

# BASIC OPERATIONS WITH REAL NUMBERS: PROFICIENCY EXAM\*

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## Abstract

This module is from Elementary Algebra by Denny Burzynski and Wade Ellis, Jr. The basic operations with real numbers are presented in this chapter. The concept of absolute value is discussed both geometrically and symbolically. The geometric presentation offers a visual understanding of the meaning of  $|x|$ . The symbolic presentation includes a literal explanation of how to use the definition. Negative exponents are developed, using reciprocals and the rules of exponents the student has already learned. Scientific notation is also included, using unique and real-life examples. This module provides a proficiency exam for the chapter "Basic Operations with Real Numbers".

## 1 Proficiency Exam

Simplify the expressions for the following problems.

**Exercise 1** *(Solution on p. 4.)*  
( here<sup>1</sup>)  $-\{-[-(-6)]\}$

**Exercise 2** *(Solution on p. 4.)*  
( here<sup>2</sup>)  $-|-15|$

**Exercise 3** *(Solution on p. 4.)*  
( here<sup>3</sup>)  $-[|-12| - 10]^2$

**Exercise 4** *(Solution on p. 4.)*  
( here<sup>4</sup>)  $-5(-6) + 4(-8) - |-5|$

**Exercise 5** *(Solution on p. 4.)*  
( here<sup>5</sup>)  $\frac{3(-8)-(-2)(-4-5)}{(-2)(-3)}$

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<sup>1</sup>"Basic Operations with Real Numbers: Signed Numbers" <<http://cnx.org/content/m18874/latest/>>

<sup>2</sup>"Basic Operations with Real Numbers: Absolute Value" <<http://cnx.org/content/m21876/latest/>>

<sup>3</sup>"Basic Operations with Real Numbers: Subtraction of Signed Numbers" <<http://cnx.org/content/m21877/latest/>>

<sup>4</sup>"Basic Operations with Real Numbers: Subtraction of Signed Numbers" <<http://cnx.org/content/m21877/latest/>>

<sup>5</sup>"Basic Operations with Real Numbers: Multiplication and Division of Signed Numbers"

<<http://cnx.org/content/m21872/latest/>>

**Exercise 6** (Solution on p. 4.)

( here<sup>6</sup>)  $-|7| - (2)^2 + (-2)^2$

**Exercise 7** (Solution on p. 4.)

( here<sup>7</sup>)  $\frac{-6(2)(-2)}{-(-5-3)}$

**Exercise 8** (Solution on p. 4.)

( here<sup>8</sup>)  $\frac{-3\{[(-2-3)][-2]\}}{-3(4-2)}$

**Exercise 9** (Solution on p. 4.)

( here<sup>9</sup>) If  $z = \frac{x-u}{s}$ , find  $z$  if  $x = 14$ ,  $u = 20$ , and  $s = 2$ .

When simplifying the terms for the following problems, write each so that only positive exponents appear.

**Exercise 10** (Solution on p. 4.)

( here<sup>10</sup>)  $\frac{1}{-(-5)^{-3}}$

**Exercise 11** (Solution on p. 4.)

( here<sup>11</sup>)  $\frac{5x^3y^{-2}}{z^{-4}}$

**Exercise 12** (Solution on p. 4.)

( here<sup>12</sup>)  $2^{-2}m^6(n-4)^{-3}$

**Exercise 13** (Solution on p. 4.)

( here<sup>13</sup>)  $4a^{-6}(2a^{-5})$

**Exercise 14** (Solution on p. 4.)

( here<sup>14</sup>)  $\frac{6^{-1}x^3y^{-5}x^{-3}}{y^{-5}}$

**Exercise 15** (Solution on p. 4.)

( here<sup>15</sup>)  $\frac{(k-6)^2(k-6)^{-4}}{(k-6)^3}$

**Exercise 16** (Solution on p. 4.)

( here<sup>16</sup>)  $\frac{(y+1)^3(y-3)^4}{(y+1)^5(y-3)^{-8}}$

**Exercise 17** (Solution on p. 4.)

( here<sup>17</sup>)  $\frac{(3^{-6})(3^2)(3^{-10})}{(3^{-5})(3^{-9})}$

**Exercise 18** (Solution on p. 4.)

( here<sup>18</sup>)  $(a^4)^{-3}$

**Exercise 19** (Solution on p. 4.)

( here<sup>19</sup>)  $\left[\frac{r^6s^{-2}}{m^{-5}n^4}\right]^{-4}$

<sup>6</sup>"Basic Operations with Real Numbers: Multiplication and Division of Signed Numbers"  
<<http://cnx.org/content/m21872/latest/>>

<sup>7</sup>"Basic Operations with Real Numbers: Multiplication and Division of Signed Numbers"  
<<http://cnx.org/content/m21872/latest/>>

<sup>8</sup>"Basic Operations with Real Numbers: Multiplication and Division of Signed Numbers"  
<<http://cnx.org/content/m21872/latest/>>

<sup>9</sup>"Basic Operations with Real Numbers: Multiplication and Division of Signed Numbers"  
<<http://cnx.org/content/m21872/latest/>>

<sup>10</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>11</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>12</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>13</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>14</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>15</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>16</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>17</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>18</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>19</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

**Exercise 20** *(Solution on p. 4.)*

( here<sup>20</sup>)  $(c^0)^{-2}$ ,  $c \neq 0$

**Exercise 21** *(Solution on p. 4.)*

( here<sup>21</sup>) Write 0.000271 using scientific notation.

**Exercise 22** *(Solution on p. 4.)*

( here<sup>22</sup>) Write  $8.90 \times 10^5$  in standard form.

**Exercise 23** *(Solution on p. 4.)*

( here<sup>23</sup>) Find the value of  $(3 \times 10^5)(2 \times 10^{-2})$ .

**Exercise 24** *(Solution on p. 4.)*

( here<sup>24</sup>) Find the value of  $(4 \times 10^{-16})^2$ .

**Exercise 25** *(Solution on p. 4.)*

( here<sup>25</sup>) If  $k$  is a negative integer, is  $-k$  a positive or negative integer?

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<sup>20</sup>"Basic Operations with Real Numbers: Negative Exponents" <<http://cnx.org/content/m21882/latest/>>

<sup>21</sup>"Basic Operations with Real Numbers: Scientific Notation" <<http://cnx.org/content/m21879/latest/>>

<sup>22</sup>"Basic Operations with Real Numbers: Scientific Notation" <<http://cnx.org/content/m21879/latest/>>

<sup>23</sup>"Basic Operations with Real Numbers: Scientific Notation" <<http://cnx.org/content/m21879/latest/>>

<sup>24</sup>"Basic Operations with Real Numbers: Scientific Notation" <<http://cnx.org/content/m21879/latest/>>

<sup>25</sup>"Basic Operations with Real Numbers: Scientific Notation" <<http://cnx.org/content/m21879/latest/>>

## Solutions to Exercises in this Module

**Solution to Exercise 1 (p. 1)**

−6

**Solution to Exercise 2 (p. 1)**

−15

**Solution to Exercise 3 (p. 1)**

−4

**Solution to Exercise 4 (p. 1)**

−7

**Solution to Exercise 5 (p. 1)**

−7

**Solution to Exercise 6 (p. 1)**

−7

**Solution to Exercise 7 (p. 2)**

3

**Solution to Exercise 8 (p. 2)**

5

**Solution to Exercise 9 (p. 2)**

−3

**Solution to Exercise 10 (p. 2)**

125

**Solution to Exercise 11 (p. 2)**

$$\frac{5x^3z^4}{y^2}$$

**Solution to Exercise 12 (p. 2)**

$$\frac{m^6}{4(n-4)^3}$$

**Solution to Exercise 13 (p. 2)**

$$\frac{8}{a^{11}}$$

**Solution to Exercise 14 (p. 2)**

$$\frac{1}{6}$$

**Solution to Exercise 15 (p. 2)**

$$\frac{1}{(k-6)^5}$$

**Solution to Exercise 16 (p. 2)**

$$\frac{(y-3)^{12}}{(y+1)^2}$$

**Solution to Exercise 17 (p. 2)**

1

**Solution to Exercise 18 (p. 2)**

$$\frac{1}{a^{12}}$$

**Solution to Exercise 19 (p. 2)**

$$\frac{n^{16}s^8}{m^{20}r^{24}}$$

**Solution to Exercise 20 (p. 2)**

1

**Solution to Exercise 21 (p. 3)**

$$2.71 \times 10^{-4}$$

**Solution to Exercise 22 (p. 3)**

890,000

**Solution to Exercise 23 (p. 3)**

6000

**Solution to Exercise 24 (p. 3)**

$$1.6 \times 10^{-31}$$

**Solution to Exercise 25 (p. 3)**  
a positive integer