

## Sequence Problems

To finish this unit we will look at problems that involve both sequence and series. We will also look at 2 unknowns in a sequence problem.

### Notice the difference

1) An arithmetic sequence has  $t_1 = 8$  and  $t_{12} = 47.6$ . Find

a)  $t_{56}$

b)  $S_{56}$

need 'd'  $47.6 = 8 + (12-1)d$   $39.6 = 11d$

$$d = 3.6$$

$$t_{56} = 8 + (56-1)(3.6)$$

$$t_{56} = 206$$

$$S_{56} = \frac{56}{2} (2(8) + (56-1)(3.6))$$

$$S_{56} = 5992$$

### Two unknowns

2) An arithmetic sequence has  $t_9 = 29$  and  $t_{42} = 656$ , find the first 5 terms of this sequence

Need  $a$  and  $d$  ... We can make 2 formulas

$$29 = a + (9-1)d \quad 656 = a + (42-1)d$$

Looks like a system

$$29 = a + (8)d$$

$$-656 = a + (41)d$$

$$-627 = -33d \quad d = 19 \quad \text{and} \quad 29 = a + 8(19) \quad a = -123$$

$$5 \text{ terms: } -123, -104, -85, -66, -47$$

### Using the summation formula

3) Rupert added up 120 terms of an arithmetic series with  $t_1 = 8$  and found the sum to be 12600. What is the exact common difference of Rupert's series?

$$12600 = \frac{120}{2} (2(8) + (120-1)(d)) \quad \rightarrow \quad 12600 = 60(16 + 119d)$$

$$210 = 16 + 119d \quad 194 = 119d \quad d = \frac{194}{119}$$

4) Jasmine added up 66 terms of an arithmetic series with  $d = 15$  and found the sum to be 1440. What is the exact first term of Jasmine's series?

$$14400 = \frac{66}{2} (2(a) + (66-1)(15)) \rightarrow 14400 = 33(2a + 975) \quad \text{not a nice if } \div$$

$$14400 = 66a + 32175 \quad -17775 = 66a \quad a = \frac{-5925}{22}$$

No cookin' in the last 2 questions

... just use your equation solving skills and not Guess and check

Assignment = worksheet



- 6) An arithmetic series has a first term of 42 and a sum of 781.2 when 12 terms are added up. What is the common difference of this series?
- 7) A human fingernail grows about 0.6 mm per week. If the visible part of a fingernail is 15 mm long, how long will the nail be in 4 weeks?
- 8) Terry was stacking logs for his camping firewood. He formed a triangular stack with 60 pieces in the bottom row, 59 in the next, 58 in the next. How many logs are in the pile in total if there is a single log in the top row?
- 9) Insert 3 numbers between -1 and 66 so that the 5 numbers form an arithmetic sequence.
- 10) In an arithmetic sequence the 5<sup>th</sup> term is 4 and the 17<sup>th</sup> term is 100, find the first 3 terms
- 11) In an arithmetic sequence the 4<sup>th</sup> term is 41 and the 12<sup>th</sup> term is -7, find the first 3 terms

Enrichment: Sum the following

a) 
$$\sum_{i=1}^{160} 8i - 6$$

b) 
$$\sum_{i=1}^{99} 3 - 5i$$