DIY: Arithmetic of Numbers

To review Arithmetic of numbers, watch the following set of YouTube videos introducing positive and negative integers, operations on integers, order of operations in an arithmetic expression, absolute values, place values and rounding. They are followed by several practice problems for you to try, covering all the basic concepts covered in the videos, with answers and detailed solutions. Some additional resources are included for more practice at the end.

1. **Numbers**
2. **Integers**
3. **Adding and subtracting Integers**
4. **Multiplying and dividing Integers**
5. **Order Of operations**
6. **Absolute value of numbers-1**
   **Absolute value of numbers-2**
7. **Decimal place value**
8. **Rounding**

**Practice problems:** The following problems use the techniques demonstrated in the above videos. The answers are given after the problems. Then detailed solutions, if you need them, are provided after the answer section. For further assistance and help please contact **Math Assistance Area.**

1. To which set(s) do the number belong (*Real number, whole number, integer*, *rational number, zero* or *irrational number*):
   - a. 2.225
   - b. -25
   - c. 0
   - d. 697
   - e. \(3 \frac{5}{8}\)
   - f. \(\sqrt{7}\)
   - g. \(\pi\)
   - h. \(-\frac{1}{3}\)

2. Plot the following on a number line:
   - a. -1
   - b. 1.5
   - c. -2
   - d. 2

3. Put <,> or = sign as appropriate:
   - a. -10 _____ 2
   - b. 217 _____ 95
   - c. -12 _____ -20
   - d. 100 _____ (200-100)
4. Evaluate absolute values:
   a. $|25|$  
   b. $|\ -21.25|$
   c. $|23 \ - 56|$
   d. $|(-4)^2|$
   e. $|-89| - |2|$
   f. $|0|$
   g. $-|(-3)^2|$

5. Evaluate:
   a. $22 + 69$
   b. $56 - 9$
   c. $2000 + 9871$
   d. $75 - 89$
   e. $-27 + 19$
   f. $(-18) + (-9)$
   g. $(-17) - (-20)$
   h. $56 - (-10)$

6. Evaluate:
   a. $2 \times 12$
   b. $33 \times (-12)$
   c. $56 \div 4$
   d. $99 \div (-11)$
   e. $(-3) \times (4)$
   f. $(-5) \times (-4)$
   g. $(-27) \div 3$
   h. $(-50) \div (-10)$

7. Evaluate using order of operations:
   a. $3 \times (22 - 10) + 5$
   b. $9^2 + 22(6 + 4) - 14(2 \times 9)$
   c. $22 \div (4 + 7) + 10$
   d. $(11^2 + 2^3) + (2 + 3 \times 4 - 9) + 100$
   e. $19 - 2(3+2) + 1$
   f. $|6(2-10)| + 4 \ |5 - 2| ^2$

8. Find the place value of the digit in the box for the following numbers:
   a. $\boxed{2}\ 203$
   b. $1\ 5\ 4\ 7\ 8$
   c. $122.\ 2\ 5$
   d. $5\ 893.\ 2\ 2\ 6$
   e. $6893.2\ 5$
   f. $2\ \boxed{8}$

9. Write the following as a single number:
   \[6(1000) + 8(10) + 4 + \frac{3}{10} + \frac{5}{100}\]

10. Find $\frac{(2^2 + 12) + 450}{100}$ and round up the answer to the:
   a. nearest integer
   b. nearest tenth

Answers:
1. a) Real, Rational  
   b) Integer, Real, Rational  
   c) Whole, Real, Rational, Zero  
   d) Integer, Whole, Natural, Rational, Real  
   e) Real, Rational  
   f) Irrational, Real  
   g) Irrational, Real  
   h) Real, Rational
2.

3. a) -10 < 2  b) 217 > 95  c) -12 > -20  d) 100 = (200-100)

4. a) 25  b) 21.25  c) 33  d) 16  e) 87  f) 0  g) -9

5. a) 91  b) 47  c) 11871  d) -14  e) -8  f) -27  g) 3  h) 66

6. a) 24  b) -396  c) 14  d) -9  e) -12  f) 20  g) -9  h) 5

7. a) 41  b) 49  c) 12  d) 234  e) 10  f) 84

8. a) Tens place  b) Ten Thousands place  c) Hundredths place  d) Thousands place  
   e) Thousandths place  f) Ones

9. 6084.35

10. a) 5  b) 4.7
Detailed Solutions to Arithmetic of Numbers Problems

1. a) Real and Rational
   b) -25 is a negative Integer hence it is also Real and Rational
   c) Whole number, Real, Rational and zero
   d) Integer, Whole number, Natural number, Rational and Real
   e) Real and Rational
      as \( 3 \frac{5}{8} = \frac{29}{8} \)
   f) \( \sqrt{7} \) is non terminating and non repeating decimal so it is Irrational but a Real number
   g) \( \pi \) is also a non terminating and non repeating decimal.
      \( \pi = \frac{22}{7} \) or \( \pi = 3.14 \), they look like rational numbers but these are just approximations of the value of \( \pi \) hence it is Irrational and a Real number
   h) Real and a rational number

2.

3. a) \(-10 \leq 2\) since \(-10\) is a negative integer so it lies on the left of 2 on the number line and hence is smaller
   b) \(21.7 > 9.5\) since 21.7 and 9.5 are both positive and 21.7 is a larger number
3c) \(-12 \leq -20\) since both the numbers are negative and on the numberline -20 occurs left of -12 hence -12 is larger than -20

3d) \(100 = 200 - 100\) since 200 - 100 = 100 hence both the sides are equal to each other.

4a) \(|25| = 25\) since 25 is the positive value of 25

4b) \(|-21.25| = 21.25\) since 21.25 is the positive value of -21.25

4c) \(|23 - 56| = |1 - 33| = 33\)

4d) \(|-4| = 16| = 16\)

4e) \(|-89| - 12| = 89 - 2 = 87\)

4f) \(|10| = 0\)

5a) \(22 + 69 = \frac{22}{69} = \frac{11}{37}\)

5c) \(2000 + 9871 = \frac{2000 + 9871}{11871}\)

5d) \(75 - 89\) Difference of 89 and 75 is 14 but since 89 is the larger quantity and is a negative number hence \(75 - 89 = -14\)
5c) \(-27 + 19\)
Again the difference of 27 and 19 is \(\frac{12}{19}\)
\(\frac{-19}{8}\)
But since 27 is the larger quantity and is negative hence \(-27 + 19 = -8\)

5g) \((-17) - (-20)\)
\(-17 + 20 = 20 - 17 = 3\)

5h) \(56 - (10)\)
\(= 56 + 10 = \boxed{66}\)

6a) \(2 \times 12 = \frac{12}{2} = \frac{24}{2}\)

6c) \(56 ÷ 4 = 4 \sqrt{56} = 4 \sqrt{\frac{56}{16}} = \frac{4 \sqrt{16}}{4} = \frac{16}{4} = 4\)

hence \(56 ÷ 4 = \boxed{14}\)

6d) \(99 ÷ (-11)\)
now \(\frac{99}{-11} = 9\)

since we are dividing a positive number by a negative number the quotient should be negative hence \(99 ÷ (-11) = -9\)

5f) \((-18) + (-9)\)
\(= -18 - 9\)
Since both have the same sign we essentially add them to get \(18 + 9 = 27\) but since 18 is the larger quantity and is negative hence \(-18 - 9 = \boxed{-27}\)

6b) \(33 \times (-12)\)
but we are multiplying a positive number to a negative number hence the answer is negative
\(\frac{33 \times 12}{66} = \frac{396}{-396}\)

Therefore \(33 \times (-12) = -396\)

6e) \((-3) \times (4)\)
since we are multiplying a negative number to a positive number so the answer should be negative hence \((-3) \times (4) = \boxed{-12}\)
6f) \((-5) \times (-4)\) since we are multiplying two negative numbers, the answer is positive hence \((-5) \times (-4) = 20\)

6g) \((-50) \div (-10)\) now \(\frac{50}{-50} = \frac{50}{-50}\) since we are dividing a negative number by a positive number, the answer is negative hence \((-50) \div (-10) = 5\)

7a) \(3 \times (22 - 10) + 5\)
\[= 3 \times 12 + 5\]
\[= 36 + 5\]
\[= 41\]

7b) \(\frac{9^2 + 22(6+4) - 14(2 \times 9)}{2}\)
\[= \frac{81 + 22(10) - 14(18)}{2}\]
\[= \frac{81 + 220 - 252}{2}\]
\[= \frac{301 - 252}{2}\]
\[= 49\]

7c) \(22 \div (4 + 7) + 10\)
\[= 22 \div 11 + 10\]
\[= 2 + 10\]
\[= 12\]

7d) \(11^2 + 2^3 + (2 + 3 \times 4 - 9) + 100\)
\[= (121 + 8) + (2 + 12 - 9) + 100\]
\[= 129 + (44 - 9) + 100\]
\[= 129 + 5 + 100\]
\[= 134 + 100 = 234\]

7e) \(|6(2 - 10)| + 4/\sqrt{5 - 2^2}\)
\[= |6(-8)| + 4/\sqrt{3}\]
\[= 144 + 4 \times 3\]
\[= 48 + 12 = 60\]

7f) \(|6.2 - 10| + 4 \times 5 - 2^2\)
\[= |6(-8)| + 4 \times 13\]
\[= 48 + 52 = 84\]
8a) 1 2 0 3 2 2
   \[ \begin{align*}
   \text{tens} & : 2 \\
   \text{ones} & : 2
   \end{align*} \]

8b) \[ \begin{align*}
   \text{ten thousands} & : 5 \\
   \text{thousands} & : 4 \\
   \text{hundreds} & : 7 \\
   \text{tens} & : 8
   \end{align*} \]

8c) \[ \begin{align*}
   \text{tenths} & : 5
   \end{align*} \]

8d) \[ \begin{align*}
   \text{thousands} & : 5 \\
   \text{hundred thousands} & : 8 \\
   \text{thousands} & : 9 \\
   \text{hundreds} & : 3 \\
   \text{tens} & : 2
   \end{align*} \]

8e) 6 8 9 3. 2 5

8f) \[ \begin{align*}
   \text{ones} & : 3
   \end{align*} \]

9) \[ \begin{align*}
   6(1000) & + 8(10) + 4 \frac{3}{10} + \frac{5}{100} \\
   & = 6000 + 80 + 4.3 + 0.05 \\
   & = 6084.35
   \end{align*} \]

10) \[ \begin{align*}
   \frac{6^2 + 12 + 456}{100} & = \frac{(4+12)+450}{100} = \frac{16+450}{100}
   \end{align*} \]

Rounding to
a) nearest integer: \[ 4.66 \approx \frac{5}{1} \]
b) nearest tenths: \[ 4.66 \approx 4.7 \]
Additional Resources

Click on the links below to download worksheets under “Basics” for more practice:

1. Order of operations
2. Number sets
3. Adding rational numbers
4. Adding and subtracting rational numbers
5. Multiplying and dividing rational numbers

Alternatively;

1. Go To http://www.kutasoftware.com/free.html
2. Under “Basics” click on:
   - Order of operations
   - Number sets
   - Adding rational numbers
   - Adding and subtracting rational numbers
   - Multiplying and dividing rational numbers
3. You can print out the worksheets and work on them. The solutions are provided at the end of the worksheets
4. For help please contact the Math Assistance Area.