Elementary Algebra
Study Guide for the ACCUPLACER (CPT)

A total of 12 questions are administered in this test.

- The first type involves operations with integers and rational numbers, and includes computation with integers and negative rationals, the use of absolute values, and ordering.

- A second type involves operations with algebraic expressions using evaluation of simple formulas and expressions, and adding and subtracting monomials and polynomials. Questions involve multiplying and dividing monomials and polynomials, the evaluation of positive rational roots and exponents, simplifying algebraic fractions, and factoring.

- The third type of question involves the solution of equations, inequalities, word problems, solving linear equations and inequalities, the solution of quadratic equations by factoring, solving verbal problems presented in an algebraic context, including geometric reasoning and graphing, and the translation of written phrases into algebraic expressions.

Suggestion: Use this study guide in conjunction with the videos at www.khanacademy.org

I. Order of operations

1. \(3^2 + 5 - \sqrt{4} + 4^0\)

2. \((5 + 1)(4 - 2) - 3\)

3. \(3 \cdot 7^2\)

4. \((7 + 3)^2\)

5. \(49 \div 7 - 2 \cdot 2\)

6. \(9 \div 3 \cdot 5 - 8 \div 2 + 27\)

7. \(3 + 2(5) - \left| - 7 \right|\)

8. \(\frac{5 \cdot 5 - 4(4)}{2^2 - 1}\)

9. \(\frac{4^2 - 5^2}{(4 - 5)^2}\)

10. \(-5^2\)

II. Scientific Notation

Write the following in Scientific Notation. Write in expanded form.

1. \(350,000,000\)

4. \(6.02 \times 10^{23}\)

2. \(0.000000000000000523\)

5. \(3.0 \times 10^8\)

3. \(120,500,000,000,000,000\)

6. \(1.819 \times 10^{-9}\)

Simplify. Write answers in scientific notation.

7. \(3 \times 10^3 \cdot 5 \times 10^6\)

9. \(\frac{6 \times 10^9}{3 \times 10^4}\)

8. \((3 \times 10^{-4})^2\)

10. \(\frac{3.2 \times 10^5 \cdot 2 \times 10^{-3}}{2 \times 10^{-5}}\)
III. Substitution
Find each value if \( x = 3 \), \( y = -4 \), and \( z = 2 \).
1. \( xyz - 4z \)
2. \( 2x - y \)
3. \( x(y - 3z) \)
4. \( \frac{5x - z}{xy} \)
5. \( 3y^2 - 2x + 4z \)

IV. Linear equations in one variable
Solve the following for \( x \).
1. \( 6x - 48 = 6 \)
2. \( \frac{2}{3} x - 5 = x - 3 \)
3. \( 50 - x - (3x + 2) = 0 \)
4. \( 8 - 4(x - 1) = 2 + 3(4 - x) \)

V. Formulas
1. Solve \( PV = nRT \) for \( T \).
2. Solve \( y = 3x + 2 \) for \( x \).
3. Solve \( C = 2\pi r \) for \( r \).
4. Solve \( \frac{x}{2} + \frac{y}{5} = 1 \) for \( y \).

VI. Word Problems
1. One number is 5 more than twice another number. The sum of the numbers is 35. Find the numbers.
2. Ms. Jones invested $18,000 in two accounts. One account pays 6% simple interest and the other pays 8%. Her total interest for the year was $1,290. How much did she have in each account?
3. How many liters of a 40% solution and an 16% solution must be mixed to obtain 20 liters of a 22% solution?
4. Sheila bought burgers and fries for her children and some friends. The burgers cost $2.05 each and the fries are $.85 each. She bought a total of 14 items, for a total cost of $19.10. How many of each did she buy?

VII. Inequalities
Solve and graph on the number line.
1. \( 2x - 7 \geq 3 \)
2. \( -5(2x + 3) < 2x - 3 \)
3. \( 3(x - 4) - (x + 1) \leq -12 \)

VIII. Exponents & polynomials
Simplify and write answers with positive exponents.
1. \( (3x^2 - 5x - 6) + (5x^2 + 4x + 4) \)
2. \( \frac{(2a^{-5}b^4c^3)^2}{(3a^2b^{-7}c^3)^2} \)
3. \( 3x^0 y^5 z^6 (-2xy^3 z^{-2}) \)
4. \( (-a^5b^7c^9)^4 \)
5. \( (4x^2 y^6 z)^2 (-x^{-2} y^3 z^4)^6 \)
6. \( \frac{24x^4 - 32x^3 + 16x^2}{8x^2} \)
7. \( (x^2 - 5x) (2x^3 - 7) \)
8. \( \frac{26a^2b^{-5}c^9}{-4a^{-6}bc^9} \)
9. \( (5a + 6)^2 \)
IX. Factoring
1. \( x^2 + 5x - 6 \)
2. \( x^2 - 5x - 6 \)
3. \( 4x^2 - 36 \)
4. \( x^2 + 4 \)
5. \( 64x^4 - 4y^4 \)
6. \( 8x^3 - 27 \)
7. \( 49y^2 + 84y + 36 \)
8. \( 12x^2 + 12x + 3 \)

X. Quadratic Equations
1. \( 4a^2 + 9a + 2 = 0 \)
2. \( 9x^2 - 81 = 0 \)
3. \( 25x^2 - 6 = 30 \)
4. \( 3x^2 - 5x - 2 = 0 \)
5. \( (3x + 2)^2 = 16 \)
6. \( r^2 - 2r - 4 = 0 \)

XI. Rational Expressions
Perform the following operations and simplify where possible. If given an equation, solve for the variable.
1. \( \frac{4}{2a - 2} + \frac{3a}{a^2 - a} \)
2. \( \frac{3}{x^2 - 1} - \frac{4}{x^2 + 3x + 2} \)
3. \( \frac{6x - 18}{3x^2 + 2x - 8} \cdot \frac{12x - 16}{4x - 12} \)
4. \( \frac{16 - x^2}{x^2 + 2x - 8} + \frac{x^2 - 2x - 8}{4 - x^2} \)
5. \( \frac{x^3 - 1}{x - 1} \)
6. \( \frac{\frac{x}{y} - \frac{1}{y}}{\frac{1}{xy}} \)
7. \( \frac{2}{x - 1} + \frac{1}{x + 1} = \frac{5}{4} \)
8. \( \frac{3}{k} + 1 = \frac{3 + k}{2k} \)
9. \( \frac{5 - x}{x} + \frac{3}{4} = \frac{7}{x} \)

XII. Graphing
Graph each equation on the coordinate axis.
1. \( 3x - 2y = 6 \)
2. \( x = -3 \)
3. \( y = 2 \)
4. \( y = -\frac{2}{3}x + 5 \)
5. \( y = |x - 3| \)
6. \( y = -x^2 + 2 \)
7. \( y = \sqrt{x} + 2 \)
XIII. Systems of Equations
Solve the following systems of equations.

1. \[ \begin{align*}
2x - 3y &= -12 \\
x - 2y &= -9 
\end{align*} \]
2. \[ \begin{align*}
4x + 6y &= 10 \\
2x + 3y &= 5 
\end{align*} \]
3. \[ \begin{align*}
x + 2y &= 5 \\
x + 2y &= 7 
\end{align*} \]
4. \[ \begin{align*}
2x - 3y &= -4 \\
y &= -2x + 4 
\end{align*} \]

XIV. Radicals
Simplify the following using the rules of radicals (rationalize denominators). All variables represent positive numbers.

1. \[ \left( \sqrt{8} \right) \left( \sqrt{10} \right) \]
2. \[ \frac{\sqrt{81}}{x^4} \]
3. \[ \frac{\sqrt{4}}{3} \]
4. \[ \frac{\sqrt{12}}{\sqrt{18}} \cdot \frac{\sqrt{15}}{\sqrt{40}} \]
5. \[ \sqrt[4]{24x^3y^5} \]
6. \[ 2\sqrt{18} - 5\sqrt{32} + 7\sqrt{162} \]
7. \[ \frac{\sqrt{3}}{5 - \sqrt{3}} \]
8. \[ \frac{2\sqrt{3} + 5\sqrt{2}}{3\sqrt{3} - 4\sqrt{2}} \]

Answers

I. Order of Operations

When working with \( ( ) ) 2^{x} \), \( \cdot \), \( \times \), \( \div \), \( \div \), and \( + \), one must remember the order of the operations. First, parenthesis or exponents as one calculates from left to right. Second, multiplication or division as one calculates from the left to right. And finally, addition or subtraction as one calculates from left to right.

1. \[ 3^2 + 5 - \sqrt{4} + 4^2 = 9 + 5 - 2 + 1 = 14 - 2 + 1 = 12 + 1 = 13 \]
2. \[ (5 + 1)(4 - 2) - 3 = (6)(2) - 3 = 12 - 3 = 9 \]
3. \[ 147 \]
4. \[ 200 \]
5. \[ 3 \]
6. \[ 38 \]
7. \[ 3 + 2(5) - |7| = 3 + 10 - 7 = 13 - 7 = 6 \]
8. \[ \frac{5\cdot 5 - 4(4)}{2^2 - 1} = \frac{25 - 16}{4 - 1} = \frac{9}{3} = 3 \]
9. \[ -9 \]
10. \[ -25 \]
II. Scientific Notation

All numbers in scientific notation have the following form: \( \text{nonzerodigit}.\text{restofnumber} \times 10^{\text{power}} \).

1. \( 350,000,000 = 3.5 \times 10^8 \)  
2. \( 0.000000000000523 = 5.23 \times 10^{-14} \)  
3. \( 120,500,000,000,000 = 1.205 \times 10^{20} \)  
4. \( 602,000,000,000,000,000,000,000 \)  
5. \( 300,000,000 \)

7. \( (3 \times 10^4)(5 \times 10^6) = 15 \times 10^9 = 1.5 \times 10^{10} \)  
8. \( (3 \times 10^{-4})^2 = 9 \times 10^{-8} \)  
9. \( \frac{6 \times 10^9}{3 \times 10^5} = 2 \times 10^4 \)  
10. \( \frac{(3.2 \times 10^5)(2 \times 10^{-1})}{2 \times 10^{-4}} = 3.2 \times 10^7 \)

III. Substitution

1. \( x y z - 4 z = (3)(-4)(2) - 4(2) = -24 - 8 = -32 \)  
2. \( 2x - y = 2(3) - (-4) = 6 + 4 = 10 \)  
3. \( x (y - 3z) = 3[-4 - 3(2)] = 3(-4 - 6) = 3(-10) = -30 \)  
4. \( \frac{5x - z}{xy} = \frac{5(3) - 2}{(3)(-4)} = \frac{13}{-12} = -\frac{13}{12} \)  
5. \( 3y^2 - 2x + 4z = 3(-4)^2 - 2(3) + 4(2) = 3(16) - 6 + 8 = 50 \)

IV. Linear equations in one variable

1. \( 6x - 48 = 6 \Rightarrow 6x - 48 + 48 = 6 + 48 \Rightarrow 6x = 54 \Rightarrow \frac{6x}{6} = \frac{54}{6} \Rightarrow x = 9 \)  
2. \( \frac{2}{3} x - 5 = x - 3 \Rightarrow \left( \frac{2}{3} x - 5 \right) = 3(x - 3) \Rightarrow 2x - 15 = 3x - 9 \Rightarrow 2x - 15 + 15 = 3x - 9 + 15 \Rightarrow 2x = 3x + 6 \Rightarrow 2x - 3x = 3x + 6 - 3x \Rightarrow -x = 6 \Rightarrow -1(-x) = -1(6) \Rightarrow x = -6 \)  
3. \( x = 12 \)
4. \( 8 - 4(x - 1) = 2 + 3(4 - x) \Rightarrow 8 - 4x + 4 = 2 + 12 - 3x \Rightarrow 12 - 4x = 14 - 3x \Rightarrow 12 - 4x - 12 = 14 - 3x - 12 \Rightarrow -4x = 2 - 3x \Rightarrow -4x + 3x = 2 - 3x + 3x \Rightarrow -x = 2 \Rightarrow x = -2 \)

V. Formulas

1. \( PV = nRT \Rightarrow \frac{PV}{nRT} = \frac{nRT}{nRT} \Rightarrow \frac{PV}{nRT} = T \)  
2. \( y = 3x + 2 \Rightarrow y - 2 = 3x \Rightarrow 2 - 2 = 3x \Rightarrow y - 2 = 3x \Rightarrow \frac{y - 2}{3} = \frac{3x}{3} \Rightarrow \frac{y - 2}{3} = x \)  
3. \( r = \frac{C}{2\pi} \)  
4. \( y = -\frac{5}{2} x + 5 \)  
5. \( y = hx + 4x \Rightarrow y = x(h + 4) \Rightarrow \frac{y}{h + 4} = \frac{x(h + 4)}{h + 4} \Rightarrow \frac{y}{h + 4} = x \)
VI. Word Problems

1. Let x = "another number" forcing 2x + 5 = "One number." x + 2x + 5 = 35 and x = 10.
"One number" = 25 and "another number" = 10.

2. Let x = the dollars in the account paying 6% interest.
Then, 18,000 – x = the dollars in the account paying 8%.
The interest dollars are calculated by multiplying the total dollars in the account by the interest rate.
Hence: .06 x = the interest earned by the first account.
.08 (18,000 – x) = the interest earned by the second account.
Adding up all the interest,
.06x + .08(18,000 – x) = 1,290. Solving, x = 7,500. So, Ms. Jones has $7,500 in the account paying 6% interest and $10,500 in the account paying 8% interest.

3. Use the following buckets:

<table>
<thead>
<tr>
<th></th>
<th>20 - x</th>
<th>20 liters</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>40 %</td>
<td>16 %</td>
</tr>
</tbody>
</table>

From the diagram, we get the equation: .4x + .16 (20 – x) = 20(.22)
x = 5 and the answer is 5 liters at 40% and 15 liters at 16%.

4. Let x = the number of burgers and 14 – x = the number of fries. To get the total amount of money spent, multiply the number of items by the cost of the item.
2.05 x = the total dollars spent on burgers and .85 (14 – x) = the total dollars spent on fries.
The equation is: 2.05x + .85 (14 – x) = 19.10. Solving the equation, x = 6. Hence, she bought 6 burgers and 8 fries.

VII. Inequalities

Solve inequalities the same as equations with one exception. When both sides are multiplied or divided by a negative number, remember to switch the direction of the inequality.

1. \[ 2x - 7 \geq 3 \Rightarrow 2x - 7 \geq 3 + 7 \Rightarrow 2x \geq 10 \Rightarrow \frac{2x}{2} \geq \frac{10}{2} \Rightarrow x \geq 5 \]
2. \[ -5(2x + 3) < 2x - 3 \Rightarrow -10x - 15 < 2x - 3 \Rightarrow -12x < 12 \Rightarrow x > -1 \]
3. \[ x \leq \frac{1}{2} \]

VIII. Exponents & Polynomials

1. Add like terms: \((3x^2 - 5x - 6) + (5x^2 + 4x + 4) = 8x^2 - x - 2\)
2. \[ \frac{(2a^{-2}b^4c^3)^2}{3b^{-1}c^5} = \frac{2^2a^{-4}b^8c^6}{3^{-1}a^0b^{-4}c^3} = \frac{4a^{10-4}b^{8-(-4)}c^{6-3}}{36} = \frac{a^6b^7c^3}{36c^3} \]
3. \((3x^2y^2z^4)(2xy^3z^2) = 6x^3y^5z^6 = -6xy^3z^4 \]
4. \((-a^2b^3c^4)^3 = (-1)^3a^{6}b^{9}c^{12} = a^{6}b^{9}c^{12} \]
5. \((4x^4y^2z)(-x^3y^3z^4) = (16x^4y^2z)(x^3y^3z^4) = 16x^{7}y^{10}z^{26} = 16 \frac{1}{x^{2}}y^{5}z^{26} = \frac{16y^{30}z^{26}}{x^{8}} \]
6. \[ \frac{24x^4 - 32x^3 + 16x^2}{8x^2} = \frac{24x^4}{8x^2} - \frac{32x^3}{8x^2} + \frac{16x^2}{8x^2} = 3x^2 - 4x + 2 \]
7. \[ (x^2 - 5)(2x^3 - 7) = 2x^5 - 7x^2 - 10x^4 + 35x = 2x^5 - 10x^4 - 7x^2 + 35x \]
8. \[ \frac{26a^7b^3c^8}{-4a^{-2}b^3c^4 - 9} \div \frac{-13a^{2-4}b^{-3-4}c^{a-9}}{2} = \frac{-13a^8b^6c^9}{2b^6} \]

9. \[(5a + 6)^2 = (5a + 6)(5a + 6) = 25a^2 + 30a + 30a + 36 = 25a^2 + 60a + 36 \]

**IX. Factoring**

Steps to factoring:
1. Always factor out the Greatest Common Factor (If possible).
2. Factor the first and third term.
3. Figure out the middle term.

1. \((x + 6)(x - 1)\)
2. \((x + 1)(x - 6)\)
3. \(4(x - 3)(x = 3)\), Difference of two squares
4. Sum of two squares requires the complex number system to factor. Not factorable.
5. \(64x^2 - 4y^2 = 4(16x^4 - y^4) = 4(4x^2 - y^2)(4x^2 + y^2) = 4(2x - y)(2x + y)(4x^2 + y^2)\)

6. Difference of two cubes: \(a^2 - b^3 = (a - b)(a^2 + ab + b^2)\). Let \(a = 2x\) and \(b = 3\) and use the formula to get: \(2x - 3(4x^2 + 6x + 9)\)

7. \((7y + 6)^2\)
8. \(3(2x + 1)^2\)

**X. Quadratic Equations**

Steps:
1. Get zero on one side of the equals
2. Factor
3. Set each factor to zero
4. Solve for your variable

If you cannot factor the equation and the quadratic is in the form \(ax^2 + bx + c = 0\), then use the quadratic formula.

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

1. \(4a^2 + 9a + 2 = 0 \Rightarrow (4a + 1)(a + 2) = 0 \Rightarrow 4a + 1 = 0 \text{ or } a + 2 = 0 \Rightarrow a = -\frac{1}{4} \text{ or } a = -2\)
2. \(3, -3\)
3. \(25x^2 - 6 = 30 \Rightarrow 25x^2 - 6 - 30 = 30 - 30 \Rightarrow 25x^2 - 36 = 0 \Rightarrow (5x - 6)(5x + 6) = 0 \Rightarrow x = \frac{6}{5} \text{ or } x = -\frac{6}{5}\)

4. \(2, \frac{-1}{3}\)

5. The solution is given below:

\[ (3x + 2)^2 = 16 \Rightarrow 9x^2 + 12x + 4 = 16 \Rightarrow 9x^2 + 12x + 4 - 16 = 16 - 16 \Rightarrow 9x^2 + 12x - 12 = 0 \]

\[ \Rightarrow 3(3x + 4x - 4) = 0 \Rightarrow 3(3x - 2)(x + 2) = 0 \Rightarrow x = \frac{2}{3} \text{ or } x = -2\]

6. \(1 \pm \sqrt{5}\)
XI. Rational Expressions

1. Need to find a common denominator (factor denominators to see what you need), add, and then reduce (if possible) at the very end.

\[
\frac{4}{2a-2} + \frac{3a}{a^2-a} = \frac{4}{2(a-1)} + \frac{3a}{a(a-1) - \frac{2}{2} = \frac{4a}{2(a-1)} + \frac{6a}{2(a-1)} = \frac{10a}{2a(a-1)}
\]

\[
= \frac{5}{a-1}
\]

2. This problem uses the same technique as above. Be careful of the subtraction.

\[
\frac{3}{x^2-1} - \frac{4}{x^2+3x+2} = \frac{3}{(x-1)(x+1)} - \frac{4}{(x+2)(x+1)} = \frac{3}{(x-1)(x+1)} - \frac{4}{(x+2)(x+1)} - \frac{(x-1)(x+1)}{(x+2)(x+1)}
\]

\[
= \frac{3x+6}{(x-1)(x+1)(x+2)} - \frac{4x-4}{(x-1)(x+1)(x+2)} = \frac{3x+6-4x+4}{(x-1)(x+1)(x+2)} = -\frac{x+10}{(x-1)(x+1)(x+2)}
\]

3. To multiply fractions, factor and cancel first before multiplying.

\[
\frac{6x-18}{3x^2+2x-8} \cdot \frac{12x-16}{4x-12} = \frac{6x-18}{(3x-4)(x+2)} \cdot \frac{4x-12}{4(x-3)} = \frac{6(x-3)}{4(3x-4)} = \frac{6}{x+2}
\]

4. Division is the same process with one extra step (invert & multiply): \[
\frac{a}{b} + \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}
\]

One other hint: \((1-x) = -(x-1)\) (Continues on next page)

\[
\frac{16-x^2}{x^2+2x-8} \div \frac{4-x^2}{x-2x+8} = \frac{16-x^2}{(x-2)(x+4)} \div \frac{4-x^2}{2-x+2+2x} = \frac{(16-x^2)(2-x+2x)}{(x-2)(x+4)(4-x^2)}
\]

\[
= \frac{(x-2)(x+4)}{(x-2)(x+4)} \div \frac{(x-2)(x+4)}{(x-2)(x+4)} = 1
\]

5. Factor and Reduce to get \(x^2 + x + 1\).

6. Find the Lowest common denominator (LCD) for all fractions \((xy)\), then multiply the numerator and denominator by the LCD.

\[
\frac{2}{x-1} + \frac{1}{y} = \frac{2}{x} - \frac{1}{y} = \frac{2y-x}{1} = 2y-x
\]

7. Annihilate the denominators by multiplying both sides of the equation by the LCD \([(x-1)(x+1)4]\), solve the resulting, fractionless equation, and check answers in the original equation to insure that the denominators are not zero.

\[
\frac{2}{x-1} + \frac{1}{x+1} = \frac{5}{4} \Rightarrow (x-1)(x+1)4\left[\frac{2}{x-1} + \frac{1}{x+1}\right] = \frac{5}{4} (x-1)(x+1)4 \Rightarrow 2(x+1)(4) + (x-1)4 = 5(x-1)(x+1)
\]

Since \(8x + 8 + 4x - 4 = 5x^2 - 5 \Rightarrow 5x^2 - 12x - 9 = 0 \Rightarrow (5x + 3)(x - 3) = 0 \Rightarrow x = -\frac{3}{5} \text{ or } x = 3\)

these answers do not make the denominator zero in the original equation, they are the solution.

8. \(k = -3\)

9. \(x = -8\)
XII. Graphing

1. \(3x - 2y = 6\)

2. \(x = -3\)

3. \(y = 2\)

4. \(y = -\frac{2}{3}x + 5\)

5. \(y = |x - 3|\)

6. \(y = -x^2 + 2\)
XIII. Systems of Equations

The following are 2 dimensional linear equations. Each equation represents a line that can be graphed on the coordinate plane. The ultimate solution to a system of equations is for the lines to intersect in on point such as question #1 and #4.

Question #2 has two equations and one is a multiple of the other. Hence, both formulas graph the same line making the solution infinite.

The last possibility is in question #3. If you graph the lines in question #2, you will see that they are parallel and do not cross. This system has no solution.

1. The answer is x = 3 and y = 6. The work is below.
   \[2x - 3y = -12\]
   \[2x - 3y = -12\]
   \[x - 2y = -9\] Multiply by -2 → \[-2x + 4y = 18\]
   \[y = 6\]
   Now, substituting into the first equation
   \[2x - 3(6) = -12\] ⇒ x = 3

4. x = 1, y = 2

XIV. Radicals

Think of the index (\(\sqrt[n]{}\)) as a door person. If it is two, then two identical factors inside become one outside. Also, remember these properties:

\[\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}\]

\[\sqrt[n]{a} / \sqrt[n]{b} = \sqrt[n]{a/b}\]

1. \(\sqrt[8]{8} \cdot \sqrt{10} = \sqrt{8 \cdot 10} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 5} = 2 \cdot 2 \sqrt{5} = 4 \sqrt{5}\)

2. \(\sqrt{\frac{x^4}{x^2}} = \frac{x^2}{x} = \frac{x \cdot x \cdot x \cdot x}{x} = \frac{3}{x}\)

3. \(\sqrt[3]{\frac{4}{2 \cdot 2}} = \frac{\sqrt[3]{2 \cdot 2}}{2 \cdot 2} = \frac{\sqrt[3]{2 \cdot 2}}{2 \cdot 2} = \frac{2 \sqrt[3]{2}}{2} = 2 \sqrt[3]{2}\)

4. \(\sqrt[3]{\frac{12}{18}} = \sqrt[3]{\frac{15}{40}} = \sqrt[3]{\frac{5}{20}} = \sqrt[3]{\frac{\sqrt{2}}{2 \cdot 2 \cdot 5}} = \frac{\sqrt{2}}{2 \sqrt{5}} = \frac{2 \sqrt{5}}{2 \cdot 2} = \frac{2}{2} = 1\)

5. \(\sqrt[3]{24x^2y^3} = \sqrt{2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot y \cdot y \cdot y} = 2 \cdot x \cdot y \cdot y \sqrt{3} = 2xy\sqrt{3}\)

6. Worked out below.
   \[2\sqrt{18} - 5\sqrt{32} + 7\sqrt{162} = 2\sqrt{3 \cdot 2 \cdot 2} - 5\sqrt{2 \cdot 2 \cdot 2 \cdot 2} + 7\sqrt{2 \cdot 9 \cdot 9} = 2 \cdot 3 \sqrt{2} - 5 \cdot 2 \sqrt{2} + 7 \cdot 9 \sqrt{2} = 6 \sqrt{2} - 20 \sqrt{2} + 63 \sqrt{2} = 49 \sqrt{2}\]

7. \(\frac{\sqrt[3]{5} + \sqrt[3]{3}}{\sqrt[3]{5} - \sqrt[3]{3}} = \left(\frac{\sqrt[3]{5}}{\sqrt[3]{5} - \sqrt[3]{3}}\right) \left(\frac{5 + \sqrt[3]{3}}{5 + \sqrt[3]{3}}\right) = \frac{5 \sqrt[3]{3} + 3}{5 \sqrt[3]{3} - 25 - 3} = \frac{5 \sqrt[3]{3} + 3}{22}\)

8. \(2\sqrt[3]{5} + 5\sqrt[3]{2} = 6\sqrt[3]{9} - 8\sqrt[3]{6} + 15\sqrt[3]{6} - 20\sqrt[3]{4} = 18 - 8\sqrt[3]{6} + 15\sqrt[3]{6} - 40 = -22 + 7\sqrt[3]{6}\)
Elementary Algebra Content Areas of ACCUPLACER

Recommendation: Use the videos at Khan Academy (www.khanacademy.org) with these content areas for additional preparation

Integers and Rationals
Ordering
Operations with signed numbers
Absolute value

Algebraic Expressions
Evaluating formulas and other algebraic expressions
Addition and subtraction of monomials and polynomials
Multiplication of monomials and polynomials
Positive rational roots and exponents
Squaring a binomial
Factoring difference of squares
Factoring $ax^2 + bx + c$ over the integers
Factoring polynomials that are not quadratics
Operations with algebraic fractions involving addition, subtraction, multiplication & division
Division of monomials and polynomials including simplification of algebraic fractions

Equations, Inequalities, and Word Problems
Solving linear equations and inequalities
Systems of linear equations
Quadratic equations solution by factoring
Translating written phrases or sentences into algebraic expressions or equations
Solving verbal problems in an algebraic context including geometric reasoning
Graphing