LEVEL UP 2026 - 2027

NYS SkillsUSA




## PURPOSE

To evaluate the competitor's understanding and ability to solve mathematical problems commonly found in the skilled trades, professional and technical occupations.

## ELIGIBILITY

Open to active NYS SkillsUSA members.

## CLOTHING REQUIREMENTS

**NYS SkillsUSA Official Attire:**

- Official red blazer, NYS Black Jacket, the older red national windbreaker or older red sweater and the Black or red Jacket from Nationals.
- Button up, collared, white dress shirt (accompanied by a plain, solid black tie), white blouse (collarless or small-collared) or white turtleneck, with any collar not to
- extend into the lapel of the outer layer coats
  Black dress slacks or black dress skirt (knee- length)
  Note: Wearing socks or hose is no longer required. If worn, socks
- must be black dress socks, and hose must be either black or skin-tone and seamless/nonpattern hose.
  Black shoes, that are not backless or open toe.

***Note:*** **Contestants must wear their contest clothing to the contest orientation meeting. Also bring #2 pencil, resume, and safety assurance form.**

## EQUIPMENT AND MATERIALS

1. Supplied by technical committee:
   a. Tables and chairs
   b. Test problems and instructions
   c. Scratch paper
   d. Formula sheets and conversion tables/charts
2. Supplied by the competitor:
   a. Hand-held calculator No. 2
   b. pencil
   c. All competitors must create a one-page resume. See "Resume Requirement" below for guidelines.

***Note:*** No reference materials may be used other than those provided by the technical committee.

### RESUME REQUIREMENT

All competitors must create a one-page résumé and submit a hard copy at orientation. Failure to do so will result in a 10-point penalty. Note: Your resume may be judged as part of your contest. Check the Contest Guidelines and/or the updates page on the NYS SkillsUSA Web site: https://www.nysskillsusa.org

### ORIENTATION

The following are required at the orientation meeting, or a penalty may apply. Refer to the penalties section.

1. Safety form will be collected
2. Resume will be collected.
3. SkillsUSA NYS Official attire is required.
4. NLSC form with student information should be in their name badges with their competition numbers displayed.

### PROHIBITED DEVICES

Cell phones or other electronic devices not approved by the NYS Chairperson will be collected by the contest chair during the competition. Chairpersons will announce their acceptance by listing it on their standard or at the orientation meeting. In case of emergencies advisors should allow the competitors to take their phones to the contest areas.

If the competitor uses their device in a manner which compromises the integrity of the competition, the competitor's score may be penalized.

# SCOPE OF THE COMPETITION

## KNOWLEDGE PERFORMANCE

A written knowledge test is required. A sound knowledge of geometry, algebra, trigonometry, and basic statistics will prepare the students to exhibit their problem-solving skills for this part of
the competition. Competitors are also required to take the NYS SkillsUSA Professional Development test at orientation.

## SKILLPERFORMANCE

Competitors will demonstrate their ability to solve math problems that deal with skilled technical real-world scenarios.

## COMPETITION GUIDELINES

1. The written knowledge test comprises 50 problems applicable to any career and technical field. It covers applications of the fundamental operations of whole numbers, fractions, and decimals, including applications of percentages, ratio and proportion, averages, areas, and volumes.
2. The written knowledge test will provide the student with the opportunity to demonstrate his or her problem-solving skills, not just mathematical ability.
3. Students have two hours to complete the problems and check their answers.
4. Hand-held calculators may be used. Competitors need nothing more than a simple scientific calculator that can be purchased for about $10–$15. A graphing calculator is not necessary. The test is based on real-world mathematical applications and reasoning — not theoretical mathematics.
5. No bonus will be given for early completion of the written knowledge test.

# SkillsUSA Related Technical Math Formulas

## *Measurement Conversions*

| Length | Mass/Weight | Area |
|---|---|---|
| **Units:**<br>Inches (in)<br>Feet (ft)<br>Yards (yd)<br>Miles (mi) | **Units:**<br>Ounces (oz)<br>Pounds (lb)<br>Tons | **Units:**<br>Square Inches ($in^2$)<br>Square Feet ($ft^2$)<br>Square Yards ($yd^2$) |
| **Conversions:**<br>1 ft = 12 in<br>1 yd = 3 ft = 36 in<br>1 mi = 5280 ft | **Conversions:**<br>1 lb = 16 oz<br>1 ton = 2000 lb | **Conversions:**<br>1 $ft^2$ = 144 $in^2$<br>1 $yd^2$ = 9 $ft^2$ = 1296 $in^2$ |

| Volume | Time | |
|---|---|---|
| **Units:**<br>Ounces (oz)<br>Cup (c)<br>Pint (pt)<br>Quart (qt)<br>Gallon (gal)<br>Cubic Feet ($ft^3$)<br>Cubic Yard ($yd^3$)<br>Cubic Inches ($in^3$) | **Units:**<br>Seconds (sec)<br>Minutes (min)<br>Hour (hr)<br>Days<br>Weeks (wk)<br>Months (mo)<br>Years (yr) | **Conversions:**<br>1 min = 60 sec<br>1 hr = 60 min<br>1 day = 24 hr<br>1 wk = 7 days<br>1 yr = 52 wk<br>1 yr = 12 mo<br>1 yr = 365 days |
| **Conversions:**<br>1 c = 8 oz<br>1 pt = 2 c = 16 oz<br>1 qt = 2 pt = 4 c = 32 oz<br>1 gal = 4 qt = 16 c = 128 oz<br>1 $ft^3$ = 1728 $in^3$<br>1 $yd^3$ =27 $ft^3$ | **Temperature Conversion**<br>Convert C to F<br>$F = (\times) +$ | **Temperature Conversion**<br>Convert F to C<br>$= (F -) \times$ |

## *Metric Chart*

| Kilo | Hecto | Deka | Base Unit | Deci | Centi | Milli |
|---|---|---|---|---|---|---|
| 1000 x Base | 100 x Base | 10 x Base | Meter, Liter, Gram | .10 x Base | .01 x Bass | .001 x Base |

## *Some Common Metric Conversions*

| | |
|---|---|
| 1 centimeter (cm) = 10 millimeters (mm) | 1 meter (m) = 100 centimeters (cm) |
| 1 kilometer (km) = 1000 meters (m) | |

## *Some Common Metric / U.S. Conversions*

| Length | Mass/Weight | Area | Volume |
|---|---|---|---|
| 1 mi = 1.61 km<br>1 yd = 0.9 m<br>1 in = 2.54 cm<br>1 km = 0.621 mi<br>1 m = 1.094 yd<br>1 m = 3.281 ft<br>1 cm = 0.3937 in | 1 kg = 2.2 lb<br>1 g = 0.035 oz<br>1 metric ton = 1.1 ton<br>1 lb = 0.454 kg<br>1 oz = 28.3 g | 1 $in^2$ = 6.45 $cm^2$<br>1 $yd^2$ = 0.84 $m^2$<br>1 $mi^2$ = 2.59 $km^2$ | 1 L = 1.06 qt<br>1 L = 0.264 gal<br>1 gal = 3.79 L<br>1 L = 2.11 pt<br>1 $yd^3$ = 0.764 $m^3$<br>1 $in^3$ =16.39 $cm^3$ |

# SkillsUSA Related Technical Math Formulas

## *Law of Sines*

$$\frac{\sin}{} = \frac{\sin}{} = \frac{\sin}{}$$

## *Law of Cosines*

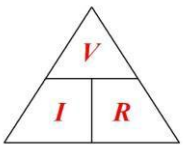
$$^2 = ^2 + ^2 - 2 \cos$$

$$^2 = ^2 + ^2 - 2 \cos$$

$$^2 = ^2 + ^2 - 2 \cos$$

## *Ohm's Law*

$V = I\,R$




$I = \frac{V}{R}$ $R = \frac{V}{I}$

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## *Sinusoidal Waves*

$$A \sin [B (x - C)] + D$$

$$A \cos [B (x - C)] + D$$

A = amplitude Period = $2\pi/B$ Phase Shift = C Midline = D

Phase Angle = (Time delay in milliseconds) * (Frequency, f=1/period) * ($360^{O}$ or $2\pi$ radians)

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## *Miscellaneous Formulas*

Distance between points $(_1, _1), (_2, _2)$: $= \sqrt{(\ -\ )} + (\ -\ )$

Midpoint of segment between points $(_1, _1), (_2, _2)$: $($ $\frac{+\ \ +}{}, \frac{}{}$ $)$

Pythagorean Theorem: $= +$

Circle Equation, Standard Form: $(-\boldsymbol{h}) + (-\ \boldsymbol{k}) =$

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## *Linear Equations*

Slope Formula: $= \frac{-}{-}$

Point – Slope Form: $-\ \ = (-\ )$

Slope – Intercept Form: $= +$

Standard Form: $+\ =$

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## *Quadratic Functions*

Quadratic Formula for solutions of $ax^2 + bx + c = 0$: $= \frac{-\pm\sqrt{-}}{}$

General Form: $() = + +$

Vertex Form: $() = (-\boldsymbol{h}) + \boldsymbol{k}$

Factored Form: $() = (-)(-)$

Vertex $(h,k)$ of $f() = {}^{2} + +$ : $\boldsymbol{h} = -$ $\quad -, \boldsymbol{k} = (\boldsymbol{h}) = (-$

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***Exponential & Logarithmic Functions***

Simple Interest: $\boldsymbol{I} = \boldsymbol{p}$

Compound Interest: $= \boldsymbol{P}( +)$ $-$

Compounding: $= \boldsymbol{P}$ Continuous Growth or Decay: $= \boldsymbol{k}$

Logarithmic Power Rule: $\mathbf{lg} = \mathbf{lg}$

Logarithmic Product Rule: $\mathbf{lg}() = \mathbf{lg}() + \mathbf{lg}()$

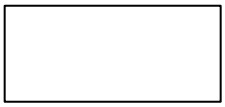
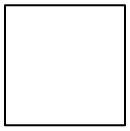
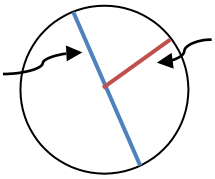
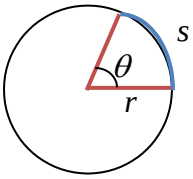
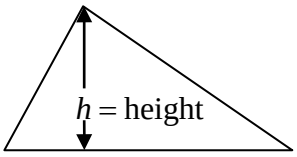
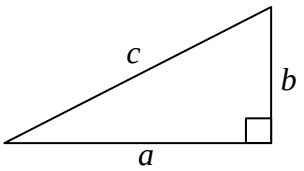
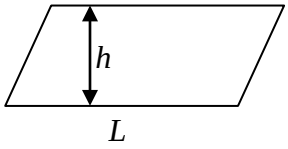
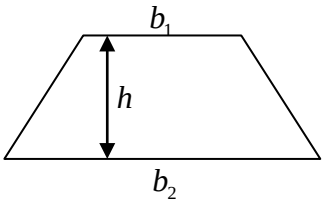
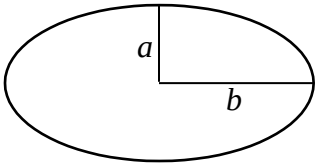
Logarithmic Quotient Rule: $\mathbf{lg}() = \mathbf{lg}() - \mathbf{lg}()$

$-$

Change of Base Formula: $\mathbf{lg} = \frac{\mathbf{lg}()}{\mathbf{lg}()} = \frac{\mathbf{l}()}{\mathbf{l}()}$

Newton's Law of Cooling: $\boldsymbol{T}() = {}^{\boldsymbol{k}} + \boldsymbol{T}$

# Geometric Formulas

| Shape | General Formulas | Picture |
|---|---|---|
| ***Rectangles*** | Perimeter: $P = 2L + 2W$<br>Area: $A = L \cdot W$ | <br>$W =$ width<br>$L =$ length |
| ***Squares*** | Perimeter: $P = 4S$<br>Area: $A = S \cdot S = S^2$ | <br>$S =$ side |
| ***Circles*** | Circumference: $C = 2\pi r = \pi d$<br>Area: $A = \pi r^2 = \frac{\pi}{4} d^2$<br>Arc Length: $s = r \cdot \theta$ ($\theta$ in radians)<br>Area of Sector: $A_s = \frac{1}{2} r^2 \cdot \theta$ ($\theta$ in radians) | $d =$ diameter, $r =$ radius<br><br> |
| ***Triangles*** | Area: $A = \frac{1}{2} b \cdot h$ |  |
| ***Right Triangles*** | Side Length Relationship: $c^2 = a^2 + b^2$ |  |
| ***Parallelograms*** | Area: $A = L \cdot h$ |  |
| ***Trapezoids*** | Area: $A = \frac{1}{2}(b_1 + b_2) \cdot h$ |  |
| ***Ellipses*** | Area: $A = \pi \cdot a \cdot b$ |  |

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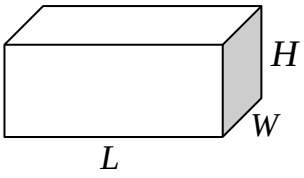
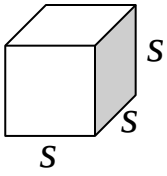
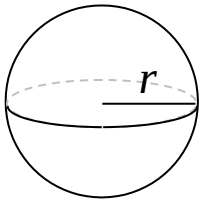
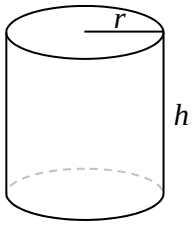
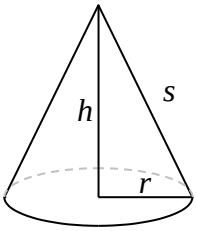
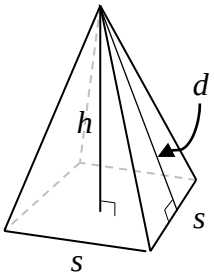
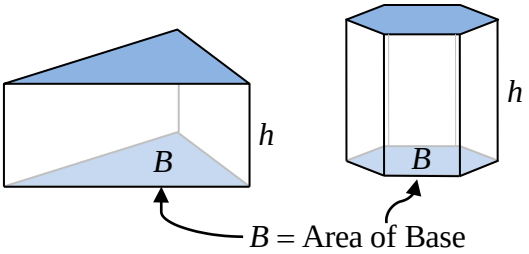
| Shape | General Formulas | Picture |
|---|---|---|
| ***Rectangular Solids (Boxes)*** | Surface Area (with top and bottom): $SA = 2LW + 2LH + 2WH$<br>Volume: $V = L \cdot W \cdot H$ |  |
| ***Cubes*** | Surface Area (with top and bottom): $SA = 6s^2$<br>Volume: $V = s \cdot s \cdot s = s^3$ |  |
| ***Spheres*** | Surface Area: $SA = 4\pi r^2$<br>Volume: $V = \frac{4}{3}\pi r^3$ |  |
| ***Cylinders*** | Surface Area (with top and bottom): $SA = 2\pi rh + 2\pi r^2$<br>Volume: $V = \pi r^2 h$ |  |
| ***Cones*** | Surface Area (with bottom): $SA = \pi rs + \pi r^2$<br>Volume: $V = \frac{1}{3}\pi r^2 h$ |  |
| ***Pyramids (Square-based)*** | Surface Area (with bottom): $SA = 2ds + s^2$<br>Volume: $V = \frac{1}{3}s^2 h$ |  |
| ***Prisms*** | Surface Area (with top and bottom): $SA = 2B + h \cdot (\text{Perimeter of base})$<br>Volume: $V = B \cdot h$ |  |

SkillsUSA
New York State

# *Championships for 2026*

## *Special Instructions to Contestants*

*Date submitted:* _____

Contest_____NameRelated Technical Math__

Chairperson:_____Tom Smiley_____

**List any new special instructions for the contestants that are not listed or might be changed from the New York SkillsUSA Technical Standards for 2025. DO NOT list requirements already printed in the NYS standards.**

**Only Special Instructions received by March 1, 2026 will be posted on the website!!!**

**Addition of Formula Sheet to scope.**