

ACCUPLACER

TEST STUDY

GUIDE

Copyright © EmerGents, LLC 2004
All Rights Reserved

ENGLISH GRAMMER AND USAGE

The following list of English Grammar Rules and their Usage Rules are essential for you to know. You must be familiar with these rules if you want to score well in this area of the test.

Capitalization

1. Capitalize the first word of a sentence.
2. Capitalize all proper names.

Example: Russia, United Methodist Church, Dan Marino.

3. Capitalize days of the week, months of they year, and holidays.

Example: The package was mailed on *Tuesday*, the day after Easter.

Note: Do NOT capitalize seasons.

Example: In Hawaii, summer is hot.

4. Capitalize the first and all other important words of a title.

Example: The Art of a Blacksmith

5. Capitalize nouns that are not regularly capitalized when they are used as part of proper names.

Example: Tomorrow, I am going to visit Aunt Mary, my favorite aunt.

Example: Tiger Avenue is a very wide avenue.

6. Capitalize the points of the compass only when referring to a direction.

Example: Many people enjoy country food in the South.

Note: Do NOT capitalize the points of the compass when referring to direction.

Example: Many geese head south in the fall.

7. Capitalize languages and specific place names used as modifiers. Do not capitalize any other school subjects.

Example: In two years, I will take German, astrology, English literature, geometry, American history, and ancient cultures.

8. Capitalize the first word of a direct quotation.

Example: It was Martin Luther King who said, "I have a dream."

Note: Do NOT capitalize the first word within quotation marks if it does not begin a complete sentence, when a directly quoted sentence is broken.

Example: "I hit my head," he told us, "because the cabinet was left open."

Punctuation

The Apostrophe

1. Use an apostrophe to indicate possession. Place the apostrophe according to this rule: "The apostrophe, when used to indicate possession, means *belonging to everything to the left of the apostrophe*."

Examples: man's = belonging to the man
men's = belonging to the men
children's = belonging to the children

Note: To test for correct placement of the apostrophe, read "of the."

Example: childrens' = of the children (clearly incorrect)

The placement rule applies at all times, even with regard to compound nouns separated by hyphens and with regard to entities made up of two or more names.

Example: son-in-law's = belonging to a son-in-law

Example: Morris, Benson, and Smith's law firm = the law firm belonging to Morris, Benson, and Smith

Example: Gomez and Son's delivery truck = the delivery truck of Gomez and Sons

2. Use an apostrophe in a contraction in place of the omitted letter or letters.

Examples: haven't = have not
we're = we are
let's = let us
o'clock = of the clock
class of '85 = class of 1985

Note: Do NOT start a paragraph with a contraction that begins with an apostrophe.

3. Use an apostrophe to form plurals of numbers, letters, and phrases referred to as words.

Example: The child pronounced his *t's* as *b's*.

Example: Solution of the puzzle involves crossing out all the 3's and 9's.

Example: Her speech was plagued with *you know's*.

The Colon

1. Use a colon after the salutation in a business letter.

Example: Dear Committee Member:

2. Use a colon to separate hours from minutes.

Example: The sun rose at 6:01 P.M.

3. Use of the colon is optional in the following cases:
 - (a) to introduce a list, especially after an expression such as *follows*
 - (b) to introduce a long quotation
 - (c) to introduce a question

Example: My question is this: Are you interested in the job?

The Comma

1. Use a comma after a salutation of a personal letter.

Example: Dear Joe,

2. Use a comma after a complimentary close to a letter.

Example: Sincerely,

3. Use a comma or pair of commas to set off a noun of address.

Example: When you finish washing your car, Mike, please sweep the porch.

4. Use a pair of commas to set off an appositive, a phrase that follows a noun or pronoun and means the same as that noun or pronoun.

Example: Mr. Jones, our designer, did an excellent job.

5. Use a pair of commas to set off parenthetical expressions, words that interrupt the flow of the sentence, such as *however*, *though*, *for instance*, *by the way*.

Example: We could not, however, get her to disagree.

Example: The movie, I believe, is the best of its time.

Note: Test for placement of commas in a parenthetical expression by reading aloud. If you would pause before and after each such expression, then it should be set off by commas.

6. Use a comma between two or more adjectives that modify a noun equally.

Example: The young, nervous, second-grade teacher stood at the front of his class of 34 seven-year-olds.

Note: If you can add the word *and* between the adjectives without changing the sense of the sentence, then use commas.

7. Use a comma to separate words, phrases, or clauses in a series. The use of a comma before *and* is optional. If the series ends in *etc.*, use a comma before *etc.* Do not use a comma after *etc.* in a series, even if the sentence continues.

Example: Gloves, umbrellas, and shoes should be placed in the closet down the hall.

Example: Rules, pens, notebooks, etc. belong in your office drawer.

8. Use a comma to separate a short direct quotation from the speaker.

Example: He said, "I want to drive my car today."

Example: "Tomorrow I am going dancing," she told us.

9. Use a comma after an introductory phrase of five or more words.

Example: Because the prisoner had a history of attempted jailbreaks, he was put in an area with maximum security.

10. Use a comma after a short introductory phrase whenever the comma would aid clarity.

Example: As a child he was playful. (no comma needed)

Example: To Paul, Joe was a friend as well as a co-worker. (comma helps to clarify)

Example: In 1934, 400 people lost their lives in a single air disaster. (comma helps to clarify)

Note: A comma is not generally used before a subordinate clause that ends a sentence, though in long, unwieldy sentences like this one, use of such comma is optional.

11. Use a comma before a coordinating conjunction unless the two clauses are very short.

Example: The man wanted to bail his friend out of jail, but the corrections officer would not allow him to take his friend until he had paid the fine.

Example: Luke washed the car and Bob dried.

12. Use a pair of commas to set off a nonrestrictive adjective phrase or clause. A nonrestrictive phrase or clause is one that can be omitted without essentially changing the meaning of the sentence.

Example: Our new car, which has bright red stripes, is very sporty.

A restrictive phrase or clause is vital to the meaning of a sentence and cannot be omitted. Do NOT set it off with commas.

Example: A car without wheels is useless.

13. Use a comma if a sentence might be subject to different interpretations without it.

Example: The banks which closed yesterday are in serious financial difficulty.
(Some banks closed yesterday, and those banks are in trouble.)
The banks, which closed yesterday, are in serious financial difficulty.
(All banks closed yesterday, and all are in trouble.)

Example: My sister Jill is getting divorced.
(The implication is that I have more than one sister.)
My sister, Jill, is getting divorced.
(Here Jill is an appositive. Presumably she is the only sister.)

14. Use a comma if a pause would make the sentence clearer and easier to read.

Example: Outside the people were eating. (confusing)
Outside, the people were eating. (clearer)

Example: After all debts must be paid. (confusing)
After all, debts must be paid. (clearer)

The pause rule is not infallible, but it is your best resort when all other rules governing use of the comma fail you.

The Dash

1. Use a dash - or parentheses - for emphasis or to set off an explanatory group of words.

Example: The tools of his trade – wrench, hammer, nails - were neatly arranged on the work bench.

Note: Unless the set-off expression ends a sentence, dashes, like parentheses, must be used in pairs.

2. Use a dash to break up a thought.

Example: There are six - remember, I said six – good men in our patrol squad.

3. Use a dash to mark sudden break in thought that leaves a sentence unfinished.

Example: She opened the door a crack and saw –

The Exclamation Mark

1. Use an exclamation mark only to express strong feeling or emotions, or to imply urgency.

Example: Congratulations! You broke the record.

Example: Rush! Perishable contents.

The Hyphen

1. Use a hyphen to divide a word at the end of a line. Always divide words between syllables.
2. Use a hyphen in numbers from *twenty-one* to *ninety-nine*.
3. Use a hyphen to join two words serving together as a single adjective before a noun.

Example: We left the highway and proceeded on a well-paved road.

Example: That baby-faced man is considerably older than he appears to be.

4. Use a hyphen with the prefixes *ex-*, *self-*, and *all-*, and the suffix *-elect*.

Examples: ex-Senator, self-appointed, all-state, Governor-elect

5. Use a hyphen to avoid ambiguity.

Example: After the soldier recovered the use of his right leg, he re-covered the office chairs.

6. Use a hyphen to avoid an awkward union of letters.

Example: semi-independent, shell-like

The Period

1. Use a period at the end of a sentence that makes a statement, gives a command, or makes a “polite request” in the form of a question that does not require an answer.

Example: I am preparing for my test.

Example: Proofread everything you type.

Example: Would you please hold the script so that I may see if I have memorized my lines.

2. Use a period after an abbreviation and after the initial in a person’s name.

Example: Lt. McGee led the soldiers into the war zone.

Note: Do NOT use a period after postal service state name abbreviations such as AZ (for Arizona) or MI (for Michigan).

The Question Mark

1. Use the question mark after a request for information.

Example: At what time does the last bus leave?

Note: A question must end with a question mark even if the question does not encompass the entire sentence.

Example: “Daddy, are we there yet?” the child asked.

Quotation Marks

1. Use quotation marks to enclose all directly quoted material. Words not quoted must remain outside the quotation marks.

Example: “If it is cold on Saturday,” she said, “we will stay inside to eat.”

Note: Do NOT enclose an indirect quote in quotation marks.

Example: He said that we would probably eat inside on Saturday.

2. Use quotation marks around words used in an unusual way.

Example: A surfer who “hangs ten” is performing a tricky maneuver on a surfboard, not staging a mass execution.

3. Use quotation marks to enclose the title of a short story, essay, short poem, song, or article.

Example: Bruce David Williamson wrote a plaintive poem called “The Dark Streets.”

Note: Titles of books and plays are NOT enclosed in quotation marks. They are printed in italics. In handwritten or typed manuscript, underscore titles of books and plays.

Example: The song “Tradition” is from *Fiddler on the Roof*.

Placement of Quotation Marks

1. A period ALWAYS goes inside the quotation marks, whether the quotation marks are used to denote quoted material, to set off titles, or to isolate words used in a special sense.

Example: The principle said, “Cars parked in the fire lane will be ticketed.”

Example: The last chapter of *The Wild Witch* is entitled “Spells of the Ocean.”

Example: Pornography is sold under the euphemism “adult books.”

2. A comma ALWAYS goes inside the quotation marks.

Example: “Lets get out of here,” said the resort guests.

Example: If your skills become “rusty,” you must study before you take the exam.

Example: Three stories in John Henson’s *The Sparks Fly High* are “Run Fast Cars,” “Killer Instinct,” and “Maybe Tomorrow.”

3. A question mark goes inside the quotation marks if it is part of the quotation. If the whole sentence containing the quotation is a question, the question mark goes outside the quotation marks.

Example: He asked, “She the train on time?”

Example: What did you really mean when you said “Absolutely not”?

4. An exclamation mark goes inside the quotation marks if the quoted words are an exclamation; it goes outside if the entire sentence, including the quoted words, is an exclamation.

Example: The cop shouted, “Drop your weapon!”

Example: Help us fight our “friends”!

5. A colon and a semicolon ALWAYS go outside the quotation marks.

Example: She said, “Flowers are beautiful”; he added, “Guns are beautiful.”

6. When a multiple-paragraph passage is quoted, each paragraph of the quotation must begin with quotation marks, but ending quotation marks are used only at the end of the last quoted paragraph.

The Semicolon

1. Use a semicolon to separate a series of phrases or clauses, each of which contain commas.

Example: The old gentleman's heirs were Joanne Nichols, his half-sister; Joey Patterson, the chef; Michael Johnson, companion of his late cousin, Max Williams; and his favorite charity, the United Way.

2. Use a semicolon to avoid confusion with numbers.

Example: Add the following: \$4.17; \$2.07; and \$13.21.

3. You may use a semicolon to join the two short, related independent clauses.

Example: Susan is working at the cash register on Wednesday; Martin will take over on Thursday.

Note: Two main clauses must be separated by a conjunction *or* by a semicolon, *or* they must be written as two sentences. A semicolon never precedes a coordinating conjunction. The same two clauses maybe written in any one of the three ways:

Example: Autumn had come, and the trees were almost bare.
Autumn had come; the trees were almost bare.
Autumn had come; The trees were almost bare.

4. You may use a semicolon to separate two independent clauses that are joined by an adverb such as *however*, *therefore*, *otherwise*, or *nonetheless*. The adverb must be followed by a comma.

Example: You may use a semicolon to separate this clause from the next; however, you will not be incorrect if you choose to write two separate sentences.

Note: If you are uncertain about how to use the semicolon to connect independent clauses, write two sentences instead.

Spelling Rules

- #1. *i* before *e*

Except after *c*

Or when sounding like *ay*

As in *neighbor* or *weigh*

Exception: neither, leisured, foreigner, seized, weird, heights

- #2. If a word ends in y preceded by a vowel, keep the y to when adding a suffix.
Examples: day, days; attorney, attorneys.
- #3. If a word ends in y preceded by a consonant, change the y to i before adding a suffix.
Examples: try, tries, tried; lady, ladies.
Exception: To avoid double i, retain the y before *-ing* and *-ish*. For example, *fly, flying; baby, babyish*.
- #4. Silent e at the end of a word is usually dropped before a suffix beginning with a vowel.
Examples: dine + ing = dining
locate + ion = location
use + able = usable
offense + ive = offensive
Exception: Words ending in ce and ge retain *e* before -able and -ous in order to retain the soft sounds of c and g. For example, *peace + able = peaceable; courage + ous = courageous*.
- #5. Silent e usually kept before a suffix beginning with a consonant.
Examples: care + less = careless
late + ly = lately
one + ness = oneness
game + ster = gamester
- #6. Some exceptions must simply be memorized. Some exceptions to the last two rules are: *truly, duly, awful, argument, wholly, ninth, mileage, dyeing, acreage, canoeing*.
- #7. A one-syllable word that ends in a single consonant preceded by a single vowel doubles the final consonant before a suffix beginning with a vowel or y.
Examples: hit, hitting; drop, dropped; big, biggest; mud, muddy
But: *help, helping* because *help* ends in two consonants; *need, needing* because the final consonant is preceded by two vowels.
- #8. A word with more than one syllable that accents the last syllable and ends in a single consonant preceded by a single vowel doubles the final consonant when adding a suffix beginning with a vowel.
Examples: begin, beginner; admit, admitted.
But: *enter, entered* because the accent is not on the last syllable.
- #9. A word ending in er or ur doubles the r in the past tense if the word is accented on the last syllable.
Examples: occur, occurred; prefer, preferred; transfer, transferred.

- #10. A word ending in er does not double the r in the past tense if the accent does not fall on the last syllable.
Examples: answer, answered; offer, offered; differ, differed.
- #11. When -full is added to the end of a noun to form an adjective, the final l is dropped.
Examples: cheerful, cupful, hopeful.
- #12. All words beginning with over are one word.
Examples: overcast, overcharge, overhear.
- #13. All words with the prefix self are hyphenated.
Examples: self-control, self-defense, self-evident.
- #14. The letter q is always followed by u.
Examples: quiz, bouquet, acquire.
- #15. Numbers from twenty-one to ninety-nine are hyphenated.
- #16. Per cent is never hyphenated. It may be written as one word (*percent*) or as two words (*per cent*).
- #17. Welcome is one word with one l.
- #18. All right is always two words. There is no such word as *alright*.
- #19. Already means “prior to some specific time.” All ready means “completely ready.”
Example: By the time I was all ready to go to the play, the bus had already left.
- #20. Altogether means “entirely.”
All together means “in sum or collectively.”
Example: There are altogether too many people to seat in this room when we are all together.
- #21. Their is the possessive of *they*.
There is the contraction for *they are*.
There is “that place.”
Example: they’re going to put their books over there.
- #22. Your is the possessive of *you*.
You’re is the contraction for *you are*.
Example: You’re certainly planning to leave your muddy boots outside.
- #23. Whose is the possessive of *who*.
Who’s is the contraction for *who is*.
Example: Do you know who’s ringing the doorbell or whose car is in the street?

- #24. *Its* is the possessive of *it*.
It's is the contraction for *it is*.
Example: It's I who put its stamp on the letter.

Improving Your Spelling Through Your Own Personal Program

If you have left yourself ample time to study for your exam, then you can go beyond memorizing rules and answering practice exercises, and you can develop a personal program for improving your own spelling. Think of your own private “demons,” the words that you must look up every time you write a note or letter, and the words that gave you trouble all through school. Everyone has such words. Make a list of these words, correctly spelled. Add to the list words that you often look up, words of which you are just not sure. Keep adding to this list right up to exam day. Each day that you have a bit of study time, type through the list three times. By typing your troublesome words correctly, your hands and fingers will get used to the “feel” of the correct spelling, and your eye will become accustomed to seeing the words correctly spelled. Frequent repetition will embed the correct spelling in your mind.

How to Answer Synonym Questions

When answering “synonym questions,” read each question carefully. If you know that some of the answer choices are wrong, eliminate them. From your answer choices that seem possible, select the one that *most nearly* means the same as the given word, even if it is a word that you don't normally use. The correct answer may not be a perfect synonym, but of those choices offered, it is the *closest* in meaning to the given word. Make up a sentence using the given word. Then test your answer by putting it in the place of the given word in your sentence. The meaning of the sentence should be unchanged. First answer the questions you know. You can come back to the others later.

How to Answer Sentence Completion Questions

Read each question carefully, looking at all the answer choices. Eliminate any answer choices that seem obviously wrong. Of the remaining choices, select the one that best completes the meaning of the sentence or passage given. Although more than one answer may make sense, the *best* choice will be the one that is most exact, appropriate, or likely, considering the information given in the sentence passage. To check yourself, read the sentence or passage through again, putting your answer in the blank. First answer the questions you know. If you have trouble with a question, leave it and come back to it later.

How to Navigate Through the Reading Comprehension Area

It would appear to the average person taking this exam, that the reading comprehension is adequately tested in the exam itself. Without being able to read and understand both the complex sets of directions and some of the tricky questions posed on some tests, failure is imminent. This test will test your ability to read a passage, understand the point being made, and answer questions based on what is said in the passage being read.

This section and the practice questions that we have included in the pages that follow are designed to help you overcome any fears you may have about taking this part of the exam. If you follow the simple suggestions listed here and do the exercises in our practice exam that follows, you will know what to look for when reading the passages. You will also know what to expect to find in the reading comprehension questions. You will then be one step ahead of the game.

- A. Skim the passage to get a general idea of the subject matter and of the point that is being made.
- B. Reread the passage, paying attention to details and point of view. Be alert for the author's hints as to what he or she thinks is important. Phrases such as "Note that....," "Of importance....," and "Do you overlook...." Give clues to what the writer is stressing.
- C. If the author has quoted material from another source, be sure that you understand the purpose of the quote. Does the author agree or disagree?
- D. Carefully read the question or incomplete statement. Determine exactly what is being asked. Watch for negatives or all-inclusive words, such as *always*, *never*, *all*, *only*, *every*, *absolutely*, *completely*, *none*, *entirely*, and *no*. These words can affect your answer.
- E. Read all of the answer choices. Do not rush to choose the first answer that might be correct. Eliminate those choices that are obviously incorrect. Reread the remaining choices, and refer to the passage, if necessary, to determine the *best* answer.
- F. Avoid inserting your judgments into your answers. Even if you disagree with the author or spot a factual error in the passage, you must answer on the basis of what is stated or implied in the passage.
- G. Do not allow yourself to spend too much time on any one question. If looking back at the passage does not help you to find or figure out the answer, choose from among the answers remaining after you eliminate the obviously wrong answers, and go on to the next question or the next reading passage.

Understanding Verbal Analogies

Verbal analogies test your understanding of word meanings and your ability to grasp relationships between words and ideas. There are various classifications of relationships, such as similarity (synonym), opposition (antonym), cause and effect, and sequence. A verbal analogy may be written in mathematical form (CLOCK : TIME :: THERMOMETER : TEMPERATURE) or expressed in words (CLOCK is to TIME as THERMOMETER is to TEMPERATURE).

A verbal analogy has four terms in two pairs. You may be presented with the first complete pair, which establishes the relationship, and the first half of the second pair followed by a list of possible matches. Or, you may be given just the first pair and then a selection of paired terms from which you must find the pair that implies the same relationship as the first pair.

1. Read each question carefully.
2. Establish what the exact relationship is between the two terms in the sample pair.
3. Study the selection of possible answers carefully, and eliminate any pairs that do not share the same relationship as the sample pair.
4. Read the remaining choices through again, this time substituting the key relationship word from the sample pair (for instance, CLOCK *measures* TIME; THERMOMETER *measures* TEMPERATURE).
5. Answer the easy questions first. You can come back to the others later.

Practice English Test

Correct Usage

In each of the following questions, there are four sentences. One of them is grammatically incorrect. Mark the answer sheet with the letter of the INCORRECT sentence.

1. (A) Everyone at camp must have his or her medical certificate on file before participating in competitive sports.
(B) A crate of oranges were sent from Florida for all of the children in cabin 6.
(C) Bruce and David's room looks as if they were prepared for inspection.
(D) Four miles is too far for an elderly person to walk.
2. (A) The game over, the spectators rushed out on the field and tore down the goal posts.
(B) The situation was aggravated by disputes over the captaincy of the team.
(C) Yesterday they lay their uniforms aside with the usual end-of-the-season regret.
(D) It is sometimes thought that politics is not for the high-minded.
3. (A) Masterson's autobiography, as well as his poems, are familiar to many students.
(B) A series of authentic records of American Indian tribes is being published.
(C) The Smokies is the home of the descendants of this brave tribe.
(D) Five dollars is really not too much to pay for a book of this type.
4. (A) Being tired, I stretched out on a grassy field.
(B) While we were rowing on a lake, a sudden squall almost capsized the boat.
(C) Entering the room, a strange mark on the floor attracted my attention.
(D) Mounting the curb, the empty car crossed the sidewalk and came to rest against a building.
5. (A) The text makes the process of developing and sustaining a successful home zoo appear to be a pleasant and profitable one.
(B) The warmth and humor, the clear characterization of the Walmsey family, which includes three children, two dogs, and two cats, is such fun to read that this reviewer found himself reading it all over again.
(C) You will be glad, I'm am sure, to give the book to whoever among your young friends has displayed an interest in animals.
(D) The consensus among critics of the children's literature is that the book is well worth the purchase price.

6. (A) Not one in a thousand readers take the matter seriously.
(B) He was able to partially accomplish his purpose.
(C) You are not as tall as she.
(D) The young people began to realize how much she had done.
7. (A) In the case of members who are absent, a special letter will be sent.
(B) The visitors were all ready to see it.
(C) I like Joe's poem, "To a Stone in the Water."
(D) Mike told Todd that he was sure he seen it.
8. (A) G. Nelson and Co. has a sale on sport shirts today.
(B) Venetian blinds—called that although they probably did not originate in Venice—are no longer used as extensively as they were at one time.
(C) She determined to be guided by the opinion of whoever spoke first.
(D) There was often disagreement as to whom was the better Shakespearean actor, Henry or Shawn.

Spelling Test

In each group of four words, one word is misspelled. Find the misspelled word, and mark its letter on your answer sheet.

1. (A) afford
(B) closeing
(C) latter
(D) headache
2. (A) gravel
(B) artifishal
(C) lodge
(D) lilies
3. (A) document
(B) handsome
(C) frighten
(D) incorect
4. (A) atached
(B) flakes
(C) distributed
(D) continue

5. (A) conductor
(B) choice
(C) particular
(D) streamline
6. (A) thunder
(B) speaking
(C) recreation
(D) rocky
7. (A) provided
(B) runner
(C) suggested
(D) principle
8. (A) throughout
(B) silence
(C) political
(D) operation
9. (A) truth
(B) organized
(C) potatoe
(D) production
10. (A) worried
(B) spinach
(C) guilt
(D) succeeded

Synonym Test

Select the word or phrase closest in meaning to the given word.

1. retain
(A) pay out
(B) play
(C) keep
(D) inquire
2. endorse
(A) sign up for
(B) announce support for
(C) lobby for
(D) renounce

3. intractable
 - (A) confused
 - (B) misleading
 - (C) instinctive
 - (D) unruly

4. correspondence
 - (A) letters
 - (B) files
 - (C) testimony
 - (D) response

5. obliterate
 - (A) praise
 - (B) doubt
 - (C) erase
 - (D) reprove

6. legitimate
 - (A) democratic
 - (B) legal
 - (C) genealogical
 - (D) underworld

7. deduct
 - (A) conceal
 - (B) withstand
 - (C) subtract
 - (D) terminate

8. mutilate
 - (A) paint
 - (B) damage
 - (C) alter
 - (D) rebel

9. egress
 - (A) extreme
 - (B) extra supply
 - (C) exit
 - (D) high price

10. horizontal
 - (A) marginal
 - (B) in a circle
 - (C) left and right
 - (D) up and down

11. controversy
 - (A) publicity
 - (B) debate
 - (C) revolution
 - (D) revocation

12. preempt
 - (A) steal
 - (B) empty
 - (C) preview
 - (D) appropriate

13. category
 - (A) class
 - (B) adherence
 - (C) simplicity
 - (D) cataract

14. apathy
 - (A) sorrow
 - (B) indifference
 - (C) aptness
 - (D) sickness

15. tentative
 - (A) persistent
 - (B) permanent
 - (C) thoughtful
 - (D) provisional

16. per capita
 - (A) for an entire population
 - (B) by income
 - (C) for each person
 - (D) for every adult

17. deficient
(A) sufficient
(B) outstanding
(C) inadequate
(D) bizarre
18. inspect
(A) disregard
(B) look at
(C) annoy
(D) criticize
19. optional
(A) not required
(B) infrequent
(C) choosy
(D) for sale
20. implied
(A) acknowledged
(B) stated
(C) predicted
(D) hinted
21. presumably
(A) positively
(B) helplessly
(C) recklessly
(D) supposedly
22. textile
(A) linen
(B) cloth
(C) page
(D) garment
23. fiscal
(A) critical
(B) basic
(C) personal
(D) financial

24. stringent
(A) demanding
(B) loud
(C) flexible
(D) clear
25. proceed
(A) go forward
(B) parade
(C) refrain
(D) resume

Sentence Completion

Each of the following sentences or passages contains a blank. Select the word or phrase that will best complete the meaning of the sentence or passage as a whole.

1. He was the chief _____ of his uncle's will. After taxes, he was left with an inheritance worth close to \$20,000.
(A) exemption (C) pensioner
(B) beneficiary (D) contestant
2. In view of the extenuating circumstances and the defendant's youth, the judge recommended _____.
(A) conviction (C) a mistrial
(B) a defense (D) leniency
3. The basic concept of civil service is that where a public job exists, all those who possess the _____ shall have an opportunity to compete for it.
(A) potential (C) qualifications
(B) contacts (D) credits
4. They would prefer to hire someone fluent in Spanish because the neighborhood in which the clinic is located is _____ Hispanic.
(A) imponderably (C) consistently
(B) sparsely (D) predominantly
5. The lover of democracy has an _____ toward totalitarianism.
(A) antipathy (C) empathy
(B) attitude (D) idolatry
6. The candidate's _____ was carefully planned; she traveled to six cities and spoke at nine rallies.
(A) pogrom (C) adjournment
(B) itinerary (D) apparition

7. _____ recommendations are generally more constructive than vague complaints or blanket praise.
(A) Justified (C) Sweeping
(B) Nebulous (D) Specific
8. In the face of an uncooperative Congress, the Chief Executive may find himself _____ to accomplish the political program to which he is committed.
(A) impotent (C) neutral
(B) equipped (D) contingent
9. The authorities declared an _____ on incoming freight because of the trucking strike.
(A) impression (C) embargo
(B) immolation (D) opprobrium
10. The information we have available on that question is _____: The form, scope, and reliability of the documents vary tremendously.
(A) essential (C) minimal
(B) homogeneous (D) heterogeneous
11. The _____ on the letter indicated that it had been mailed in Minnesota three weeks previously.
(A) address (C) postmark
(B) stamp (D) envelope
12. The television ads _____ an unprecedented public response. Sales skyrocketed, and within a few months the brand name had become a household word.
(A) boosted (C) elicited
(B) promised (D) favored
13. The chairman submitted a _____ for the new equipment, but it won't be delivered for two weeks.
(A) requisition (C) proposal
(B) reason (D) plea
14. With all his courtroom experience, the attorney was able to pry very little information out of the _____ witness.
(A) cooperative (C) reactionary
(B) recalcitrant (D) testifying
15. Although for years substantial resources had been devoted to alleviating the problem, a satisfactory solution remained _____.
(A) costly (C) elusive
(B) probable (D) esoteric

Reading Comprehension

Each passage is followed by questions that pertain to that passage. Read the passage and answer the questions based on information stated or implied in that passage.

A NASA (National Aeronautics and Space Administration) occupational health program called Enlightened Employee Health featured the following:

Due to the involuntary simultaneous contraction of 15 facial muscles, the upper lip is raised, partially uncovering the teeth and effecting a downward curving of the furrows that extend from the wings of both nostrils to the corners of the mouth. This produces a puffing out of the cheeks on the outer side of the furrows. Creases also occur under the eyes and may become permanent at the side edges of the eye. The eyes undergo reflex lacrimation and vascular engorgement. At the same time, an abrupt strong expiration of air is followed by spasmodic contractions of the chest and diaphragm resulting in a series of expiration-inspiration microcycles with interval pauses. The whole body may be thrown backward, shaken or convulsed due to other spasmodic skeletal muscle contractions. We call this condition laughter.

Of all human expressive behaviors, laughter has proven a most fascinating enigma to philosophers and scientists alike. Its physiology, neurology and anthropological origins and purpose are only partially defined. But its effects and uses are becoming increasingly apparent to health care professionals.

Laughter is considered to be an innate human response which develops during the first few weeks of life. Evidence of the innate quality of laughter is seen in its occurrence in deaf and blind infants and children who are completely without visual or auditory clues from their environment. Darwin propounded in his *Principle of Antithesis* that laughter develops as the infant's powerful reward signal of comfort and well-being to the nurturing adult. In other words, a child's laughter can let an adult know if the child is content. This signal is totally antithetical perceptually to the screams or cries of distress associated with discomfort. Laughter seems to play an important role in the promotion of social unity, production of a sense of well-being, communication of well-being, and as a mechanism for coping with stressful situations. Physiologically, both reflective (tickle-response) and heart-felt (mental response) laughter effect changes to the human system which may be significant in the treatment and prevention of illness. These include laughter's association with an increase in pulse rate, probably due to increased levels of circulatory catecholamines (blood catecholamine levels vary directly with the intensity of laughter). There is an increase in respiration. There is a decrease in blood CO₂ levels. There is a possible increase in secretion of brain pituitary endorphins – the body's natural anaesthetics which relieve pain, inhibit emotional response to pain, and thus reduce suffering. There is a decrease in red blood cell sedimentation rate ("sed rate" is associated with the body's level of infection or inflammation).

The possibility exists that laughter and other salutary emotions have a placebo effect upon the body. This in no way minimizes the therapeutic potential for these emotions. Hippocrates propounded that the mind and body are one. It may be possible that there is a physical chemistry associated with the will to live. Further investigation of

the effects of positive emotions upon health and well being may give us the keys to unlocking the power of the life force.

Immanuel Kant, in his *Critique of Pure Reason*, wrote that laughter is the physician of the body. Echoing Kant's thesis nearly two centuries later, Norman Cousins, author, senior lecturer at the UCLA School of Medicine and editor of *Saturday Review*, has become the modern day patron saint of self-potential through the healing power of laughter.

1. The purpose of the first paragraph is to
 - (A) describe the physical features of laughter
 - (B) list the causes of laughter
 - (C) urge people to laugh more
 - (D) propose a plan for developing muscular control
 - (E) analyze the damaging effects of laughter on the central nervous system

2. In the 3rd paragraph, the author uses the example of blind and deaf infants to make the point that
 - (A) laughter has salubrious physical effects
 - (B) all children love to laugh
 - (C) the ability to laugh is inborn, not acquired
 - (D) sighted and hearing children laugh at different things and in different ways than do blind and deaf children
 - (E) laughter is a socializing event, drawing people together

3. Which of the following is the best rewording of the author's explanation of Darwin's *Principle of Antithesis* in this context?
 - (A) Children learn faster than do adults.
 - (B) Children communicate contentment to condition adults to distinguish between children's pleasure and displeasure.
 - (C) Adults are unable to understand or communicate with infants.
 - (D) Younger parents are better able to communicate with their infants than are older parents.
 - (E) Children have different concepts of what is funny than do adults.

4. According to the passage, the sed rate
 - (A) increases with laughter
 - (B) is proportionally related to heartbeat and pulse rate
 - (C) is associated with the body's level of infection
 - (D) stimulates the laughter response
 - (E) increases the level of circulatory catecholamines

5. In the 4th paragraph, you may infer that “placebo effect” means something that is
- (A) therapeutic
 - (B) toxic
 - (C) inflammatory
 - (D) healthy
 - (E) harmless
6. The best title for this passage might be
- (A) How to Develop a Sense of Humor
 - (B) Why We Laugh
 - (C) Cultural Differences in Humor
 - (D) The Physical and Emotional Effects of Laughter
 - (E) Laughter: America’s Favorite Medicine

There is much concern nationwide about air quality. The following is from a 1985 report by the Tennessee Valley Authority.

Sulfur Dioxide a colorless and odorless gas in typical outdoor concentrations, is formed naturally through biological decay and volcanic eruptions. Natural background levels are intensified by manmade emissions from fossil-fueled power plants, industrial and commercial boilers, ore smelters, cement plants and petroleum refineries.

When a blanket of pollution enveloped the Meuse Valley, Belgium in 1993, 60 people died and 6,000 people became ill. When similar events occurred in Donora, Pennsylvania in 1948 and London, England in 1952, the scientific community was forced to locate and identify the culprit. During these incidents the estimated excessive concentrations of sulfur dioxide and particulate matter (many times greater than today’s standards) made them obvious choices as the problem pollutants.

Sulfur dioxide becomes most dangerous to people when, clinging to small particulates, it is carried into the lungs. When this happens, as it did in the deadly incidents of the mid-1900’s, it may kill or incapacitate sensitive individuals such as the very young or very old or those with serious preexisting heart or lung problems. It can also cause increased illness in normally healthy people.

The harmful effects of elevated sulfur dioxide concentrations on sensitive vegetation have been widely acknowledged and researched. Sulfur dioxide can injure plants growing near large emission sources and sometimes may reduce crop yield. Sulfur dioxide can also cause corrosive damage when it combines with water to form acids. Many of the problems associated with sulfur dioxide emissions (such as acid rain, inhalable particles and visibility impairment) are not a result of the sulfur dioxide itself but rather the secondary compounds it forms in the atmosphere.

Particulates are small liquid droplets or solid particles or airborne “dust,” which range in size from those visible as soot or smoke to those too small to be seen without a high powered microscope. While large particles remain in the air for only a few minutes, falling out near their source, small particles often remain aloft for several days, traveling great distances and dispersing over a wide area. Particulates can be emitted directly from their source as liquid droplets or solid particles (primary particulates) or they can be formed in the atmosphere where gaseous pollutants can be chemically transformed

(secondary particulates).

Particulates have both natural and man made sources. Natural sources include the sea, volcanoes, forest fires, and wind blown silt. Important manmade sources include incinerators, manufacturing and industrial processes, fossil-fueled power plants, mining and materials processing, the internal combustion engine, and agricultural activities. On a global scale, natural emissions of particulates far exceed manmade emissions, but manmade emissions are predominant in industrialized or urban areas.

The health effects of particulates depend on their size and composition. The larger particulates are usually filtered out in the nose and throat and rapidly cleared from the body. Smaller particles may be carried deeper into the lungs. Particles reaching sensitive deep lung areas are considered relatively more important for health purposes. Particle composition is also important because some compounds are relatively harmless whereas others – such as asbestos and beryllium – can result in serious health problems. Welfare effects caused by particulates have to do with soiling clothes and surfaces, and in combination with some gases, such as sulfur dioxide, corroding materials.

Acid rain, or more accurately, acidic deposition (which refers to both wet and dry deposition of acidifying compounds), is one of the most controversial and important environmental issues of the day. It is the subject of both international concern and worldwide research.

The principle causes of high rainfall acidity are sulfuric, nitric, and hydrochloric acids. The major manmade sources of pollutants that cause these acids are fossil-fueled utility and industrial boilers and the internal combustion engine. Proposed efforts to control man's contributions to acid rain concentrate on controlling these acidifying pollutants, especially sulfur dioxide.

Acidity is measured using a logarithmic scale of 0 to 14 called the pH scale. On this scale, a neutral substance has a pH of 7. An acidic substance, like vinegar, has a pH value less than 7. An alkaline or basic substance, like baking soda, has a pH value higher than 7. Theoretically, pure rainfall has a pH of 5.6 and is acidic because the water has combined with carbon dioxide in the air to form weak carbonic acid. Rain with a lower pH than 5.6 is called acid rain.

There is no reliable way to estimate what the acidity of rainfall may have been at various times and places throughout history. Preserved as ice in glaciers, arctic snows that fell in the 1800's were generally above pH 5, and some in Greenland even range from 6 to 7.6. Because of the remote location, however, these values might not be typical, and because snow and acid rain form by different processes and at different temperatures, values for rain and snow may not be directly comparable.

Recent evidence suggests that natural rain (in the absence of manmade pollution) is several times more acidic than previously thought. In several remote areas of the globe, rainfall pH's of 4.5 to 5.0 are routinely encountered. Some scientists suggest that these low pH values indicate the global extent of the acid rain problem.

An important factor in determining the impact of acid rain on the environment is the ability of the natural ecosystem to neutralize or buffer incoming acidity. For a variety of reasons this capacity is different for each geographic area. Generally speaking, it is thought that most sensitive areas overlie crystalline rock whereas the least sensitive overlie limestone rock. Calcium carbonate and other alkaline substances dissolved from limestone rock act as neutralizing agents which raise the pH toward neutral.

In some areas, there have been fishkills associated with acidic stream runoff following heavy rains. If the water in the streams, rivers, and lakes become too acidic, fish cannot survive. Spring snowmelt or heavy rain may abruptly change the water acidity level. Scientists are also studying the effects of acid rain on crops, plants, and land animals. For sensitive environments, an increase in the acidity of rainfall could be very serious. Clearly something must be done. However, it would be unwise to investigate every aspect of acid rain before action is taken.

7. Which of the following would be the best title for the passage?
 - (A) Sulfur Dioxide: The Silent Killer
 - (B) The Effects of Sulfur Dioxide and Acid Rain
 - (C) How Chemistry is Destroying our Universe
 - (D) The Benefits of Clean Air
 - (E) Why New, Stronger Anti-Pollution Laws are Needed

8. According to the passage, the dangers of Sulfur Dioxide to a person's health increase when
 - (A) biological decay occurs
 - (B) pollution laws are rescinded
 - (C) particulates carry it into the lungs
 - (D) acid rain increases
 - (E) drought conditions exist for extended periods of time

9. With which of the following would the author disagree
 - (A) Sulfur dioxide never harms normally healthy people, preying on only the ill.
 - (B) Sulfur dioxide's effects are often indirect.
 - (C) If manmade emissions were to cease worldwide, there would be no danger from harmful particulates.

10. Which of the following does the author list as a means of controlling the harmful effects of particulates?
 - (A) crop rotation
 - (B) body filters
 - (C) forest fires
 - (D) increased vigilance
 - (E) decreased cattle grazing

11. In paragraph #7, the author uses the word "welfare" to mean
 - (A) charity
 - (B) condition
 - (C) poverty
 - (D) hopelessness
 - (E) subsistence payments

12. You may infer from the passage that a substance with a pH balance of 5
- (A) cannot mix with a substance with a pH balance above 7
 - (B) is a solid
 - (C) has no acidity
 - (D) is volatile and dangerous
 - (E) is acidic
13. The author gives the same information about which of the following in his discussion of sulfur dioxide, particulates, and acid rain?
- (A) the solution to the problem
 - (B) the leading scientists working on the problem
 - (C) the economic repercussions of the problem
 - (D) the number of deaths attributed to the problem
14. By stating in paragraph #12, “some scientists suggest that these low pH values indicate the global extent of the acid rain problem,” the author....
- (A) indicates that there may be disagreement on the point.
 - (B) denigrates as scaremongers those scientists who are attempting to frighten us.
 - (C) lampoons the scientists who claim that acid rain is a theory, not a fact.
 - (D) predicts that global warming is finally coming under control.
 - (E) proves that global warming is the most serious consequence of acid rain.
15. The rest of the last paragraph of this passage most likely would discuss which of the following?
- (A) the steps to take to decrease acid rain
 - (B) the importance of swift action on the problem
 - (C) the economic difficulties of implementing acid rain controls
 - (D) the programs that have already been attempted and have failed to decrease acid rain
 - (E) the folly of being too hasty in enacting stringent anti-pollution laws

Verbal Analogies

In each question, the two capitalized words have a certain relationship to each other. Select the letter of the pair of words that are related in the same way as the two capitalized words.

1. INTIMIDATE : FEAR::
- (A) maintain : satisfaction
 - (B) astonish : wonder
 - (C) sooth : concern
 - (D) feed : hunger

2. STOVE : KITCHEN::
(A) window : bedroom
(B) sink : bathroom
(C) television : living room
(D) trunk : attic
3. CELEBRATE : MARRIAGE::
(A) announce : birthday
(B) report : injury
(C) lament : bereavement
(D) face : penalty
4. MARGARINE : BUTTER::
(A) cream : milk
(B) lace : cotten
(C) nylon : silk
(D) egg : chicken
5. NEGLIGENT : REQUIREMENT::
(A) careful : position
(B) remiss : duty
(C) cautious : injury
(D) cogent : task
6. GAZELLE : SWIFT
(A) horse : slow
(B) wolf : sly
(C) swan : graceful
(D) elephant : gray
7. IGNOMINY : DISLOYALTY::
(A) fame : heroism
(B) castigation : praise
(C) death : victory
(D) approbation : consecration
8. SATURNINE : MERCURIAL
(A) Saturn : Venus
(B) Apennines : Alps
(C) redundant : wordy
(D) allegro : adagio

9. ORANGE : MARMALADE

(A) potato : vegetable

(B) jelly : jam

(C) tomato : ketchup

(D) cake : picnic

10. BANISH : APOSTATE

(A) reward : traitor

(B) welcome : ally

(C) remove : result

(D) avoid : truce

Answer Key

Correct Usage Test

1. B
2. C
3. A
4. C
5. B
6. A
7. D
8. D

Spelling Test

1. B – closing
2. B – artificial
3. D – incorrect
4. A – attached
5. A – conductor
6. D – rocky
7. C – suggested
8. B – silence
9. C – potato
10. D – succeeded

Synonym Test

1. C
2. B
3. D
4. A
5. C
6. B
7. C
8. B
9. C
10. C
11. B
12. D
13. A

Synonym test answers cont.

14. B
15. D
16. C
17. C
18. B
19. A
20. D
21. D
22. B
23. D
24. A
25. A

Sentence Completion Test

1. C
2. D
3. C
4. D
5. A
6. B
7. D
8. A
9. C
10. D
11. C
12. C
13. A
14. B
15. C

Reading Comprehension Test

1. A
2. C
3. B
4. C
5. A
6. D
7. B
8. C
9. A
10. B

Reading comprehension answers cont.

- 11. B
- 12. D
- 13. C
- 14. A
- 15. B

Verbal Analogies Test

- 1. B – To intimidate is to inspire fear; to astonish is to inspire wonder.
- 2. B – A stove is often part of a kitchen; a sink is often part of a bathroom.
- 3. C – You happily celebrate a marriage; you sorrowfully lament a bereavement.
- 4. C – Margarine is a manufactured substitute for butter; nylon is a manufactured substitute for silk.
- 5. B – A person may be negligent in meeting a requirement; he may similarly be remiss in performing his duty.
- 6. C – A gazelle is known to be swift; a swan is known to be graceful.
- 7. A – One falls into ignominy if he shows disloyalty; one gains fame if he shows heroism.
- 8. D – *Saturnine* and *mercurial* are antonyms; so are *allegro* and *adagio*.
- 9. C – Marmalade is made from oranges; ketchup is made from tomatoes.
- 10. B – An apostate is banished (sent away); an ally is welcomed (brought in).

Math Review

A comprehensive overview of basic mathematical Concepts used on the Test

Properties of Real Numbers

Closure

- $a + b$ is a real number; when you add two real numbers, the result is also a real number
Example: 3 and 7 are both real numbers, $3+7=10$ and the sum, 10, is also a real number.
- $a - b$ is a real number; when you subtract two real numbers the result is also a real number.
Example: 2 and 5 are both real numbers, $2 - 5 = -3$, and the difference, -3, is also a real number.
- $(a)(b)$ is a real number; when you multiply two real numbers, the result is also a real number.
Example: 9 and -2 are both real numbers; $(9)(-2) = -18$, and the product, -18 is also a real number.
- a / b is a real number when $b \neq 0$; when you divide two real numbers, the result is also a real number unless the denominator (divisor) is zero.
Example: -10 and 5 are both real numbers, $-10 / 5 = -2$, and the quotient, -2, is also a real number.

Commutative

- $a + b = b + a$; you can add numbers in either order and get the same answer.
Example: $2 + 6 = 8$ and $6 + 2 = 8$ so $2 + 6 = 6 + 2$
- $(a)(b) = (b)(a)$; you can multiply numbers in either order and get the same answer. **Example:** $(7)(10) = 70$ and $(10)(7) = 70$ so $(7)(10) = (10)(7)$
- $a - b \neq b - a$; you cannot subtract in any order and get the same answer.
Example: $4 - 6 = -2$, but $6 - 4 = 2$. There is no commutative property for subtraction.
- $a / b \neq b/a$; you cannot divide in any order and get the same answer. Example : $4/2 = 2$, but $2/4 = .5$ so there is no commutative property for division.

ASSOCIATIVE

- $(a + b) + c = a + (b + c)$; you can group any numbers in any arrangement when adding and get the same answer. Example: $(1 + 2) + 3 = 3 + 3 = 6$ and $1 + (2 + 3) = 1 + 5 = 6$ so $(1 + 2) + 3 = 1 + (2 + 3)$.
- $(ab)c = a(bc)$; you can group any numbers in any arrangement when multiplying and get the same answer. Example: $(2 \times 6)3 = (12)3 = 36$ and $2(6 \times 3) = 2(18) = 36$ so $(2 \times 6)3 = 2(6 \times 3)$
- The associative property does not work for subtraction or division.

IDENTITIES

- $a + 0 = a$; zero is the identity for addition because adding zero does not change the original **number**.

EXAMPLE: $7 + 0 = 7$ and $0 + 7 = 7$.

- $a(1) = a$; one is the identity for multiplication because multiplying by one does not change the original number.

EXAMPLE: $21(1) = 21$ and $(1)21 = 21$.

- Identities for subtraction and division become a problem. It is true that $29 - 0 = 29$, but $0 - 29 = -29$, not 29. This is also the case for division because $4/1 = 4$, but $1/4 = .25$, so the identities do not hold when the numbers are reversed.

INVERSES

- $a + (-a) = 0$; a number plus its additive inverse (the numbers with the opposite sign) will always equal zero. **EXAMPLE:** $6 + (-6) = 0$ and $(-6) + 6 = 0$. The exception is zero because $0 + 0 = 0$ already.
- $a(1/a) = 1$; a number time its multiplicative inverse or reciprocal (the number written as a fraction and flipped) will always equal one. **EXAMPLE:** $5(1 / 5) = 1$. The exception is zero because zero cannot be multiplied by any number and result in a product of one/

DISTRIBUTIVE PROPERTY

- $a(b + c) = ab + ac$ or $a(b - c) = ab - ac$; each term in the parentheses must be multiplied by the term in front of the parentheses **EXAMPLE:** $4(5 + 7) = 4(5) + 4(7) = 20 + 28 = 48$. This is a simple example and the distributive property is not required to find the answer. When the problem involves a variable however, the distributive property is a necessity. **EXAMPLE:** $4(5a + 7) = 4(5a) + 4(7) = 20a + 28$.

PROPERTIES OF EQUALITY

- **REFLEXIVE** : $a = a$; both sides of the equation are identical **EXAMPLE:**
 $6+k = 6+k$
- **SYMMETRIC:** If $a = b$ then $b = a$. This property allows you to exchange the two sides of an equation. **EXAMPLE:** $4a - 7 = 9 - 7a + 15$ becomes $9 - 7a + 15 = 4a - 7$.
- **TRANSITIVE;** If $a = b$ and $b = c$ the $a = c$. This property allows you to connect statements which are each equal to the same common statement. **EXAMPLE:** $5a - 6 = 9k$ and $9k = a + 2$; you can eliminate the common term $9k$ and connect the following into one equation: $5a - 6 = a + 2$.
- **ADDITION PROPERTY OF EQUALITY:** If $a = b$ then $a + c = b + c$. This property allows you to add any number or algebraic term to any equation as long as you add it to both sides to keep the equation true. **EXAMPLE:** $5 = 5$; if you add 3 to one side and not the other the equation becomes $8 = 5$ which is false, but if you add 3 to both sides you gets true equation $8 = 8$. Also, $6a + 2 = 14$ becomes $6a + 2 + (-2) = 14 + (-2)$ if you add 2 to both sides. The results in the equation $6a = 12$
- **MULTIPLICATION PROPERTY OF EQUALITY:**

If $a = b$ then $ac = bc$ when $c \neq 0$. This property allows you to multiply both sides of an equation by any nonzero value. **EXAMPLE:** If $4a = -24$, then $(4a)(.25) = (-24)(.25)$ and $a = -6$. Notice that both sides of the $=$ were multiplied by 25.

DEFINITIONS

- **NATURAL or Counting NUMBERS:** $\{1, 2, 3, 4, 5, \dots, 11, 12, \dots\}$
- **WHOLENUMBERS:** $\{0, 1, 2, 3, \dots, 10, 11, 12, 13, \dots\}$
- **INTEGERS:** $\{\dots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \dots\}$
- **RATIONAL NUMBERS:** $\{p/q \mid p \text{ and } q \text{ are integers, } q \neq 0\}$; the sets of Natural numbers, Whole numbers, and Integers, as well as numbers which can be written as proper or improper fractions, are all subsets of the set of Rational Numbers.
- **IRRATIONAL NUMBERS:** $\{x \mid x \text{ is a real number but is not a Rational number}\}$; the sets of Rational numbers and Irrational numbers have no elements in common and are therefore disjoint sets.
- **REAL NUMBERS:** $\{x \mid x \text{ is the coordinate of a point on a number line}\}$; the union of the set of Rational numbers with the set of Irrational numbers equals the set of Real Numbers.
- **IMAGINARY NUMBERS:** $\{ai \mid a \text{ is a real number and } i \text{ is the number whose square is } -1\}$; $i^2 = -1$; the sets of Real numbers and Imaginary numbers have no elements in common and are therefore disjoint sets.
- **COMPLEX NUMBERS:** $\{a + bi \mid a \text{ and } b \text{ are real numbers and } i \text{ is the number whose square is } -1\}$; the set of Real numbers and the set of Imaginary numbers are both subsets of the set of Complex numbers. **EXAMPLES:** $4 + 7i$ and $3 - 2i$ are complex numbers.

OPERATIONS OF REAL NUMBERS

VOCABULARY

- **TOTAL or SUM** is the answer to an addition problem. The numbers added are called addends. **EXAMPLE:** In $5 + 9 = 14$, 5 and 9 are addends and 14 is the total or sum.
- **DIFFERENCE** is the answer to a subtraction problem. The number subtracted is called the subtrahend. The number from which the subtrahend is subtracted is called the minuend. **EXAMPLE:** In $25 - 8 = 17$, 25 is the minuend, 8 is the subtrahend, and 17 is the difference.
- **PRODUCT** is the answer to a multiplication problem. The numbers multiplied are each called a factor. **EXAMPLE:** In $15 \times 6 = 90$, 15 and 6 are factors and 90 is product.
- **QUOTIENT** is the answer to a division problem. The number being divided is called the dividend. The number that you are dividing by is called the divisor. If there is a number remaining after the division process has been completed, that number is called the remainder. **EXAMPLE:** In $45 \div 5 = 9$, which may also be written as $45/5$, 45 is the dividend, 5 is the divisor and 9 is the quotient.

- An EXPONENT indicates the number of times the base is multiplied by itself; that is, used as a factor. EXAMPLE: In 5^2 , 5 is the base and 2 is the exponent, or power, and $5^2 = (5)(5) = 25$, notice that the base, 5, was multiplied by itself 2 times.
- PRIME NUMBERS are natural numbers greater than 1 having exactly two factors, itself and one. EXAMPLES: 7 is prime because the only two natural numbers that multiply to equal 7 are 7 and 1; 13 is prime because the only two natural numbers that multiply to equal 13 are 13 and 1.
- COMPOSITE NUMBERS are natural numbers that have more than two factors. EXAMPLES: 15 is a composite number because 1, 3, 5, and 15 all multiply in some combination to equal 15; 9 is composite because 1, 3, and 9 all multiply in some combination to equal 9. The GREATEST COMMON FACTOR (GCF) or greatest common divisor (GCD) of a set of numbers is the largest natural number that is a factor of each of the numbers in the set; that is, the largest natural number that will divide into all of the numbers in the set without leaving a remainder. EXAMPLE: The greatest common factor (GCF) of 12, 30 and 42 is 6 because 6 divides evenly into 12, 30, and 42 without leaving remainders.
- The LEAST COMMON MULTIPLE (LCM) of a set of numbers is the smallest natural number that can be divided (without remainders) by each of the numbers in the set. EXAMPLE: The least common multiple of 2, 3, and 4 is 12 because although 2, 3, and 4 divide evenly into many numbers including 48, 36, 24, and 12, the smallest is 12.
- The DENOMINATOR of a fraction is the number in the bottom; that is, the divisor of the indicated division of the fraction. EXAMPLE.- In $5/8$, 8 is the denominator and also the divisor in the indicated division.
- The NUMERATOR of a fraction is the number in the top; that is, the dividend of indicated division of the fraction. EXAMPLE: In $3/4$, 3 is the numerator and also the dividend in the indicated division.

ORDER OF OPERATIONS

DESCRIPTION: The order in which addition, subtraction, multiplication, and division are performed determines the answer.

• ORDER

1. **Parentheses:** Any operations contained in parentheses are done first, if there are any. This also applies to these enclosure symbols { } and [].
2. **Exponents:** Exponent expressions are simplified second, if there are any.
3. **Multiplication and Division:** These operations are done next in the order in which they are found, going left to right; that is, if division comes first going left to right, then it is done first.
4. **Addition and Subtraction:** These operations are done next in the order in which they are found going left to right; that is, if subtraction comes first, going left to right, then it is done first.

DECIMAL NUMBERS

• The PLACE VALUE of each digit in a base ten number is determined by its position with respect to the decimal point. Each position represents multiplication by a power of ten. EXAMPLE: In 324, 3 means 300 because it is 3 times 10^2 ($10^2 = 100$). 2 means 20 because it is 2 times 10 ($10 = 10$). And 4 means 4 times one because it is 4 times 10^0 ($10^0 = 1$). There is an invisible decimal point to the right of the 4. In 5.82, 5 means 5 times one because it is 5 times 10^0 ($10^0 = 1$), 8 means 8 times one tenth because it is 8 times 10^{-1} ($10^{-1} = .1 = 1/10$), and 2 means 2 times one hundredth because it is 2 times 10^{-2} ($10^{-2} = .01 = 1/100$).

PLACE VALUE

In the number **3025.6789**

3 is the thousands place

0 is the hundreds place

2 is the tens place

5 is the ones or units

.6 is the tenths place

.67 is the hundredths place

.678 is the thousandths place

.6789 is the ten-thousandths place

WRITING DECIMAL NUMBERS AS FRACTIONS

- Write the digits that are behind the decimal point as the numerator (top) of the fraction
- Write the place value of the last digit as the denominator (bottom) of the fraction. Any digits in front of the decimal point are whole numbers
- Example: In 4.068, the last digit behind the decimal point is 8 and it is in the 1000ths place; therefore, 4.068 becomes $4 \frac{68}{1000}$
- Notice the number of zeros in the denominator is equal to the number of digits behind the decimal point in the original number

ADDITION

- Write the decimal numbers in a vertical form with the decimal points lined up one under the other, so digits of equal place value are under each other.

SUBTRACTION

- Write the decimal numbers in a vertical form with the decimal points lined up one under the other.
- Write additional zeros after the last digit behind the decimal point in the minuend (number on top) if needed (both the minuend and the subtrahend should have an equal number of digits behind the decimal point.)

MULTIPLICATION

- Multiply
- Count the number of digits behind the decimal point in all factors.
- Count the number digits behind the decimal point in the answer. The answer must have the same number of digits behind the decimal point as there are digits behind the decimal points in all the factors. It is not necessary to line the decimal points up in multiplication.

RATIO, PROPORTION, & PERCENT

Ratio

- Definition: Comparison between two quantities
- Forms: 3 to 6, 3 : 6, 3/6

Proportion

- Definition: Statement of equality between two ratios of fractions.
- Forms: 3 : 6 :: 6 : 12, $3/6 = 6/12$

Percents

- Definition: Percent means “out of 100” or “per 100”
- Percent and equivalent fractions
 1. Percents can be written as fractions by placing the number over 100 and simplifying or reducing. Example: $20\% = 20/100 = 2/10$; $4.5\% = 4.5/100 = 45/1000 = 9/200$
 2. Fractions can be changed to percents by writing them with denominators of 100. The number is then the percent number. Example: $3/5 = 3/5 \times 20/20 = 60/100 = 60\%$
- Percents and decimal numbers
 1. To change a percent to a decimal number; move the decimal point two places to the left because percent means “out of 100” and decimal numbers with two digits behind the decimal point also mean “out of 100”.
 2. To change a decimal number to a percent move the decimal point two places to the right

FRACTIONS

Reducing

- Divide numerator (top) and denominator (bottom) by the same number, thereby renaming it to an equivalent fraction in lower terms This process may be repeated

ADDITION

$$a/c + b/c = a + b/c \text{ where } c \neq 0$$

Change to equivalent fractions with common denominator.

1. Find the least common denominator by determining the smallest number which can be divided evenly (no remainders) by all of the numbers in the denominators (bottoms).
2. Multiply the numerator and denominator of each fraction so the fraction value has not changed but the common denominator has been obtained.
3. Add the numerators and keep the same denominator because the addition of fractions is counting equal parts.

Subtraction

$$a/c - b/c = a - b/c \text{ where } c \neq 0$$

Change to equivalent fractions with a common denominator.

1. Find the least common denominator by determining the smallest number which can be divided evenly by all of the numbers in the denominators (bottoms).
2. Multiply the numerator by the same number so the fraction value has not changed, but the common denominator has been obtained
3. Subtract the numerators and keep the same denominator because subtraction of fractions is finding the difference between equal parts.

Multiplication

$$a/c * b/d = a * b / c * d \text{ where } c \neq 0 \text{ and } d \neq 0$$

- Common denominators are NOT needed.
1. Multiply the numerators (tops) and multiply the denominators (bottoms) then reduce the answer to lowest terms.
 2. OR - reduce any numerator (top) with any denominator (bottom) and then multiply the numerators and multiply the denominators.

DIVISION

$$(a/c) / (b/d) = (a/c) \times (d/b) = (a * d) / (c * b) \text{ where } b \neq 0, c \neq 0 \text{ and } d \neq 0$$

- Common denominators are NOT needed.
1. Change division to multiplication by the reciprocal; that is, flip the fraction in back of the division sign and change the division sign to a multiplication sign.
 2. Now follow the steps for multiplication of fractions as indicated above.

ALGEBRA

VOCABULARY

- Variables are letters used to represent numbers.
- Constants are specific numbers that are not multiplied by any variables.
- Coefficients are numbers that are multiplied by one or more variables.
- Term. are constants or variable expressions.
- Like or similar terms are terms that have the same variables to the same degree or exponent value. Coefficients do not matter, they may be equal or not.
- Algebraic expressions are terms that are connected by either addition or subtraction.
- Algebraic equations are statements of equality between at least two terms.

1. $\frac{9}{10}$ a) .09 b) 90 c) .9 d) 9.0
2. $\frac{60}{100}$ a) .6 b) .06 c) 6.0 d) .006
3. $48 \div 1.25$ a) 3.84 b) 38.4 c) 28.4 d) 2.84
4. 6.7×2.69 a) 180.23 b) 1.802 c) 18.023 d) 18.23
5. 96,000,000 a) 96.0×10^9 b) $.96 \times 10^9$ c) 960×10^7 d) 9.6×10^7
6. .000045 a) 4.5×10^{-4} b) 4.5×10^{-5} c) 4.5×10^{-6} d) 4.5×10^5
7. $\frac{2}{12}$ a) $\frac{2}{6}$ b) $\frac{1}{6}$ c) $\frac{3}{4}$ d) $\frac{1}{12}$
8. $\frac{15}{2}$ a) $6\frac{1}{2}$ b) $7\frac{1}{4}$ c) $7\frac{1}{2}$ d) $6\frac{1}{4}$
9. $\frac{4}{7} + \frac{2}{7}$ a) $\frac{6}{7}$ b) $\frac{2}{7}$ c) $\frac{1}{2}$ d) $\frac{5}{7}$
10. $\frac{3}{14} + \frac{1}{7}$ a) $\frac{4}{14}$ b) $\frac{2}{7}$ c) $\frac{6}{14}$ d) $\frac{5}{14}$
11. $4\frac{3}{4} \times 6$ a) $28\frac{5}{8}$ b) $28\frac{1}{2}$ c) $28\frac{3}{4}$ d) $29\frac{1}{2}$
12. $\frac{1}{5} \div \frac{3}{4}$ a) $\frac{2}{7}$ b) $\frac{4}{20}$ c) $\frac{4}{9}$ d) $\frac{4}{15}$
13. $\frac{3}{7} \times \frac{6}{7}$ a) $\frac{18}{49}$ b) $\frac{21}{42}$ c) $\frac{9}{7}$ d) $\frac{9}{49}$
14. 28% of 58 a) 16.24 b) 162.3 c) 15.23 d) 16.14
15. 54 is what % of 108 a) .20% b) 50% c) 0.5% d) 200%
16. 74 is 18.5% of a) 0.0025 b) 400 c) 40 d) .25
17. 59% a) 5.9 b) 59.0 c) 0.59 d) 0.059
18. 188% a) .188 b) 1.88 c) 18.80 d) 0.0188

19. Which of the following have the same value?

$$3\frac{3}{8} \quad 33\% \quad 37.5\% \quad 3.33 \quad \frac{3}{8}$$

- a) $3\frac{3}{8}$ and 3.33 b) 33% and 3.33 c) 37.5% and $3\frac{3}{8}$ d) 37.5 and $\frac{3}{8}$

20. $18 + (-5)$ a) 13 b) 23 c) -13 d) -23

21. $-22 + (-10)$ a) 32 b) -32 c) 12 d) -12

22. $-6(4)$ a) 24 b) 10 c) 18 d) -24

23. $9(3x)$ a) 12x b) 27x c) 27 d) 3x

24. $\frac{12x}{6}$ a) 72x b) 4x c) 2x d) 18x

25. $X + 9 = 30$ $X = ?$ a) 18 b) 21 c) 25 d) 3

26. $\frac{1}{8}m - 27 = 16$ $m = ?$ a) 344 b) 300 c) 188 d) 6

27. Sergeant Jones bought 140 off-duty badges for his squad, but 35% of the badges were defective and had to be returned. How many badges did the sergeant return?

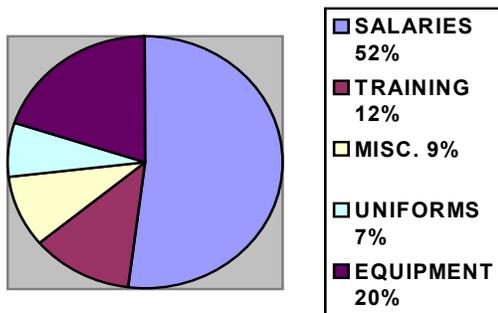
- a) 49 b) 105 c) 27 d) 100

28. Frank invested \$43,608 in a mutual fund that paid \$432.96 in interest at the end of the year. What was the percent of interest Frank earned from his initial investment?

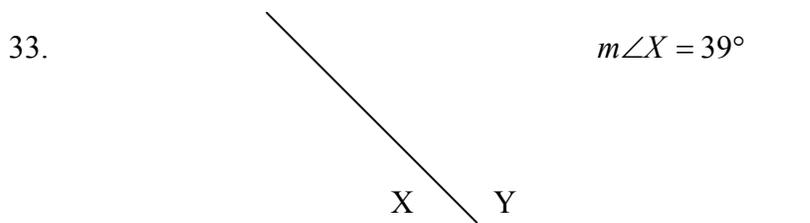
- a) 10% b) 3% c) 6% d) 1%

29. Officer Jacobi drove 180 miles in his patrol car during part of May. The distance represents 40% of May. How many miles did he drive all of May? a) 710 miles
b) 420 miles c) 720 miles d) 450 miles

Annual Expenses for the North Hill Police Department



30. What part of the North Hill Police Department's annual expenses does equipment and training represent? a) about $\frac{1}{2}$ b) about 20% c) about $\frac{1}{3}$ d) 40%
31. Which section of the chart accounts for vehicle repair? a) Uniforms b) Training
c) Salaries d) Miscellaneous
32. Which two sections equal 16% of expenses? a) Miscellaneous & Uniforms
b) Training & Equipment c) Training & Uniforms d) Miscellaneous & Training

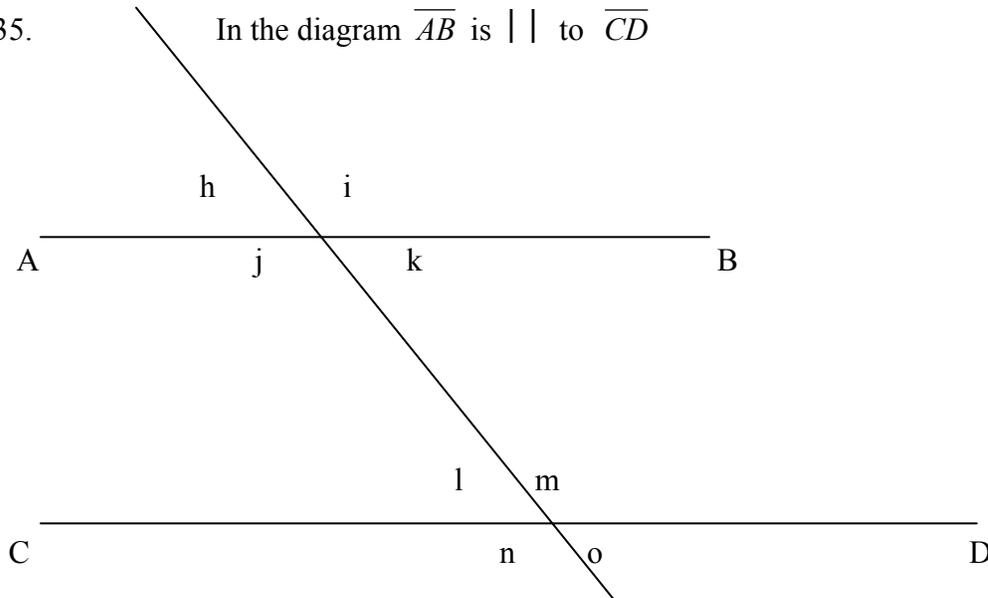


What is the $m\angle Y$?

- a) 141° b) 51° c) 321° d) 219°

34. $m\angle X + m\angle Y = ?$ a) 360° b) 90° c) 180° d) 75°

35. In the diagram \overline{AB} is \parallel to \overline{CD}



A. Name all other angles equal to $\angle h$ a) k, l, o b) k, o, n c) i, l, o d) None

B. Name all the angles equal to $\angle n$ a) k, o, m b) m, j, k c) m, i, j d) None

C. If $\angle n = 117^\circ$, what is $m\angle h$? a) 63° b) 180° c) 90° d) 117°

36. $5x + 12x = ?$ a) $7x$ b) $17x$ c) $-17x$ d) -7

37. $-14a - (-3a) = ?$ a) $11a$ b) $17a$ c) $-11a$ d) $-17a$

38. $9bc + (-3bc) = ?$ a) $6bc$ b) $12bc$ c) $-12bc$ d) $-6bc$

39. $6(6x) = ?$ a) $36x$ b) $12x$ c) x d) $42x$

40. $\frac{12x}{4} = ?$ a) $28x$ b) $4x$ c) $3x$ d) 3

41. $15x(6y) = ?$ a) $90xy$ b) $21xy$ c) 90 d) 21

42. $\frac{24x}{8x} = ?$ a) $192x$ b) $3x$ c) 3 d) $4x$

43. $4(3a-9)=?$ a) $12-9a$ b) $12a-36$ c) $-24a$ d) $52a$
44. $2(4x+7y-p)=?$ a) $8x+14y-2p$ b) $22xy-2p$ c) $8x+14yp$ d) $4x+7y-2p$
45. $x(x^3)=?$ a) $2x^3$ b) x^2 c) x^4 d) x^3
46. $3x(3x)=?$ a) $6x^2$ b) $9x^2$ c) $9x$ d) $6x$
47. $\frac{14x^4}{7x}=?$ a) $2x^3$ b) $21x^4$ c) $21x^3$ d) $2x^2$
48. $\frac{49s^3}{s}=?$ a) $49s^4$ b) $49s$ c) $49s^2$ d) $7s^2$

ANSWERS TO MATH SECTION

1. C
2. A
3. B
4. C
5. D
6. B
7. B
8. C
9. A
10. D
11. B
12. D
13. A
14. A
15. B
16. B
17. C
18. B
19. D
20. A
21. B
22. D
23. B
24. C
25. B
26. A
27. A
28. D
29. D
30. C
31. D
32. A
33. A
34. C
35. (A) A (B) C (C) A
36. B
37. C
38. A
39. A
40. C
41. A
42. C
43. B
44. A
45. C
46. B
47. A
48. C

Math Section

1. 15% of 300 =

A. 45

B. 75

C. 50

D. 900

2. 60% of \$760 =

A. 400

B. 356

C. 456

D. 233

3. Which of these numbers is a factor of 36?

A. 5

B. 7

C. 8

D. 6

4. $(6 \div 2) \times (10 \div 5) =$

A. 6

B. 2

C. 54

D. 400

5. One yard equals three feet , How many feet is a 29 yards?
- A. 78 feet
 - B. 56 feet
 - C. 87 feet
 - D. 100 feet
6. What is the reciprocal of 3?
- A. $1/9$
 - B. $1/3$
 - C. $1/7$
 - D. $1/33$
7. A office measures 22 ft x 10 ft x 14 ft. What is the volume?
- A. 3000 ft^3
 - B. 4567 ft^3
 - C. 2080 ft^3
 - D. 3080 ft^3
8. A turkey was cooked at 350 °F in the oven for 5 hours. The internal temperature rose from 25 °F to 150 °F. What was the average rise in temperature per hour?
- A. $21.9 \text{ }^\circ\text{F/hr}$
 - B. 25°F/hr
 - C. 55.05°F/hr
 - D. 19°F/hr
9. You buy radio for \$120.00, and the sales tax where you are purchasing the book is 7.5 %. You have \$200. How much change will you receive back?
- A. \$71.00

- B. \$87.50
- C. \$10.23
- D. \$67.00

10. You buy a boat making a down payment of \$10,000 and 9 monthly payments of \$450. How much have you paid so far for the car?
- A. \$1405
 - B. \$14000
 - C. \$14050
 - D. \$13050
11. A teacher buys 575 pencils and 60 folders for her students. Pencils are purchased in sets of 5 for \$3.55 per pack. Folders are sold in sets of 3 for 7.99. How much will the teacher spend buying these products cost?
- A. \$586.50
 - B. \$600.09
 - C. \$568.05
 - D. \$334.88
12. Which of the following percentages is equal to 0.78?
- A. 78%
 - B. 0.87%
 - C. 7.95%
 - D. .78%
13. A banker lost Saturday's deposit. He was supposed to deposit \$1200, but only made a deposit of \$1024. How much money did the banker lose?
- A. \$167.00
 - B. \$176.00
 - C. \$129.00
 - D. \$24.00
14. A Doctor prescribes a patient 30 mg of a certain medication. The medication is stored 6 mg per 8-mL dose. How many milliliters will need to be given?
- A. 50 mL
 - B. 11 mL
 - C. 25 mL
 - D. 40 mL
15. In the number 678.32 which digit represents the hundredths space?
- A. 6
 - B. 7
 - C. 3
 - D. 2
16. Which of these percentages equals 6.67?

- A. 667%
- B. 66.7%
- C. 6670%
- D. .667%

17. If Paul drinks 8, (8oz) bottles of Powerade per day. If John drinks 12.8 oz of Powerade after a hard workout he has consumed what fraction of his average?

- A. $\frac{1}{2}$
- B. $\frac{1}{6}$
- C. $\frac{1}{5}$
- D. $\frac{1}{3}$

18. If $x = 2$, then $x^3(x^3 - x) =$

- A. 20
- B. 45
- C. 48
- D. 480

19. 15% of 280 =

- A. 42
- B. 24
- C. 40
- D. 245

20. You need $\frac{3}{4}$ cups of milk for a cake. You accidentally put $\frac{1}{4}$ cup into the mixing bowl with the dry ingredients. How much more milk in cups do you need to add?

- A. $\frac{1}{4}$ cups
- B. $\frac{1}{2}$ cups
- C. $\frac{1}{3}$ cups
- D. $\frac{2}{3}$ cups

21. $\frac{2}{3} - \frac{2}{6} =$

- A. $\frac{3}{5}$
- B. $\frac{1}{3}$
- C. $\frac{5}{6}$
- D. $\frac{1}{2}$

22. $\frac{1}{8} + \frac{1}{4} =$

- A. $\frac{1}{8}$
- B. $\frac{1}{16}$
- C. $\frac{3}{8}$
- D. $\frac{1}{4}$

23. You are financing a car for \$10000. You are required to put down a 20% down payment. How much money do you need for your down payment?

- A. \$500
- B. \$5000
- C. \$200
- D. \$2000

24. You are traveling in Italy, and you see a sign stating that Rome is 6 kilometers away. If 1 kilometer is equal to 0.625 miles, how many miles away is London from where you are?

- A. .375miles
- B. 3 miles
- C. 1.75 miles
- D. 3.75 miles

25. You need exactly a 880 ft^3 box for your fine china. At the shipping store you see four choices of boxes, but the volume is not listed. The length, width, and height are listed on the box. Which of the following boxes would fit your needs?

- A. 11 ft x 10 ft x 8 ft
- B. 12 ft x 14 ft x 12 ft
- C. 10 ft x 20 ft x 7 ft
- D. 13 ft x 12 ft x 11 ft

26. You invested \$6000 and received yearly interest of \$600. What is your interest rate on your investment?

- A. 20%
- B. 10%
- C. 5%
- D. 15%

27. At the car dealership there are 58 cars, 28 cars are white and the rest are blue.

Approximately what percentage is blue?

- A. 34%
- B. 25%
- C. 51%
- D. 77%

28. If $x = 84 + 2$, and $y = 35 (2)$, then

- A. $x < y$
- B. $x = y$
- C. $x > y$
- D. Not enough information

29. $8x = 4a + 4a$. If $a = 3$, then $x =$

- A. 3
- B. 5
- C. 6
- D. 2

30. In a bag there are 6 red marbles, 4 blue marbles, and 10 green marbles. What percentage of the marbles are blue?
- A. 25%
 - B. 15%
 - C. 40%
 - D. 20%
31. A soda is 90 calories. How many calories are in 6 sodas?
- A. 500 calories
 - B. 540 calories
 - C. 322 calories
 - D. 440 calories
32. $10x = 6y + 4y$. If $y = 5$, then $x =$
- A. 2
 - B. 6
 - C. 5
 - D. 10
33. $4x = 2y + 6y$. If $y = 2$, then $x =$
- A. 4
 - B. 5
 - C. 2
 - D. 7
34. What is the area of a triangle if the base is 8 cm and the height is 10 cm.
- A. 28 cm^3
 - B. 40 cm^3
 - C. 32 cm^3
 - D. 50 cm^3
35. $8\frac{1}{2} - 2\frac{3}{8} =$
- A. $\frac{23}{8}$
 - B. $\frac{39}{8}$
 - C. 39
 - D. 8
36. The Miami Dolphins won 14 games, but lost 2. What was ratio of wins to losses?
- A. 6:1
 - B. 2:1
 - C. 8:2
 - D. 7:1
37. 50 is 25% of what number?
- A. 250
 - B. 400

- C. 200
- D. 350

38. $7 \times 1 \times 5 \times 2 \times 0 \times 10$

- A. 700
- B. 350
- C. 0
- D. 1

39. $8.5 \div 2.5$

- A. 3.4
- B. 2.3
- C. 4.3
- D. 4.4

40. If $x = 3$, then $3x + 5x =$

- A. 24
- B. 14
- C. 34
- D. 135

41. $1/2$ equals:

- A. .005
- B. .5
- C. .05
- D. 5

42. $3/4$ equals:

- A. 7.5
- B. .05
- C. .25
- D. .75

43. $2/5$ equals:

- A. .004
- B. .04
- C. .4
- D. 4

44. 25,000 equals:

- A. 25.0×10^5
- B. 2.5×10^4
- C. 2.5×10^{-4}

D. 25.0×10^{-3}

45. .00567 equals:

A. 5.67×10^1

B. 5.67×10^{-3}

C. 5.67×10^3

D. 56.7×10^4

46. $-25 + 6$ equals:

A. 19

B. 31

C. -19

D. 30

47. $-19 + -10$ equals:

A. 29

B. -9

C. 19

D. -29

48. 39% equals:

A. .39

B. 3.9

C. .039

D. 39

49. $12(4x) =$

A. $4x$

B. $480x$

C. $8x$

D. $48x$

Math Section Answer Key

1) A $(.15 \times 300) = 45$

2) C $(760 \times .60) = 456$

3) D (6 can factor (divide) evenly in to 36 three times)

4) A $(6/2) \times (10/5) = 3 \times 2 = 6$

5) C $29 \times 3 = 87$

6) B $3 = 3/1$ To find the reciprocal you flip $3/1$ to $1/3$

7) D $22 \text{ ft} \times 10 \text{ ft} \times 14 \text{ ft} = 3080 \text{ ft}^3$

8) B $150^\circ\text{F} - 25^\circ\text{F} = 125^\circ\text{F}$, $125^\circ\text{F} \div 5\text{hrs} = 25^\circ\text{F/hr}$

9) A $\$120 \times 0.075 = \9 , $\$12080 + \$9 = \$129$, $\$200 - \$129 = \$71$

- 10) C $9 \times 450 = 4050$, $4050 + 10000 = 14050$
- 11) C $575/5 = 115$, $115 \times 3.55 = \$408.25$, $60/3 = 20$, $20 \times 7.99 = \$159.80$,
 $408.25 + 159.80 = \$568.05$
- 12) A $.78 \times 100 = 78\%$
- 13) B $1200 - 1024 = \$176$
- 14) D $6/8 = 30/x$, $6x = 30(8)$, $x = 240/6 = 40\text{ml}$
- 15) D moving right of the decimal point two spaces is the hundredths position
- 16) A $6.67 \times 100 = 667\%$
- 17) C $12.8 \div 64 = .20$. $.20 = 20/100$, reduce $20/100$ to $1/5$
- 18) C $8(8-2) = 8(6) = 48$
- 19) A $280 \times .15 = 42$
- 20) B $\frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$
- 21) B $\frac{2}{3} - \frac{2}{6} = \frac{2}{3} - \frac{1}{3} = \frac{1}{3}$
- 22) C $\frac{1}{8} + \frac{1}{4} = \frac{1}{8} + \frac{2}{8} = \frac{3}{8}$
- 23) D $\$10000 \times .20 = \2000
- 24) D $6 \times .625 = 3.75$
- 25) A $11 \text{ ft} \times 10 \text{ ft} \times 8 \text{ ft} = 880 \text{ ft}^3$
- 26) B $600/6000 = .10 = 10\%$
- 27) C $58 - 28 = 30$, $30/58 = 51\%$
- 28) C $x=86$ $y=70$ $x>y$
- 29) A $.8x=12 + 12 = 8x=24=x=24/8=3$
- 30) D $4/20 = .20 = 20\%$
- 31) B $90 \times 6 = 540$
- 32) C $10x = 30 + 20 = 10x = 50$, $x = 50/10 = 5$
- 33) A $4x = 4 + 12 + 4x = 16 - x = 16/4 = 4$
- 34) B $\frac{1}{2} (b) (h) = \frac{1}{2} (8) (10) = 40 \text{ cm}^3$
- 35) B $\frac{17}{2} - \frac{19}{8} = \frac{68}{8} - \frac{19}{8} = \frac{39}{8}$
- 36) D $14:2 = 7:1$
- 37) C 25% is $\frac{1}{4}$ of a number, $\frac{1}{4} = 50/x$, $1x = 50(4)$, $x = 200$
- 38) C any number multiplied by 0 is equal to 0
- 39) A $8.5/2.5 = .085/.025 = 3.4$
- 40) A $3(3) + 5(3) = 9 + 15 = 24$
- 41) B 1 Divided by 2 = .5
- 42) D .75
- 43) C $2/5 = .4$
- 44) B
- 45) B
- 46) C $-25 + 6 = -19$
- 47) D (-29)
- 48) A (.39)

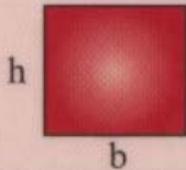
GEOMETRIC FORMULAS

PERIMETER: The perimeter, P , of a two-dimensional shape is the sum of all side lengths.

AREA: The area, A , of a two-dimensional shape is the number of square units that can be put in the region enclosed by the sides. NOTE: Area is obtained through some combination of multiplying heights and bases, which always form 90° angles with each other, except in circles.

VOLUME: The volume, V of a three-dimensional shape is the number of cubic units that can be put in the region enclosed by all the sides.

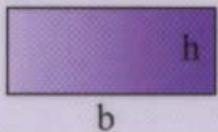
Square Area: $A = hb$
If $h=8$ then $b=8$ also, as all sides are equal in a square, then:
 $A=64$ square units



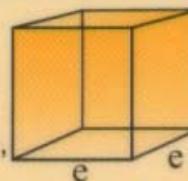
Rectangular Prism Volume
 $V=lwh$; If $l=12$
 $w=3$, $h=4$ then:
 $V=(12)(3)(4)$, $V=144$ cubic units



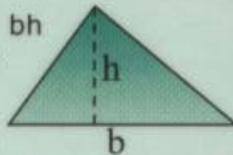
Rectangle Area $A=hb$, or
 $A=lw$
If $h=4$ and $b=12$ then: $A = (4)(12)$
 $A=48$ square units



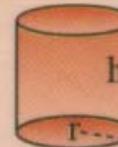
Cube Volume, $V=e^3$
Each edge length, e , is equal to the other edges in a cube.
If $e=8$ then: $V=(8)(8)(8)$,
 $V=512$ cubic units



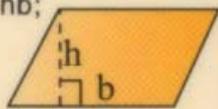
Triangle Area: $A=1/2 bh$
If $h=8$ and $b=12$ then:
 $A=1/2 (8)(12)$
 $A=48$ square units



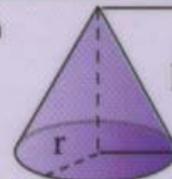
Cylinder Volume, $V=\pi r^2 h$
If radius, $r=9$, $h=8$ then:
 $V=\pi(9)^2(8)$, $V=3.14(81)(8)$,
 $V=2034.72$ cubic units



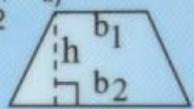
Parallelogram Area: $A=hb$;
If $h=6$ and $b=9$ then: $A=(6)(9)$
 $A=54$ square units

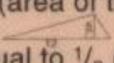


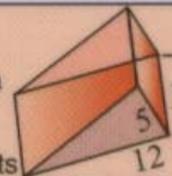
Cone Volume, $V=1/3\pi r^2 h$
If $r=6$ and $h=8$ then:
 $V=1/3\pi(6)^2(8)$,
 $V=1/3(3.14)(36)(8)$
 $V=301.44$ cubic units



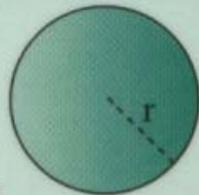
Trapezoid Area: $A=1/2 h(b_1+b_2)$
If $h=9$ and $b_1=8$ and $b_2=12$ then: $A=1/2(9)(8+12)$
 $A=1/2(9)(20)$
 $A=90$ square units



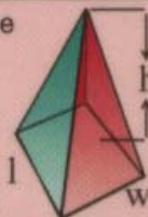
Triangular Prism Volume,
 $V=(\text{area of triangle})h$
If  has an area equal to $1/2 (5)(12)$ then:
 $V=30h$ and if $h=8$ then:
 $V=(30)(8)$, $V=240$ cubic units



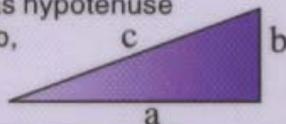
Circle Area: $A=\pi r^2$
If $\pi=3.14$ and $r=5$ then: $A=(3.14)(5)^2$,
 $A=78.5$ square units
Circumference: $C=2\pi r$
 $C=(2)(3.14)(5)=31.4$ units



Rectangular Pyramid Volume
 $V=1/3 (\text{area of rectangle})h$
If $l = 5$ and $w = 4$ the rectangle has an area of 20, then:
 $V=1/3(20)h$ and if $h=9$ then:
 $V=1/3(20)(9)$, $V=60$ c.u.



PYTHAGOREAN THEOREM
If a right triangle has hypotenuse c and sides a and b , then $c^2=a^2+b^2$



Sphere Volume, $V=\frac{4\pi r^3}{3}$
If radius, $r=5$,
 $\frac{4(3.14)(5)^3}{3}$
then:
 $V=\frac{1570}{3}$, $V=523.3$ cubic units

