# INTERMEDIATE ALGEBRA (MA-140) FINAL EXAM REVIEW

• This practice exam is designed to help you focus your studying for the final.
• If you have trouble with a particular problem or a set of problems, go to the book and work similar problems until you are confortable with the material.
• Many of the problems on the final will look very similar to problems on this practice exam, or problems from the tests and quizzes you already took.
• In addition to solving the problems on this practice exam, review all the tests and quizzes as well as your class notes in preparation for the final.

**PART I: MULTIPLE-CHOICE QUESTIONS** Each problem is worth 4 points.

**1.** Determine the correct inequality for the statement "$x$ is at most 30.".

A. $x > 30$
B. $x < 30$
C. $x \geq 30$
D. $x \leq 30$
E. $0 \leq x < 30$

**2.** Evaluate the expression: $30 \div 6 \cdot 5$.

A. 1
B. 25
C. 36
D. 20
E. 30

**3.** Which of the following verbal expressions correctly represents the algebraic expression $\frac{5x}{7} + 4$.

A. Five sevenths times the sum of $x$ and four

B. Five times $x$, divided by seven, the result added to four

C. Five times the sum of one seventh of $x$ and four

D. The sum of four and the product of five and $x$, all divided by seven

E. Five times the sum of $x$ and four sevenths

**4.** Solve: $3x + 1 = x + 7$.

A. $x = 1$
B. $x = 2$
C. $x = 3$
D. $x = 4$
E. $x = 5$

**5.** 55 is what percent of 22?

A. 40%
B. 80%
C. 150%
D. 250%
E. 300%

**6.** Solve the inequality: $-2 \leq 3x + 1 \leq 10$.

A. $[-1, 2]$
B. $[1, 3]$
C. $[-1, 3]$
D. $[1, 2]$
E. $[0, 3]$

**7.** Solve the equation: $|x - 1| = 3$.

A. $x = 2$
B. $x = 4$
C. $x = -2$
D. $x = -2$ or $x = 4$
E. $x = 2$ or $x = -4$

**8.** Solve the inequality: $|x - 2| < 4$.

A. $(2, 6)$
B. $(-2, 6)$
C. $(-1, 5)$
D. $(2, 5)$
E. $(-\infty, 6)$

**9.** Determine the slope of the line passing through the points $(-1, 1)$ and $(2, 7)$.

A. 1
B. 2
C. 3
D. $-1$
E. $-2$

**10.** Determine the distance between the points $(4, 1)$ and $(-1, 13)$.

A. 10
B. 11
C. 12
D. 13
E. 14

**11.** Multiply and simplify: $2x(x + 3) + (x - 1)(x + 1)$.

A. $3x^2 - x - 1$
B. $3x^2 - 6x + 4$
C. $4x^2 + 6x + 1$
D. $3x^2 + 6x - 1$
E. $4x^2 + 6x - 4$

**12.** Simplify: $\dfrac{(3x^2)^3}{9x^3}$.

A. $x^3$
B. $3x^3$
C. $9x^3$
D. $3x^2$
E. $9x^2$

**13.** Divide by long division: $(x^3 + 3x^2 + 3x + 2) \div (x^2 + x + 1)$.

A. $x + 2$
B. $x + 2 + \dfrac{1}{x^2 + x + 1}$
C. $x + \dfrac{1}{x^2 + x + 1}$
D. $x + \dfrac{2}{x^2 + x + 1}$
E. $x - 2$

**14.** Divide by long division: $\dfrac{x^3 - x^2 - 4x - 6}{x - 3}$.

A. $x^2 - 2x + 1$
B. $x^2 + 2x + 2$
C. $x^2 + x + 2$
D. $x^2 + x - 2$
E. $x^2 - 2x + 2$

**15.** Evaluate the expression: $27^{-\frac{2}{3}}$.

A. 9
B. $\frac{1}{9}$
C. 3
D. $\frac{1}{3}$
E. 18

**16.** Evaluate: $\frac{8.4 \times 10^9}{4.1 \times 10^6}$.

A. 40
B. 400
C. 4000
D. $40,000$
E. $400,000$

**17.** Solve the equation: $(x-1)^2 = 1$.

A. $x = 0$ or $x = 1$
B. $x = 0$ or $x = -2$
C. $x = 1$ or $x = 3$
D. $x = 0$ or $x = 2$
E. $x = 1$ or $x = -2$

**18.** Find the real number $c$ such that $x^2 + 6x + c$ is a perfect square trinomial.

A. 4
B. 9
C. 16
D. 25
E. 36

**19.** Find an equation for the line passing through the points $(1, 3)$ and $(3, 1)$.

A. $x - y = -2$
B. $x - y = 2$
C. $x + y = 4$
D. $-x + y = 2$
E. $x + y = 2$

**20.** Solve the system of equations:

$$\begin{cases} x - y = 2 \\ x + y = 4. \end{cases}$$

A. $(5, 3)$
B. $(1, -1)$
C. $(3, -1)$
D. $(2, 4)$
E. $(3, 1)$

**PART II: 15 OPEN-ENDED QUESTIONS** Each problem is worth 6 points.

**1.** Solve: $\dfrac{x+1}{2} + \dfrac{x+5}{4} = 4.$

**2.** A pair of shoes that lists for \$60 is advertized at 25% off. Find the selling price.

**3.** Solve the inequality: $3 \leq 2x + 1 < 7$.

**4.** Sketch the graph of the equation $2x + y = 4$ and determine the two intercepts.

**5.** Multiply and simplify: $(x - 4)(x^2 + 4x + 16)$.

**6.** Factor $x^3 - 7x^2 + 10x$ completely.

**7.** Simplify: $\dfrac{x^2-4}{6-3x} \cdot \dfrac{6}{2x+4}$.

**8.** Add and simplify: $\dfrac{2}{x(x+2)} - \dfrac{1}{x} + \dfrac{1}{x+2}$.

**9.** Perform the indicated operations and simplify: $\dfrac{x^2+x}{x-2} \div \dfrac{2x+2}{x^2-5x+6}$.

**10.** Use properties of exponents and simplify. Write your answers without negative exponents.

$$\frac{2x^{-3}y^2}{x^{-4}y^3}.$$

**11.** Rationalize the denominator and simplify: $\dfrac{4}{\sqrt{3}-1}$.

**12.** Solve the equation: $4x^2 + 3x - 1 = 0$.

**13.** Solve the equation: $x^6 - 9x^3 + 8 = 0$.

**14.** A business had annual retail sales of \$200,000 in 1990 and \$300,000 in 1995. Assuming that the annual increase in sales followed a linear pattern, what were the retail sales in 1993.

**15.** Solve the system by the method of substitution:

$$\begin{cases} x^2 + y = 2 \\ 2x + y = -1. \end{cases}$$

**16.** Solve by the elimination method:

$$\begin{cases} 5x + 8y = -1 \\ 3x + y = 7. \end{cases}$$

**17.** If possible, solve the system:

$$\begin{cases} 4x - 2y = 6 \\ -6x + 3y = 9. \end{cases}$$

**18.** For the visiting archaeologist lecture on campus, advance tickets cost \$5 and tickets at the door cost \$6. The ticket sales this year came to \$4540. The department chairman wants to raise prices next year to \$7 for advance tickets and \$9 for tickets at the door. He said that if exactly the same number of people attended next year at these new price levels, the ticket sales would total \$6560. If he is correct, how many tickets are sold in advance? How many tickets are sold at the door?

**19.** An electronic firms makes two types of switching devices. Type A takes 4 minutes to make and requires \$3 worth of materials. Type B takes 5 minutes to make and requires \$5 worth of materials. When the production manager reviewed the latest batch, he found that it took 35 hours to make these switches with a material cost of \$1900. How many switches of each type were produced.

**20.** The length of a rectangle is 3 feet less than twice the width. The area of the rectangle is 54 square feet. Find the dimensions of the rectangle.

**EXTRA CREDIT** (10 points): Find a real number $a$ such that the equation

$$ax^2 - 2(a+2)x + (a+5) = 0$$

has one repeated solution.