

Topics on the ALEKS Math Assessment:

- Real numbers (including fractions, integers, and percentages)
- Equations and inequalities (including linear equations, linear inequalities, systems of linear equations, and quadratic equations)
- Linear and quadratic functions (including graphs and functions, linear functions, and parabolas), exponents and polynomials (including integer exponents, polynomial arithmetic, factoring, and polynomial equations), rational expressions (including rational equations and rational functions)
- Radical expressions (including higher roots and rational exponents)
- Exponentials and logarithms (including function compositions and inverse functions, properties of logarithms, and logarithmic equations)
- Geometry and trigonometry (including perimeter, area, and volume, coordinate geometry, trigonometric functions, and identities and equations).

You will find practice problems below (p. 1-5) for each category listed above. Solutions to these problems are also provided (p 6-11) and links to more practice (p. 12).

Math practice sample questions.

Real numbers (including fractions, integers, and percentages)

1. Which of the following numbers is NOT a real number?

A) $\sqrt{25}$

B) $-\frac{7}{3}$

C) π

D) $\sqrt{-4}$

2. Simplify the expression:

$$\frac{3}{4} + \frac{5}{6}$$

3. Which of the following is equivalent to 40%?

A) $\frac{2}{5}$

B) $\frac{4}{10}$

C) $\frac{3}{7}$

D) $\frac{5}{12}$

4. Evaluate:

$$(-8) + 15 - (-3) - 6$$

5. A shirt originally costs \$50. If it is on sale for 30% off, what is the sale price of the shirt?

Equations and inequalities (including linear equations, linear inequalities, systems of linear equations, and quadratic equations)

1. Solve for
- x
- :

$$3x - 7 = 11$$

2. Solve the inequality:

$$2x + 5 > 11$$

3. Solve the system of equations:

$$\begin{cases} x + y = 10 \\ 2x - y = 4 \end{cases}$$

4. Find the solution set for
- x
- in the quadratic equation:

$$x^2 - 5x + 6 = 0$$

5. Solve for
- x
- :

$$\frac{x}{3} + 2 = 5$$

6. Which of the following values of
- x
- satisfies the inequality?

$$4x - 3 \leq 5$$

A) $x = 0$

B) $x = 2$

C) $x = 3$

D) $x = 5$

7. Solve for
- x
- :

$$(x - 3)(x + 4) = 0$$

8. Solve the system of equations using substitution:

$$\begin{cases} y = 2x + 3 \\ 3x - y = -5 \end{cases}$$

9. Find the value of
- x
- that satisfies:

$$|2x - 3| = 7$$

10. Solve the quadratic equation using the quadratic formula:

$$x^2 + 4x - 12 = 0$$

Linear and quadratic functions (including graphs and functions, linear functions, and parabolas), exponents and polynomials (including integer exponents, polynomial arithmetic, factoring, and polynomial equations), rational expressions (including rational equations and rational functions

Linear and Quadratic Functions

- Which of the following equations represents a linear function?
A) $y = 3x + 2$
B) $y = x^2 - 4x + 1$
C) $y = \frac{1}{x}$
D) $y = 2^x$
- Find the slope of the line passing through the points $(2, 5)$ and $(6, 3)$.
- What is the vertex of the quadratic function $f(x) = (x - 3)^2 - 4$?
- Determine the x-intercepts of the quadratic function:

$$y = x^2 - 5x + 6$$

- Which of the following represents the graph of a parabola that opens downward?
A) $y = x^2 + 3x - 7$
B) $y = -2x^2 + 5x + 4$
C) $y = \frac{1}{2}x^2 - x + 6$
D) $y = x^2 - 9$

Exponents and Polynomials

- Simplify the expression:

$$(2x^3y^2)^2 \cdot (3x^2y^3)$$

- Factor completely:

$$x^3 - 9x$$

- Solve for x :

$$2x^2 - 8x = 0$$

Rational Expressions

- Simplify the rational expression:

$$\frac{x^2 - 4}{x^2 + 2x - 8}$$

- Solve the rational equation:

$$\frac{3}{x} + 2 = \frac{5}{x}$$

1. Simplify the expression:

$$\sqrt{50}$$

2. Rewrite using rational exponents:

$$\sqrt[3]{x^5}$$

3. Simplify the expression:

$$(16^{\frac{1}{4}})^2$$

4. Solve for x :

$$\sqrt{x+3} = 5$$

5. Rationalize the denominator:

$$\frac{5}{\sqrt{7}}$$

Exponentials and logarithms (including function compositions and inverse functions, properties of logarithms, and logarithmic equations)

1. Rewrite the expression using logarithms:

$$5^x = 125$$

2. Simplify using logarithm properties:

$$\log_3(81)$$

3. Find the inverse function of:

$$f(x) = 2^x$$

4. Solve for x :

$$\log_2(x-1) = 3$$

5. Expand the logarithmic expression using logarithm properties:

$$\log\left(\frac{x^2 \cdot \sqrt{y}}{z^3}\right)$$

Geometry and trigonometry (including perimeter, area, and volume, coordinate geometry, trigonometric functions, and identities and equations).

1. Find the perimeter of a rectangle with length 8 cm and width 5 cm.
2. A circle has a radius of 7 cm. Find its area.
3. Calculate the volume of a cylinder with a height of 10 cm and a base radius of 4 cm.
4. Find the distance between the points $A(3, 4)$ and $B(7, 1)$ in the coordinate plane.
5. Find the midpoint of the line segment joining $(-6, 2)$ and $(4, -8)$.
6. A right triangle has legs of length 6 cm and 8 cm. Find the length of the hypotenuse.
7. Simplify the trigonometric expression:

$$\sin^2 x + \cos^2 x$$

8. Find $\sin 30^\circ$ and $\cos 60^\circ$.
9. Solve for x in the equation:

$$2 \sin x = 1, \quad 0^\circ \leq x \leq 360^\circ$$

10. Find the exact value of $\tan 45^\circ$.

Solutions

Real numbers (including fractions, integers, and percentages)

- D) $\sqrt{-4}$ is not a real number because it results in an imaginary number ($2i$).
- $\frac{3}{4} + \frac{5}{6} = \frac{9}{12} + \frac{10}{12} = \frac{19}{12}$.
- A) $\frac{2}{5}$ is equivalent to 40% since $\frac{2}{5} = 0.4 = 40\%$.
- $(-8) + 15 - (-3) - 6 = -8 + 15 + 3 - 6 = 4$.
- The discount is $50 \times 0.30 = 15$, so the sale price is $50 - 15 = 35$.

Equations and inequalities (including linear equations, linear inequalities, systems of linear equations, and quadratic equations)

- $3x - 7 = 11$

$$3x = 18 \Rightarrow x = 6.$$

- $2x + 5 > 11$

$$2x > 6 \Rightarrow x > 3.$$

- Solving the system:

- $x + y = 10$
- $2x - y = 4$

Add both equations:

$$(x + y) + (2x - y) = 10 + 4 \Rightarrow 3x = 14 \Rightarrow x = \frac{14}{3}.$$

Substituting $x = \frac{14}{3}$ into $x + y = 10$:

$$\frac{14}{3} + y = 10 \Rightarrow y = \frac{30}{3} - \frac{14}{3} = \frac{16}{3}.$$

Solution: $(\frac{14}{3}, \frac{16}{3})$.

- Factoring $x^2 - 5x + 6 = 0$:

$$(x - 2)(x - 3) = 0$$

Solutions: $x = 2, 3$.

- $\frac{x}{3} + 2 = 5$

$$\frac{x}{3} = 3 \Rightarrow x = 9.$$

- Solve $4x - 3 \leq 5$:

$$4x \leq 8 \Rightarrow x \leq 2.$$

The correct answer is **B)** $x = 2$.

- $(x - 3)(x + 4) = 0$

$$x - 3 = 0 \Rightarrow x = 3, \quad x + 4 = 0 \Rightarrow x = -4.$$

8. Substituting $y = 2x + 3$ into $3x - y = -5$:

$$3x - (2x + 3) = -5$$

$$x - 3 = -5 \Rightarrow x = -2.$$

Substituting $x = -2$ into $y = 2x + 3$:

$$y = 2(-2) + 3 = -4 + 3 = -1.$$

Solution: $(-2, -1)$.

9. Solve $|2x - 3| = 7$:

Two cases:

$$2x - 3 = 7 \Rightarrow 2x = 10 \Rightarrow x = 5.$$

$$2x - 3 = -7 \Rightarrow 2x = -4 \Rightarrow x = -2.$$

Solution: $x = -2, 5$.

10. Solve $x^2 + 4x - 12 = 0$ using the quadratic formula:

Quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Here, $a = 1$, $b = 4$, $c = -12$:

$$x = \frac{-4 \pm \sqrt{16 + 48}}{2} = \frac{-4 \pm \sqrt{64}}{2} = \frac{-4 \pm 8}{2}.$$

$$x = \frac{-4 + 8}{2} = \frac{4}{2} = 2, \quad x = \frac{-4 - 8}{2} = \frac{-12}{2} = -6.$$

Solution: $x = 2, -6$.

Linear and quadratic functions (including graphs and functions, linear functions, and parabolas), exponents and polynomials (including integer exponents, polynomial arithmetic, factoring, and polynomial equations), rational expressions (including rational equations and rational functions

1. **A)** $y = 3x + 2$ is a linear function because it has the form $y = mx + b$.

2. Slope formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 5}{6 - 2} = \frac{-2}{4} = -\frac{1}{2}$$

3. The given function is in vertex form:

$$f(x) = (x - h)^2 + k$$

The vertex is $(3, -4)$.

4. Solve $x^2 - 5x + 6 = 0$ by factoring:

$$(x - 2)(x - 3) = 0$$

So, $x = 2$ and $x = 3$.

5. B) $y = -2x^2 + 5x + 4$ has a negative leading coefficient (-2), meaning the parabola opens downward.
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6. Expand using exponent rules:

$$(2x^3y^2)^2 = 4x^6y^4$$
$$4x^6y^4 \cdot 3x^2y^3 = 12x^{6+2}y^{4+3} = 12x^8y^7$$

7. Factor out the GCF:

$$x^3 - 9x = x(x^2 - 9)$$

Recognizing the difference of squares:

$$x(x - 3)(x + 3)$$

8. Factor the quadratic equation:

$$2x(x - 4) = 0$$

Solutions: $x = 0$ or $x = 4$.

9. Factor numerator and denominator:

$$\frac{(x - 2)(x + 2)}{(x + 4)(x - 2)}$$

Cancel $(x - 2)$:

$$\frac{x + 2}{x + 4}$$

10. Solve $\frac{3}{x} + 2 = \frac{5}{x}$:

Subtract $\frac{3}{x}$ from both sides:

$$2 = \frac{2}{x}$$

Multiply both sides by x :

$$2x = 2$$

Solve for x :

$$x = 1$$

Radical expressions (including higher roots and rational exponents)

1. Simplify
- $\sqrt{50}$
- :

$$\sqrt{50} = \sqrt{25 \times 2} = \sqrt{25} \times \sqrt{2} = 5\sqrt{2}$$

2. Rewrite
- $\sqrt[3]{x^5}$
- using rational exponents:

$$x^{\frac{5}{3}}$$

3. Simplify
- $(16^{\frac{1}{4}})^2$
- :

$$16^{\frac{1}{4} \times 2} = 16^{\frac{2}{4}} = 16^{\frac{1}{2}} = \sqrt{16} = 4$$

4. Solve
- $\sqrt{x+3} = 5$
- :

$$x + 3 = 25$$

$$x = 22$$

5. Rationalize
- $\frac{5}{\sqrt{7}}$
- :

Multiply numerator and denominator by $\sqrt{7}$:

$$\frac{5}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = \frac{5\sqrt{7}}{7}$$

Exponentials and logarithms (including function compositions and inverse functions, properties of logarithms, and logarithmic equations)

1. Rewrite
- $5^x = 125$
- using logarithms:

Since $125 = 5^3$, we can rewrite:

$$5^x = 5^3$$

So, $x = 3$. Alternatively, using logarithms:

$$x = \log_5(125) = \log_5(5^3) = 3$$

2. Simplify
- $\log_3(81)$
- :

Since $81 = 3^4$,

$$\log_3(81) = \log_3(3^4) = 4$$

3. Find the inverse of $f(x) = 2^x$:

Replace $f(x)$ with y :

$$y = 2^x$$

Swap x and y :

$$x = 2^y$$

Solve for y using logarithms:

$$y = \log_2(x)$$

So, the inverse function is:

$$f^{-1}(x) = \log_2(x)$$

5. Expand $\log\left(\frac{x^2\sqrt{y}}{z^3}\right)$ using logarithm properties:

$$\log x^2 + \log \sqrt{y} - \log z^3$$

Using logarithm rules $\log a^b = b \log a$ and $\log \sqrt{y} = \log y^{1/2}$:

$$2 \log x + \frac{1}{2} \log y - 3 \log z$$

Geometry and trigonometry (including perimeter, area, and volume, coordinate geometry, trigonometric functions, and identities and equations).

1. Perimeter of a rectangle:

$$P = 2(l + w) = 2(8 + 5) = 2(13) = 26 \text{ cm}$$

2. Area of a circle:

$$A = \pi r^2 = \pi(7)^2 = 49\pi \approx 153.94 \text{ cm}^2$$

3. Volume of a cylinder:

$$V = \pi r^2 h = \pi(4)^2(10) = 160\pi \approx 502.65 \text{ cm}^3$$

4. Distance between two points:

Using the distance formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(7 - 3)^2 + (1 - 4)^2} = \sqrt{4^2 + (-3)^2} = \sqrt{16 + 9} = \sqrt{25} = 5$$

5. Midpoint formula:

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$M = \left(\frac{-6 + 4}{2}, \frac{2 + (-8)}{2} \right) = \left(\frac{-2}{2}, \frac{-6}{2} \right) = (-1, -3)$$

6. Hypotenuse using the Pythagorean theorem:

$$c^2 = a^2 + b^2 = 6^2 + 8^2 = 36 + 64 = 100$$

$$c = \sqrt{100} = 10 \text{ cm}$$

7. Trigonometric identity:

$$\sin^2 x + \cos^2 x = 1$$

8. Trigonometric values:

$$\sin 30^\circ = \frac{1}{2}, \quad \cos 60^\circ = \frac{1}{2}$$

9. Solving $2 \sin x = 1$:

$$\sin x = \frac{1}{2}$$

From the unit circle, $\sin x = \frac{1}{2}$ at:

$$x = 30^\circ, 150^\circ$$

10. Exact value of $\tan 45^\circ$:

$$\tan 45^\circ = 1$$

Students may **practice/review** these topics through the following websites:

<https://accuplacer.collegeboard.org/accuplacer/pdf/next-generation-sample-questions-arithmetic.pdf>

<https://accuplacer.collegeboard.org/accuplacer/pdf/next-generation-sample-questions-quantitative-reasoning.pdf>

<https://accuplacer.collegeboard.org/accuplacer/pdf/next-generation-sample-questions-advanced-algebra-and-functions.pdf>

Students who choose to retest and seek extra practice:

After completing the ALEKS math assessment for the first time, each student receives an individualized prep-and-learning program that provides targeted instruction and practice on the topics they did not master. Before retesting, students are required to complete a minimum of 3 hours of practice within this tailored module. The module offers the most effective, personalized practice for students seeking to improve their mathematical skills and understanding, as it closely aligns with the content of the assessment and adapts based on each student's performance to focus on areas that need improvement.

Brookdale Community College uses your Mathematics Assessment score, along with additional information, to determine placement. Before taking the ALEKS math assessment, you'll complete a brief survey to gather this information. It's helpful to have your most recent high school transcript and standardized test scores (such as the SAT, PSAT, ACT, GED, or NJSLA) available. However, if you don't have these records or have been out of school for a few years, you should still complete the survey to the best of your ability—test results and high school grades are just one of several factors considered in placement decisions. Please submit your high school transcripts to Brookdale and discuss your math placement with an academic advisor.

Research shows that students who practice taking computerized tests and refresh their math and reading skills before a placement exam tend to receive scores that more accurately reflect their abilities. The following information provides some online resources to help you review mathematical topics and practice.