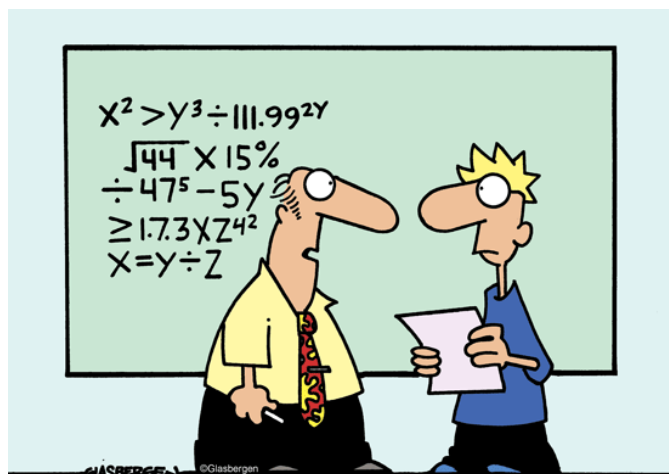
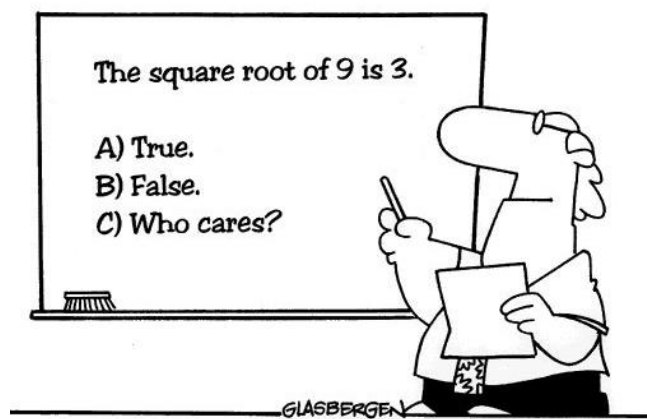


Name: _____

Problem	Total
Possible	100
Received	

DO NOT OPEN YOUR EXAM UNTIL TOLD TO DO SO.**You may use a 3×5 (both sides) of handwritten notes.****You will NOT use a calculator.****In giving your answers, except on page 4, do not simplify your answers.****For example, leave your answer in the form** **$P(5, 3)$ or $12!$ or $C(4, 3) \cdot C(7, 4)$ or $7 \cdot 6 \cdot 5$ or ...**

"Can you keep a secret? I've been teaching this stuff for 15 years and I still don't understand it."



Many students actually look forward to Mr. Atwadder's math tests.

- /3 How many 8-letter passwords could be made using the 26 lower case and 26 upper case letters (so 52 letters total)?

- /3 In how many ways can a committee of 8 persons be chosen from 10 married couples if a husband and wife cannot both serve on the committee (i.e. the 8 persons must come from 8 different couples)?

- /3 In how many ways could we divide a basketball team of 14 players into the 5 starters and the 9 substitutes?

- /3 In how many ways can I arrange 25 books on a shelf?

- /3 In how many ways can I arrange 25 books on a shelf, if 5 of them are math books which must be placed together side-by-side?

- /3 How many 4-digit numbers from 1000 to 9999 are there in which the digits are all different? Example: 3902.

- /3 How many 3-digit numbers from 100 to 999 are there in which exactly two of the digits are the same? Example: 393 or 339 or

- /3 How many different meals can be chosen if there are 2 appetizers, 5 main dishes, and 4 desserts, assuming a meal consists of one item from each category?

- /3 For Halloween, if I have 10 pieces of candy, all of different types, and 10 kids show up at my door, in how many different ways could I hand out the 10 pieces of candy, one piece to each kid?

- /3 In how many ways can I arrange 3 items?
- /3 In how many ways can I choose 3 books from 8?
- /3 In how many ways can I arrange 3 books of 8 on a shelf?
- /4 How many ways can I divide a group of 20 people into *two* groups of 5 and *one* group of 10?
- /3 How many ways can you give a \$1, \$2, \$5 and \$10 bill to 4 of your 8 friends (one bill for each friend that you choose)?
- /4 In how many ways can you choose 3 green balls and 4 red ones from a basket containing 6 green, 7 red and 8 yellow balls?
- /3 In the United States we have 10-digit phone numbers: 3-digit area code, 7-digit phone number. How many 10-digit phone numbers are there if the only restriction is that 0 cannot be the first digit of the area code or of the phone number?
- /5 How many nine-letter words (including nonsense words) can you make in which:
No letter can be repeated
All five vowels must be used
None of the four consonants can be next to each other.
Example: **BEQIOTAXU**

For problems on this page, simplify your answers, i.e., give an actual number.

For the five questions on this page, suppose there are eight kids: four boys and four girls.

/4 In how many different ways could we choose two (different) girls?

/4 In how many different ways could we choose any two of them (of either gender)?

/5 In how many different ways could we divide the eight into four boy-girl couples?

/5 In how many different ways could we divide the eight into three groups (of any gender) of sizes 2, 2 and 4?

/5 In how many ways can they be seated in a row such that no person is seated next to someone of the same gender? (You do NOT need to simplify this answer.)

**For the above problems (except the final problem),
simplify your answers, i.e., give an actual number.**

For the next two questions, note that in California a typical automobile license plate has a letter, then three numbers, then three letters, for example, U747ROC. Assume each number can be a digit from 0 through 9.

/3 How different license plates could there be?

/3 How many different license plates with no repetition of numbers or letters could there be?

For the next four questions, suppose there is a deck of 80 cards of 4 different colors of cards numbered 1 to 20. We will choose 7 cards.

/5 In how many ways can you choose 7 cards and have exactly 3 of them be 5's (there could be duplication in the other 4 cards, but no other 5's), e.g. **5 5 5 17 3 1 17**.

/3 In how many ways can you choose any 7 cards from the 80?

/3 In how many ways can you choose the 7 cards and end up with a straight (e.g. **1 – 7** or **2 – 8** or ...), where color doesn't matter?

/5 In how many ways can you choose the 7 cards and have a really full house consisting of 3 of one number, 2 of another (different) number, and 2 more of another (different number) e.g. **5 5 5 11 11 8 8**.

Extra credit:

/4 In how many ways can a housing director assign 8 students to 5 dorm rooms if 3 rooms are doubles and 2 rooms are singles, and if 2 of the students don't get along with each other and thus cannot be placed together?