



Math Olympiad and Problem Solving Programs  
F130 - Advanced Problem Solving  
Problem Set 13.2 - Perfect Squares

Name:

Date:

1. (01)
- (02)
- (03)
- (04)
- (05)
- (06)
- (07)
- (08)
- (09)
- (10)
  
2.
  
3.
  
4.  $2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 + 23 + 29 + 31 + 37 + 41 =$
  
5. (a)
- (b)
  
6. (a)
- (b)
- (c)
- (d)
- (e)
  
7.  $31^2 = 961$ ,  $32^2 = 1024$ ,  $44^2 = 1936$  and  $45^2 = 2025$ . All the perfect squares from 1000 to 2000 are essentially the perfect squares from 1024 to 1936. Now we can represent these numbers by the following:  
 $32^2, 33^2, 34^2, \dots, 42^2, 43^2, 44^2$   
This means that there are just as many perfect squares from 1000 to 2000 as there are numbers from 32 to 44.  $44 - 32 + 1 =$  .
  
8.
  
9. Whatever Ethan's dad age is, when we multiply 1512 by it we get a perfect square.  $1512 = 2^3 \times 3^3 \times 7$ . In order to make it a perfect square, we need even powers so multiply 1512 by  $2 \times 3 \times 7 = 42$  to get  $63504 = 2^4 \times 3^4 \times 7^2 = 252^2$ , our perfect square. Ethan's dad is .



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10. The 21st century includes the years from 2000 to 2999. This means  $2000 \leq N^2 \leq 2099$ . From #7 we know that  $44^2 = 1936$ ,  $45^2 = 2025$ , and  $46^2 = 2116$ . Only  $45^2$  is in the 21st century so  $N = 45$ . Robert will be 45 years old in year 2025. Then Robert was born in year  $2025 - 45 =$  1980.