CLASSROOM DIVISION SOLUTIONS

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1. Computer Number Systems

$16743_8 = 001\ 110\ 111\ 100\ 011_2$
So there are 9 1's.

1. 9

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2. Computer Number Systems

$3F6A_{16} = 0011\ 1111\ 0110\ 1010_2$
$= 0\ 011\ 111\ 101\ 101\ 010_2$
$= \quad 3\ \ \ 7\ \ \ 5\ \ \ 5\ \ \ 2_8$

2. 37552_8 or 37552

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2. Recursive Functions
Stage 1 has 1 rhombus and 4 segments. Stage 2 has 5 rhombuses and 12 segments since 4 were drawn on the original sides. In Stage 3 there are 12 perimeter segments but because 8 are used in more than 1 rhombus, there are only 8 new rhombuses drawn for a total of 13 and 20 segments. Continuing in this manner, Stage 4 has 12 new rhombuses for a total of 25 and 28 segments. Stage 5 adds 16 for a total of 41 and has 36 segments and Stage 6 adds 20 for a total of 61 and 44 segments.
The sequence is 4, 12, 20, 28, 36, 44 …

3. 44

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3. Recursive Functions
$f(12) = f(10) - 3 = 11$
$f(10) = f(8) - 3 = 14$
$f(8) = f(6) + 4 = 17$
$f(6) = f(2) + 4 = 13$
$f(2) = 9$ Now substitute backwards.

4. 11

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5. What Does This Program Do?
The table contains the values of a, b, c, d, and e after each line.

a	b	c	d	e
12	1	0	4	2
8	1	0	4	2
8	1	0	4	2
8	1	0	4	4
8	2	0	4	4
8	2	0	0	4

$(a + e) / b + (d + c) \uparrow b * c$
$= (8 + 4) / 2 + (0 + 0) \uparrow 2 * 0 = 12 / 2 + 0^2 * 0 = 6 + 0 = 6$

5. 6

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6. Computer Number Systems	**6.** 35233_8 or 35233

$3A9B_{16} = 0011\ 1010\ 1001\ 1011_2$
$= 0\ 011\ 101\ 010\ 011\ 011_2$ grouping by three
$=\ \ \ 3\ \ \ \ 5\ \ \ 2\ \ \ 3\ \ \ \ 3\ _8$

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7. Computer Number Systems	**7.** 234_{16} or 234

$32_8 = 26$
$1011_2 = 11$
$352_{10} = 352$
$AF_{16} = 175$
 So $32_8 + 1011_2 + 352_{10} + AF_{16}$
  $= 26 + 11 + 352 + 175$
    $= 564$
But $564 = 234_{16}$

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8. Recursive Functions	**8.** 191

The original T has 2 segments. The next step adds 3 more segments for a total of 5. The next step adds 6 segments for a total of 11. Next 12 segments are added for 23. The sequence formed is:
$$2,\ 5,\ 11,\ 23,\ 47,\ \ldots,\ 3*2^{n-1}-1,\ \ldots$$
The 7th term would be $3*2^6-1 = 191$

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9. Recursive Functions	**9.** 525

$f(12,7) = f(12-1,7+2)+3 = f(11,9)+3 = 522 + 3 = 525$
$f(11,9) = f(11-1,9+2)+3 = f(10,11)+3 = 519 + 3 = 522$
$f(10,11) = 2 * f(10+1,11-1)-5 = 2 * f(11,10)-5 = 2*262-5 = 519$
$f(11,10) = f(11-1,10+2)+3 = f(10,12)+3 = 259 + 3 = 262$
$f(10,12) = 2 * f(10+1,12-1)-5 = 2 * f(11,11)-5 = 2*132-5 = 259$
$f(11,11) = 11*11+11= 132$ Now substitute backwards.

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10. 5

10. What Does This Program Do?

The table contains the values of a, b, c, d, e, and f after each line.

a	b	c	d	e	f
1	2	3	4	4	6
1	2	3	2	4	6
12	2	3	2	4	6
12	4	3	2	4	6
12	4	2	2	4	6
16	4	2	2	4	6
16	4	4	2	4	6

$(b * c) * (f + d) / a / 2 * d - c + e \uparrow (b - 2 * d)$

$= (4 * 4) * (6 + 2) / 16 / 2 * 2 - 4 + 4 \uparrow (4 - 2 * 2)$

$= 16 * 8 / 16 / 2 * 2 - 4 + 4^0$

$= 128 / 16 / 2 * 2 - 4 + 1 = 8 / 2 * 2 - 4 + 1 = 5$