TOPIC: Number Sense & Numeration

FOCUS OF ACTIVITIES: Apply operations with natural whole numbers, fractions and integers to every day problems -- generate multiples and factors of given numbers.

INSTRUCTIONS:

This task requires the use of multiplication and division to investigate the ratio of the length to the width of a “Jumbotron” screen. Students will require a ruler and a calculator to answer the questions.

ACTIVITY:

**Jumbotron Assignment**

A new “Jumbotron” will be included in the plans for a new stadium. Since the stadium must be a multi-use facility (convention centre and arena), the structure of the building is somewhat unusual, as shown below.

This version of the “Jumbotron” contains 31,400 square “Trini-lights” and is 8.1 m high and 25.2 m long.
1. (a) Measure the length and height of each one of the following rectangles and calculate the area and perimeter of each one (round answers to one decimal).

(b) Circle the rectangle which most closely resembles the shape of the "Jumbotron"?

(c) State one observation about all of the rectangles above.

2. Write all of the pairs of factors for each of the following:

<table>
<thead>
<tr>
<th>e.g.,</th>
<th>8</th>
<th>1 X 8</th>
<th>2 X 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) 38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d) 31400</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

3. In question #2(d), select the pair of figures which most closely matches the ratio of the dimensions of the new "Jumbotron"? Show your reasoning.

4. What does this pair of figures tell you about the arrangement of the "Trinilights"? Include a diagram.

5. Given that the dimensions of the Jumbotron are 8.1 m high and 25.2 m long, write what you would say to a younger sister or brother to explain how really big it is compared to something in your house. Include a diagram.
4. There are 100 rows and 314 columns -- a rectangular array.

\[
25.2 \div 8.1 \equiv 3.1
\]

\[
200 \times 157 = 31400
\]

\[
40 \times 786 = 31400
\]

\[
25 \times 1256 = 31400
\]

\[
10 \times 3140 = 31400
\]

\[
8 \times 3925 \equiv 31400
\]

\[
5 \times 6280 = 31400
\]

\[
4 \times 7850 = 31400
\]

\[
2 \times 15700 = 31400
\]

\[
1 \times 31400 = 31400
\]

2. (a) 6: 1 x 6

(b) 18: 1 x 18

(c) 44: 2 x 22

(d) 40: 1 x 40

(e) 88: 1 x 88

3. All of the perimeters are about the same but their areas are all quite different.

4. Asterisk (*) most closely resembles the jambition.

\[
\begin{align*}
A &= 5.46 \text{ cm}^2 \\
A &= 4.62 \text{ cm}^2 \\
A &= 2.76 \text{ cm}^2 \\
A &= 6.51 \text{ cm}^2 \\
A &= 3.96 \text{ cm}^2 \\
A &= 5.96 \text{ cm}^2
\end{align*}
\]

\[
\begin{align*}
p &= 1.4 \times 3.9 \\
p &= 1.1 \times 4.2 \\
p &= 0.6 \times 4.6 \\
p &= 2.1 \times 3.1 \\
p &= 0.9 \times 4.4 \\
p &= 1.6 \times 3.6
\end{align*}
\]

Jambition Assignment

ANSWERS
TOPIC: Number Sense & Numeration

FOCUS OF ACTIVITIES:
• Understand and explain that exponents represent repeated multiplication
• Understand that repeated multiplication can be represented as exponents
• Represent whole numbers in expanded form using powers and scientific notation (e.g., $347 = 3 \times 10^2 + 4 \times 10 + 7$; $356 = 3.56 \times 10^2$

INSTRUCTIONS:
Students will need a calculator to answer the questions. They are encouraged to use scientific notation to write their final answers.

ACTIVITY:
One of the great problems of antiquity is the "Sand Reckoner’s Problem". Archimedes, b. c. 298 BC, d. 212 BC, was asked if the number of grains of sand on the face of the Earth was an infinite quantity or not. Very carefully, Archimedes demonstrated that one could count the number of grains of sand that one might find in a pea for instance, give or take a few. Then one could calculate the number of peas one might find in a coconut shell and then multiply to find the number of grains of sand in that coconut shell. One could calculate approximately how many coconut shells might be contained in the hold of an ancient sailing ship and multiply again to find the number of grains of sand. Carrying this methodology to an extreme, one can see that in fact one could eventually approximate the number of grains of sand found on the face of the Earth using carefully selected assumptions. Regardless, the approximate quantity could be represented as a number (today we would represent this number using scientific notation) and therefore, the quantity would indeed be finite!

Use scientific notation and/or a power to represent the values found in the following calculations:

1. For your allowance, you were given one penny on the first day of January, two pennies on the second day, four pennies on the third day, eight pennies on the
fourth day, and so on in this manner to the 31st day, how much would you receive? How many times more or less would this be if you received $100 a day for each of the 31 days?

2. The Rajah of India looked at a chess board and was inspired to offer to his people a grain of rice on the first square, two grains of rice stacked vertically on the second square, four grains of rice stacked vertically on the third square, and so on to the 64th square. How far would the last stack reach given that the thickness of a grain of rice is 1 mm.

3. Conduct an experiment to find out how many marbles it would take to fill your living room.

4. Conduct an experiment to find out how many baseballs it would take to fill the Skydome. (One baseball is contained in a cube [box] 7.3 cm x 7.3 cm x 7.3 cm and the internal volume of the Skydome is about 1 600 000 cubic metres.)

5. State appropriate assumptions and solve the "Sand Reckoner's Problem".
1. $6 \times 10^{12} \div 400 = 4.0 \times 10^9$

$= 1.6 \times 10^{12} \text{ cm}^2$

$1 \text{ m}^3 = 600000 \text{ cm}^3$

Converted to $1 \text{ m}^3$

$= 389 \text{ cm}^3$

$\equiv 389 \text{ Round to 400 cm}^3$

4. $7.3 \times 10^3 \text{ cm}^3$

Answers will vary:

3.

$\equiv 9.22 \times 10^{15} \text{ km}$

$\equiv 9.22 \times 10^{15} \text{ m}$

$2.2 \text{ cm} \equiv 9.22 \times 10^{15} \text{ mm}$

$2.15 \times 10^{15} \text{ cm}$

$\equiv 2.147483647 \times 10^{15} \text{ cm}$

Therefore, Day 31

$1 + 2 + 4 = 7 \phi$

$8 - 7 = 1$

Day 3

$2^2 - 1 = 3$

Day 2

$2 - 1 = 1$

Day 1

$2^3 - 1 = 7$

The Legend of the Numbers:

ANSWERS:
TOPIC: Measurement

FOCUS OF ACTIVITIES:
- Understand that irregular two-dimensional shapes can be decomposed into simple two-dimensional shapes to find the area and perimeter.
- Estimate, measure and calculate areas of irregular figures by decomposition and areas of truncated figures by subtraction.

INSTRUCTIONS:
Students will use the figures provided to determine the total cost of constructing one end of a building.

ACTIVITY:
You have been given the plans to one end of a house that has not been built. You are to find the following:

(a) the surface area to be covered by insulated material,
(b) the surface area of the windows,
(c) the window to insulated material ratio,
(d) the cost of the windows before taxes, given that windows cost $100/m² for rectangular windows and $125/m² for circular windows,
(e) the insulation costs given that the materials cost is $75/m², and
(f) the PST (8%) AND GST (7%) for both materials.

If $17,000 is allotted for this section of the construction, will the contractor be under or over contract? By how much?

Further information is provided on page 2.

You are to prepare a report indicating all of the required information.
Given:
the base of the building is 11 m
the radius of the large circular window is 1.5 m
the diameter of the small window is 1 m
the rectangular window is 1 m from each side and the bottom of the house
the top of the rectangular window is 3 m off the ground
the bracket supporting the large window is 7 m long
the bracket is 8 m off the ground
the small windows are 1 m above the large one
1 m separates the top of the small windows to where the roof begins
the peak of the roof is 11.5 m from the ground.
Under contract by \( 17 \times 000 - 9455.88 = \$7544.12 \)

\[
\begin{align*}
\$9455.88 &= (9 \times 175 + 5 \times 47.50) \times 1.15 \\
\text{(i) Total} \\
\text{(e) Insulation} &= 67.3 \times 75 = \$5047.50 \\
\text{(d) Cost} &= 18 \times 100 + 11 \times 125 = \$3175 \\
29 : 67.3 &= \text{(c)} \\
7.1 + 3.9 + 18 : 67.3 \\
\text{Small} \quad || \quad 5 \quad \frac{2}{3} \text{m}^2 \\
\text{Large} \quad || \quad 7.1 \text{m}^2 \\
6 \times 11 + \left( \frac{2}{3} \times \frac{5}{2} \right) \times 3.9 \times 2 = 67.3 \text{m}^2
\end{align*}
\]

\text{ANSWERS:}