10. a. There is no common ratio. The differences are 6, 8, 10, 12, 14, 16, . . . , and the second differences are all 2, so the sequence is quadratic. As in Problem 9, see if the terms factor with an obvious pattern.

n	t_n	
1	4	$1 \cdot 4$
2	10	$2 \cdot 5$
3	18	$3 \cdot 6$
4	28	$4 \cdot 7$
5	40	$5 \cdot 8$
n	t_n	$n(n+3)$

So $t_n = n^2 + 3n$.

b. $8^2 + 3 \cdot 8 = 8(8 + 3) = 88$

$9^2 + 3 \cdot 9 = 9(9 + 3) = 108$

c. $t_{100} = 100^2 + 3 \cdot 100 = 100(100 + 3) = 10{,}300$

d. $n^2 + 3n = 178{,}504 \Rightarrow n^2 + 3n - 178{,}504 = 0$
$\Rightarrow (n + 424)(n - 421) = 0 \Rightarrow n = 421$
(because you want the positive value); the 421st term

Series $5+12+21+32+45$ (11/17)

Sequence $5, 12, 21, 32, 45$

n	t_n	
1	5	1×5
2	12	2×6
3	21	3×7
4	32	4×8
5	45	5×9

$(n)(n+4)$

Partial sum

Greek capital sigma

$$S_5 = \sum_{n=1}^{5} (n)(n+4)$$

index

$= 5 + 12 + 21 + 32 + 45$

Summation notation

S_5, S_{100} } in calculator

$$t_n = 7 + 3(n-1)$$

$$7 + 10 + 13 + 16 + 19 + 22 + 25 + 28 + 31 + 34$$

$$S_{10} = 41 + 41 + 41 + 41 + 41$$

$$= 5(41)$$

$$= \frac{10}{2}(7+34)$$

$$S_n = \frac{n}{2}(t_1 + t_n)$$

Partial sum of arithimetic series

$$S_n = \frac{n}{2}(t_1 + t_n)$$

Partial sum of geometric series

$$S_n = t_1 \frac{(1-r^n)}{(1-r)}$$

Homework

p. 660 # 11–27 odd