The following Reference Sheet may be helpful.

**ISAT MATHEMATICS REFERENCE SHEET**

*Grades 7 and 8*

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**FORMULAS FOR PLANE FIGURES**

- **Parallelogram:** \( A = bh \)
- **Trapezoid:** \( A = \frac{1}{2} (b_1 + b_2)h \)
- **Triangle:** \( A = \frac{1}{2} bh \)
- **Circle:**
  - Circumference: \( C = 2\pi r \)
  - Area: \( A = \pi r^2 \)
- **Right Triangle:**
  - The Pythagorean Formula: \( c^2 = a^2 + b^2 \)

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**FORMULAS FOR SOLID FIGURES**

- **Prism:** \( V = Bh \) (\( B \) is the area of the base.)
- **Right Cylinder:** \( V = \pi r^2 h \)
- **Regular Pyramid:** \( V = \frac{1}{3} Bh \)
Evaluate each expression. (NO CALCULATOR)

1) \(7[8(3) \div (15 - 9)]\)

2) \(8[(12 - 5) + 4]^2\)

Find the product or quotient. Express using positive exponents.

3) \(4^{-5} \cdot 4^7\)

4) \(\frac{y^{15}}{y^{-2}}\)

5) \((-n)^{-6} \div (-n)^4\)

6) \(a^7 \cdot a^9\)

Find the missing exponent.

7) \((5^2)(5^2) = 5^3\)

8) \(\frac{c^{10}}{c^2} = c^{13}\)
9.) **FIND THE ERROR:** Jason is multiplying $(4a^2)(4a^3)$. Find his error and correct it.

\[
(4a^2)(4a^3) = 4a^{2+3} = 4a^5
\]

Order each set of numbers from least to greatest.

10.) $2.4 \times 10^2$, $2.45 \times 10^{-2}$, $2.45 \times 10^2$, $2.4 \times 10^{-2}$

11.) $9,562,301$; $9.05 \times 10^{-6}$; $9.5 \times 10^6$; $905,000$

Use the table below to answer the following questions.

12.) List the states in the table below from greatest to least production of maple syrup.

<table>
<thead>
<tr>
<th>State</th>
<th>Amount of Syrup Produced (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine</td>
<td>$1.10 \times 10^6$</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>$3.14 \times 10^5$</td>
</tr>
<tr>
<td>New York</td>
<td>$9.65 \times 10^5$</td>
</tr>
<tr>
<td>Vermont</td>
<td>$1.89 \times 10^6$</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>$3.79 \times 10^5$</td>
</tr>
</tbody>
</table>
13.) A sheet of gold leaf is approximately $1.25 \times 10^{-5}$ centimeters thick.

a.) Write the value of the thickness in standard form. ________________________________

b.) Use the formula $V = lwh$ to find the volume in cubic meters of a sheet of gold leaf that is 2 meters wide and 5 meters long.

ANSWER: ________________________________

Evaluate each expression. Express the result in scientific notation and standard form.

14.) $(5.32 \times 10^8)(3.54 \times 10^3)$

15.) $(0.159)(5.19 \times 10^{-3})$

Scientific Notation: ____________________ Scientific Notation: ____________________

Standard Form: ____________________ Standard Form: ____________________

16.) $\frac{4.97 \times 10^6}{7.1 \times 10^{-8}}$

17.) $\frac{(2.8 \times 10^{-7})(14,000,000)}{3.92 \times 10^4}$

Scientific Notation: ____________________ Scientific Notation: ____________________

Standard Form: ____________________ Standard Form: ____________________
18.) The diameter of Mars is about $7 \times 10^6$ meters. A standard table tennis ball is 0.04 meter in diameter. About how many times greater is the diameter of Mars than that of a table tennis ball.

ANSWER: _______________________

Estimate each root to the nearest integer.

19.) $\sqrt[3]{520}$  
20.) $-\sqrt{48}$  
21.) $\pm \sqrt{39}$  
22.) $\sqrt[3]{-636}$

________________________  ______________________  ______________________  ______________________

Find each root.

23.) $\sqrt{16}$  
24.) $\sqrt[3]{-1000}$  
25.) $-\sqrt{100}$  
26.) $\sqrt[3]{512}$

________________________  ______________________  ______________________  ______________________

Simplify.

27.) $(7x + 5) + (x + 2)$  
28.) $(-x + 3) + (-5x + 6)$

____________________________________  ______________________________________

29.) $(-4x + 3) - (x - 4)$  
30.) $(3x + 7) - (x - 2)$

____________________________________  ______________________________________
Simplify.

31.) \( 7 - 4(x + 3) \)  
32.) \( 3(2 + 3x) + 21x \)

______________________________  ________________________________

33.) Find the perimeter of the shape below. BOX YOUR ANSWER.

\[
\text{triangle with sides } (9x - 4) \text{ cm, } (2x + 3) \text{ cm, } (9x - 4) \text{ cm}
\]

ANSWER: ______________________

Solve each equation. Round to the nearest tenth, if necessary. Check your solution.
BOX YOUR FINAL ANSWER.

34.) \( p^3 = 1331 \)  
35.) \( n^2 = 64 \)  
36.) \( 42 = 4x + 3x \)

37.) \(-7 - 8d = 17\)  
38.) \( 7.8 = 3 + 0.1n + 0.7n \)  
39.) \( \frac{1}{3}p + 6 - \frac{2}{3}p = 0 \)
Solve each equation. Round to the nearest tenth, if necessary. Check your solution.

BOX YOUR FINAL ANSWER.

40.) \(5(w + 1) = 25\)  
41.) \(-2(b + 5) = 12\)  
42.) \(x + 6 = 3x\)

43.) \(3 - 3.7b = 10.3b + 10\)  
44.) \(8x - 4 = 2(4x - 2)\)  
45.) \(9(x - 4) = 3(3x - 8) - 5\)

46.) \(8(3a + 6) = (2a - 4)\)  
47.) \(-7(k + 9) = 9(k - 5) - 14k\)
48.) **FIND THE ERROR:** Ali is solving the equation $10x + 6 = 8x - 4$. Find her error and correct it.

\[
\begin{align*}
10x + 6 &= 8x - 4 \\
10x - 10x + 6 &= 8x - 4 - 10x \\
6 &= 4 - 2x \\
2 &= -2x \\
-1 &= x
\end{align*}
\]

Solve.

49.) $6n - 18 \geq 4(n + 2.1)$

50.) $\frac{1}{4}x + 13 > 0.25(2x - 32)$

51.) Jamie is going to fence the rectangular and triangular sections of grass shown below. The perimeters of the two sections are now equal. If $w$ represents the width of the rectangle, how could you find the lengths of the sides of the rectangle and of the triangle? Justify your response and use your method to solve the problem.
Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary.

52.)

\[ \text{EQUATION: } \]
\[ \text{SOLUTION: } \]

53.) What is the perimeter of a right triangle if the hypotenuse is 15 centimeters and one of the legs is 9 centimeters?

\[ \text{ANSWER: } \]

Find the area of the following shapes. Include appropriate units and round your answer to the nearest tenth if necessary. SHOW ALL OF YOUR WORK! (CALCULATOR ALLOWED)

54.)

\[ \text{_________________} \]

55.)

\[ \text{_________________} \]

56.)

\[ \text{_________________} \]
State the slope and y-intercept and then graph each line.

57.) \( y = \frac{3}{4} x - 1 \)

Slope: ______________

y-intercept: ______________

58.) \( y = 5 \)

Slope: ______________

y-intercept: ______________

Solve the system algebraically.

59.) \[
\begin{align*}
    y &= 4 \\
    y &= 3x - 11
\end{align*}
\]

60.) \[
\begin{align*}
    7x - 3y &= -4 \\
    7x &= -3 + 3y
\end{align*}
\]

61.) \[
\begin{align*}
    8y &= 6 - 2x \\
    x &= 3 - 4y
\end{align*}
\]