$

32. $\dfrac{2y^2 + 8xy}{2y}$

33. Subtract and simplify $\dfrac{1}{x} - \dfrac{2 - x}{3}$

> A square root is simplified if the number inside the radical does not have any perfect square factor other than 1. For example $\sqrt{18}$ is not simplified, since 9 is a factor of 18, but $4\sqrt{3}$ is simplified.

34. Multiply and simplify $\sqrt{12}(3\sqrt{2} - \sqrt{3})$.

35. Factor $x^2 - x - 56$.

36. Solve for x: $3x - 4(x - 2) = 10$

37. Solve for x: $3x^2 - 11x = 4$

38. Solve for x: $7x - 8 = 4x - 4$

39. Solve for x: $\frac{3}{7}x = 20$

40. Solve for a: $\dfrac{a - 2}{3} = \dfrac{3a + 1}{2}$.

41. Solve the system of equations
$$\begin{cases} 2x & - & y & = & -4 \\ 3x & + & 2y & = & 8 \end{cases}$$

42. Solve the system of equations
$$\begin{cases} 2x + 6y = 5 \\ y = 7x - 1 \end{cases}$$

43. Louis has \$7.60 in dimes and quarters. If he has 40 coins, how many of each type of coin does he have?

44. A piece of rope 75 feet long is cut into two pieces. One piece is 4 times as long as the other. What are the lengths of the two pieces?

45. A 3 inch line segment represents a distance of 20 miles on a map that is drawn to scale. What is the actual distance between two cities that are $7\frac{1}{2}$ inches apart?

46. A straight line that goes through the points $(6, -1)$ and $(-4, 4)$ also goes through the point $(40, y)$. Determine the value of y.

1. $\frac{37}{21}$ or $1\frac{16}{21}$

2. 50

3. 150

4. 0.754

5. $\frac{58}{45}$ or $1\frac{13}{45}$

6. $\frac{17}{40}$

7. -4.813

8. 200

9. 0.67 or $\frac{67}{100}$

10. $\frac{81}{8}$ or $10\frac{1}{8}$

11. 45.6

12. 62.5%

13. 27.5

14. -19

15. 29

16. -9

17. 0.185

18. $\frac{73}{18}$ or $4\frac{1}{18}$

19. 0.03

20. 0

21. 1.468×10^3

22. 0.01278

23. $-32x^{20}y^{15}$

24. $6x^2 + 3x - 30$

25. $-4x - 18y$

26. $x^2 - x + 10$

27. $6x^3 + x^2 - 12x + 5$

28. $x^2 + 4xy + 4y^2$

29. $x - 5$

30. $3b$

31. $\dfrac{x-2}{x+5}$

32. $y + 4x$

33. $\dfrac{x^2 - 2x + 3}{3x}$

34. $6\sqrt{6} - 6$

35. $(x - 8)(x + 7)$

36. $x = -2$

37. $x = -\frac{1}{3}$ or $x = 4$

38. $x = \frac{4}{3}$

39. $\frac{140}{3}$ (or $46\frac{2}{3}$)

40. $a = -1$

41. $(0, 4)$

42. $\left(\frac{1}{4}, \frac{3}{4}\right)$

43. 16 dimes, 24 quarters

44. 15 feet and 60 feet

45. 50 miles

46. $y = -18$

Math and Science majors should be able to solve all problems listed in the Math Skills Practice, as well as the problems listed in this practice. These problems are examples involving the mathematics that you should know to answer the actual Placement Test questions. The use of a calculator is not permitted.

Multiply and simplify:

1. $(1 + \sqrt{a})^2$

2. $3x^2y(2xy^4)^3$

3. $(x^2 + 2y + 5)(3x^2 - y - 7)$

Perform the indicated operation and simplify:

4. $2\sqrt{12} - 7\sqrt{3}$

5. $\dfrac{9}{x+2} - \dfrac{3+2x}{x}$

6. $-\left| -\frac{3}{7} + \frac{2}{9} \right|$

7. $|17 - 45|$

8. Solve the system of equations
$$\begin{cases} 2x & + & y & = & 7 \\ 3x & - & 2y & = & 4 \end{cases}$$

9. Solve the inequality: $4 - (x - 6) \geq 10$

10. Solve for x: $2x^2 + 5x = 12$.

11. Factor: $z^2 - 11zx + 10x^2$.

12. Factor as a product of irreducible factors: $6a^5 - 21a^4 - 45a^3$.

13. Write the equation for the line through the point $(4, -1)$ which is perpendicular to the line $2x - y = 6$

14. The length of a rectangle is 10 feet greater than its width. If the perimeter is 170 feet, find the dimensions of the rectangle.

15. Tom has grades of 84 and 98 on his first two history tests. What must he score on his third test so that his average is 90?

1. $1 + 2\sqrt{a} + a$

2. $24x^5 y^{13}$

3. $3x^4 + 5x^2 y + 8x^2 - 2y^2 - 19y - 35$

4. $-3\sqrt{3}$

5. $\dfrac{-2(x^2 - x + 3)}{x(x + 2)}$

6. $-\frac{13}{63}$

7. 28

8. $\left(\frac{18}{7}, \frac{13}{7} \right)$

9. $x \leq 0$

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

11. $(z - 10x)(z - x)$ or $(10x - z)(x - z)$ (Either form is acceptable.)

12. $3a^3 (2a + 3)(a - 5)$

13. $y = -\frac{1}{2}x + 1$ or $x + 2y = 2$ (Either form is acceptable.)

14. Width $=37.5$ feet, Length $= 47.5$ feet

15. 88