	Theta Ciphering Answers
0.	18
1.	$3\frac{3}{7}$ only
2.	125,000
3.	$\frac{55}{48}$
4.	39
5.	$\mathbf{(x^2 - 7 + 5x)(x^2 - 7 - 5x)}$
6.	**4**
7.	$(10,1)$
8.	$\sqrt{170}$
9.	$5\sqrt{29}$
10.	**50**

0) (5x + 12)(4x - 3)
5 + 12 + 4 + (-3) = **18**

1)
t = time to fill pool

$$\left(\frac{1}{4}+\frac{1}{6}-\frac{1}{8}\right)t = 1$$

$$\left(\frac{6+4-3}{24}\right)t = 1$$

$$\frac{7}{24}t = 1$$

$$t = \frac{24}{7} \text{ or } \mathbf{3\frac{3}{7}} \text{ hours}$$

2) S = 250 (all but one team must lose)
D = 500 (all but one team loses twice, the champion is undefeated)
(250)(500) = **125,000**

3)
$$\frac{\frac{11}{30}}{\frac{16}{60}} \qquad \frac{11}{30}\bullet\frac{60}{16}=\frac{11}{8}$$

$$\frac{\frac{12}{32}}{\frac{20}{64}} \qquad \frac{12}{32}\bullet\frac{64}{20}=\frac{6}{5}$$

$$\frac{11}{8}\bullet\frac{5}{6}=\mathbf{\frac{55}{48}}$$

4) Part I
circumference = 6(3π) = 18π → radius = 9
Part II
2x + y = 55
x + 2y = 35 → x = 25, y = 5
9 + 25 + 5 = **39**

5) $x^4 - 14x^2 + 49 - 39x^2 + 14x^2$
$(x^2 - 7)^2 - 25x^2$
$(x^2 - 7 + 5x)(x^2 - 7 - 5x)$

6) $x^2 - 2x = x^4 - 4x^3 + 4x^2 - 2x^2 + 4x$
$x^2 - 2x = x^4 - 4x^3 + 2x^2 + 4x$
$0 = x^4 - 4x^3 + x^2 + 6x$
$0 = x(x^3 - 4x^2 + x + 6)$
2 | 1 -4 1 6
2 -4 -6
$1x^2-2x-3=0$
(x-3)(x+1)=0
zeroes : 0, 2, 3, -1 → 0 + 2 + 3 + (-1) = **4**

7) $\log\frac{a^5}{b^3} = 5 \rightarrow 10^5 = \frac{a^5}{b^3}$
$\log(a^3b^4) = 3 \rightarrow 10^3 = a^3b^4$
eliminate b
$$\left(\frac{a^5}{b^3}\right)^4 (a^3b^4)^3 = (10^5)^4(10^3)^3$$
$a^{20} \bullet a^9 = 10^{20} \bullet 10^9 \rightarrow a^{29} = 10^{29} \rightarrow a = 10$
$\log(10^3b^4) = 3$
$10^3 = 10^3b^4$
b = 1 (b can not equal -1)
The only answer is **(10, 1)**

8) $36x^2 - 216x + 16y^2 + 160y = -148$
$36(x^2 - 6x + 9) + 16(y^2 + 10y + 25) = -148 + 324 + 400$
$36(x - 3)^2 + 16(y + 5)^2 = 576$
center is at (3, -5)
y = x + 4
y = 2x → (4, 8)
$d = \sqrt{(4 - 3)^2 + (8 + 5)^2}$
$d = \sqrt{\mathbf{170}}$

9) Since the 3 triangles are similar by AA, use the geometry mean formulas. To find AD:
$BD = \sqrt{AD \bullet CD}; 10 = \sqrt{AD \bullet 4}; AD = 25.$
$AB = \sqrt{AD \bullet AC} = \sqrt{25 \bullet 29} = 5\sqrt{29}.$

10) Originally, the watermelon was 1% (1 lb.) of "meat". The meat does not evaporate, so now the 1 lb. is 2% of the watermelon. Therefore, the watermelon then weighed **50** lbs.