You will receive questions 2 to 14 once you hand in this sheet.

1. Evaluate each expression without using a calculator. You do not need to show your work. (15/15)

<table>
<thead>
<tr>
<th>Expression</th>
<th>Answer</th>
<th>Checking</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) (7(-4))</td>
<td>(-28)</td>
<td>✔️</td>
</tr>
<tr>
<td>(b) (\frac{7 + (-4)}{7 - 4})</td>
<td>(3)</td>
<td>✔️</td>
</tr>
<tr>
<td>(c) (-7 + 4)</td>
<td>(-3)</td>
<td>✔️</td>
</tr>
<tr>
<td>(d) (-7 + 10)</td>
<td>(3)</td>
<td>✔️</td>
</tr>
<tr>
<td>(e) (-7 + (-10))</td>
<td>(-17)</td>
<td>✔️</td>
</tr>
<tr>
<td>(f) (-7 - (-10))</td>
<td>(3)</td>
<td>✔️</td>
</tr>
<tr>
<td>(g) (-5(-7))</td>
<td>(35)</td>
<td>✔️</td>
</tr>
<tr>
<td>(h) (-5 - 7)</td>
<td>(-12)</td>
<td>✔️</td>
</tr>
<tr>
<td>(i) (-5(-4)(-3))</td>
<td>(-60)</td>
<td>✔️</td>
</tr>
<tr>
<td>(j) (-5 - 4 - 3)</td>
<td>(-12)</td>
<td>✔️</td>
</tr>
<tr>
<td>(k) (0 - 19)</td>
<td>(-19)</td>
<td>✔️</td>
</tr>
<tr>
<td>(l) (0(-19))</td>
<td>0</td>
<td>✔️</td>
</tr>
<tr>
<td>(m) (-19 \div 0)</td>
<td>undefined</td>
<td>✔️</td>
</tr>
<tr>
<td>(n) ((-2)^2)</td>
<td>16</td>
<td>✔️</td>
</tr>
<tr>
<td>(o) (-2^4)</td>
<td>(-16)</td>
<td>✔️</td>
</tr>
</tbody>
</table>

Use this space for rough work.
Part One – Integers 29/29

1. This question is given on a separate sheet. (15/15)

2. Evaluate each expression. You must show your work. (14/14)

(a) \(-5 - 2(3 - 13)\)
\[
\begin{align*}
\text{\(=\)} & -5 - 2(-10) \\
\text{\(=\)} & -5 + 20 \\
\text{\(=\)} & 15
\end{align*}
\]

(b) \(-8(4) - 2\left[1 + 27 \div (-3)^2\right]\)
\[
\begin{align*}
\text{\(=\)} & -32 - 2\left[1 + (-9)\right] \\
\text{\(=\)} & -32 - 2(-8) \\
\text{\(=\)} & -32 + 16 \\
\text{\(=\)} & -16
\end{align*}
\]

(c) \(-21 - 24 \div (-4) - 5(-2)\)
\[
\begin{align*}
\text{\(=\)} & -21 - (-6) - (-10) \\
\text{\(=\)} & -21 + 6 + 10 \\
\text{\(=\)} & -5
\end{align*}
\]

(d) \(-14 -(13+9) \div 2\)
\[
\begin{align*}
\text{\(=\)} & -14 - \frac{22}{2} \\
\text{\(=\)} & -14 - 11 \\
\text{\(=\)} & -25
\end{align*}
\]

Part Two – Rational Numbers 18/18

3. Evaluate each expression. You must show your work. (11/11)

(a) \(-\frac{2}{7} + \left(-\frac{3}{7}\right)\)
\[
\begin{align*}
\text{\(=\)} & \frac{-2 - 3}{7} \\
\text{\(=\)} & \frac{-5}{7}
\end{align*}
\]

(b) \(-\frac{2}{5} \left(-\frac{3}{5}\right)\)
\[
\begin{align*}
\text{\(=\)} & \frac{-2(-3)}{5 \times 5} \\
\text{\(=\)} & \frac{6}{25}
\end{align*}
\]

(c) \(-\frac{11}{3} \left(-\frac{9}{44}\right)\)
\[
\begin{align*}
\text{\(=\)} & \frac{11 \times 3}{1 \times 4} \\
\text{\(=\)} & \frac{33}{4}
\end{align*}
\]

Total: 91/91
(d) \[ \frac{21}{15} \div \frac{5}{12} = \frac{21 \times 12}{15 \times 5} = \frac{21 \times 2}{5 \times 3} = \frac{21}{5} \times \frac{2}{3} = \frac{21}{5} \times \frac{2}{3} = \frac{21 \times 2}{5 \times 3} = \frac{42}{15} = \frac{14}{5} = \frac{2}{3} \]

(e) \[ \frac{1 \times 2 \times 3 \times 3}{6 \times 2 \times 4 \times 3} = \frac{2 \times 9}{12} = \frac{2 + 9}{12} = \frac{11}{12} \]

(f) \[ -\frac{5}{9} - \left( -\frac{1}{12} \right) = -\frac{5 \times 4}{9 \times 4} + \frac{1 \times 3}{12 \times 3} = -\frac{20}{36} + \frac{3}{36} = -\frac{20}{36} + \frac{3}{36} = -\frac{17}{36} \]

4. This question deals with number sense. (7/7)

(a) Place each of the given numbers on the number line.

(b) Arrange the given numbers from largest to smallest.

Part Three – Algebra (8/8)

5. Substitute and evaluate. (3/3)

\[ -8s^2 + 20 \quad (s = 4) \]

\[ = -8(4)^2 + 20 \checkmark \]

\[ = -8(16) + 20 \checkmark \]

\[ = -128 + 20 \]

\[ = -108 \checkmark \]

6. Solve the following equation. (1/1)

\[ w + 7 = -51 \]

\[ \therefore w + 7 - 7 = -51 - 7 \]

\[ \therefore w = -58 \checkmark \]

7. Write an algebraic expression that means “the quotient of a number and 10.” (2/2)

\[ \frac{x}{10} \]

8. Translate the algebraic expression 15 - y into words. (2/2)

15 decreased by a number

Part Four – Geometry and Measurement (28/28)

9. Determine the value of c that would make the given triangle a right triangle. (4/4)

By the Pythagorean Theorem,

\[ c^2 = a^2 + b^2 \]

\[ = 7^2 + 15^2 \]

\[ = 49 + 225 \]

\[ = 274 \]

\[ \therefore c = \sqrt{274} \checkmark \]

\[ \therefore c = 16.6 \checkmark \]
10. Calculate the perimeter and area of the given shape. (5/5)

\[ P = 10 + 6 + 7 + 6 + 7 + 4 + 6 \]
\[ = 46 \text{ m} \]

\[ A = A_1 + A_2 \]
\[ = 10(6) + 7(6) \]
\[ = 60 + 42 \]
\[ = 102 \text{ m}^2 \]

11. Calculate the surface area and volume of the given hemisphere (i.e. “half sphere”). (7/7)

\[ A = \frac{A_{\text{sphere}}}{2} + A_{\text{circle at bottom}} \]
\[ = \frac{4\pi r^2}{2} + \pi r^2 \]
\[ = \frac{4(3.14)(10)^2}{2} + 3.14(10)^2 \]
\[ = 942 \text{ m}^2 \]

\[ V = \frac{\frac{4}{3}\pi r^3}{2} \]
\[ = \frac{4(3.14)(10)^3}{2} \]
\[ = 2093.3 \text{ m}^3 \]

12. Find the measures of each angle labelled with a letter. In each case, state your reasoning. (12/12)

<table>
<thead>
<tr>
<th>Measure of Angle</th>
<th>Reasoning (State Why)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( a = 113^\circ )</td>
<td>( \times ) Pattern (opposite angles are equal)</td>
</tr>
<tr>
<td>( b = 34^\circ )</td>
<td>( \Rightarrow ) Pattern (Alternate angles are equal)</td>
</tr>
<tr>
<td>( c = 33^\circ )</td>
<td>( a + b + c = 180^\circ ) ( \therefore 113^\circ + 34^\circ + c = 180^\circ ) (Sum of interior angles of a triangle must be 180°)</td>
</tr>
<tr>
<td>( d = 33^\circ )</td>
<td>( c = d ) ( \Rightarrow ) Pattern (Alternate angles are equal)</td>
</tr>
<tr>
<td>( e = 113^\circ )</td>
<td>( d + c + 34^\circ = 180^\circ ) ( \therefore 33^\circ + c + 34^\circ = 180^\circ ) (Sum of interior angles of a triangle must be 180°)</td>
</tr>
<tr>
<td>( f = 113^\circ )</td>
<td>( b + d + f = 180^\circ ) (supplementary angles) ( \therefore 34^\circ + 33^\circ + f = 180^\circ ) (straight angle)</td>
</tr>
</tbody>
</table>
13. Gulam was so proud of his report card that he decided to frame it and hang it on his bedroom wall. Once he framed it, Gulam realized that his report card would be too hard to read from a distance. After giving some thought to his problem, he decided to get the report card enlarged to four times its original area. If the original report card measured 21.6 cm by 28 cm, what are the dimensions of the enlarged report card? (4/4)

\[
\begin{array}{c|c}
\text{Original Report Card} & \text{Enlarged Report Card} \\
\hline
21.6 & 28 \\
28 & 28 \\
\end{array}
\]

\[\text{Area of original report card} = 28(21.6) = 604.8 \text{ cm}^2\]

\[\text{Four times original area} = 4(604.8) = 2419.2 \text{ cm}^2\]

As can be seen from the diagram, the area can be made four times larger by doubling the length and width. Therefore, the dimensions of the enlarged report card should be 56 cm by 43.2 cm.

Check: \(56 \times 43.2 = 2419.2\)

14. In kite \(ABCD\), angle \(B\) is at the top of the kite and measures \(80^\circ\) degrees. Angles \(A\) and \(C\) are on the sides and angle \(D\) is at the bottom of the kite. What is the largest possible measure of angle \(A\) or \(C\)? (4/4)

Since \(\triangle ABC\) is isosceles and \(\triangle ADC\) is isosceles,

\(\angle BAD = \angle BCA\) and \(\angle DAC = \angle DCA\)

Also, \(\angle BAD = \angle BCA = 50^\circ\) since the sum of the interior angles of a triangle must be \(180^\circ\).

Now \(x + x + y = 180^\circ\)

\(180 - 2x > 0^\circ\)

\(x < 90^\circ\)

Since \(y > 0^\circ\),

\(2x + y = 180^\circ\)

\(y = 180 - 2x\)

\(\angle A\) and \(\angle C\) can have any measure greater than \(50^\circ\) but less than \(140^\circ\).

Another Approach

Imagine "pulling" the point \(D\) down the page. This would make line segments \(AD\) and \(CD\) longer, \(\angle CAD\) and \(\angle ACD\) larger, while \(\angle ADC\) would get smaller. There is no limit to how far point \(D\) can be pulled down but there is a limit to how large \(\angle CAD\) and \(\angle ACD\) can be. Clearly, the measures of these angles can be as close to \(90^\circ\) as we like but cannot exceed \(90^\circ\).