



# STAR SESSIONS

**SAM TEST ARITHMETIC REVIEW**

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**PURDUE** NORTH CENTRAL

# Q & A:

**Q: What is STAR?**

A: STAR stands for Sam Test Arithmetic Review and covers the first 14 problems on the math portion (Form D) of the placement test – also called the SAM test.

**Q: Why are there 14 arithmetic problems on this test?**

A: PNC does not offer a course in computational arithmetic. This part of the test allows a student to show their knowledge of this material.

**Q: What happens if a student does poorly on these problems?**

A: Since PNC does not offer a Basic Math/Computational arithmetic course, the student is responsible for learning the material on his or her own.

**Q: How many questions does a student need correct to pass this section?**

A: A student needs 9 or 10 (or more!) correct out of 14 to pass this section.

**Q: What kind of problems are on this part of the test?**

A: The 14 problems cover the following math topics...

- ❖ Add, subtract, multiply, and divide whole numbers
- ❖ Add, subtract, multiply, and divide fractions and mixed fractions
- ❖ Add, subtract, multiply, and divide integers (negative and positive numbers)
- ❖ Students should also know how to read a graph, follow the order of operations, solve for an unknown (variable), solve a story problem, and simplify exponents

**Q: Are students allowed to repeat the placement tests?**

A: Yes! Students may repeat all of the placement test, or any one of the three components (Math, English, and Reading).

# I. Operations with Whole Numbers.

## ADD

$$28 + 19 = 47$$

$$52 + 63 + 10009 = 10,124$$

## SUBTRACT

$$690 - 538 = 152$$

$$4201 - 3859 = 342$$

## MULTIPLY

$$53 \times 18 = 954$$

$$(9)(2) = 18$$

$$5 \cdot 3 = 15$$

## DIVIDE

$$14 \div 7 = 2$$

$$24 / 8 = 3$$

$$\frac{81}{9} = \frac{9}{1} = 9$$

Additional problems may be found in any basic math textbook or on the Internet.

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## II. Operations with Fractions.

### ADD

$$\begin{array}{r} \frac{1}{3} \\ + \frac{1}{3} \\ \hline \frac{2}{3} \end{array}$$

$$\begin{array}{r} \frac{1}{2} = \frac{2}{4} \\ + \frac{1}{4} = \frac{1}{4} \\ \hline \frac{3}{4} \end{array}$$

$$\begin{array}{r} \frac{1}{6} = \frac{3}{18} \\ + \frac{1}{9} = \frac{2}{18} \\ \hline \frac{5}{18} \end{array}$$

$$\begin{array}{r} \frac{1}{5} = \frac{7}{35} \\ + \frac{1}{7} = \frac{5}{35} \\ \hline \frac{12}{35} \end{array}$$

### SUBTRACT

$$\begin{array}{r} \frac{3}{4} \\ - \frac{1}{4} \\ \hline \frac{2}{4} = \frac{1}{2} \end{array}$$

$$\begin{array}{r} \frac{7}{9} = \frac{7}{9} \\ - \frac{1}{3} = \frac{3}{9} \\ \hline \frac{4}{9} \end{array}$$

$$\begin{array}{r} \frac{5}{6} = \frac{10}{12} \\ - \frac{1}{4} = \frac{3}{12} \\ \hline \frac{7}{12} \end{array}$$

$$\begin{array}{r} \frac{2}{3} = \frac{4}{6} \\ - \frac{1}{2} = \frac{3}{6} \\ \hline \frac{1}{6} \end{array}$$

### MULTIPLY

Cancel, and multiply straight across

$$\begin{array}{c} 4 \\ \cancel{8} \end{array} \times \begin{array}{c} \cancel{5}^1 \\ 6 \end{array} = \frac{4}{9}$$

### DIVIDE

$$\frac{25}{32} \div \frac{5}{8}$$

Invert (flip) and Multiply...

$$\begin{array}{c} 5 \\ \cancel{25} \end{array} \times \begin{array}{c} \cancel{8}^1 \\ \cancel{5}_1 \end{array} = \frac{5}{4}$$

or...  $1 \frac{1}{4}$

Things to know about operations with fractions:

- ❖ Numerator: top number of a fraction
- ❖ Denominator: bottom number of a fraction
- ❖ Find least common denominator (add & subtract)
- ❖ Reduce answer to lowest term
- ❖ Canceling (multiply & divide)
- ❖ Invert (flip) & multiply (division)

### III. Operations with Mixed Fractions.

#### ADD

$$\begin{array}{r} 3 \frac{1}{3} \\ + 4 \frac{1}{3} \\ \hline 7 \frac{2}{3} \end{array} \qquad \begin{array}{r} 6 \frac{3}{5} = \frac{21}{5} \\ + 5 \frac{2}{7} = \frac{10}{7} \\ \hline 11 \frac{31}{35} \end{array}$$

#### SUBTRACT

$$\begin{array}{r} 8 \frac{3}{5} \\ - 3 \frac{2}{5} \\ \hline 5 \frac{1}{5} \end{array} \qquad \begin{array}{r} 4 \frac{1}{10} = 3 \frac{11}{10} \\ - 2 \frac{7}{10} = 2 \frac{7}{10} \\ \hline 1 \frac{4}{10} = 1 \frac{2}{5} \end{array} \quad \text{Borrow from the whole number of the mixed fraction}$$

#### MULTIPLY

$$3 \frac{5}{9} \times 3 \frac{6}{16}$$

Change to an improper fraction

$$2 \frac{32}{9} \times 3 \frac{54}{16} = \frac{12}{1} = 12$$

Multiply straight across

Things to know about operations with mixed fractions:

#### DIVIDE

$$2 \frac{8}{11} \div 2 \frac{4}{33}$$

Change to an improper fraction

$$\frac{30}{11} \div \frac{70}{33}$$

Invert and multiply

$$3 \frac{30}{11} \times \frac{33}{70} = \frac{9}{7} \text{ or } 1 \frac{2}{7}$$

- ❖ Proper fraction  $1 \frac{3}{4}$  to improper fraction  $\frac{7}{4}$
- ❖ Improper  $\frac{7}{4}$  to proper  $1 \frac{3}{4}$
- ❖ Borrow in mixed fraction subtraction

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# IV. Operations with Integers: Negative and Positive Numbers.

## ADD

$$3 + 2 = 5$$

$$(-3) + 2 = (-1)$$

$$3 + (-2) = 1$$

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

## SUBTRACT

$$6 - 4 = 2$$

$$(-6) - 4 = (-10)$$

$$6 - (-4) = 10$$

$$(-6) - (-4) = (-2)$$

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## MULTIPLY

$$3 \times 2 = 6$$

$$(-3) \times 2 = (-6)$$

$$3 \times (-2) = (-6)$$

$$(-3) \times (-2) = 6$$

## DIVIDE

$$12 \div 4 = 3$$

$$(-12) \div 4 = (-3)$$

$$12 \div (-4) = (-3)$$

$$(-12) \div (-4) = 3$$

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## FRACTIONS (A Form of Division)

$$\frac{-3}{4} = \frac{3}{-4} = -\frac{3}{4} \qquad \frac{-3}{-4} = \frac{3}{4}$$

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# V. Exponents

$$3^2 = 3 \times 3 = 9 \qquad 2^4 = 2 \times 2 \times 2 \times 2 = 16$$

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# VI. Solve for the Variable.

$$\begin{array}{r} 3 + y = 12 \\ -3 \quad -3 \end{array}$$

Subtract  
3 from  
both  
sides

$$y = 9$$

$$\begin{array}{r} 9 - x = 6 \\ -9 \quad -9 \end{array}$$

$$\begin{array}{r} -x = -3 \\ -1 \quad -1 \end{array} \quad \text{Factor out a } (-1)$$

$$x = 3$$

$$\begin{array}{r} y - 4 = 1 \\ +4 \quad +4 \end{array}$$

$$y = 5$$

$$8x = 16$$

$$\begin{array}{r} 8x = 16 \\ 8 \quad 8 \\ x = 2 \end{array}$$

$$12 \div y = 6$$

$$\begin{array}{r} (y) \frac{12}{y} = 6 \quad (y) \\ \swarrow \quad \text{Multiply both} \\ \quad \quad \quad \downarrow \quad \text{sides by "y"} \\ 12 = 6y \\ \frac{12}{6} = \frac{6y}{6} \\ 2 = y \end{array}$$

$$x \div 4 = 5$$

$$x = 20$$

# VII. Order of Operations

1. Work inside parenthesis first

- ( ) Parenthesis
- [ ] Brackets
- { } Braces

2. Simplify exponents

3. Multiply or divide in order

$$\begin{array}{r} 3 \times 4 \div 2 \\ 12 \div 2 \\ = 6 \end{array}$$

4. Add or Subtract in order

$$\begin{array}{r} 5 - 2 + 7 \\ 3 + 7 \\ = 10 \end{array}$$

## Order of Operations...

**P**lease      **P**arenthesis

**E**xercise      **E**xponents

**M**y      **M**ultiplication

**D**ear      **D**ivision

**A**unt      **A**ddition

**S**ally      **S**ubtraction