

WISE Pathways Session 4— WorkKeys Applied Math Handout

The following material is publicly available on the ACT web site at:

<https://www.act.org/content/act/en/products-and-services/workkeys-for-job-seekers/assessments/applied-math.html>

The Applied Math Assessment

At some point, many of us sat in math class and asked ourselves, “When am I going to use this?” We may not have believed it, but the answer in a variety of professions is, “Every day!” The Applied Math assessment measures critical thinking, mathematical reasoning, and problem solving techniques for situations that actually occur in today’s workplace. While individuals may use calculators and conversion tables to help with the problems on the assessment, math skills are still needed to think them through.

Number of Items: 34

Test Length

- 55 minutes (WorkKeys Internet Version and Paper)

What it Measures

There are five levels of difficulty. Level 3 is the least complex, and Level 7 is the most complex. The levels build on each other, each incorporating the skills assessed at the previous levels. For example, at Level 5, individuals need the skills from Levels 3, 4, and 5. Examples are included with each level description.

Level 3

Characteristics of Items

- Translate easily from a word problem to a math equation
- All needed information is presented in logical order
- No extra information

Skills

- Solve problems that require one type of mathematical operation. They add or subtract either positive or negative numbers (such as 10 or -2). They multiply or divide using only positive numbers (such as 10).
- Convert a familiar fraction (such as $\frac{1}{2}$ or $\frac{1}{4}$ to a decimal) and convert from a decimal to a common fraction; OR convert between decimals to percentages (such as 0.75 to 75%).

- Convert between familiar units of money and time (such as one hour equals 60 minutes or $\frac{1}{2}$ of a dollar equals \$0.50).
- Add the prices of several products together to find the total, and calculate the correct change for a customer.

Level 3 Applied Math Sample Question

In your job as a cashier, a customer gives you a \$20 bill to pay for a can of coffee that costs \$3.84.

How much change should you give back?

Individual Question

- A. \$15.26
- B. \$16.16
- C. \$16.26
- D. \$16.84
- E. \$17.16

Level 4

Characteristics of Items

- Information may be presented out of order
- May include extra, unnecessary information
- May include a simple chart, diagram, or graph

Skills

- Solve problems that require one or two mathematical operations. They can add, subtract, or multiply using positive or negative numbers (such as 10 or -2), and they can divide positive numbers (such as 10).

- Calculate the average or mean of a set of numbers (such as $(10+11+12)/3$). For this, they may use whole numbers and decimals.
- Figure out simple ratios (such as $\frac{3}{4}$), simple proportions (such as 10/100 cases), or rates (such as 10 mph).
- Add commonly known fractions, decimals, or percentages (such as $\frac{1}{2}$, 0.75, or 25%).
- Add or subtract fractions with a common denominator (such as $\frac{1}{4} + \frac{3}{4} + \frac{1}{4}$).
- Multiply a mixed number (such as $12 \frac{1}{8}$) by a whole number or a decimal.
- Put information in the right order before performing calculations.

Level 4 Applied Math Sample Question

Over the last 5 days, you made the following numbers of sales calls: 8, 7, 9, 5, and 7.

Level 5

Characteristics of Items

- Problems require several steps of logic and calculation (e.g., problem may involve completing an order form by totaling the order and then computing tax)

Skills

- Decide what information, calculations, or unit conversions to use to find the answer to a problem.
- Add and subtract fractions with unlike denominators (such as $\frac{1}{2} - \frac{1}{4}$).
- Convert units within or between systems of measurement (e.g., time, measurement, quantity) where the conversion factor is given either in the problem or in the formula sheet.
- Solve problems that require mathematical operations using mixed units (such as adding 6 feet and 4 inches to 3 feet and 10 inches, or subtracting 4 hours and 30 minutes from 3.5 hours).
- Identify the best deal using one or two step calculations that meet the stated conditions.
- Calculate the perimeter or circumference of a basic shape, or calculate the area of a basic shape.
- Calculate a given percentage of a given number and then use that percentage to find the solution to a problem (e.g., find the percentage and then use it to find the discount, markup, or tax).
- Identify where a mistake occurred in a calculation (such as identifying the row in a spreadsheet where a problem occurred).

Level 5 Applied Math Sample Question

You work in a furniture repair shop and are taking apart an old table to refinish it. You are trying to remove a bolt with a wrench. You tried a wrench size of $\frac{1}{2}$ inch but found that it was slightly too big. Your wrenches are sized in $\frac{1}{16}$ -inch increments.

What size wrench should you try next?

Individual Question

- A. $\frac{1}{32}$
- B. $\frac{3}{8}$
- C. $\frac{7}{16}$
- D. $\frac{9}{16}$
- E. $\frac{5}{8}$

Level 6

Characteristics of Items

- May require considerable translation from verbal form to mathematical expression
- Generally require considerable setup and involve multiple-step calculations

Skills

- Use fractions with unlike denominators and calculate reverse percentages.
- Convert units within or between systems of measurement (e.g., time, measurement, and quantity) where multiple-step conversions are required and the formulas are provided such as converting from kilometers to meters to feet.
- Identify why a mistake occurred in a solution.
- Find the best deal from a group of solutions and then use the result for another calculation.

- Find the area of basic shapes when it may be necessary to rearrange a formula, convert units of measurement in the calculations, or use the result in further calculations.
- Calculate the volume of rectangular solids (e.g., cubes).
- Calculate rates, production rates, rate by time (such as, production rate is 59 cups produced per hour, how many will be produced in an 8 hour shift).
- Identify the correct equation for solving a problem.

Level 6 Applied Math Sample Question

A chemist has a certain number of containers of liquid. Each container is labeled with the number of fluid ounces it contains. The chemist is assigning a lab assistant the task of labeling each container with the number of cups of liquid it contains.

Which of the following formulas should the chemist give to the lab assistant to use for the task?

Individual Question

- A. cups = 0.125 x (fluid ounces)
- B. cups = 8 ÷ (fluid ounces)
- C. cups = 8 x (fluid ounces)
- D. cups = 8 + (fluid ounces)
- E. cups = (fluid ounces) – 8

Level 7

Characteristics of Items

- Content or format may be unusual
- Information may be incomplete or implicit
- Problems often involve multiple steps of logic and calculation

Skills

- Solve problems that include ratios, rates, or proportions with at least one of the quantities is a fraction.
- Identify the reason for a mistake.
- Convert between units of measurement using fractions, mixed numbers, decimals, and percentages.
- Calculate volumes of spheres, cylinders, or cones.
- Calculate the volume when it may be necessary to rearrange the formula, convert units of measurement in calculations, or use the result in further calculations.
- Set up and manipulate ratios, rates, or proportions where at least one of the quantities is a fraction.
- Determine the better economic value of several alternatives by using graphics, or determining the percentage difference, or by determining unit cost.
- Apply basic statistical concepts for example calculate the weighted mean, interpret measures of central tendency, or interpret measure of spread and tolerance.

Level 7 Applied Math Sample Question

The farm where you just started working has a vertical cylindrical oil tank that is 2.5 feet across on the inside. The depth of the oil in the tank is 2 feet.

If 1 cubic foot of space holds 7.48 gallons, about how many gallons of oil are left in the tank?

Individual Question

- A. 37
- B. 59
- C. 73
- D. 230
- E. 294