# Quiz 5

MATH 100:11 Mathematical Concepts
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Name: SOLUTIONS

This quiz is double-sided!

1. Suppose an archaeologist discovers a primitive tribe that uses a simple grouping mathematical system that is base 10 consisting of the symbols $\triangle, \triangledown, \heartsuit, \odot, \square$. Based on drawings on caves, she determines the following:

   - $\triangle = 1$
   - $\square = 10^2$
   - A square field with sides of length $\square$ has an area of $\odot$.
   - $\heartsuit = \triangledown \times \square$
   - $\triangledown = \triangle\triangle\triangle\triangle\triangle\triangle\triangle\triangle\triangle\triangle$

   [3]

   (a) Find the values of $\triangle, \triangledown, \heartsuit, \odot, \square$.

   (b) Express the number 53275 in terms of these symbols.

a) $\triangle = 1$ given $\square = 10^2 = 100$ $\odot = \square^2 = 10000$

$\heartsuit = \triangledown \times \square$ $\triangledown = 10\triangle = 10$ so $\heartsuit = 10 \times 100 = 1000$

b) 53275

$\odot\odot\odot\odot\odot\ \heartsuit\heartsuit\heartsuit\ \square\square\ \triangledown\triangledown\triangledown\triangledown\triangledown\triangledown\triangledown\ \triangle\triangle\triangle\triangle\triangle$

2. Convert $1362_{seven}$ to decimal. [1]

powers of 7: $7^0 = 1, 7^1 = 7, 7^2 = 49, 7^3 = 343$

So $1362_{seven} = (1)(343) + (3)(49) + 6(7) + (2)(1)$

$= 343 + 147 + 42 + 1$

$= 534$

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 1 1
 3 4 3
 1 4 7
   4 2
     2
 5 3 4
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343
7
2401 - too high

343 | 1362 (3)
1029
333

49 | 333 (6)
294
39

3. Convert the decimal number 1362 to base 7. [2]

1362 in decimal to base 7

= ___ x343 + ___ x49 + ___ x7 + ___ x1

$1362 = 3(343) + 333$

$333 = 6(49) + 39$

$39 = 5(7) + 4$

$4 = 4(1)$

so $3654_{seven}$

4. Find $576_{nine} + 244_{nine}$ (keep everything base 9). [2]

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 576_{nine} \\ +\ 244_{nine} \\ \hline 831_{nine} \end{array}$$

$6+4 = 10 = 9+1$

$1+7+4 = 12 = 9+3$

$1+5+2 = 8$

5. Find $322_{five} - 143_{five}$ (keep everything base 5). [2]

6

2+5=7

$322_{five}$

$-\ 143_{five}$

$124_{five}$