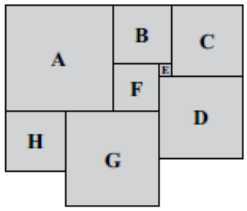
1. _____ units^2 This figure consists of eight squares labeled A through H. The area of square F is 16 units^2. The area of square B is 25 units^2. The area of square H is 25 units^2. In square units, what is the area of square D?



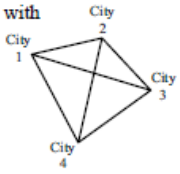
2. _____

38	?	?
?	?	40
46	?	50

Nine consecutive positive even integers are entered into the 3 × 3 grid shown so that the sums of the three numbers in each row, each column and each diagonal are the same. What is the average value of the five numbers that are missing? Express your answer as a decimal to the nearest tenth.

3. _____ routes

Quatro Airlines flies between four major cities. To provide direct flights from each city to the other three cities requires a total of six different direct routes, as shown. How many routes are needed to connect 15 cities, with exactly one route directly connecting each pair?



4. _____ shirts

Xiang needs to print T-shirts for a class project. For what number of shirts will the cost under Plan A and Plan B be the same?

	Plan A	Plan B
Set-up charge	$250	$150
Printing charge per shirt	$4.25	$5.25

250
−150
100

5.25
4.25
1.00

100

5. 4 years

Jackie invested $1000 into an account that earns 3% interest, compounded annually. If she has $1125.51 now, for how many years did she have her money in her account? Express your answer as a whole number.

Year

$1000 \times 1.03 = \$1030$ 1

$1030 \times 1.03 = \$1060.90$ 2

$1060.90 \times 1.03 = \$1092.73$ 3

$1092.73 \times 1.03 = \$1125.51$ (4)

6. 8 primes

Abigail, Bartholomew and Cromwell play a game in which they take turns adding 1, 2, 3 or 4 to a sum in order to create an increasing sequence of primes. For example, Abigail must start with either 2 or 3. If she chooses 2, then Bartholomew can add 1 to make 3, or he can add 3 to make 5. If Bartholomew makes 3, then Cromwell can add 2 to make 5, or he can add 4 to make 7. Abigail, Bartholomew and Cromwell take turns, in that order, until no more primes can be made, and the game ends. The player who makes the last prime wins. If Bartholomew wins, how many primes were made?

2, ~~4~~, 5, 7, 11, 13, 17, 19, 23, 29, 31

A B C A B C A B C A B

7. 728 integers How many positive integers less than 1000 do not have 7 as any digit?

19 × 9 = 171; 171 + 100 = 271

999 − 271 = 728

7 17 27 37 47 57 67 70-79 87 97

7. 728 integers How many positive integers less than 1000 do not have 7 as any digit?

3 digit: 8 · 9 · 9 = 648

2 digit: 8 9 = 72

1 digit: 8 + 8

728

8. _____ points In a particular word game, there are two types of letters: vowels and consonants. Vowels are worth 1 point each and consonants are worth 2 points each. (The letter Y is always considered a consonant.) When more than one letter of the same type appears consecutively, each letter is worth twice as much as the one before. For example, CUP is worth 2 + 1 + 2 = 5 points and SLY is worth 2 + 4 + 8 = 14 points. What is the absolute difference between the values of QUEUEING and SYZYGY?

2+1+2+4+8+16+2+4

39

2+4+8+16+32+64

126

−39

87

9. 360 integers Using each of the digits 1 to 6, inclusive, exactly once, how many six-digit integers can be formed that are divisible by 6?

÷3 1+2+3+4+5+6 = 21 ÷ 3 = 7

All are ÷ by 3

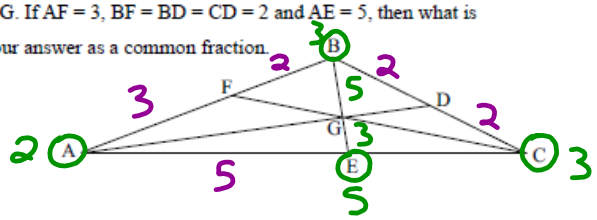
÷2 ends in even (2,4,6) half of total

$6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720 \div 2$

360

10. $\frac{5}{3}$

Points D, E and F lie along the perimeter of ΔABC such that $\overline{AD}$, $\overline{BE}$ and $\overline{CF}$ intersect at point G. If AF = 3, BF = BD = CD = 2 and AE = 5, then what is $\frac{BG}{EG}$? Express your answer as a common fraction.



$\frac{5}{3}$