Attempt questions 1, 3 (a), (c), (e), 4 (a), (h), 6 (a), (d), 7 (a), (d) and 8 before your tutorial class in week 2.

A. The Number System

1. Complete the following table by putting a tick in the column(s) that correctly classifies the listed number.

<table>
<thead>
<tr>
<th>Number</th>
<th>( \mathbb{N} )</th>
<th>( \mathbb{W} )</th>
<th>( \mathbb{Z} )</th>
<th>( \mathbb{Q} )</th>
<th>Irrational</th>
<th>( \mathbb{R} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td>-1</td>
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<td>( \frac{1}{2} )</td>
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<tr>
<td>0</td>
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<tr>
<td>( \sqrt{2} )</td>
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<tr>
<td>3 ( \frac{1}{2} )</td>
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<tr>
<td>0.6</td>
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<tr>
<td>( \pi )</td>
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<tr>
<td>( \sqrt{27} )</td>
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<tr>
<td>1.88</td>
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<tr>
<td>( (\sqrt{16})^2 )</td>
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<tr>
<td>0.27( \overline{1} )</td>
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<tr>
<td>( e )</td>
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</tbody>
</table>

2. Determine if the following statements are true or false.

(a) All natural numbers are real numbers.
(b) All real numbers are natural numbers.
(c) All whole numbers are natural numbers.
(d) All natural numbers are whole numbers.
(e) A number is either rational or irrational, but not both.
(f) An irrational number cannot be an integer.
(g) All real numbers are either positive or negative.
(h) All real numbers are either rational or irrational

3. Give examples of the following.

(a) An integer with a square root that is also an integer.
(b) An integer with a cube root that is also an integer.
(c) An integer with integer cube root and integer square root.
(d) A rational number that is not an integer, but with a square root that is also rational.
(e) An irrational number with a square that is an integer.
(f) An irrational number with a square that is irrational but a fourth power that is an integer.
(g) A number all the powers of which are irrational.
B. BIDMAS

4. Evaluate the following.

(a) \((2^3 - 4) \div (4 + 2^2) - 8\)
(b) \((-4 \times 12) - [32 - (-4)]\)
(c) \(-14 \div 2 - (-20) \div (-5)\)
(d) \(4 + 4 \times 4 \div 4 - 4\)
(e) \(4 + 4 \times 4 \div (4 - 4)\)
(f) \(4 + 4 \times (4 \div 4 - 4)\)
(g) \(2^{(4+2-1)} \times 4 - (3^2 - 1)\)
(h) \([4 \times (3 + 4) - 21] \div [2 \times 14 \div 7 + 3]\)

C. Fractions

5. Find the LCM and HCF of each of the following set of numbers.

(a) 4, 12, 16
(b) 6, 18, 24
(c) 12, 18, 36, 48
(d) 16, 36, 48, 60

6. Compute the following, leaving your answer in the simplest fraction form.

(a) \(\frac{1}{2} + \frac{3}{4} + \frac{5}{12}\)
(b) \(\frac{3}{4} - \frac{3}{5} + \frac{7}{10}\)
(c) \(\frac{9}{10} - \frac{5}{20} + 1\frac{2}{3}\)
(d) \(1\frac{2}{3} - 2\frac{2}{9} + 1\frac{4}{5}\)

7. Compute the following, leaving your answer in the simplest fraction form.

(a) \(2\frac{2}{3} \div 4\frac{2}{3} \times 1\frac{1}{3}\)
(b) \(\frac{7}{5} \times 1\frac{2}{5} \div \frac{5}{2}\)
(c) What is half of the difference between a third of 60 and a quarter of 80?
(d) What is the sum of half of 45 and a third of the product of two thirds and 1\(\frac{1}{8}\)?

8. James and his wife Sweet Li have a 12 year old daughter called Lyn. James is 50 year old and Lyn is 12. Half of his age added to five thirds of Lyn’s age gives the age of Sweet Li. How old is Sweet Li?

9. Swee Khum put a third of her savings in the bank, a third in bonds, a quarter of the remainder in stocks and the rest in fixed deposit. If her total amount is $600,000 how much did she put in fixed deposit?

10. The game of Tangles The game of Tangles consists of rotations (R) and twists (T). The value of the tangle is 0 in the starting position. Every twist adds 1 to the result and every rotation takes the negative reciprocal of the result. This game will be demonstrated in class. For example, starting from the zero position, the sequence TTRTRRRTTRTT gives the value of the tangle as \(\frac{4}{5}\). The trick is to untangle the knot, that is, take the value of the tangle back to 0, by using only twists and rotations. The following sequence will achieve this (the value of the tangle is given in brackets):

\[
R \left( -\frac{5}{8} \right) T \left( \frac{3}{5} \right) R \left( -\frac{8}{3} \right) T \left( -\frac{5}{3} \right) T \left( -\frac{2}{3} \right) T \left( \frac{1}{3} \right) R(-3)T(-2)T(-1)T(0)
\]

No consider the following games. In each case find the value of the tangle and find a sequence of moves that will untangle the knot.

(a) TTTTRRRTTT
(b) TRTRTRRRTTR
(c) TRTRTRRRTTRR