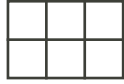
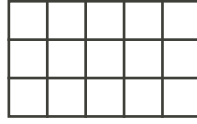


2007 Fryer Contest (Grade 9)
Wednesday, April 18, 2007

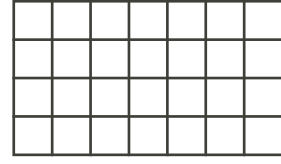
1. Squares measuring 1 by 1 are arranged to form the following sequence of rectangles:



Rectangle 1



Rectangle 2

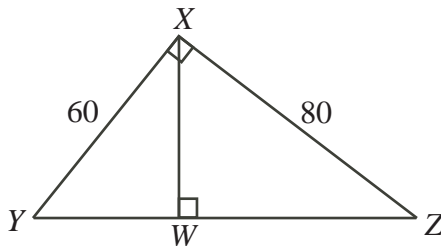


Rectangle 3

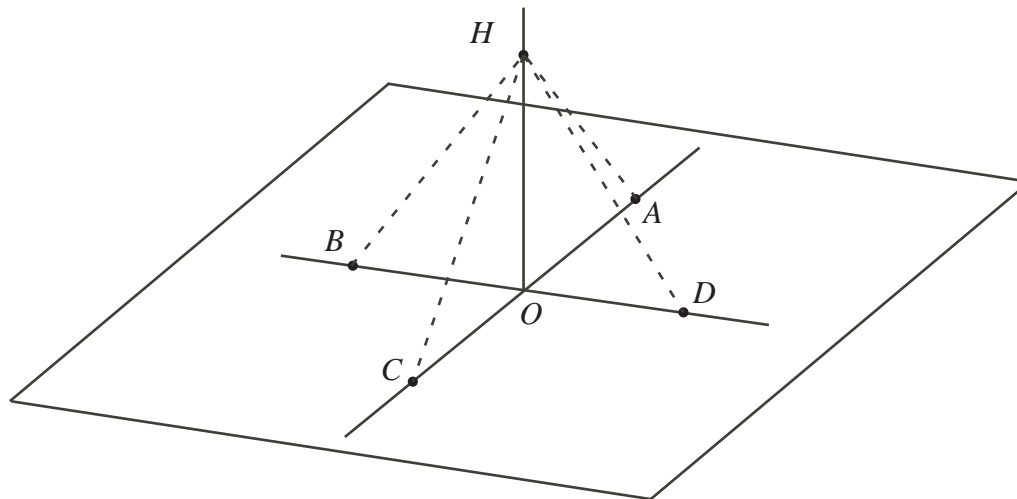
Many more rectangles are drawn, with each rectangle having one more row and two more columns than the previous rectangle.

- (a) How many 1 by 1 squares would there be in Rectangle 4? Explain how you obtained your answer.
- (b) Determine the perimeter of Rectangle 4. Explain how you obtained your answer.
- (c) Determine the perimeter of Rectangle 7. Explain how you obtained your answer.
- (d) Rectangle n has a perimeter of 178. Determine n . Explain how you obtained your answer.
2. At last week's hockey game involving the Waterloo Blueberries, the price of a platinum ticket was \$25, the price of a gold ticket was \$10, the price of a silver ticket was \$5, and the price of a bronze ticket was \$1.
- (a) Jim buys 5 platinum tickets, 2 gold tickets and 3 silver tickets. Determine the average cost of the tickets that Jim buys. Explain how you obtained your answer.
- (b) Mike buys 8 tickets whose average cost is \$12. He then buys five more platinum tickets. What is the new average cost of the tickets that he has bought? Explain how you obtained your answer.
- (c) Ophelia buys 10 tickets with an average cost of \$14. Suppose that she buys n more platinum tickets. The new average cost of the tickets that she has bought is \$20. What is the value of n ? Explain how you obtained your answer.
3. (a) A number is divisible by 8 if the number formed by its last 3 digits is divisible by 8. For example, the number 47 389 248 is divisible by 8 because 248 is divisible by 8. However, 47 389 284 is not divisible by 8 because 284 is not divisible by 8. If 992 466 1A6 is divisible by 8, where A represents one digit, what are the possible values of A ? Explain how you obtained your answer.
- (b) A number is divisible by 9 if the sum of its digits is divisible by 9. For example, the number 19 836 is divisible by 9 but 19 825 is not. If D 767 E 89 is divisible by 9, where D and E each represent a single digit, what are the possible values of the sum $D + E$? Explain how you obtained your answer.
- (c) The number 5 41G 507 2H6 is divisible by 72. If G and H each represent a single digit, what pairs of values of G and H are possible? Explain how you obtained your answer.

4. (a) In the diagram, $\triangle XYZ$ is right-angled at X , with $YX = 60$ and $XZ = 80$. W is the point on YZ so that WX is perpendicular to YZ . Determine the length of WZ . Explain how you obtained your answer.



- (b) Five points A , B , C , D , and O lie on a flat field. A is directly north of O , B is directly west of O , C is directly south of O , and D is directly east of O . The distance between C and D is 140 m. A hot-air balloon is positioned in the air at H directly above O . The balloon is held in place by four ropes HA , HB , HC , and HD . Rope HC has length 150 m and rope HD has length 130 m. Determine how high the balloon is above the field (that is, determine the length of OH). Explain how you obtained your answer.



- (c) To reduce the total length of rope used, rope HC and rope HD are to be replaced by a single rope HP where P is a point on the straight line between C and D . (The balloon remains at the same position H above O as in part (b).) Determine the greatest length of rope that can be saved. Explain how you obtained your answer.