Midterm One

Show all your work

Name: _____

Number: _____

Signature: _____

Score: ___/40

Problem 1: Sierpinski triangle is a fractal: first take an equilateral triangle (stage 0), then remove the middle triangle (stage 1), and so on by continuing to remove middle triangles from each shaded ones. Below shows stages 1, 2, and 3 following stage 0.
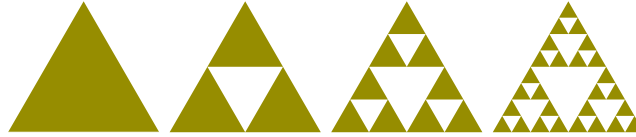
Tabulate the number of *white* triangles at each stage for at least stages 0, 1, 2 and 3, and conclude with a formula giving the number of white triangles at the n-th stage.

Score: /4

Problem 2: Fire Horse would like to choose cellphone numbers for her family. Suppose all the numbers must begin with 236 followed by 7 digits, and their family's favourite digits are $\{3, 5, 7, 8\}$, how many choices are there if Fire Horse only uses her family's favourite digits, not necessarily all five? Drawing a correct tree diagram may help.

Score: /3

Problem 3: Anjali's dormitory is surrounded by mature trees with many birds and squirrels. One morning Anjali noticed that there were 5 more birds than squirrels. However, when one more bird showed up, the number of birds was three times the number of squirrels. How many squirrels were there?

Score: /3

/10

Problem 4: Translate each of the following into Hindu-Arabic numerals.
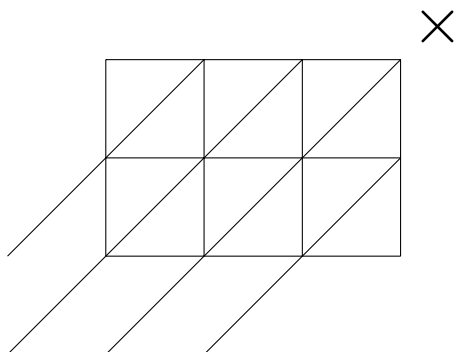
    a. MCMXCVII

    b.

    c.

    d. 235_8

Problem 5: Write 5211_{10} in Kaktovik numerals.
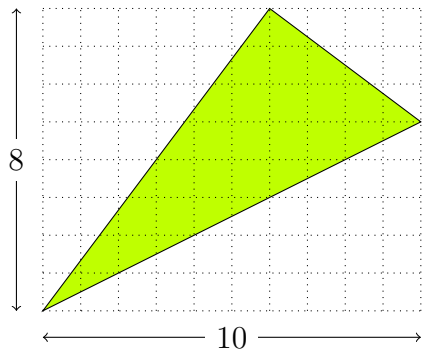
Problem 6: Use the Galley Method to perform the following: 897×63
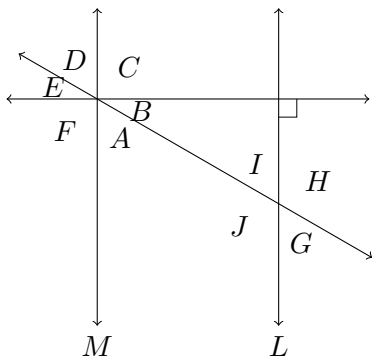
/17

Problem 7: Find the perimeter and area of the shaded triangle in the middle of the grid shown.

Problem 8: Given $\angle E = 29°$, find the measures of $\angle B = $ [ ], $\angle D = $ [ ],

$\angle G = $ [ ], and $\angle J = $ [ ].

Score: /4

Problem 9: Draw a square-based rectangular prism of height 3π cm and a volume of 12π cm^3. Suppose that a right cylinder of height 3 cm also have the same volume as the rectangular prism. Which solid has a bigger surface area? Show all steps.

Score: /4

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