Algebra II
11-1/11-2 Application Problems: Arithmetic Sequence and Series

1. An arithmetic sequence is 120, 114, …, 36. a) How many terms are there in the sequence? b) What is the sum of the terms in the sequence?	2. Matt Berry has a set of 12 stamps in his collection; the denominations increase in the steps of 2 cents starting with one cent. a) What is the highest denomination of stamp in the set? b) What is the total cost of the complete set?
3. Paul's starting salary in a company is $14,000 and during the time he stays with the company it increases by $500 per year. a) What is his salary in the sixth year? b) How much is his TOTAL earnings after 20 years?	4. A jogger is training for a 10km (1km=1000 m) charity run. He starts out with a run of 400m, then he increases the distance he runs by 200m per day. a) How many days does it take the jogger to reach a distance of 10km? b) What total distance will he have run in training by then?
5. A person just fitted for contact lenses is told to wear them only 2 hours the first day and to increase the length of time by 20 minutes each day. After how many days will the person be able to wear the contacts for 14 hours?	6. Poor Elijah! His dog ate his math homework. He remembered that the first three terms of his arithmetic sequence were 4, 8, and 12, and the last two were 356 and 360. How many terms were there in this sequence?
7. Ms. King gets better and better at a video game each time she plays. She scores 20 points in the first game, 25 in the second, 30, in the third and so on. How many points will she score in her 15th game?	8. A house worth $350,000 when purchased was worth $335,000 after the first year and $320,000 after the second year. If the economy does not pick up and this trend continues, what will be the value of the house after 6 years.

9. The fifth term in an arithmetic sequence is 28 and the tenth is 58.	10. The training program of a pilot requires him to fly "circuits" of an airfield. Each day he flies 3 more circuits than the day before. On the fifth day he flew 14 circuits.
a) Find the first term and the common difference.	Calculate how many circuits he flew: a) On the first day.
b) Find the sum of the first ten terms.	b) In total by the end of the 5th day.
c) Find the formula for the nth term.	c) Find the explicit formula for the nth day.
	d) In total by the end of the nth day (explicit formula).
11. A runner begins training by running 5 miles one week. The second week she runs a total of 6.5 miles. The third week she runs 8 miles. Assume this pattern continues.	12. Suppose on January 1st, you deposit $1.00 in an empty piggy bank. On January 8, you deposit $1.50; on January 15 you deposit $2.00; and each week thereafter you deposit $0.50 more than the previous week.
a) How far will she run in the tenth week?	a) What kind of sequence do these deposits generate?
b) At the end of the tenth week, what will be the total distance she has run since she started training?	b) What amount will you deposit the 52nd week?
c) Express the total distance with summation notation.	c) What is the total in the piggy bank at the end of these 52 weeks?
13. There is a stack of logs in the backyard. There are 15 logs in the first layer, 14 in the second, 13 in the third, 12 in the fourth, and so on wit the last layer having one log. How many logs are in the stack?	14. Sherry works at the local fast food chain at the rate of $7.40 an hour. The management said that depending on her performance, her hourly wage will increase by $0.30 per month. In how many months will she be earning $15.50 per hour?

15. A pile of bricks has 97 bricks in the first row, 91 bricks in the second row, 85 bricks in the third row, and so on until there is only 1 brick in the top row.
 	
   a) How many bricks in the 15th row?
 	
   b) What row has only one brick?
	16. Taylor makes gift baskets for Mother's Day. She has 13 baskets left over from last year, and she plans to make 12 more each day.
	
	   a) If there are 15 work days until the day she begins to sell the baskets, how many baskets will she have to sell?
	
	   b) If she sells each basket for $49.00, how much money will she earn?

17. You visit the Grand Canyon and drop a penny off the edge of a cliff. The distance the penny will fall is 16 feet the first second, 48 feet the next second, 48 feet the third second, and so on in an arithmetic sequence. What is the total distance the object will fall in 6 seconds?	18. After knee surgery, your trainer tells you to return to your jogging program slowly. He suggests jogging for 12 minutes each day for the first week. Each week thereafter, he suggests that you increase that time by 6 minutes per week. How many weeks will it be before you are up to jogging 60 minutes?

19. There are 20 rows of seats in a concert hall. 25 seats are in the first row, 27 in the second row, 29 in the third row and so on.
 	
   a) How many seats are there in the 20th row?
 	
   b) How many seats are there in all?
 	
   c) If the average seat costs $125 dollars, how much will the total sales for a one-night concert be if all seats are taken?
	20. Find the sum of all ODD numbers between 50 and 150.

21. Find the sum of all EVEN numbers between 26 and 158.	22. Find the sum of ALL numbers between 180 and 577.

11-1/11-2 Notes on Application Problems

$a_n = a_1 + (n-1)d$	$S_n = \dfrac{n}{2}(a_1 + a_n)$

A runner begins training by running 2 miles one week. The second week she runs a total of 4 miles. The third week she runs 6 miles. Assume this pattern continues.
 	
  a) How far will she run in the eighth week?
 	
  b) At the end of the eighth week, what will be the total distance she has run since she started training?
 	
  c) Express the total distance with summation notation.
	Suppose on January 1st, you deposit $1.00 in an empty piggy bank. On January 8, you deposit $1.25; on January 15 you deposit $1.50; and each week thereafter you deposit $0.25 more than the previous week.
	
	  a) What kind of sequence do these deposits generate?
	
	  b) What amount will you deposit the 52nd week?
	
	  c) What is the total in the piggy bank at the end of these 52 weeks?

A house worth $175,000 when purchased was worth $162,000 after the first year and $149,000 after the second year. If the economy does not pick up and this trend continues, what will be the value of the house after 8 years.	A pile of bricks has 49 bricks in the first row, 45 bricks in the second row, 41 bricks in the third row, and so on until there is only 1 brick in the top row.
	
	  a) How many bricks in the 10th row?
	
	  b) What row has only one brick?

Paul's starting salary in a company is $28,000 and during the time he stays with the company it increases by $800 per year.
 	
   a) What is his salary in the eighth year?
 	
   b) How much is his TOTAL earnings after 25 years?
	A person just fitted for orthotics is told to wear them only 2 hours the first day and to increase the length of time by 20 minutes each day. After how many days will the person be able to wear the orthotics for 12 hours?

Kaitlin makes cake pops for a bake sale. She has 5 dozen left over from yesterday, and she plans to make 3 dozen more each day.
 	
   a) If there are 6 days until the day she begins to sell the cake pops, how many cake pops will she have to sell?
 	
   b) If she sells each cake pop for $1.50, how much money will she earn?
	Find the sum of all ODD numbers between 50 and 150.