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Quantity A	Quantity B
The circumference of a circular region with radius r	The perimeter of a square with side r

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

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Triangle ABC is contained within a circle with center C. Points A and B lie on the circle. If the area of circle C is 25π, and the measure of angle C is 60°, which of the following are possible lengths for the legs of triangle ABC ?

*Indicate **all** possible values.*

- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7

Click on your choice(s).

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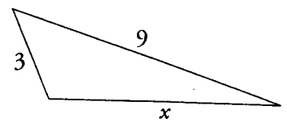

Quantity A	Quantity B
x	5.9

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

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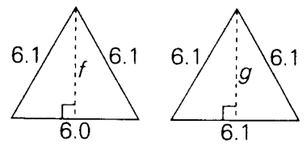

Quantity A	Quantity B
f	g

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

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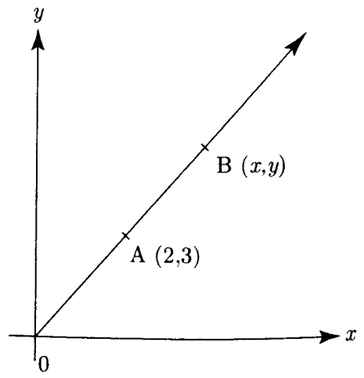

Given points $A(2, 3)$ and $B(x, y)$ in the rectangular coordinate system above, if $y = 4.2$, then $x =$

- ○ 2.6
- ○ 2.8
- ○ 2.9
- ○ 3.0
- ○ 3.2

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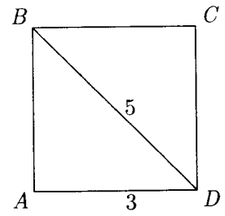

In rectangle $ABCD$ above, which of the following is the area of the triangle ABD ?

- ○ 6
- ○ 7.5
- ○ 10
- ○ 12
- ○ 15

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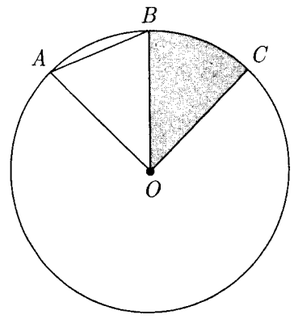

The circle above has a center O.

$\angle AOB = \angle BOC$

Quantity A	Quantity B
The area of triangle AOB	The area of the shaded region

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

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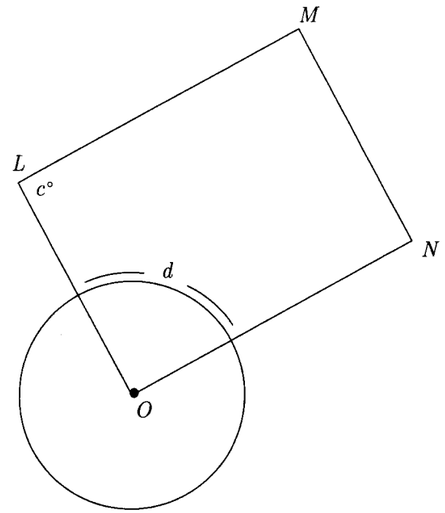

The circumference of the circle with center O is 15π. $LMNO$ is a parallelogram and $c = 108$. What is the value of d ?

- ○ 15π
- ○ 9π
- ○ 3π
- ○ 2π
- ○ It cannot be determined from the information given.

Summary

- There may only be a handful of geometry questions on the GRE, but you'll be expected to know a fair amount of rules and formulas.
- Line and angle problems typically test your knowledge of vertical angles, parallel lines, right angles, and straight angles.
- Triangles are a popular geometry topic on the GRE. Make sure you know your triangle basics, including the total degrees of a triangle, the relationship between the angles and sides of a triangle, and the third side rule.
- Right triangle problems frequently test the Pythagorean theorem.
- Be aware of the two special right triangles that ETS likes to torture test takers with: the 45°-45°-90° triangle and 30°-60°-90° triangle.
- Know the area formulas for triangles, rectangles, squares, and circles.
- Problems involving the coordinate plane frequently test common geometry concepts such as the area of triangle or square. Other plane geometry questions will test you on slope and the equation of a line.
- Slope is defined as rise over run. Find it by finding the change in y-coordinates (the rise) and the change in x-coordinates (the run).
- The equation of a line is $y = mx + b$, where x and y are the coordinates of any point on the line, m is the slope and b is the y-intercept, the point at which the line crosses the y-axis.
- Don't forget to Plug In on geometry problems!

Chapter 12
Math Et Cetera

There are a few more math topics that may appear on the GRE that don't fit nicely into the preceding chapters. This chapter looks at some of these leftover topics, including probability, permutations and combinations, and factorials. The topics in this chapter are not essential to your GRE Math score, because these areas are not tested as frequently as the topics detailed earlier. However, if you feel confident with the previous math topics, and you're looking to maximize your GRE Math score, this chapter will show you all you need to know to tackle these more obscure GRE problems.

These topics show up rarely on the GRE, but if you're going for a very high score, they are useful to know.

OTHER MATH TOPICS

The bulk of the GRE Math section tests your knowledge of fundamentals, basic algebra, and geometry. However, there are a few other topics that may appear. These "et cetera" concepts usually show up only once or twice per test (although at higher scoring levels they may appear more frequently) and often cause anxiety among test takers. Many test takers worry excessively about probability problems, for example, even though knowledge of more familiar topics such as fractions and percents will be far more important in determining your GRE math score. So tackle these problems only after you've mastered the rest. If you find these concepts more difficult, don't worry—they won't make or break your GRE score.

PROBABILITY

If you flip a coin, what's the probability that it will land heads up? The probability is equal to one out of two, or $\frac{1}{2}$. What is the probability that it won't land heads up? Again, one out of two, or $\frac{1}{2}$. If you flip a coin nine times, what's the probability that the coin will land on "heads" on the tenth flip? Still 1 out of 2, or $\frac{1}{2}$. Previous flips do not affect the outcome of the current coin flip.

There's no need to be intimidated by probability questions. If you can work with fractions, you can work with probability questions!

You can think of probability as just another type of fraction. Probabilities express a special relationship, namely the chance of a certain outcome occurring. In a probability fraction, the denominator is the total number of possible outcomes that may occur, while the numerator is the number of outcomes that would satisfy the criteria. For example, if you have 10 shirts and 3 of them are black, the probability of selecting a black shirt from your closet without looking is $\frac{3}{10}$.

Think of probability in terms of fractions:

- If it is impossible for something to happen—if no outcomes satisfy the criteria—then the numerator of the probability fraction is 0 and the probability is equal to 0.
- If something is certain to happen—if all possible outcomes satisfy the criteria—then the numerator and denominator of the fraction are equal and the probability is equal to 1.
- If it is possible for something to occur, but it will not definitely occur, then the probability of it occurring is between 0 and 1.

$$\text{probablity} = \frac{\text{number of possible outcomes that satisfy the condition}}{\text{number of total possible outcomes}}$$

Let's see how it works.

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At a meeting of 375 members of a neighborhood association, $\frac{1}{5}$ of the participants have lived in the community for less than 5 years and $\frac{2}{3}$ of the attendees have lived in the neighborhood for over 10 years. If a member of the meeting is selected at random, what is the probability that the person has lived in the neighborhood for more than 5 years but less than 10 years?

- ○ $\frac{2}{15}$
- ○ $\frac{3}{10}$
- ○ $\frac{4}{15}$
- ○ $\frac{1}{2}$
- ○ $\frac{8}{15}$

Here's How to Crack It

In order to solve this problem, we need to put together our probability fraction. The denominator of our fraction is going to be 375; the total number of people from which we are selecting. Next we need to figure out how many attendees satisfy the criteria of having lived in the neighborhood for more than 5 years but fewer than 10 years.

What number goes on the bottom of the probability fraction?

First, we know that $\frac{1}{5}$ of the participants have lived in the neighborhood for less than 5 years. $\frac{1}{5}$ of 375 is 75 people, so we can take them out of the running. Also, $\frac{2}{3}$ of the attendees have lived in the neighborhood for over 10 years. $\frac{2}{3}$ of 375 (be careful not to use 300 as the total!) is 250, so we can also remove them from consideration. Thus, if 75 people have lived in the neighborhood for less than 5 years and 250 have lived for more than 10, the remaining people are the ones we want. 250 + 75 is 325, so that leaves us with 50 people who satisfy the criteria. We need to make 50 the numerator of our fraction, which gives us $\frac{50}{375}$. This reduces to $\frac{2}{15}$, and answer choice (A) is the best answer.

Two Important Laws of Probability

Probability of A and B = Probability of A × Probability of B

When you want to find the probability of a series of events in a row, you multiply the probabilities of the individual events. What is the probability of getting two heads in a row if you flip a coin twice? The probability of getting a head on the first flip is $\frac{1}{2}$. The probability is also $\frac{1}{2}$ that you'll get a head on the second flip, so the combined probability of two heads is $\frac{1}{2} \times \frac{1}{2}$, which equals $\frac{1}{4}$. Another way to look at it is that there are four possible outcomes: HH, TT, HT, TH. Only one of those outcomes consists of two heads in a row. Thus, $\frac{1}{4}$ of the outcomes consist of two heads in a row. Sometimes the number of outcomes is small enough that you can list them out and calculate the probability that way.

Probability of A or B = Probability of A + Probability of B

Occasionally, instead of finding the probability of one event AND another event happening, you'll be asked to find the probability of either one event OR another event happening. In this situation, instead of multiplying the probabilities, you add them. Let's say you have a normal deck of 52 cards. If you select a card at random, what's the probability that you select a 7 or a 4? The probability of selecting a 7 is $\frac{4}{52}$, which reduces to $\frac{1}{13}$. The probability of selecting a 4 is the same; $\frac{1}{13}$. Therefore the probability of selecting a 7 or a 4 is $\frac{1}{13} + \frac{1}{13} = \frac{2}{13}$.

Let's look at a problem:

> Julie is going to roll a pair of six-sided dice, one at a time. What is the probability that she rolls a 3 and then a 4, OR a 5 and then a prime number?

Click on the answer box, then type in a number. Backspace to erase.

Here's How to Crack It

Let's start with the first possibility. The probability of rolling a 3 is $\frac{1}{6}$, and the probability of rolling a 4 is $\frac{1}{6}$. So the probability of rolling a 3 and then a 4 is $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$. Now let's look at the second possibility. The probability of rolling a 5 is $\frac{1}{6}$ and the probability of rolling a prime number is $\frac{1}{2}$. (There are six outcomes when you roll a die and three of them are prime: 2, 3, and 5. So the probability of rolling a prime number is $\frac{3}{6}$, which reduces to $\frac{1}{2}$.) Therefore, the probability of rolling a 5 and then a prime number is $\frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$. So now we know the probability of rolling a 3 and then a 4 is $\frac{1}{36}$, and we know the probability of rolling a 5 and a prime number is $\frac{1}{12}$. To find the probability of one of these things OR the other happening, we add the individual probabilities. So $\frac{1}{12} + \frac{1}{36} = \frac{4}{36}$ which reduces to $\frac{1}{9}$.

One last important thing you should know about probabilities is that the probability of an event happening and the probability of an event not happening must add up to 1. For example, if the probability of snow falling on one night is $\frac{2}{3}$, then the probability of no snow falling must be $\frac{1}{3}$. If the probability that it will rain is 80%, then the probability that it won't rain must be 20%. The reason this is useful is that, on some GRE probability problems, it will be easier to find the probability that an event doesn't occur; once you have that, just subtract from 1 to find the answer.

Since probabilities are just fractions, they can also be expressed as percents.

Let's look at the following example.

> Dipak has a 25% chance of winning each hand of blackjack he plays. If he has $150 and bets $50 a hand, what is the probability that he will still have money after the third hand?
>
> ○ $\frac{1}{64}$
> ○ $\frac{3}{16}$
> ○ $\frac{27}{64}$
> ○ $\frac{37}{64}$
> ○ $\frac{3}{4}$

Here's How to Crack It

If Dipak still has money after the third hand, then he must have won at least one of the hands, and possibly more than one. However, directly calculating the probability that he wins at least one hand is tricky because there are so many ways it could happen (for example, he could lose-lose-win, or W-W-L or W-L-W or L-W-L, etc.). So think about it this way: The question asks for the probability that he will win at least one hand. What if he doesn't? That would mean that he doesn't win any hands at all. If we calculate the probability that he loses every hand, we can then subtract that from 1 and find the corresponding probability that he wins at least one hand. Since Dipak has a 25% chance of winning each hand, this means that he has a 75% chance of losing it, or $\frac{3}{4}$ (the answers are in fractions, so it's best to work with fractions). To find the probability that he loses all three hands, simply multiply the probabilities of his losing each individual hand. $\frac{3}{4}\times\frac{3}{4}\times\frac{3}{4}=\frac{27}{64}$ so there is a $\frac{27}{64}$ probability that he will lose all three hands. Subtracting this from 1 gives you the answer you're looking for. $1-\frac{27}{64}=\frac{37}{64}$. The answer is (D).

Given events A and B, the probability of:

- A and B = (Probability of A) × (Probability of B)
- A or B = Probability of A + Probability of B

Given event A:

- A + *not* A = 1

FACTORIALS

The factorial of a number is equal to that number times every positive whole number smaller than that number, down to 1. For example, the factorial of 6 is equal to $6 \times 5 \times 4 \times 3 \times 2 \times 1$, which equals 720. The symbol for a factorial is ! so 4! doesn't mean we're really excited about the number 4, it means $4 \times 3 \times 2 \times 1$, which is equal to 24. (0! is equal to 1, by the way.) When factorials show up in GRE problems, always look for a shortcut like canceling or factoring. The point of a factorial problem is not to make you do a lot of multiplication. Let's try one.

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Quantity A	Quantity B
$\frac{12!}{11!}$	$\frac{4!}{2!}$

○ Quantity A is greater.
○ Quantity B is greater.
○ The two quantities are equal.
○ The relationship cannot be determined from the information given.

Here's How to Crack It

Let's tackle Quantity A. We definitely don't want to multiply out the factorials since that would be pretty time-consuming: 12! and 11! are both huge numbers. Instead let's look at what they have in common. What we're really talking about here is $\frac{12\times11\times10\times9\times8\times7\times6\times5\times4\times3\times2\times1}{11\times10\times9\times8\times7\times6\times5\times4\times3\times2\times1}$. Now it's clear that both factorials share everything from 11 on down to 1. The entire bottom of the fraction will cancel and the only thing left on top will be 12, so the value of Quantity A is 12. For Quantity B, we can also write out the factorials and get $\frac{4\times3\times2\times1}{2\times1}$. The 2 and the 1 in the bottom cancel, and the only thing left on top will be 4×3, which is equal to 12. The two quantities are equal and the answer is (C).

PERMUTATIONS AND COMBINATIONS

Permutation problems often ask for arrangements, orders, schedules, or lists.

The basic definition of a **permutation** is an arrangement of things in a particular order. Suppose you were asked to figure out how many different ways you could arrange five statues on a shelf. All you have to do is multiply $5 \times 4 \times 3 \times 2 \times 1$, or 120. (Yes, this is another application of factorials.) You have five possible statues that could fill the first slot on the shelf, then, once the first slot is filled, there are four remaining statues that could fill the second slot, three that could fill the third slot, and so on, down to one.

Now suppose that there are five people running in a race. The winner of the race will get a gold medal, the person who comes in second will get a silver medal, and the person who comes in third will get a bronze medal. You're asked to figure out how many different orders of gold-silver-bronze winners there can be. (Notice that this is a permutation because the order definitely matters.)

First, ask yourself how many of these runners can come in first? Five. Once one of them comes in first, she's out of the picture, so how many can then come in second? Four. Once one of them comes in second, she's out of the picture, so how many of them can come in third? Three. And now you're done because all three slots have been filled. The answer is $5 \times 4 \times 3$, which is 60.

To solve a permutation

- Figure out how many slots you have.
- Write down the number of options for each slot.
- Multiply them.

Combination problems usually ask for groups, teams, or committees.

The difference between a permutation and a combination is that in a combination, the order is irrelevant. A **combination** is just a group, and the order of elements within the group doesn't matter. For example, suppose you were asked to go to the store and bring home three different types of ice cream. Now suppose that when you got to the store, there were five flavors in the freezer—chocolate, vanilla, strawberry, butter pecan, and mocha. How many combinations of three ice cream flavors could you bring home? Notice that the order doesn't matter, because bringing home chocolate, strawberry, and vanilla is the same thing as bringing home strawberry, vanilla, and chocolate. One way to solve this is the brute force method; in other words, write out every combination.

Does the order matter?

VCS VCB VCM VSB VSM VBM CSB CSM CBM SBM

That's 10 combinations, but there's a quicker way to do it. Start by filling in the three slots as you would with a permutation (there are three slots because you're supposed to bring home three different types of ice cream). Five flavors could be in the first slot, four could be in the second, and three could be in the third. So far, that's $5 \times 4 \times 3$. But remember, this takes into account all the different orders that three flavors can be arranged in. We don't want that, because the order doesn't matter in a combination. So we have to divide $5 \times 4 \times 3$ by the number of ways of arranging three things. In how many ways can three things be arranged? That's 3!, $3 \times 2 \times 1$, which is 6. Thus we end up with $\frac{5\times4\times3}{3\times2\times1}$, which is equal to $\frac{60}{6}$, or 10. Bingo.

To solve a combination

- Figure out how many slots you have.
- Fill in the slots as you would a permutation.
- Divide by the factorial of the number of slots.

The denominator of the fraction will always cancel out completely, so you can cancel first before you multiply.

Always cross off wrong answer choices on your scratch paper.

Here's an example:

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Brooke wants to hang three paintings in a row on her wall. She has six paintings to choose from. How many arrangements of paintings on the wall can she create?

- ○ 6
- ○ 30
- ○ 90
- ○ 120
- ○ 720

Here's How to Crack It

The first thing you need to do is determine whether the order matters. In this case it does, because we're arranging the paintings on the wall. Putting the Monet on the left and the Van Gogh in the middle isn't the same arrangement as putting the Van Gogh on the left and the Monet in the middle. This is a permutation question. We have three slots to fill because we're arranging three paintings. There are 6 paintings that could fill the first slot, 5 paintings that could fill the second slot, and 4 paintings that could fill the third slot. So we have $6 \times 5 \times 4$, which equals 120. Thus, the correct answer is (D).

Here's another example:

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A pizza may be ordered with any of eight possible toppings.

Quantity A	Quantity B
The number of different ways to order a pizza with three different toppings	The number of different ways to order a pizza with five different toppings

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

Here's How to Crack It

First, note that for both quantities we're dealing with a combination, because the order of toppings doesn't matter. A pizza with mushrooms and pepperoni is the same thing as a pizza with pepperoni and mushrooms. Let's figure out Quantity A first.

We have eight toppings and we're picking three of them. That means we have three slots to fill. There are 8 toppings that could fill the first slot, 7 that could fill the second slot, and 6 that could fill the third, so we have $8 \times 7 \times 6$. Since this is a combination, we have to divide by the factorial of the number of slots. In this case we have three slots, so we have to divide by 3!, or $3 \times 2 \times 1$. So our problem looks like this: $\frac{8 \times 7 \times 6}{3 \times 2 \times 1}$. To make the multiplication easier, let's cancel first. The 6 on top will cancel with the 3×2 on the bottom, leaving us with $\frac{8 \times 7}{1}$, which is 56. Thus, there are 56 ways to order a three-topping pizza with eight toppings to choose from. Now let's look at Quantity B.

We still have eight toppings, but this time we're picking five of them so we have five slots to fill. There are 8 toppings that could fill the first slot, 7 that could fill the second slot, 6 that could fill the third, 5 that could fill the fourth, and 4 that could fill the fifth. That's $8 \times 7 \times 6 \times 5 \times 4$, but we still have to divide by the factorial of the number of slots. We have five slots, so that means we need to divide by 5!, or $5 \times 4 \times 3 \times 2 \times 1$. Thus we have $\frac{8 \times 7 \times 6 \times 5 \times 4}{5 \times 4 \times 3 \times 2 \times 1}$. We definitely want to cancel first here, rather than doing all that multiplication. The 5 on top

will cancel with the 5 on the bottom. Likewise, the 4 on top will cancel with the 4 on the bottom. The 6 on top will cancel with the 3 × 2 on the bottom, leaving us again with $\frac{8\times7}{1}$, which is 56. Therefore, there are also 56 ways to order a five-topping pizza with eight toppings to choose from. The two quantities are equal, and the answer is (C).

Let's try one more:

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Nicole needs to form a committee of 3 from a group of 8 research attorneys to study possible changes to the Superior Court. If two of the attorneys are too inexperienced to serve together on the committee, how many different arrangements of committees can Nicole form?

- ○ 20
- ○ 30
- ○ 50
- ○ 56
- ○ 336

Here's How to Crack It

This problem is a little more complicated than an ordinary combination problem, because an extra condition has been placed on the committee. Without that condition, this would be a fairly ordinary combination problem, and we'd simply calculate how many groups of three can be created with eight people to choose from.

There's more than one way to approach this problem. First, you should realize that there are two ways that we could form this committee. We could have three experienced attorneys, or we could have two experienced attorneys and one inexperienced attorney. If we find the number of ways to create each of those two possibilities, we can add them together and have our answer. It's fairly straightforward to calculate the number of ways to have three experienced attorneys on a committee: There are three slots to fill, and we have 6 options for the first slot, 5 for the second, and 4 for the third. Here the order doesn't matter, so we divide by 3! to get $\frac{6\times5\times4}{3\times2\times1} = 20$. Thus there are 20 ways to create the committee using three experienced attorneys. What about creating a committee that has two experienced attorneys and one inexperienced attorney? We have 6 options for the first experienced attorney and 5 options for the second. Order doesn't matter so we divide by 2!. So far we have $\frac{6\times5}{2\times1}$. Next we have 2 options for the inexperienced attorney, so now we have to multiply by 2, and our calculation is $\frac{6\times5}{2\times1}\times\frac{2}{1} = 30$. As you can see, there are 30 ways to create the committee using two experienced attorneys and one inexperienced attorney. Adding 20 and 30 gives us 50 total committees, and the answer is (C).

Here's another way that you could solve the problem. If there were no conditions placed on the committee, we could just calculate $\frac{8\times7\times6}{3\times2\times1}$, which would give us 56 committees. But we know some of those committees are not allowed; any committee that has the two inexperienced attorneys on it isn't allowed. How many of these types of committees are there? Let's call the inexperienced attorneys A and B. An illegal committee would be A B __, in which the last slot could be filled by any of the experienced attorneys. Since there are 6 experienced attorneys, there are 6 illegal committees. Subtracting them from 56 gives us 50 legal committees. Hey, the answer's still (C)!

FUNCTIONS AND FUNNY-LOOKING SYMBOLS

The GRE contains "function" problems, but they aren't like the functions that you may have learned in high school. GRE functions use funny-looking symbols, such as @, *, and #. Each symbol represents an arithmetic operation or a series of arithmetic operations. All you have to do is follow directions in the problem. Here's an example:

With funny-looking symbols, simply follow the directions.

5 of 20

For any non-negative integer x, let $x^* = x - 1$

Quantity A	Quantity B
$\frac{15^*}{3^*}$	$\left(\frac{15}{3}\right)^*$

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

Here's How to Crack It

Just follow the directions—15* = 15 – 1, or 14, and 3* = 3 – 1, or 2. So we get $\frac{14}{2}$, or 7, in Quantity A. Don't forget PEMDAS for Quantity B. First, $\frac{15}{3}$ is 5. Then, 5* = 5 – 1, or 4. So because Quantity A is 7 and Quantity B is 4, the answer is (A). Function questions aren't scary if you follow the directions. Be sure to write everything down on your scratch paper. By the way, these funny-looking symbols don't necessarily indicate exponents, but you'll always be told what they mean.

GROUPS

You might see one group problem on the GRE.

Group problems, although not too common on the GRE, can be troublesome if you don't know how to set them up. When confronted by a group problem, use the group equation

$$T = G_1 + G_2 - B + N$$

In the equation, T represents the Total, G_1 is one group, G_2 is the second group, B is for the members in both groups and N is for the members in neither group. Here's an example of a typical group problem.

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A biologist studying breeding groups noted that of 225 birds tagged for the study, 85 birds made nests in pine trees, 175 made nests in oak trees, and 40 birds did not build nests in either type of tree. How many birds built nests in both types of trees?

- ○ 45
- ○ 60
- ○ 75
- ○ 80
- ○ 125

Here's How to Crack It

Let's use the group equation. The total is 225, one group consists of 85 birds, the other group has 175 birds in it, and we know that 40 birds built nests in neither type of tree. Our equation would look like this:

$$225 = 85 + 175 - B + 40$$

All we have to do is solve for B. Simplifying the equation gives us 225 = 300 – B, so B must equal 75. Choice (C) is our answer.

Et Cetera Drill

Here are some math questions to practice on. Remember to check your answers when you finish. You can find the answers in Part V.

1 of 10

15 marbles are placed in a bowl; some are red, and some are blue. If the number of red marbles is 1 more than the number of blue marbles, what is the probability that a marble taken from the bowl is blue?

- ○ $\frac{1}{15}$
- ○ $\frac{2}{15}$
- ○ $\frac{7}{15}$
- ○ $\frac{1}{2}$
- ○ $\frac{8}{15}$

2 of 10

If ¥$(x) = 10x - 1$, what is ¥(5) − ¥(3) ?

- ○ 15
- ○ 18
- ○ 19
- ○ 20
- ○ 46

3 of 10

Quantity A	Quantity B
The largest odd factor of 78	The largest prime factor of 78

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

4 of 10

At a recent dog show, there were 5 finalists. One of the finalists was awarded "Best in Show" and another finalist was awarded "Honorable Mention." In how many ways could the two awards be given out?

[ ]

Click on the answer box, then type in a number. Backspace to erase.

5 of 10

Company X spends \$40,000 per year on advertising for product A and \$30,000 per year on advertising for product B. The company spends \$15,000 on advertisements that advertise both product A and B as a system. The company spends \$90,000 total on advertising for all of its products.

Quantity A	Quantity B
The total amount the company spends advertising products other than products A and B.	\$20,000

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

6 of 10

Lee randomly selects a 2-digit prime number less than 50. What is the probability that the tens digit is greater than the units digit?

- ○ $\frac{3}{14}$
- ○ $\frac{3}{11}$
- ○ $\frac{3}{8}$
- ○ $\frac{1}{2}$
- ○ $\frac{8}{11}$

7 of 10

An elected official wants to take five members of his staff to an undisclosed secure location. What is the minimum number of staff members the elected official must have in order to have at least 20 different groups from which to choose?

- ○ 7
- ○ 8
- ○ 9
- ○ 10
- ○ 11

8 of 10

For all real numbers x and y, if $x \# y = x(x - y)$, then $x \# (x \# y) =$

- ○ $x^2 - xy$
- ○ $x^2 - 2xy$
- ○ $x^3 - x^2 - xy$
- ○ $x^3 - (xy)^2$
- ○ $x^2 - x^3 + x^2y$

9 of 10

A jar contains 12 marbles. Each is either yellow or green and there are twice as many yellow marbles as green marbles. If two marbles are to be selected from the jar at random, what is the probability that exactly one of each color is selected?

- ○ $\frac{8}{33}$
- ○ $\frac{16}{33}$
- ○ $\frac{1}{2}$
- ○ $\frac{17}{33}$
- ○ $\frac{25}{33}$

10 of 10

A set of 10 points lie in a plane such that no three points are collinear.

Quantity A	Quantity B
The number of distinct triangles that can be created from the set	The number of distinct quadrilaterals that can be created from the set

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

Comprehensive Math Drill

Let's do a drill involving all of the math topics we've covered throughout the book. Remember to check your answers when you finish. You can find the answers in Part V.

1 of 20

$$\frac{0.05}{0.6} = \frac{x}{.18}$$

Quantity A	Quantity B
x	.015

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

2 of 20

$x \neq 0$

Quantity A	Quantity B
$\frac{x}{10}$	$\frac{\left(\frac{x}{5}\right)}{2}$

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

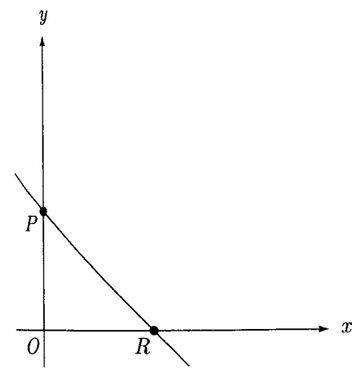
3 of 20

The test scores for a class have a normal distribution, a mean of 50, and a standard deviation of 4.

Quantity A	Quantity B
Percentage of scores at or above 58	Percentage of scores at or below 42

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

4 of 20



The line $y = -\frac{5}{6}x + 1$ is graphed on the rectangular coordinate axes.

Quantity A	Quantity B
OR	OP

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

5 of 20

At a dog show, there are 20 judges and 10 dogs in the final round.

Quantity A	Quantity B
The number of distinct pairs of judges	The number of possible rankings of dogs from first to third place

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

6 of 20

$k > 0$

$l > 1$

Quantity A	Quantity B
$\frac{1}{\frac{1}{k}+\frac{1}{l}}$	$\frac{kl}{\frac{1}{k}+\frac{1}{l}}$

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

7 of 20

Quantity A	Quantity B
$\sqrt{3}+\sqrt{4}$	$\sqrt{7}$

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

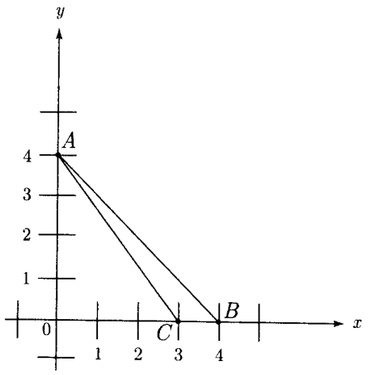
8 of 20

Joe has $200. If he buys a CD player for $150, what is the greatest number of CDs he can buy with the remaining money if CDs cost $12 each?

[ ]

Click on the answer box, then type in a number. Backspace to erase.

9 of 20



What is the area of triangle ABC in the figure above?

- ○ 2
- ○ 4
- ○ $4\sqrt{2}$
- ○ 7
- ○ 8

10 of 20

Which of the following could equal $10(3^2 - 2)$ divided by a positive integer?

Indicate **all** possible values.

- ☐ 140
- ☐ 70
- ☐ 35
- ☐ 10
- ☐ 0

Click on your choice(s).

11 of 20

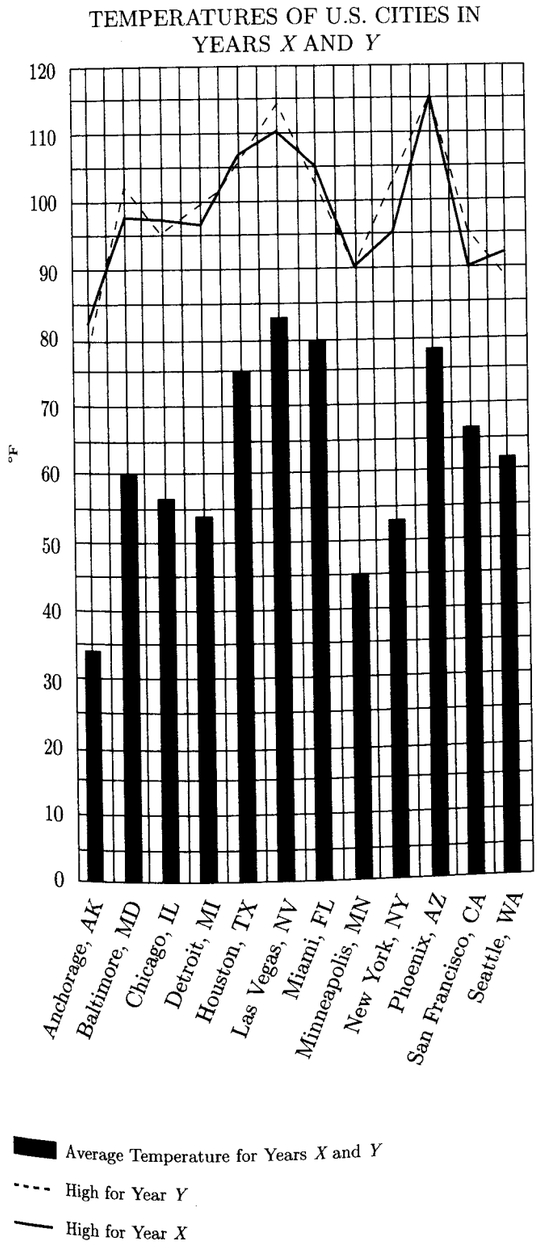
Roberta drove 50 miles in 2 hours. Her rate in miles per hour is equivalent to which of the following proportions?

Indicate **all** possible values.

- ☐ 5 to 20
- ☐ 100 to 4
- ☐ 400 to 16
- ☐ 20 to 500

Click on your choice(s).

Questions 12 through 14 refer to the following graph.



12 of 20

For how many of the cities shown was the highest temperature in Year Y greater than or equal to the highest temperature in Year X ?

- ○ 4
- ○ 5
- ○ 7
- ○ 8
- ○ 12

13 of 20

What is the approximate percent increase from the lowest average temperature for Years X and Y to the highest average temperature?

- ○ 60%
- ○ 82%
- ○ 140%
- ○ 188%
- ○ 213%

14 of 20

If the average temperature for Years X and Y in Baltimore is equal to the average of that city's high and low temperatures for each of those years, then what is the average of the low temperatures for Baltimore in Years X and Y ?

- ○ –9° F
- ○ 11° F
- ○ 20° F
- ○ 44° F
- ○ It cannot be determined from the information given.

15 of 20

If $|2x - 3| + 2 > 7$, which of the following could be the value of x ?

Indicate **all** possible values.

- ☐ –4
- ☐ –3
- ☐ –2
- ☐ –1
- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3

Click on your choice(s).

16 of 20

If x, y, and z are consecutive odd integers where $x < y < z$ and $x + y + z < z$, then whch of the following could be the value of x ?

Indicate **all** possible values.

- ☐ –3
- ☐ –1
- ☐ 0
- ☐ 1
- ☐ 3

Click on your choice(s).

17 of 20

If $4^r = 1024$, then $(4^{r+1})(5^{r-1}) =$

- ○ 10^6
- ○ $(5^4)(10^5)$
- ○ $(4^4)(10^5)$
- ○ $(5^4)(10^4)$
- ○ $(4^4)(10^4)$

18 of 20

What is the greatest distance between two vertices of a rectangular solid with a height of 5, a length of 12, and a volume of 780?

- ○ 12
- ○ $12\sqrt{2}$
- ○ 13
- ○ $13\sqrt{2}$
- ○ $13\sqrt{3}$

19 of 20

Six children, three boys and three girls, sit in a row on a park bench. How many arrangements of children are possible if no boy can sit on either end of the bench?

Indicate **all** possible values.

- ☐ 46,656
- ☐ 38,880
- ☐ 1,256
- ☐ 144
- ☐ 38

Click on your choice(s).

20 of 20

If 16 is the average of p, 24, and q, what is $16(p + q)$?

- ○ 180
- ○ 192
- ○ 384
- ○ 524
- ○ 768

Summary

- Topics such as probability, permutations and combinations, factorials, and functions represent only a small percentage of the math topics tested on the GRE. Make sure you've mastered all the more important topics before attempting these.
- Probability is expressed as a fraction. The denominator of the fraction represents the total number of possible outcomes, while the numerator stands for the desired outcomes.
- If a probability question asks for the chance of event A or event B, find the probability of each event and add them together. If the question asks for the probability of event A and event B, multiply the individual probabilities.
- The key to factorial problems is to look for ways to cancel or factor out terms.
- Permutations and combinations are related concepts. A permutation tells you how many arrangements or orderings of things are possible. A combination tells you how many groupings of things are possible.
- Function problems use funny looking symbols as shorthand for the operations to perform on a certain number.
- The group equation is: Total = Group I + Group II – Members of Both Groups + Members of Neither Group.

Part IV
How to Crack the Critical Thinking and Analytical Writing Section

13 The Geography of the Critical Thinking and Analytical Writing Section
14 The Issue Essay
15 The Argument Essay
16 Analytical Writing Practice Sets and Sample Essays

Chapter 13
The Geography of the Critical Thinking and Analytical Writing Section

This chapter clues you in on everything you've ever wanted to know about the Critical Thinking and Analytical Writing sections of the GRE. It contains important information on how the essays are used by graduate schools, the scoring system ETS graders use to evaluate your essays, and the crucial distinctions between the issue essay and the argument essay. This chapter also looks at the basic word-processing program used by ETS.

ESSAYS AND THE GRE

The Critical Thinking and Analytical Writing section of the GRE requires you to write two essays—one will be an analysis of an issue and the other will be an analysis of an argument. You will have 30 minutes each for both the Issue and Argument essay.

In the past, ETS has had problems with test takers relying on preplanned essays. The essay questions have been reformulated to reduce the possibility of testers preparing their essays in advance. However, while you may not be able to plan your entire essay in advance, you can still go into your test session having a good idea of what type of essay you're going to write.

How Do Schools Use the Writing Assessment?

Even if your program doesn't care much for the essay, a poor score might still raise a red flag.

First, the essays are probably more important for international students and those for whom English is not a first language. If you are not a native English speaker, expect your essay score and the essays you wrote to receive more attention. (ETS also makes the essays available to schools, which may choose to read them or not.) Second, and not surprisingly, the essays will probably be weighted more heavily by programs for which writing is a frequent and necessary task. A master's program in applied mathematics might not care so much about your 30-minute written opinion about whether or not it's necessary for a person to read imaginative literature, but a program in creative writing probably would.

Ultimately, though, the most honest answer to this question is: It depends. Some schools will not care at all about the Critical Thinking and Analytical Writing score, while others will say that they only want applicants who scored a 5 or higher on this section. Call the schools you're interested in and talk to people in the department. By finding out how important your target schools consider the Analytical Writing section, you'll be able to determine the appropriate amount of effort to devote to it.

Regardless of your target score on this section, you should at least read through these chapters to get a better sense of what ETS is looking for. You'll have to write these essays, so no matter what, you want to do a decent job. You'll find that writing high-scoring essays is not as hard as it may seem once you've been shown how to do it.

How Will the Essays Be Scored?

What you write—the content—will be weighted more than how you write.

Your essays will be read by two graders, and each will assign a score from 1 to 6, based on how well you do the following:

- follow the instructions of the prompt
- consider the complexities of the issue or argument
- effectively organize and develop your ideas
- support your position with relevant examples
- control the elements of written English

The grades you receive for each essay will be totaled and averaged. For example, if you receive a 4 and a 5 on your issue essay and a 3 and a 4 on your argument essay, your Analytical Writing score will be a 4.0; 16 total points divided by 4 scores. If the graders' scores for your essays differ by more than one point, a third person will be brought in to read the essay. The graders use a "holistic" grading system; they're trained to look at the big picture, not to focus on minor details. Your essay is not expected to be perfect, so the graders will overlook minor errors in spelling, punctuation, and grammar. However, pervasive or egregious errors will affect your score.

Here are ETS's descriptions of the scoring levels:

Issue Essay	
6	An essay that scores a 6 presents a cogent, well-articulated critique of the issue and conveys meaning skillfully.
5	An essay that scores a 5 presents a generally thoughtful, well-developed analysis of the complexities of the issue and conveys meaning clearly.
4	An essay that scores a 4 presents a competent analysis of the issue and conveys meaning adequately.
3	An essay that scores a 3 demonstrates some competence in its analysis of the issue and in conveying meaning but is obviously flawed.
2	An essay that scores a 2 demonstrates serious weaknesses in analytical writing.
1	An essay that scores a 1 demonstrates fundamental deficiencies in analytical writing skills.

Argument Essay	
6	An essay that scores a 6 presents a cogent, well-articulated critique of the argument and conveys meaning skillfully.
5	An essay that scores a 5 presents a generally thoughtful, well-developed critique of the argument and conveys meaning clearly.
4	An essay that scores a 4 presents a competent critique of the argument and conveys meaning adequately.
3	An essay that scores a 3 demonstrates some competence in its critique of the argument and in conveying meaning but is obviously flawed.
2	An essay that scores a 2 demonstrates serious weaknesses in analytical writing.
1	An essay that scores a 1 demonstrates fundamental deficiencies in both analysis and writing.

An essay written on a topic other than the one provided will receive a score of 0.

ETS graders spend less than two minutes grading your essay.

Who Are These Readers Anyway?

We'll put this in the form of a multiple-choice question:

Your essays will initially be read by

(A) captains of industry

(B) leading professors

(C) college TAs working part time

If you guessed (C), you're correct. Each essay will be read by part-time employees of ETS, mostly culled from graduate school programs.

How Much Time Do They Devote to Each Essay?

The short answer is: not much. It is unusual for a grader to spend more than two minutes grading an essay, and some essays are graded in less than a minute. The graders are reading many, many GRE essays and they aren't going to spend time admiring that clever turn of phrase you came up with. So don't sweat the small stuff—it probably won't even be noticed. Focus on the big picture—that's what the graders will be focusing on.

So How Do You Score High on the Analytical Writing Essays?

Make the graders' jobs easy. Give them exactly what they're looking for.

On the face of it, you might think it would be pretty difficult to impress these jaded readers, but it turns out that there are some very specific ways to persuade them of your superior writing skills.

What ETS Doesn't Want You to Know

In a recent analysis of a group of essays written by actual test takers, and the grades that those essays received, ETS researchers noticed that the most successful essays had one thing in common. Which of the following characteristics do you think it was?

- Good organization
- Proper diction
- Noteworthy ideas
- Good vocabulary
- Sentence variety
- Length

What Your Essay Needs in Order to Look Like a Successful Essay

The ETS researchers discovered that the essays that received the highest grades from ETS essay graders had one single factor in common: length.

To ace the Analytical Writing section, you need to take one simple step: Write as much as you possibly can. Each essay should include *at least* four indented paragraphs. Your Issue essay should be 400 to 750 words in length, and your Argument essay should be 350 to 600 words.

So All I Have to Do Is Type "I Hate the GRE" Over and Over Again?

Well, no. The length issue isn't that easy. The ETS researchers also noted that, not surprisingly, the high-scoring essays all made reasonably good points addressing the topic. So you have to actually write something that covers the essay topic. And in your quest for length, it's more important that you add depth than breadth. What this means is that it's better to have a few good examples that are thoroughly and deeply explored than it is to add length by tacking more and more examples and paragraphs onto your essay until it starts to feel like a superficial list of bulleted points rather than a thoughtful piece of writing.

Read the Directions Every Time

You should read the directions for each essay prompt. The instructions we provide here for each essay task are not necessarily the ones you will see on the GRE. Directions can vary in focus, so you shouldn't memorize any particular set of instructions. Visit the ETS website at **www.ets.org/gre** for a complete list of all the potential essay topics and direction variants. (Yes, you really get to see this information in advance of the test!) Practice responding to the different instructions, combined with a variety of issue and argument prompts. Be sure to mix it up; the prompt/directions pairings you see on the ETS website are not necessarily the duos you will see on the real test. Practicing with a variety of these essays will prepare you for whatever comes your way on test day.

Oh, Yes, You Can Plan Your Essays in Advance

In fact, there are some very specific ways to prepare for the essays that go beyond length and good typing skills. So how can you prepare ahead of time?

Creating a Template

When a builder builds a house, the first thing he does is construct a frame. The frame supports the entire house. After the frame is completed, he can nail the walls and windows to the frame. We're going to show you how to build the frame for the perfect GRE essay. Of course, you won't know the exact topic of the essay until you get there (just as the builder may not know what color his client is going to paint the living room), but you will have an all-purpose frame on which to construct a great essay no matter what the topic is. We call this frame the template.

Preconstruction

Just as a builder can construct the windows of a house in his workshop weeks before he arrives to install them, so can you pre-build certain elements of your essay. We call this "preconstruction."

In the next two chapters we'll show you how to prepare ahead of time to write essays on two topics that you won't see until they appear on your screen.

ISSUE VERSUS ARGUMENT ESSAY

It is worth noting at this time that the essay section gives you two very distinct writing tasks, and that a failure to appropriately address the question tasks will severely reduce your score.

The Issue Essay

The Issue essay asks for your opinion; you're expected to present your viewpoint on a particular topic and support that viewpoint with various examples. The following is one example of the instructions for the Issue essay:

> You will be given a brief quotation that states or implies an issue of general interest and specific instructions on how to respond to that issue. You will have 30 minutes to plan and compose a response in which you develop a position on the issue according to the specific instructions. A response to any other issue will receive a score of zero.
>
> Make sure that you respond to the specific instructions and support your position on the issue with reasons and examples drawn from such areas as your reading, experience, observations, and/or academic studies.

Note how important it is to specifically address the assignment provided as part of the Issue prompt; not following ETS's directions will make your grader unhappy and result in a poor score on the essay.

The Argument Essay

The Argument essay requires a different type of response. Instead of presenting your own perspective, your job is to critique someone else's argument. You're supposed to address the logical flaws of the argument, not provide your personal opinion on the subject. The following is one example of the directions for the Argument essay:

> You will be given a short passage that presents an argument, or an argument to be completed, and specific instructions on how to respond to that passage. You will have 30 minutes to plan and compose a response in which you analyze the passage according to the specific instructions. A response to any other argument will receive a score of zero.
>
> Note that you are NOT being asked to present your own views on the subject. Make sure that you respond to the specific instructions and support your analysis with relevant reasons and/or examples.

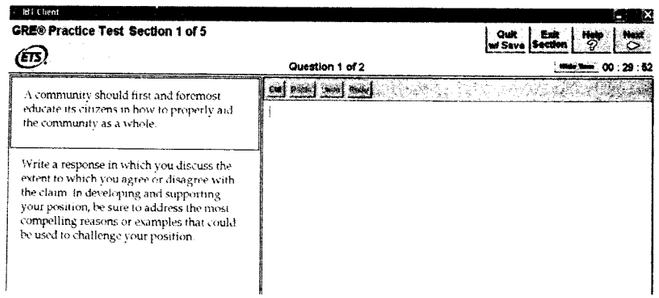
In the Argument essay, the emphasis is on writing a logical analysis of the argument, not an opinion piece. It is absolutely essential that you don't confuse the two essay tasks on the GRE.

ETS graders don't expect a perfect essay; occasional spelling, punctuation, and grammar errors won't kill your score.

HOW DOES THE WORD-PROCESSING PROGRAM WORK?

ETS has created a very simple program that allows students to compose their essays on the screen. Compared to any of the commercial word-processing programs, this one is extremely limited, but it does allow the basic functions: You can move the cursor with the arrow keys, and you can delete, copy, and paste. If you're a computer novice, don't worry. You don't have to use any of these functions. With just the backspace key and the mouse to change your point of insertion, you will be able to use the computer like a regular word-processing program.

Take a look at the image below to see what your screen will look like during the Analytical Writing section of the test:



The question will always appear at the top of your screen. Below it, in a box, will be your writing area (in the writing area above, you can see a partially completed sentence). When you click inside the box with your mouse, a winking cursor will appear, indicating that you can begin typing. As we said above, the program supports the use of many of the normal computer keys:

- The "Backspace" key removes text to the left of the cursor.
- The "Delete" key removes text to the right of the cursor.
- The "Arrow" keys move the cursor up, down, left, or right.
- The "Home" key moves the cursor to the beginning of a line.
- The "End" key moves the cursor to the end of a line.
- The "Enter" key moves the cursor to the beginning of the next line.
- "Page up" moves the cursor up one page.
- "Page down" moves the cursor down one page.

You can also use the icons on the right of the screen to copy and paste words, sentences, or paragraphs. To do this, you first have to highlight the desired text by clicking on the starting point with your mouse and holding down the mouse button while you drag it to the ending point. Then click on the "Cut" button. This deletes the text you've selected from the screen, but also stores it in the computer's memory. Next, just move the cursor to wherever you would like the selected text to reappear, and click on the "Paste" button. The selected text will appear in that spot.

If you make a mistake, simply click on the "Undo" button, which will undo whatever operation you have just done. You can undo a cut, a paste, or even the last set of words you've typed in. Unfortunately, unlike many word-processing programs, ETS's program does not have a "Redo" button, so be careful what you decide to undo.

Obviously, the small box on the screen is not big enough to contain your entire essay. However, by hitting the "Page up" and "Page down" keys on your keyboard, or by using the arrows on your keyboard, you will be able to go forward and backward to reread what you have written and make corrections.

Does Spelling Count?

Officially, no. The word-processing program doesn't have a spell checker, and ETS essay readers are supposed to ignore minor errors of spelling and grammar, but the readers wouldn't be human if they weren't influenced by an essay that had lots of spelling mistakes and improper grammar—it gives the impression that you just didn't care enough to proofread.

Because pervasive spelling errors will detract from your score, pick an easier word if you're really uncertain of how to spell a word.

Summary

- Different programs value the essay section in different ways. Check with your program to see how important the essays are.
- Understand the criteria ETS uses when judging your essay. Organization, examples, and language use are important. Perfect grammar and spelling less so.
- On the GRE, longer essays tend to get better scores, so strive to write as much as you can for each essay.
- Make sure you understand the differences in the assignments for the Issue essay and the Argument essay.
- Issue essays ask for your opinion on a topic while argument essays expect you to critique the logic of an argument. The ways in which you're asked to do each of these tasks will vary, so make sure you read each set of directions carefully.
- The word processor ETS provides has only the most basic functions. You can delete, copy, and paste text, but not much more.

Chapter 14
The Issue Essay

The Issue essay of the GRE requires you to present your opinion on the provided topic. This chapter will show you the steps to take in order to write a clear, coherent essay in the limited time provided. You'll learn exactly what sort of things the ETS graders are looking for when they evaluate your essay so you'll know just what to do on test day.

THREE BASIC STEPS

Because you don't have a lot of time to write the essays, you'll need to have a pretty good idea of how you're going to attack them as soon as you sit down at the computer on test day. Our approach to the essays involves three steps. These are:

1. **Think.** Before you start writing, take a moment to brainstorm some thoughts about the topic.
2. **Organize.** Take the ideas you've come up with and fit them into the assignment for the prompt.
3. **Write.** Once you've completed the first two steps, the final step should be a snap.

Thirty minutes is not a lot of time to write an essay, so you have to get it right the first time out. While ETS advises you to leave enough time to proofread and edit your essay, it simply isn't feasible to expect to make any significant changes to your essay during the final minutes of the section. Furthermore, if you get halfway through your essay and realize you're stuck or you're not saying what you need to say, you'll be hard pressed to fix your essay in the time you have left.

You have to know what you want your essay to say before you can start writing.

It is essential, therefore, to make sure you spend time planning your essay before you start writing. You have to figure out what it is you want to say before you begin; otherwise, you run the risk of writing an incoherent, rambling essay. The first two steps are actually more important to a successful GRE essay than the final step; by spending a little time planning your essay, the actual writing part should be relatively painless.

> The keys to the essay: Think, Organize, Write.

Let's start our discussion of the Issue essay by looking at a typical prompt.

The Prompt

> "True beauty is found not in the exceptional but in the commonplace."
>
> Write an essay in which you take a position on the statement above. In developing and supporting your essay, consider instances in which the statement does and does not hold true.

The prompts are supposed to get you thinking about areas of "general interest," whatever that means. A better way of thinking about the prompt is to look at it as agree/disagree- or pro/con-type statement. Your task in the essay will be to look at both sides of the issue, the pro and the con side, and take a position on the statement. Let's look at how to do that.

STEP 1: THINK

"Think" is a pretty broad command, so we need to clarify this step in order to make it more useful. Specifically, we want you to think about three things:

1. **Key Terms.** What are the key words or phrases in the prompt? Do the terms need clarifying before you can properly deal with them in the essay?
2. **Opposite Side.** What would the converse of the statement be?
3. **Examples.** What are some examples that would support the statement? What are some examples that would support the opposite statement?

Let's work through these steps with our sample prompt.

Key Terms

When preparing your essay, you first want to look more closely at the key terms in the prompt. Do they need to be clarified? Are there multiple ways of interpreting the words? In order to make your essay as focused as possible, you might need to limit the key terms to a specific definition or interpretation. If the key terms in the prompt seem pretty straightforward, you still want to note them. By repeatedly returning to these terms in your essay, you'll convey the impression that your essay is strongly organized and on topic.

For the sample prompt above, write down the key terms:

_____

_____

_____

Using key terms from the prompt throughout your essay contributes to its overall coherency.

For this prompt, the key terms are *beauty, true, exceptional*, and *commonplace*. We need to think about how we're going to use these terms in our essay. For example, what is *true beauty?* Do we want that to mean just natural beauty or can we consider man-made objects? As for the word *beauty*, do we want to limit our discussion to artistic beauty such as paintings and sculptures, or should we consider poems and literature as well? Should we only discuss natural beauty, such as stars and flowers, or should we consider personal beauty as well, such as models and GRE instructors? As you can see, we could write a lot on this topic, if we had the time. But we don't, so it's important to focus. By defining our key terms, we make the essay a lot more manageable and easier to write in a short amount of time. For this essay, let's include both natural objects and manmade artistic feats, but leave out personal beauty.

Opposite Side

In order to score well on the Issue essay, you'll have to consider both sides of the prompt. ETS is looking for more than a straightforward "I agree and here's why" or "I disagree and here's why" essay. Rather, the graders want to see you consider both sides of the issue and then defend your position. Take a brief moment to look at the sample prompt, and then write down the converse of the statement.

_____

For this prompt, the opposite side of the argument would be something along the lines of "True beauty is found not in the commonplace, but the exceptional." Note that ETS doesn't have a preference for the pro or con side. So if you find the opposite of the statement more convincing, that's fine. As long as you can support your position with some relevant examples, it doesn't matter what position you take on the prompt. This brings us to the final part of step one—brainstorming examples.

Examples

In many ways, the examples will be the most important part of your essay. Without strong, relevant examples you cannot expect to achieve a high score on the Issue essay. As the instructions state, you should support your position with examples drawn from your reading, experience, observation, and academic studies. In general, the more specific your examples are, the better your essay score. And examples from history, literature, or current events are better than personal observations or experiences. Imagine yourself as an ETS grader (a terrible thought, we know). Which sentence would you respond more favorably to?

"Few observers would doubt the awesome beauty of the ceiling of the Sistine Chapel in Rome, a work of art produced by the great Renaissance artist Michelangelo."

"Few observers would doubt the awesome beauty of the various paintings they see in museums, works of art produced by great artists."

Both sentences essentially say the same thing and use practically the same words. But the first sentence would be graded more favorably by an ETS grader because of the specificity of the example.

Take a moment to jot down some examples for the previous prompt. Make sure you come up with examples for both the original statement and its opposite.

_____

_____

_____

Now take a moment to look over your examples. Are they specific? Are they relevant to the topic? Do they support a position on the topic? The strength of your examples will determine the strength of your argument. It's hard to write a convincing paper with weak examples. Here are some examples that might work for our sample topic, both weaker and stronger:

Okay Example	**Better Example**
paintings, artwork	Leonardo da Vinci's *Mona Lisa*
buildings, churches	Notre Dame Cathedral in Paris
flowers, natural wonders	Niagara Falls

Avoid hypothetical examples—the more specific your example is, the better.

Good examples are relevant to the topic and contain specific details.

In each case, the better example is the more specific, more detailed example. Also note that we've avoided any personal examples. While you certainly may feel that your boyfriend or girlfriend is the most beautiful person in the world, that sort of personal example won't resonate with an ETS grader nearly as well as a more academic or global example. Use personal examples only when specifically instructed to by the prompt or as a last resort.

STEP 2: ORGANIZE

Once you've identified the key terms, considered the opposite side of the issue, and generated some examples, it's time to organize your thoughts. Basically, you'll want to do the following:

1. **Separate Your Examples**. How many of your examples support the pro side and how many support the con side? Divide your examples up and see which side has more support.
2. **Write Your Thesis Statement**. After evaluating the strength of your examples, decide what position you will take in your essay, and then write your thesis. Your thesis is the main point that you want your essay to express.

Let's continue the process on the sample prompt.

Separate Your Examples

Do this before you decide on your thesis statement. Even though you might have a strong preference for one position on the issue, you might notice that the examples you brainstormed tend to support the other side of the issue. Don't expend more time trying to think of examples to support your preconceptions; just write your essay supporting the other side! There is no right or wrong response. All that matters is being able to write a strong, coherent essay in a very limited time. Your personal views or beliefs are unimportant to the ETS graders. If we continue with the examples we used earlier, they would probably break down like this:

It doesn't matter what side of the issue you take on the GRE.

Pro	Con
natural wonders	*Mona Lisa*
	Notre Dame

Based on some of the examples we've come up with, it looks like we'd be better off supporting the idea that "True beauty is found not in the commonplace, but in the exceptional." While natural wonders like sunsets and flowers are pretty commonplace, we've come up with a lot more exceptional examples. And it looks like we could even argue that it is the exceptional natural wonders, such as Niagara Falls, that are truly beautiful.

Write Your Thesis Statement

Now comes the culmination of all of our work. What point do we want to make about the topic? Write it down here:

Our thesis should probably be something along the lines of this: "While certain commonplace natural objects are examples of beauty, true beauty is most often found in rare, exceptional cases."

Now that we have figured out what we want to say, we can focus on proving why we believe it. But remember, only after working through these steps are we truly ready to write!

Practice: Steps 1 and 2

Work through steps one and two on the following Issue essay prompts below.

PROMPT 1

"Genius is nothing more than another term for obsession."

Write an essay in which you take a position on the statement above. In developing and supporting your position, you should consider instances in which the statement is true as well as those in which the statement is false.

On your scratch paper, write the (1) Key Terms, (2) Opposite Side, (3) Examples, and (4) Thesis.

PROMPT 2

"The proper role of education is to teach facts, not morals."

Write an essay in which you take a position on the statement above. In developing and supporting your position, you should consider cases in which education teaches facts as well as those in which morals are taught.

On your scratch paper, write the (1) Key Terms, (2) Opposite Side, (3) Examples, and (4) Thesis.

Practice: Sample Responses

Obviously, your examples and thesis statements will differ, but these sample responses will give you a good indication of what ETS is looking for.

Prompt 1

Key Terms: Genius and obsession. Are we talking about artistic genius? Or scientific genius? What does the word *obsession* entail? Is it just another word for being crazy?

Opposite Side: "Genius is not just another term for obsession."

Examples: Isaac Newton, who once stuck pins into his own eyes in order to better understand optics; Vincent Van Gogh, who cut off part of his own ear under the stresses of his work; Thomas Edison, who patented over 1,300 different inventions

Thesis: "Many geniuses in both the artistic and scientific fields do demonstrate a form of obsession or mental unbalance."

Prompt 2

Key Terms: What sort of education are we referring to—elementary school, college, business school? What are morals? Are we considering religious viewpoints or just ethical standards?

Opposite Side: "Education should teach morals."

Examples: Law schools, business schools, and medical schools all teach proper ethics for their professions; Trade schools and vocational schools tend to teach only facts; Students can get moral training at home or in a religious institution

Thesis: "Many educational institutions have an obligation to teach morals as well as facts."

STEP 3: WRITE

Now that we know how to prepare for our Issue essay, we can write it. In this section, we'll discuss various templates for essays and show you how you can preconstruct certain portions of your essay. Before we do that though, let's revisit what the readers are looking for from your writing.

What the Readers Want to See

The essay readers will be looking for four characteristics as they skim your Analysis of an Issue essay (at the speed of light). According to ETS, an outstanding essay:

- considers the complexities of the issue
- supports the position with relevant examples
- is clearly well organized
- demonstrates superior facility with the conventions of standard written English, but still with minor flaws.

To put it more simply, the readers are looking for good organization, good supporting examples for whatever position you've taken, and reasonably good use of the English language. We've hopefully taken care of the first two parts, so now we'll deal with the next two.

Essay Essentials

As you learned in sixth-grade composition class, a basic essay has three parts: an introduction, some body paragraphs, and a conclusion. These three things are exactly what ETS wants to see in your Analysis of an Issue essay. Each of these parts has a specific role to play.

1. The **Introduction** should introduce the topic of the essay, discuss the issues surrounding it, and present the essay's thesis.
2. The **Body Paragraphs** should use examples to support the thesis of the essay.
3. The **Conclusion** should summarize the major points of the issue, reiterate the thesis and perhaps consider its implications.

Basically, if you try to think of each paragraph as having a specific job to do, you can pretty much preconstruct each type of paragraph and then fill in the specific details on test day.

Preconstruction: The Introduction

For the Issue essay, a good introduction accomplishes the following tasks:

> A good introduction:
> 1. Clearly establishes the topic of the paper
> 2. Previews both sides of the issue at hand
> 3. Presents a clear thesis

Let's look at each of these tasks in detail and discuss different ways to accomplish the goals of the introductory paragraph.

Establish the Topic

We want the reader to know what issue the essay is going to talk about. Even though the grader will see the prompt you're writing about, he or she should be able to figure out the prompt just from reading the introduction of your essay. There are a few different ways you can quickly establish the topic, so let's return to our original prompt and preconstruct some approaches.

Here, once again, is our prompt:

> "True beauty is found not in the exceptional but in the commonplace."
>
> Write an essay in which you take a position on the statement above. In developing and supporting your essay, consider instances in which the statement does and does not hold true.

One of the worst ways of establishing the topic is to merely quote the prompt. ETS graders look upon this tactic with disdain, so let's find other ways of starting our essay.

Approach #1: Rhetorical Questions

This is a tried-and-true way of introducing your topic. Instead of simply quoting or paraphrasing the prompt, turn it into a rhetorical question. Here are a few samples:

Where does true beauty lie, in the exceptional or in the commonplace?

Do we find the exceptional more beautiful or the commonplace?

Can we only find beauty in rare, exceptional instances or does it truly lie all around us?

It is immediately clear what topic the essay will explore, from each of these examples of introductory sentences. See if you can come up with a rhetorical question for either this topic or one from the previous drill.

Approach #2: Famous Quotations

Another classic approach to beginning an essay is to use either a well-known saying or a famous quote from someone. Many of the GRE topics are fairly bland, so even if you can't think of a famous quote, there are usually some classic aphorisms you use. Here's what we mean:

"Beauty is Truth and Truth Beauty," or so said the romantic poet John Keats.

A common saying is that beauty is in the eye of the beholder.

Obviously, this type of introduction can be tough to do if something doesn't pop into your head right away. Try to come up with a quote or common saying for this topic or one from the drill.

Approach #3: Anecdote

An anecdote is a brief story. Oftentimes you can grab your reader's attention and introduce the topic with a good anecdote. For example:

A good opening line is great to have, but if you're stuck, don't spend an excessive amount of time trying to come up with something clever.

It is said that Cezanne, the famed French painter, was so concerned with the beauty of his paintings that he would destroy any of his works that he felt was flawed.

The Romantic poet John Keats was so struck by the beauty of Chapman's translation of Homer's work that he wrote a poem about it.

When using an anecdote you might have to write a sentence or two explaining the relevance of your story. Try out an anecdote for this topic or one of the drill topics.

Approach #4: Fact/Statistic

For some topics, it might be appropriate to start your essay by stating a fact or statistic. ETS graders aren't allowed to penalize you for factual mistakes and they certainly aren't going to fact-check your essay. So don't be afraid if your fact isn't 100 percent accurate. Here's an illustration:

A recent scientific study showed that the faces that people find the most beautiful are those that are the most symmetrical.

Psychologists have demonstrated that people's responses to certain phenomena are based on certain innate mechanisms in the brain.

Give this approach a shot, using this topic or one from the drill.

Approach #5: Definition

One way you may wish to start your essay is by defining one of the key terms from the prompt. For example:

Beauty, by definition, is that which moves us or impacts us significantly.

The "exceptional" typically refers to those things that stand out, which is also a plausible definition for beauty.

The advantage to this approach is that you already spent some time thinking along these lines when you were planning your essay. Come up with a sample introductory sentence for this topic or one of the drill topics.

Preview the Issue

Once you've told the reader what the topic is, your next task is to inform the reader of the issues at hand. You want to briefly touch on both sides of the debate, explaining the pros and cons of the prompt. A good way to accomplish this is to make use of strong trigger words—words like *but, despite, while,* and *although.* Here are some examples.

While some people can find beauty in the most common of places, true beauty is only found in the exceptional.

Some would argue that beauty is found everywhere. from the flowers to the stars, but others would state that true beauty is found only in rare, special instances.

Despite the assertions of many that beauty is everywhere, true beauty is found only in exceptional cases.

Although one might argue that many commonplace things are beautiful, it is the exceptional things that possess true beauty.

There can be no doubt that some of the world's most common things are beautiful. And yet, it is often the exceptional objects that possess true beauty.

Practice writing sentences that address both sides of the issue. Use the sample topic or one from the drill.

Present the Thesis

A good thesis tells the reader exactly what your position is and why.

Your final task in the introduction is to present the thesis. Some writers prefer to avoid the first person, refusing to use sentences such as "I believe..." or "I feel..." However, GRE graders will not penalize you for use of the first person. A more important consideration when writing your thesis is giving the reader some indication why you hold your particular position. ETS graders want to see that you've thought about and analyzed the issue. Here are some examples of thesis statements.

I believe that beauty is truly found in the exceptional, not the commonplace, because if common things were beautiful, the very word would lose its meaning.

In my view, beauty is found in the exceptional, not the commonplace. This is because only exceptional things really stand out as special in our minds.

It is clear that true beauty is not to be found in the commonplace but in the exceptional. On closer inspection, even so-called common objects that people consider beautiful are actually exceptional.

After weighing the evidence, it is certain that beauty is the province of the exceptional, not the commonplace. People find true beauty in things that they rarely experience, not the things they experience every day.

For each thesis, you can see that the author is also giving some justification for the viewpoint. This justification will be of course explored more thoroughly in the body paragraphs, but it's good to give the reader a preview of how your essay will take shape. Try writing thesis statements for some of the sample prompts.

Preconstruction: Body Paragraphs

A body paragraph should do the following:

> Good body paragraphs:
>
> 1. Use a good transition/topic sentence
> 2. Present an example
> 3. Explain how the example supports the thesis

Body paragraphs are a little harder to preconstruct because they are the most specific part of the essay. Still, there are some handy tips for creating body paragraphs that an ETS grader will love.

Transition/Topic Sentence

ETS graders love organized essays that flow well. The best way to write an essay like this is to use strong topic sentences and good transitions for each of your body paragraphs. Your topic sentence should serve as a gentle reminder to the reader of what the thesis of the essay is. For example:

One example of beauty found in the exceptional is Leonardo da Vinci's Mona Lisa.

A second instance in which true beauty lies not in the commonplace but in the exceptional is Notre Dame Cathedral in Paris.

Of course, you might want to avoid using simple transitions like "the first example," and "the second example." You can make your writing stronger by leading with the example and making the transition a little more subtle, like so:

Leonardo da Vinci's Mona Lisa *is surely one of the most exceptional, and beautiful, paintings ever created.*

Consider the beauty of Notre Dame Cathedral in Paris, a building that is in no way commonplace.

Or to get even fancier, refer to the previous example in your transition sentence:

Like da Vinci's Mona Lisa, *the cathedral of Notre Dame in Paris is an exceptional, and exceptionally beautiful, object.*

The important point is that each sentence introduces the example and reminds the reader of the purpose of the example, which in this case is to support the notion of beauty as exceptional. In the next few sentences, you'll provide details about your example. It's important that you remember to link the example to your thesis.

Explain How Your Example Supports Your Thesis

Don't just tell the grader about the example; tell the grader why the example is relevant to your thesis.

On the GRE essays, don't get so caught up in providing details for your example that you forget to explain to the reader how or why your example helps your thesis. The purpose of the Issue essay is not to just list out some examples; the purpose is to develop and support a position on the issue. Here's an example of a body paragraph that doesn't quite fulfill that goal:

Like da Vinci's Mona Lisa, *the cathedral of Notre Dame in Paris is an exceptional, and exceptionally beautiful, object. Notre Dame is a stunning example of gothic architecture, famous for the flying buttresses that adorn the sides of the building. The cathedral also has rows and rows of beautiful sculptures recessed into the walls, as well as a gorgeous central stained-glass window. These features make Notre Dame one of the most beautiful cathedrals in the world.*

The writer here did a good job of providing specific details about the example, which ETS graders love. However, the reader failed to explain why Notre Dame supports the view that true beauty is exceptional, not commonplace. Let's fix that:

Like da Vinci's Mona Lisa, *the cathedral of Notre Dame in Paris is an exceptional, and exceptionally beautiful, object. Churches and cathedrals line the streets of most major cities in Western Europe, but few possess the renown of Notre Dame. Notre Dame is a stunning example of gothic architecture, famous for the flying buttresses that adorn the sides of the building. The cathedral also has rows and rows of beautiful sculptures recessed into the walls, as well as a gorgeous central stained-glass window. These features make Notre Dame one of the most beautiful cathedrals in the world. Compared to a common church or cathedral, Notre Dame is truly awe-inspiring; Victor Hugo used the building as the backdrop for his magnificent book* The Hunchback of Notre Dame *and thousands of tourists travel untold miles to view the cathedral. That sort of beauty is not possessed by just any church on the corner.*

This is a stronger body paragraph because it is more explicit in its discussion of the thesis. The author notes that churches and cathedrals are fairly common, but then argues that Notre Dame stands out as an exceptional cathedral. The author concludes the paragraph by showing how Notre Dame is more beautiful than any typical church. Just as a reader should be able to figure out what the topic of the paper is from the introduction, a reader should be able to figure out the thesis from each paragraph.

Write a body paragraph for one of the examples for this sample topic, or one of your examples from the practice. Make sure you have a good topic/transition sentence, specific details for the example, and an explanation of how or why the example is relevant to the thesis.

Preconstruction: Conclusion Paragraphs

Make sure your essay has a conclusion.

Your essay should always have a conclusion, for two reasons. First, a conclusion paragraph is evidence of good organization. It shows the reader that you knew exactly what points you wanted to make, you made them, and now you're ending the essay. And second, an essay that lacks a conclusion seems incomplete, almost as if your writing abruptly ends before it should. This can give the grader a negative impression of your essay. Fortunately, conclusion paragraphs are easy to write. A good conclusion basically:

A good conclusion:

1. Alerts the reader that the essay is ending
2. Summarizes the main points of the essay

Some test takers even prefer to write their introduction and conclusion first and then fill in the body paragraphs. This strategy has the advantage of making your essay seem complete even if you happen to run out of time writing the body paragraphs.

Alert the Reader

Conclusion paragraphs have their own topic/transition sentences, which generally should contain a word or phrase that tells the reader he or she is reaching the end. Here are some examples:

In conclusion, it's clear that true beauty is found not in the commonplace, but the exceptional.

Ultimately, beauty lies in the exceptional, not the commonplace.

As the bulk of the evidence shows, the exceptional, not the commonplace, possesses true beauty.

Clearly, true beauty is found in exceptional things, not in commonplace ones.

The examples above all support the idea that we find true beauty in exceptional cases, not in commonplace ones.

Write some conclusion sentences for this topic or a sample topic from the sompple prompts.

Summarize Main Points

Your conclusion should also summarize the main points of the essay, meaning that it should mention the thesis and how the examples support it. Additionally, you can briefly consider the implications of the thesis. Here are some sample conclusions:

In conclusion, it's clear that true beauty is found not in the commonplace, but the exceptional. The Mona Lisa *and Notre Dame Cathedral are both exceptional examples of fairly commonplace things and it is these exceptions that are noted as truly beautiful. If anything, the commonplace only serves as a contrast to what true beauty really is.*

Ultimately, beauty lies in the exceptional, not the commonplace. While paintings and churches are fairly commonplace, only a small few of them, such as the Mona Lisa *or Notre Dame, truly reach the heights of beauty. It is in these exceptions that we find real beauty.*

The examples above all support the idea that we find true beauty in exceptional cases, not in commonplace ones. Common things may seem at first glance to be beautiful, but once we compare these commonplace examples to the truly exceptional ones, we see that the exceptional ones are truly beautiful.

Try your hand at constructing a conclusion paragraph, once again using this topic or one from the sample prompts.

Putting It All Together

Read through this sample essay that's based on the basic five-paragraph model. Then you'll have the chance to try writing a similar essay for a different prompt.

> "True beauty is found not in the exceptional but in the commonplace."
>
> Write an essay in which you take a position on the statement above. In developing and supporting your essay, consider instances in which the statement does and does not hold true.

Beauty, by definition, is that which moves us or impacts us significantly. Some would argue that beauty is found everywhere, from the flowers to the stars. But others would state that true beauty is found only in rare, special instances. After weighing the evidence, it is certain that beauty is the province of the exceptional, not the commonplace. People are moved most by things that they rarely experience, not the things they experience every day.

Those that would argue that true beauty is everywhere might point to the beauty of a flower, or the starlit night. These experiences are certainly common, but do they show that true beauty is commonplace? Flowers might be considered beautiful, but how often does a person stop to look at or appreciate every flower? Flowers are so common that in many cases, they are ignored or viewed as nothing special. However, on those rare occasions—exceptional occasions, one might say—when we want to commemorate an event or express emotion, we notice the beauty of flowers. Thus, it is not the commonplace flower that strikes us as beautiful, but the exceptional situations themselves that move us to appreciate the flower.

Now consider the exceptional. Leonardo da Vinci's Mona Lisa *is surely one of the most exceptional, and beautiful, paintings ever created. Few people who view the painting are not moved by the sheer beauty of it, and the* Mona Lisa *is instantly recognized as a masterpiece of art. And yet, there have been literally millions of paintings produced in human history. Is every single one of them beautiful? Does every one of those paintings have the impact that da Vinci's does? Of course not. In order to find beauty, we must separate the exceptional cases from the common ones. True beauty is such because it stands out from the masses of the average and pedestrian.*

Like da Vinci's Mona Lisa, *the cathedral of Notre Dame in Paris is an exceptional, and exceptionally beautiful, object. Churches and cathedrals line the streets of most major cities in Western Europe, but few possess the renown of Notre Dame, one of the most beautiful cathedrals in the world. Compared to a common church or cathedral, Notre Dame is truly awe-inspiring; Victor Hugo used the building as the backdrop for his magnificent book* The Hunchback of Notre Dame *and thousands of tourists travel untold miles to view the cathedral. That sort of beauty is not possessed by just any church on the corner.*

In conclusion, it's clear that true beauty is found not in the commonplace, but the exceptional. The Mona Lisa *and Notre Dame Cathedral are both exceptional examples of fairly commonplace things and it is these exceptions that are noted as truly beautiful. If anything, the commonplace only serves as a contrast so that we can understand what true beauty really is.*

Your Turn

Try writing a similar essay for the prompt that follows this paragraph. Make sure you consider the opposing side of the argument. Devote a paragraph to looking at an example for the other side of the issue, but make sure you indicate to the reader that there is a flaw in the example or that the example is less than convincing. Set a timer for 30 minutes to practice GRE time constraints.

> "People most respect the powerful not when they exercise their power, but when they refrain from exercising it."
>
> Write an essay in which you develop and support a position on the statement above. In writing your essay, you should consider both when the statement may be true and when it may be false.

How to Score Your Essay

Now it's time to put on your essay-scoring hat and prepare to grade your own essay. If you're lucky enough to have a friend who is also preparing for the GRE, you could switch essays and grade each other's like you used to do in sixth grade. You'll need to be objective during this process. Remember, the only way to improve is to honestly assess your weaknesses and systematically eliminate them.

Set a timer for two minutes. Read the essay carefully but quickly, so that you do not exceed the two minutes on the timer.

Now ask yourself the following questions about the essay:

1. Overall, did it make sense?
2. Did you address the topic directly?
3. Did you address the topic thoroughly?
4. Did your introduction paragraph repeat the issue to establish the topic of the essay?
5. Did you consider both sides of the issue?
6. Did your examples make sense?
7. Did you flesh out your examples with details?
8. Did you explain how your examples supported your thesis?
9. Did your essay have a strong concluding paragraph?
10. Was your essay well organized, using transitions and topic sentences?
11. Did you use language that made the organization of the essay obvious?
12. Did you use correct grammar, spelling, and language, for the most part?

If you could answer "yes" to all or almost all of these questions, congratulations! Your essay would probably receive a score in the 5–6 range. If you continue to practice, and write an essay of similar quality on the real Analysis of an Issue section of the real test, you should score very well.

If you answered "yes" to fewer than 12 of the questions, you have room for improvement. Fortunately, you also know which areas you need to strengthen as you continue to practice.

If you answered "yes" to fewer than 6 of the questions, your essay would probably not score very well on a real GRE. An essay of this quality would not help you in the admissions process and could raise some red flags in the minds of the admissions people. You need to continue to practice, focusing on the areas of weakness that you discovered during this scoring process.

Another Sample Response

Take a look at a high scoring response to the prompt you just practiced on. Your essay might look different and that's fine. This is just one of many ways to successfully complete the Issue essay assignment.

"The powerful are most respected not when they exercise their power, but when they refrain from exercising it."

Write an essay in which you develop and support a position on the statement above. In writing your essay, you should consider both when the statement may be true and when it may be false.

What aspect of power engenders the greatest respect? Some would argue that power inspires respect only by its ability to change things or bring about results. This camp respects the powerful only when they demonstrate their power by raising a massive army or bestowing charity on the less fortunate. Others believe that the true measure of power lies not in what it is used for, but in how it is restrained. These people believe that people most respect the powerful when they choose not to use their power, such as granting clemency to a criminal on death row or allowing critics of the government to speak out.

Consider first the respect people hold for the exercise of power. One of the mightiest displays of power is the ability to protect and safeguard people and property and this aspect of government is what many people respect. Indeed, in Hobbes's Leviathan, *he argued that one of the reasons people sacrifice themselves for the good of the state is to preserve the power of the state to protect its members from outside attacks. And one of the stated goals of the United States massive military buildup was so that other countries would either "love us or fear us." Thus, it is clear that people have respect for displays of power. Similarly, the ability of the powerful to bestow gifts of charity on the less fortunate is also well respected. The names of philanthropists like Carnegie and Rockefeller are held in high esteem because they used their power to help those less fortunate than themselves.*

On the other hand, the ability to show restraint can also engender respect. Recently, the governor of Illinois decided to commute the death sentences of all the prisoners on death row. Such an act of clemency brought high praise from human rights proponents around the world. Furthermore, the fact that democratic governments allow dissent when they could in many cases censor or squash unfavorable opinions also lends credence to the view that restraint of power is what people respect. For example, the arbitrary arrest and sentencing of political dissidents in Russia has brought much international criticism of the Kremlin, while countries that support freedom of speech and the press are widely respected in the world.

Ultimately, after considering both sides of the issue, it must be concluded that the exercise of power is most respected. This because even in cases of restraint, the entity in power is still exercising its power. Granting clemency is only possible because the state holds the power of life and death. Allowing dissent is only exceptional because the government has the power to crush it. Thus, it is not the restraint of power that people most respect, it is the exercise of it.

FINAL THOUGHTS: WHAT TO DO WITH YOUR TIME

Now that you know how to construct your essay, you have to practice writing essays in a mere 30 minutes. Here's a guideline for how to use your time:

Your essay doesn't have to be perfect. Focus on the big picture.

- Find key terms, state opposite side, brainstorm examples: 5–7 minutes
- Formulate thesis: 2 minutes
- Write essay: 18–20 minutes
- Proofread: 1–2 minutes

Notice that not a lot of time is allotted for proofreading. Remember that it's okay to have minor spelling and grammatical errors. Your time is better spent making sure you consider both sides of the issue completely and write an effective essay. For tons more practice, you can go to **ETS.org** for the complete list of essay topics.

Summary

- Follow the three simple steps to essay success: Think, Organize, Write.
- One of the keys to high scoring essays is good examples. Make sure your examples are relevant to the topic and as specific as possible.
- Try to use examples drawn from your readings, current events, literature, and history. Avoid personal examples.
- Spice up your writing by employing an interesting "hook" to get your readers attention. Consider using such hooks as rhetorical questions, quotes, anecdotes, facts and statistics, and other attention getting devices.
- A good GRE essay presents a smooth flow of ideas and examples. Make sure you use transitions to help your reader follow the progression of ideas in your essay.
- Templates can be effective ways of organizing your essay, but don't feel restricted to them. Come up with your own template or modify the existing templates as you see fit.

Chapter 15
The Argument Essay

The Argument essay of the GRE asks you to examine and critique the logic of an argument. The arguments you will see in this chapter are similar to the ones you worked with earlier in the book and you will need to use the same approach to breaking these arguments down. This chapter will show you how to organize and write an essay once you've found the premises, conclusion, and assumptions of a GRE argument.

You'll be able to use all the skills we've discussed for the Analysis of an Issue essays on this type of essay as well, but in a slightly different way. Instead of asking for your opinion on a topic, the Analysis of an Argument essay asks you to critique someone else's argument. Before we jump into setting up templates and other pre-construction steps, let's take a look at how Analytical Writing arguments work.

THE PARTS OF AN ARGUMENT

As seen in the Critical Reasoning portion in Chapter 6, an argument, for GRE purposes, is a short paragraph in which an author introduces a topic and uses reasoning or factual evidence to back up his or her opinion about that topic.

A really simplified example of an argument could be:

> *My car broke down yesterday, and I need a car to get to work. Therefore, I should buy a new car.*

The car argument above is composed of three parts:

- The conclusion—the author's opinion and recommendation for action
- The premises—the facts the author uses to back up his or her opinion
- The assumptions—unstated conditions that must be true in order for the argument to make sense

In this argument, the author's conclusion is "I should buy a new car."

The premises the author uses to support this conclusion are that his car broke down yesterday, and that he needs a car to get to work.

The premises must support the conclusion the way table legs support a tabletop. The tabletop is the most obvious and useful part of a table—you see more of it, and you can put things on it. But without the legs to hold it up, it's just a slab of wood on the floor. The same is true for the conclusion of an argument. The conclusion is the part that gets all the attention, since it recommends some course of action, but without the premises to support the conclusion, the conclusion won't hold up.

Conclusion Words

Certain words indicate a conclusion:

- so
- therefore
- thus
- hence
- showed that
- clearly
- then
- consequently
- as a result
- concluded that

When you see these words, you can be pretty sure that you've found the conclusion of the argument.

Premise Words

Certain words indicate premises:

- because
- since
- if
- given that
- in view of
- in light of
- assume

ASSUMPTIONS

An assumption is an unstated premise that supports the author's conclusion. It's the connection between the stated premises and the conclusion. In the example of the table, the assumption is that nails or glue hold the legs and the tabletop together. Without the glue or nails, the table will fall apart. Without the assumption, the argument will fall apart.

Sometimes the assumption is described as the *gap* between the facts that make up the premises and the conclusion. They don't always connect, so the assumption is the gap between them.

Let's take a look back at the car argument:

> *My car broke down yesterday, and I need a car to get to work. Therefore, I should buy a new car.*

The premises are that my car broke down yesterday and I need a car to get to work. The conclusion is that I should buy a new car.

When you first read this argument, you may have had some questions. These questions might have been along the lines of "Why can't the author just rent a car?" or "Why can't the author just fix the car?"

As you read an argument, identifying the premises and conclusion, questions may pop into your head. Those questions are pointing out the gap that leads to the assumption. Here, the gap is between having a broken car and still needing a car to get to work on the one side, and having to buy a new car on the other side.

Therefore, the assumption must be:
There is no other way to have a car.

There are all sorts of smaller assumptions here—that the car can't be fixed, that a car can't be rented, that there's no other car the author can borrow—but those are all covered in the main assumption.

The assumption fills the gap between the premises and conclusion, and, in fact, functions as an unstated premise:
My car broke down yesterday, and I need a car to get to work. There is no other way to have a car. Therefore, I should buy a new car.

Brainstorming for the Argument Essay consists primarily of coming up with a list of assumptions.

Three Common Types of Arguments and Their Assumptions

As outlined in Chapter 6, there are three types of arguments you are likely to see. They are Sampling, Analogy, and Causal. Becoming familiar with these three types will help you identify the assumptions in the argument more quickly when the clock is ticking on the real test.

1. The Sampling Assumption

A sampling argument assumes that A is equal to A, B, and C, or that a small group is representative of a much larger group to which it belongs. To attack a sampling argument, show that one cannot assume that the opinions or experiences of the smaller group are not necessarily representative of the larger group.

2. The Analogy Assumption

An argument by analogy assumes that A = B or that what is true for one entity will be true for another. To attack an argument by analogy, simply show that the two groups or places or individuals are nothing like each other. What is true for one does not have to be true of the other.

3. The Causal Assumption

A causal argument assumes that A causes B, or that if you remove the cause, you will remove the effect. While there may be a strong correlation between A and B, it does not always follow that it is a causal relationship or that A is the cause of B.

To attack a causal relationship, point out that there are other possible causes for B and brainstorm some possible examples.

Well, Great, But Why Do I Care?

You should care about taking apart the argument, and finding the assumptions in particular, because the key to writing a great Argument essay on the Analytical Writing section is ripping apart the argument.

Think about it. The official instructions on the test ask you to "critique" the author's argument. However, if you claim that everything the author says makes sense, you won't be able to write an essay that's more than a few sentences long. This means that in order to write a great essay, you'll need to tear the author's argument apart.

> **Danger:** The most common mistake people make in writing the Argument essay is expressing their own opinions. Don't do this! The Issue essay specifically asks you to give an opinion and then back it up. The Argument essay wants a critique of someone else's opinion, not your own.

WRITING THE ARGUMENT ESSAY

Writing the Analysis of an Argument essay requires a series of steps.

Step 1: Read the topic and identify the conclusion and the premises.

Step 2: Since they're asking you to critique (i.e., weaken) the argument, concentrate on identifying its assumptions. Look for gaps in the argument, weaknesses in the logic, and new information in the conclusion that wasn't present in the premises. Brainstorm as many different assumptions as you can think of. Write these out on your scratch paper or on the computer screen.

Step 3: Select three or four of the strongest assumptions around which to build your essay.

Step 4: Choose a template that allows you to attack the assumptions in an organized way.

Step 5: Write the essay, using all the tools and techniques that you'll be learning in this chapter.

Step 6: Read over the essay and edit it.

You will have 30 minutes to plan and compose a response to the argument topic, so make sure to budget your time wisely.

WHAT THE READERS ARE LOOKING FOR

In the Analysis of an Argument topic section, your job is to critique the argument's line of reasoning and the evidence supporting it and to suggest ways in which the argument could be strengthened. Again, you aren't required to know any more about the subject than would any normal person—but you must be able to spot logical weaknesses. Make absolutely sure you have read and understood the previous section about taking apart the argument and that you can take apart all the arguments in the drills in that section.

Your opinion is not the point in an Analysis of an Argument Essay.

The essay readers will be looking for four things as they skim through your Analysis of an Argument essay at the speed of light. According to a booklet prepared by ETS, "An outstanding argument essay...clearly identifies and insightfully analyzes important features of the argument; develops ideas cogently, organizes them logically, and connects them smoothly with clear transitions; effectively supports the main points of the critique; and demonstrates superior control of language, including diction, syntactic variety, and the conventions of standard written English. There may be minor flaws."

To put it more simply, the readers will be looking for all the same things they were looking for in the Analysis of an Issue essay, plus one extra ingredient: a cursory knowledge of the rules of logic.

Doing the Actual Analysis of the Argument

In any Analytical Writing argument, the first thing you should do is separate the conclusion from the premises.

Let's see how this works with an actual essay topic. The following is the Analysis of an Argument topic you saw before:

Topic:

> *The director of the International Health Foundation recently released this announcement:*
>
> *"A new medical test that allows the early detection of a particular disease will prevent the deaths of people all over the world who would otherwise die from that disease. The test has been extremely effective in allowing doctors to diagnose the disease six months to a year before it would have been spotted by conventional means. As soon as we can institute this test as routine procedure in hospitals around the world, the death rate from this disease will plummet."*

Save the fancy prose for English class! Your grader cares more that you can identify the parts of the argument than for a clever turn of phrase.

The conclusion in this argument comes in the first line:

> *A new medical test that allows the early detection of a particular disease will prevent the deaths of people all over the world who would otherwise die from that disease.*

The premises are the evidence in support of this conclusion.

> *The test has been extremely effective in allowing doctors to diagnose the disease six months to a year before it would have been spotted by conventional means.*

The assumptions are the unspoken premises of the argument—without which the argument would fall apart. Remember that assumptions are often causal, analogical, or statistical. What are some assumptions of this argument? Let's brainstorm.

Brainstorming for Assumptions

You can often find assumptions by looking for a gap in the reasoning. "Medical tests allow early detection": According to the conclusion, this medical test leads to the early detection of the disease. There doesn't seem to be a gap here.

"Early detection allows patients to survive": In turn, the early detection of the disease allows patients to survive the disease. Well, hold on a minute. Is this necessarily true?

- First, do we know that early detection will *necessarily* lead to survival? We don't even know if this disease is curable. Early detection of an incurable disease is not going to help anyone survive it.
- Second, will the test be widely available and cheap enough for general use? If the test is expensive or only available in certain parts of the world, people will continue to die from the disease.
- Third, will doctors and patients interpret the tests correctly? The test may be fine, but if doctors misinterpret the results or if patients ignore the need for treatment, then the test will not save lives.

"Death rate will plummet": There's a huge gap here in that there's absolutely no explanation of how merely detecting the disease will immediately cause the death rate from it to plummet. This area is ripe for exploration.

The arguments provided for the writing assessment of the GRE typically contain more flaws than those you worked with in the multiple-choice section. The flaws are often easier to spot as well.

Organizing the Analysis of an Argument Essay

We're now ready to put this into a ready-made template. In any Analysis of an Argument essay, the template structure should be pretty straightforward: You're simply going to reiterate the argument, attack the argument in three different ways (each in a separate paragraph), summarize what you've said, and mention how the argument could be strengthened. From an organizational standpoint, this is pretty easy. Try to minimize your use of the word *I*. Your opinion is not the point in an Analysis of an Argument essay.

A Sample Template

Of course, you will want to develop your own template for the Analysis of an Argument essay, but to get you started, here's one possible structure:

> The argument that (restatement of the conclusion) is not entirely logically convincing, since it ignores certain crucial assumptions.
>
> First, the argument assumes that _____.
>
> Second, the argument never addresses _____.
>
> Finally, the argument omits _____.
>
> Thus, the argument is not completely sound. The evidence in support of the conclusion _____.
>
> Ultimately, the argument might have been strengthened by _____.

The key to succeeding on an Analysis of an Argument essay is to critique the argument clearly.

How Would the Result of Our Brainstorming Fit into the Template?

Here's how the assumptions we came up with for this argument would fit into the template:

> The argument that the new medical test will prevent deaths that would have occurred in the past is not entirely logically convincing since it ignores certain crucial assumptions.
>
> First, the argument assumes that early detection of the disease will lead to an immediate drop in the mortality rate from this disease, yet it does nothing to explain how this will happen, etc.
>
> Second, the argument never addresses the point that the existence of this new test, even if totally effective, is not the same as the widespread use of the test, etc.
>
> Finally, even supposing the ability of early detection to save lives and the widespread use of the test, the argument still depends on the doctors' correct interpretation of the test and the patients' willingness to undergo treatment, etc.
>
> Thus, the argument is not completely sound. The evidence in support of the conclusion that the test will cause death rates to plummet does little to prove that conclusion, since it does not address the assumptions already raised. Ultimately, the argument might have been strengthened if the author could have shown that the disease responds to early treatment, which can be enacted immediately upon receipt of the test results, that the test will be widely available around the world, and that doctors and patients will make proper use of the test.

Customizing Your Analysis of an Argument Template

Your organizational structure may vary in some ways, but it will always include the following elements: The first paragraph should sum up the argument's conclusion. The second, third, and fourth paragraphs will attack the argument and the supporting evidence. The last paragraph should summarize what you've said and state how the argument could be strengthened. Here are some alternate ways of organizing your essay:

Variation 1

1st paragraph: Restate the argument.

2nd paragraph: Discuss the link (or lack thereof) between the conclusion and the evidence presented in support of it.

3rd paragraph: Show three holes in the reasoning of the argument.

4th paragraph: Show how each of the three holes could be plugged up by explicitly stating the missing assumptions.

Variation 2

1st paragraph: Restate the argument and say it has three flaws.

2nd paragraph: Point out a flaw and show how it could be plugged up by explicitly stating the missing assumption.

3rd paragraph: Point out a second flaw and show how it could be plugged up by explicitly stating the missing assumption.

4th paragraph: Point out a third flaw and show how it could be plugged up by explicitly stating the missing assumption.

5th paragraph: Summarize and conclude that because of these three flaws, the argument is weak.

Write Your Own Template for the Argument Topic Here

1st paragraph:

2nd paragraph:

3rd paragraph:

4th paragraph:

5th paragraph:

You Are Ready to Write an Argument Essay

You've separated the conclusion from the premises. You've brainstormed for the gaps that weaken the argument. You've noted how the premises support (or don't support) the conclusion. Now it's time to write your essay. Start typing, indenting each of the four or five paragraphs. Use all the tools you've learned in this chapter. Remember to keep an eye on the time. Again, if you have a minute at the end, read over your essay and do any editing that's necessary.

What To Do with Your Time

Now that you know how to construct your essay, you have to practice writing essays in a mere 30 minutes. Here's a guideline for how to use your time:

- Break down the argument: 3–4 minutes
- Find 2–3 assumptions: 3–4 minutes
- Write essay: 18–20 minutes
- Proofread: 1–2 minutes

Notice that not a lot of time is allotted for proofreading. Remember that it's okay to have minor spelling and grammatical errors. Your time is better spent making sure you consider both sides of the issue completely and write an effective essay.

Practice: Writing an Argument Essay

Practice on the following sample argument topic. If you have access to a computer, turn it on and start up a word-processing program (again, you may want to use a very rudimentary one like Notepad to simulate the ETS program you'll see on the real test). Then set a timer for 30 minutes. In that time, read the topic, brainstorm in the space provided in this book, then type your essay into the computer.

A Sample Argument

The market for the luxury-goods industry is on the decline. Recent reports show that a higher unemployment rate, coupled with consumer fears, has decreased the amount of money the average household spends on both essential and nonessential items, but especially on nonessential items. Since luxury goods are, by nature, nonessential, this market will be the first to decrease in the present economic climate, and luxury retailers should refocus their attention to lower-priced markets.

Conclusion:

Why? (premises)

Assumptions:

When writing your essay, make sure to use terms like "causative," "analogy," "sampling" and so forth. Nothing impresses an ETS grader like a sentence like "The argument assumes the sample is representative."

Ways you can pull the argument apart:

Ways the argument could be made more compelling:

Now use the template you developed earlier in this chapter to type your essay on the computer.

How to Score Your Essay

It's time to put on your essay-scoring hat and prepare to grade your own essay. (Again, if you're lucky enough to have a friend who is also preparing for the GRE, you could switch essays.) You'll need to be objective about the process. Remember, the only way to improve is to honestly assess your weaknesses and systematically eliminate them.

Set a timer for two minutes. Read the essay carefully but quickly, so that you do not exceed the two minutes on the timer.

Now ask yourself the following questions about the essay:

1. Overall, did it make sense?
2. Did you address the argument directly?
3. Did you critique the argument thoroughly?
4. Did your introduction paragraph repeat the argument to establish the topic of the essay?
5. Did you avoid injecting your own opinion into the essay?
6. Did your essay have three strong paragraphs critiquing the arguments?
7. Did your critiques make sense?
8. Did you flesh out your points to make the weaknesses of the argument explicit?
9. Did the examples apply directly to the topic?
10. Did the essay have a strong conclusion paragraph?
11. Was the essay well organized?
12. Did you use language that made the organization of the essay obvious?
13. Did you use correct grammar, spelling, and language, for the most part?
14. Was the essay of an appropriate length (four to five paragraphs of at least three sentences each)?

If you could answer "yes" to all or almost all of those questions, congratulations! Your essay would receive a score in the 5–6 range. If you continue to practice, and write an essay of similar quality on the Analysis of an Argument essay on the real test, you should score very well.

If you answered "yes" to fewer than 12 of the questions, you have room for improvement. Fortunately, you also know which areas you need to strengthen as you continue to practice.

If you answered "yes" to fewer than 5 of the questions, your essay would not score very well on a real GRE. You need to continue to practice, focusing on the areas of weakness that you discovered during this scoring process.

There are more Argument topics for you to practice in the back of this book, but if you'd like to practice even more, go to **www.gre.org** and view the list of real Argument topics. You cannot possibly practice writing essays on all of these real ETS topics, so don't even try. However, you should spend time reading through them to become familiar with the variety of topics that ETS may give you.

Just Keep Practicing

So now you've read everything you need to know about writing high-scoring essays on the GRE. With a little practice, writing these essays should become second nature, and you'll find yourself sitting at the word processor on test day confident and prepared. Keep it up!

Summary

- Always start by identifying the conclusion of the argument.
- Look for the common types of arguments: Sampling, Analogy, and Causal.
- Brainstorm all of the assumptions that attach the premises to the conclusion.
- Outline your essay on your scratch paper before you start writing.
- Leave yourself two minutes to proofread your essay once you are done writing.

Part V
Answers and Explanations to Drills and Practice Sets

CHAPTER 4: TEXT COMPLETIONS

Practice: Finding the Clue (Page 50)

1. Your words: *bad, tortured, negative;* Underline: *reflected in the harrowing nature*

2. Your words: *highest, lofty, tallest;* Underline: *second highest mountain in the world, reaching more than 28,000 feet high*

3. Your words: *dangerous, deadly, deleterious;* Underline: *wind-chill warning, minus 25 degrees Fahrenheit or lower*

4. Your words: *leftovers, remnants, remains;* Underline: *70-year-old from World War II*

5. Your words: *distinct, different, dissimilar;* Underline: *mammoths were hairy with long tusks, while mastodons had low-slung bodies and flatter skulls*

6. Your words: *practical, pragmatic, apolitical;* Underline: *he crafted his policies not with an eye toward their political consequences but instead toward their practical effects*

7. Your words: *amount, volume, preponderance;* Underline: *he imagined that he'd have to read for hours and hours each day to finish it all*

8. Your words: *derived, obtained, borrowed;* Underline: *from the Arabic word "Algol."*

Practice: Clues and Triggers (Page 53)

1. Your words: *poor, disastrous, bad;* Underline: *top talents, ended his career;* Circle: *but*

2. Your words: *praise, accolades, thanks;* Underline: *she brokered a diplomatic solution to a potential crisis;* Circle: *work; she*

3. Your words: *healthful, beneficial, good;* Underline: *detrimental to one's health;* Circle: *While*

4. Your words: *disconnected, separate, apart;* Underline: *technological connectivity;* Circle: *Despite*

5. Your words: *graceful, beautiful, positive;* Underline: *ugliness and clumsiness;* Circle: *Although*

6. Your words: *gauge, sign, portent;* Underline: *use holiday sales to gauge future stock prices;* Circle: *prices; thus*

7. Your words: *negativity, animosity, antagonism;* Underline: *ironic, negative view;* Circle: *while, rarely*

8. Your words: *toxicity, danger, hazards;* Underline: *devastating effects on insects;* Circle: *insects; unfortunately*

Text Completions Drill (Page 56)

1. **B** **sorrow**

   The trigger *despite* tells you to change direction from the clues *smile* and *jauntily*. The blank must be something sad. Only *sorrow* fits. *Jubilance* and *liveliness* are the opposite of what would fit the blank. *Vision* is not a change of direction from *smile*.

2. **D** **scant**

   Ruthless is your clue here. Whether they're capitalists or sharecroppers, *ruthless* people would have *little* regard for others. *Mixed* and *inconsistent* imply variations in the capitalists' feelings, so toss those choices. Meanwhile, *undue* and *obtrusive* are extreme and take the sentence in the wrong direction. *Scant* fits best.

3. **C** **static**

   The semicolon in this sentence acts as a same-direction trigger, which indicates that what follows should continue the idea of "stability versus change." To keep the flow, you'll need replacement words for the opposing pair in the first clause. You already have *different* to stand in for *change*; you'll need a word that describes *stability* to go in the blank. Try *stable* and use POE. An even shorter way to crack this is to use the trigger word *yet*, which tells you that the word in the blank contrasts with *different*. In either case, *static* is the only choice that makes sense.

4. **E** **prodigious**

   The clue in this sentence is "property values and industrial output…rose exponentially," which tells you the ripples were *large*. *Persistent* doesn't address the rise in values and output, while neither *invaluable* nor *incredulous* makes sense in the blank's context. *Severe*, in contrast, implies a negative economic outcome, something unlikely if values and output were increasing

5. **B** **stolidity**

   The clue in the sentence is *inured*, which means toughened to the point where one doesn't respond. If the voters are inured, then they would not have a strong reaction, so a good word for the blank might be *stoicism* or *ambivalence*. *Stolidity* is the best answer. Eliminate *amazement*, *exasperation*, and *alarm* because they don't fit. They're not confused by the tax, so eliminate *perplexity*.

6. **A** **contradiction**

   The clue is "division between child-rearing goals." Therefore, find a word similar to *discrepancy*. *Contradiction* is the closest match for *discrepancy*.

Text Completions Practice Set (Page 63)

1. **E** **scrumptious**

   The trigger *although* tells you to change direction from the clue "did not appeal." Sean expected the donuts to be gross, but he found them tasty. Look for an answer that means *tasty* or *yummy*. Only *scrumptious* matches. *Unappetizing*, *detestable*, and *bland* are the opposite of *yummy*. Although Sean may have been *gleeful*, the donuts themselves would not be.

2. **A timid** and **F upset**

Try working with the second blank first. The clue is "using recorded bird calls makes the California gnatcatcher... easier to observe." The trigger *although* reverses the direction of the clue. Therefore, find a word similar to *disturb*. Eliminate *direct* and *increase* because they go in the wrong direction. The clue for the first blank is "easier to observe." Thus, the recorded calls must make the bird less *hard to observe*. Only *timid* goes in the right direction.

3. **C hostile** and **D obvious**

The word *however* is a trigger that tells you that the sentence changes direction. It's likely that sparring between two lawyers would appear negative in some way and that "the friendship" will be described positively. *Hostile* sparring is a direct contrast to an *obvious* friendship.

4. **B inhibits**, **E thrived**, and **I abandoned**

The three blanks work together to complete the sentence. Socialism "emphasizes collective ownership of the means of production," which would likely hurt individual expression. Put *limits* in the first blank; *inhibits* is only choice that goes in the right direction. Given this information, individualism would decrease if socialism persists and likely increase if socialism is given up. Find a pair of words for the second and third blanks that fits one of these options. Only *diminished* and *abandoned* make sense together.

5. **B casual**, **D employing**, and **I discarding**

Start with the second blank. The clue "tool users" tells you the blank means *use*. Only *employing* fits. For the first blank, if humans used whatever sticks and stones seemed *convenient*, then they were pretty lazy or impromptu tools users. Only *casual* fits. For the third blank, these casual humans would use the tool, but then get rid of it when they were finished. So, look for a word that means *to throw away*. Only *discarding* fits. *Annihilating* is too extreme.

6. **A flamboyant**

The colon is a punctuation trigger that indicates that the clue is almost certain to follow. The clue is "attended fashionable parties, wore flashy clothing, and dated other men's wives." You need a word that encapsulates all of this. *Flamboyant* is the best choice.

7. **C maladroit** and **E tyro**

The clue for the first blank comes in the phrase "the initial sense of awkwardness." Thus, developing a new skill should feel *awkward*, making *maladroit* the best choice. For the second blank, *however* acts as a trigger word before "is usually ephemeral," signaling the reversal of the beginner's awkward phase; taken together with "is usually ephemeral" and "soon gives way to mastery," it becomes even clearer that the last blank needs a word that indicates the status of someone learning a new skill. The only word that comes close is *tyro*.

8. **B tautology** and **E prestidigitation**

The primary clue for the first blank is the phrase "A is A"; a statement declaring that something is itself is a *tautology*. For the second blank, there are two main clues: The speakers mentioned in the second sentence are said to *substitute in different concepts* in a manner *worthy of a stage magician*. These phrases suggest that the speakers are engaging in a sort of verbal *sleight of hand*, which is also known as *prestidigitation*. *Peregrination* means wandering, while a *peroration* is the concluding part of a speech—and while rhetoric is the subject of this passage, there is no textual support for this choice.

9. **B quotidian**

The clue is "tremendous humanitarian consequence." The trigger is *however*, which reverses the direction of the clue. Therefore, find a word similar to *mundane*. *Fascinating* does not mean *mundane*. If you don't know *quotidian*, you can still use POE to narrow the choices. Choices (A) and (D) clearly do not mean *mundane*, nor do answer choices (C) and (E).

10. **B complaisant** and **D meddlesome**

Begin with the first sentence. The clue is that "Gomez seemed a pleasing combination." Notice the trigger word *and* following *affable*. The clue and trigger together mean that something positive and complementary to affable should go in the first blank. Choose *complaisant*. Whatever goes in the second blank can't be good, because the trigger *however* reverses the nice things said about Gomez in the first sentence, and *officious* is negative. Choose *meddlesome* for the second blank.

CHAPTER 5: SENTENCE EQUIVALENCE

Sentence Equivalence Drill (Page 71)

1. **C modern** and **E contemporary**

The trigger *or* tells you to change direction from the clue *ancient*. Look for words that mean *modern*. *Modern* and *contemporary* are the only words that mean modern. *Antiquated* and *archaic* are the opposite of what's needed. *Perceptive* and *astute* are a good trap pair because they are similar in meaning and fit the incorrect clue of *observer*, but you don't know that ancient observers were not perceptive or astute.

2. **D innate** and **F instinctive**

The blank refers to personality characteristics that interest researchers. The clue is "those that arise through experience." The use of *compared to* indicates that the blank is the opposite of the clue, so the blank has to mean *inborn*. *Innate* and *instinctive* have the same meaning as *inborn*. The other words don't fit the meaning.

3. **A aberrant** and **D unconventional**

The blank refers to Mackenzie King's behavior. The clue is "often used séances to contact his dead pet dog for advice," which would be an *abnormal* behavior. *Aberrant* and *heretical* are the only words with a similar meaning. *Repulsive* and *lackluster* don't fit. *Poised* and *decorous* describe appropriate or formal behavior, so they are more nearly opposites of what's needed.

4. **B dynamic** and **F fluctuating**

The clue *adaptability* and list of examples tell you that the conditions must be *changing*. *Dynamic* and *fluctuating* fit this meaning. None of the other choices fit. *Inveterate* means persisting. *Timorous* and *cowed* mean that the conditions of life are fearful. *Turgid* means complex.

5. **B commandeer** and **F appropriate**

The main clue is that the armed forces were "without an adequate number of vehicles of their own," strongly suggesting that they were looking to get some more. Secondary clues are that time was of the essence—"days after Hurricane Zelda had passed"—and the very fact that the subject of the sentence is *armed forces*, a group capable of taking what it wants. This all adds up to something like *seize* for the blank. *Commandeer* and *appropriate* (the verb, not the adjective) both mean this; none of the other words does.

Sentence Equivalence Practice Set (Page 76)

1. **B affinity** and **F predilection**

The word in the blank is used to describe Jim's feelings for gumdrops. The clues "enjoyed all kinds of candy" and "his absolute favorite" indicates that the blank means *liking*. Both *affinity* and *predilection* mean *liking*. *Odium* and *disregard* go in the wrong direction. *Container* might sound right, but it is not related to the clue. *Nature* does not mean liking.

2. **A fiasco** and **B debacle**

The blank concerns the Wright brothers' first attempt at flying. The clue is that they "subsequent efforts similarly ended in failure." Recycle the clue, and put *failure* in the blank. *Fiasco* and *debacle* are the best matches. *Triumph* and *feat* have the opposite meaning. *Hindrance* isn't close enough, and *precedent* doesn't mean failure.

3. **D diminishes** and **F wanes**

The clue "due to the additional demands" suggests that fuel efficiency is likely to decrease as speed increases. *Diminishes* and *wanes* both mean decreases. Eliminate *equalizes* and *stabilizes* because they mean the fuel efficiency evens out. *Adapts* and *increases* don't fit the clue, and neither has a synonym among the other answer choices.

4. **B malicious** and **F churlish**

The trigger *belied* tells you to change direction from the clue "outwardly amiable disposition." He seems friendly and nice, but he is actually unfriendly and mean, as the actions described in the second part of the sentence attest. *Malicious* and *churlish* fit this meaning. *Gregarious* and *affable* are opposite of unfriendly and mean. *Innocuous* and *insipid* don't go in the right direction—he is bad, not bland.

5. **A servile** and **C obsequious**

This asks what a language with *humble* and *honorific* forms of speech might sound like "to an ear accustomed to more egalitarian phrasings," one from a culture in which one is generally free to address others as equals. Such self-abasing forms of speech might sound *overly deferential* or just *too polite*. This leaves *servile* and *obsequious* as the correct answers, both of which connote excessive humility. *Circumspect* is close, but it has more to do with being careful about revealing information rather than with being careful about showing respect. The other possibilities do describe speech but are otherwise not close to what the sentence calls for.

CHAPTER 6: READING COMPREHENSION

Reading Comprehension Drill (Page 105)

1. C

According to the last paragraph, "To move beyond subsistence level farming, new ways to transport excess crops to market had to be found. The development of canal systems as well as an expanded and improved roadway system facilitated transportation." In other words, the infrastructure of canal systems and roadways allowed excess goods to be more easily transported and made it possible for the revolution to take hold.

2. A

According to the passage, "The term 'revolution' has been reserved by most historians for social upheaval characterized by bloodshed, the use of force, and great technological change." The author goes on to state that he agrees with Cornwall that "the term can be extended to apply to the massive agricultural transformation that took place in the mid- to late- eighteenth century." We can infer from this statement that historians generally did not view agricultural changes as revolutionary. Answer choice (B) is incorrect because the second paragraph notes that the practice of enclosure facilitated the agricultural revolution. Answer choice (C), with the use of the term *disastrous*, is too extreme. No evidence is provided in the passage to support choices (D) or (E).

3. **"To combat soil exhaustion, farmers would be required..."**

This provides a great lead word to help you find the answer—*communal*. If you search for the word *communal* in the passage, you will see that it states, "Prior to the mid-eighteenth century, farming was a *communal* activity in which the entire village decided what, where, and when to plant." The next sentence tells us the problems inherent in communal farming.

4. A

The author says that "Robert Cornwall cogently argues...," and the rest of the passage explains why Cornwall was right. Thus, you can infer the meaning of *cogently* from the passage; it means *convincingly*. Therefore, the best answer is choice (A).

5. B

Choice (B) is correct. The author states that taxonomic classifications should be used in conjunction with other information about the animal. In choice (B), the team uses both observed and accepted data, which would include classification. Choice (A) is incorrect because the scientists are use only the taxonomic information. Choice (C) is incorrect because the zookeeper uses only observed information, ignoring the taxonomic information.

6. B

The author tries to convey several facts and make a point about the appropriate use of classifications. Because *didactic* means "intended to instruct," that's pretty close. Choice (A) is incorrect because nothing in the passage indicates that the author is upset. Choice (C) is incorrect because the author has a definite opinion on the matter. Choice (D) is incorrect because the author does not sound sad. Choice (E) is incorrect because the passage does not praise anything.

7. **"The appearance and habitat of the moon rat are actually..."**

The author's conclusion is that you have to look at a variety of different types of information to get an accurate picture of the moon rat. The correct sentence mentions that, although the moon rat is similar to the other animals in its family in some ways, it's dissimilar in others. This demonstrates that the classification alone does not give an accurate picture, which leads directly to the conclusion.

8. **A**

Laudatory means expressing praise, which you can surmise from the second paragraph. *Approbative* also means expressing praise, thereby making it the correct answer. Choice (B) is incorrect because *analytical* doesn't mean expressing praise. Choice (C) means not affected by personal or emotional involvement. Choice (D) means an outstandingly clear or typical example of. Choice (E) means leaving no doubt.

9. **"Critics rightly praised the book's vivid accounts of tribal beliefs..."**

The usage of the word "rightly" shows that the author approves of the critical praise Achebe's book received.

10. **B**

The first paragraph of the passage explains why Achebe decided to write *Things Fall Apart*. The second paragraph describes some of the praise Achebe received for his work. The final paragraph explains some of the criticism Achebe received for his work. Answer choice (A) focuses only on the first paragraph and is too specific. The use of the word *prove* in answer choice (C) is too strong. Neither choice (D) nor choice (E) is supported by the passage.

Practice: Identifying Conclusions (Page 111)

1. "it is unlikely that the new defense bill will pass"
2. "grass was not a significant part of the dinosaur diet"
3. "automaker X will have no choice but to file for bankruptcy"
4. "country Y will experience a decrease in obesity-related health problems"
5. "machines will soon outnumber humans as the number-one users of the Internet"

Practice: Finding the Premise (Page 115)

1. **Premise**: A bipartisan group of 15 senators has announced that it does not support the legislation.
2. **Premises:**

(1) "The earliest known grass fossils date from approximately 55 million years ago"
(2) "Dinosaurs most likely disappeared from the earth around 60 million years ago"
(3) "fossilized remains of dinosaur teeth that indicate the creatures were more suited to eating ferns and palms"

3. **Premises:**

(1) "company's poor financial situation"
(2) "the workers at automaker X are threatening to go on strike"

4. **Premise**: "the leading members of the nation's food industry have agreed to provide healthier alternatives, reduce sugar and fat content, and reduce advertisements for unhealthy foods"
5. **Premise**: "Recent advances in technology have led to a new wave of 'smart' appliances"

Practice: Locating Assumptions (Page 119)

1. **Conclusion**: There will be no decline in enrollment at the University.

Why?

Premise: The University plans to hire two highly credentialed biology professors to replace Professor Jones.

Assumption: That the two new biology professors will be at least as attractive to prospective students as was Professor Jones.

2. **Conclusion**: It makes no sense to charge more to customers under 25 years of age who rent cars.

Why?

Premise: Most states allow people as young as 16 to have a driver's license and all states allow 18-year-olds the right to vote.

Assumption: Because people under the age of 25 have the right to vote and drive there is no reason to charge them more to rent a car.

3. **Conclusion**: Roughly 12.5 percent of planets in the universe should have life on them

Why?

Premise: In our solar system, there are eight planets and at least one of them has life on it.

Assumption: All planetary systems in the universe have the same proportion of planets with life on them as does our solar system.

4. **Conclusion**: The leaders of State A should institute the gas tax.

Why?

Premise: 58 percent of voters in Township B approve of a proposed 2-cent gasoline tax.

Assumption: The opinion of Township B is representative of the opinion of all of State A.

Critical Reasoning Practice Set (Page 133)

1. A

If the conclusion is that it is unlikely that a sufficient number of parts will be available, and the main premise is that the number of factory returns is decreasing, the assumption must be that parts come from factory returns. Choice (A) correctly identifies the gap in the argument. Choice (B) is extreme. Note the use of the word *will*. You don't need anything that strong to hold the argument together. For choice (C), how many people decide to *purchase* a refurbished unit is out of scope because the argument is about the actual process of refurbishing. For choice (D), the manufacturer's predictions are out of scope. For choice (E), be suspicious of the word *every*. You don't need to assume anything that extreme to connect the premise to the conclusion.

2. A

The conclusion is that the apprehension about the dumping of liquid waste from 1983 to 1993 is unwarranted. The premise is that tests performed during the 1960s showed little or no contamination. The argument assumes that the dumping that took place during the 1960s is comparable to the dumping that took place from 1983 to 1993. To weaken the argument, find a reason why the two time periods should not be compared. Choice (A) points out that the amount of dumping during the 1960s was significantly less than that from 1983 to 1993. For choice (B), the greater concentration of contaminants would strengthen the argument. For choice (C), solid waste is out of scope. For choice (D), the "efforts of environmentalists" are beyond the scope of the argument. Choice (E) would strengthen the argument.

3. C

This is an inference , so you're looking for the answer choice that is supported by the argument. We know from the argument that democratic governments have more autonomous departments, and so they require a higher level of cooperation as stated in choice (C). For choice (A), there is no information in the passage about generalized policy. Choice (B) gets the information backwards. There will be more specialized policy makers in democratic governments because democratic governments have more autonomous departments. Choice (D) also gets the information backwards. The argument leads us to believe that an administrator's job is more difficult in a democratic government. For choice (E), efficiency is out of scope

4. E

You need to explain why there were more occurrences of retinal irritations between 1983 and 1991, even though people were exposed to UVRs less frequently. Choice (E) explains that the number of retinal irritations between 1983 and 1991 was not affected by the level of UVRs in that time period. For choice (A), the temporary nature of the irritations is out of scope. For choice (B), the atmospheric elements are out of scope. For choice (C), the decrease in the average level of exposure does not explain the rise in irritations. For choice (D), anything that happened after 1991 is out of scope.

5. A

Choice (A) explains how it can be true that even though running the engine consumes gas, letting the engine run during a short stop uses less gas than does turning the engine off. If more fuel is consumed by restarting the engine than would have been consumed by the running engine, then the scientific study becomes understandable. For choice (B), the amount of fuel consumed to bring the engine up to running speed is out of scope. For choice (C), the decrease in output for the engine is out of scope. For choice (D), the release of gases into the atmosphere is out of scope. For choice (E), why people use their cars is out of scope.

6. B

The argument concludes that the improved surgical techniques were responsible for the increased longevity of those diagnosed with stomach cancer. The premises are that more people experience complete remission and that improved surgical techniques were developed. The argument assumes that there was no other cause for the increase in longevity. Choice (B) strengthens the argument by eliminating an alternate cause. If the percentage of advanced stage cancers was the same before and after 1982, a decrease in the cancer rate could not have been the reason for the increase in longevity. For choice (A), people having more surgery in the early stage would provide an alternate cause and weaken—not strengthen—the argument. For choice (C), if a greater percentage were diagnosed, that would provide an alternate cause, and weaken—not strengthen—the argument. For choice (D), the frequency of stomach surgery among the general population is out of scope. For choice (E), other improvements would provide an alternate cause and weaken—not strengthen—the argument.

CHAPTER 7: VOCABULARY FOR THE GRE

Group 1 Exercises: Matching (Page 145)

1. C
2. J
3. E
4. G
5. A
6. L
7. K
8. B
9. N
10. H
11. M
12. I
13. D
14. F

Group 2 Exercises: Matching (Page 149)

1. B
2. M
3. F
4. J
5. N
6. A
7. D
8. E
9. L
10. C
11. H
12. I
13. G
14. K

Group 3 Exercises: Matching (Page 152)

1. D
2. G
3. K
4. I
5. M
6. A
7. C
8. N
9. H
10. F
11. E
12. B
13. J
14. L

Group 4 Exercises: Matching (Page 155)

1. I
2. L
3. N
4. C
5. K
6. B
7. J
8. A
9. G
10. E
11. M
12. D
13. H
14. F

CHAPTER 9: NUMBERS AND EQUATIONS

Numbers and Equations Drill (Page 217)

1. A, B, and D

Follow PEMDAS, and simplify each answer choice. For choice (A), $\frac{2}{3} \times 33 - 12 = 22 - 12 = 10$, so choice (A) is correct. Choice (B): $\frac{2}{3} \times 51 - 24 = 34 - 24 = 10$, and choice (B) is correct. Choice (C): $33 - 22 \times 1\frac{1}{2} = 33 - 33 = 0 \neq 10$, so choice (C) is wrong. Choice (D): $51 \div (17 \times 3) + 9 = 51 \div 51 + 9 = 1 + 9 = 10$, and choice (D) is correct. Choice (E): $(51 \div 17) \times 3 + 9 = 3 \times 3 + 9 = 9 + 9 = 18$, so choice (E) is wrong.

2. A

Solve for a by subtracting 7 from both sides of the first equation: $23 - 7 = 16$. Plug $a = 16$ in for the second equation to get $b - 16 = -10$. Add 16 to both sides to find $b = 6$.

3. 27

Because $9 = 3^2$; the original equation becomes $3^3 \times (3^2)^{12} = 3^x$; or, $3^3 \times 3^{24} = 3^x$; or, $3^{3+24} = 3^x$. Therefore, $x = 27$.

4. C

Solve for x by stacking up and adding the two inequalities. In so doing, the y variable from each inequality cancels out, and you get $3x > 36$, or $x > 12$.

5. A

You have the relationship among can prices, but no actual numbers, so try plugging in some numbers for can prices. The calculations will be easy if you make the large can cost $5 \times 7 = \$35$, which means that the medium can costs $35 \div 5 = \$7$, and the small can costs $35 \div 7 = \$5$. The amount of money that would buy 200 medium cans is $200 \times \$7 = \$1400$. Because the customer buys the same number of small and large cans, she spends \$40 on each small-and-large can combination. Divide \$1400 by \$40 to get the number of sets she buys ($\$1400 \div \$40 = 35$). She buys 35 sets of small and large cans, which means that she buys 35 small cans, choice (A).

6. 12 and –12

To isolate $(x + y)$, take the square root of both sides. So, $(x + y) = \pm 4$. Solving the same way for $(x - y)$, you get $(x - y) = \pm 3$. Substituting into the difference of two squares equation $(x^2 - y^2) = (x + y)(x - y)$, you get $(x^2 - y^2) = (\pm 4)(\pm 3)$, or a value of 12 or –12.

7. B

Translate the equation. $3a = 6b - 4$. Because the asks for the value of $a - 2b$, go ahead and rearrange your equation so the a and b are on the same side. $3a - 6b = -4$. Next, divide both sides by 3. $\frac{3a - 6b}{3} = -\frac{4}{3}$.

8. A

Simplify each quantity by rationalizing the denominators. For Quantity A, to get rid of the radicals, multiply numerator and denominator by $(\sqrt{5} + \sqrt{2})$, because $(x - y)(x + y) = x^2 - y^2$. You now have $\frac{\sqrt{12}(\sqrt{5} + \sqrt{2})}{\sqrt{5}^2 - \sqrt{2}^2} = \frac{\sqrt{60} + \sqrt{24}}{5 - 2} = \frac{2\sqrt{15} + 2\sqrt{6}}{3}$. For Quantity B, multiply numerator and denominator by $\sqrt{27}$ to get $\frac{(\sqrt{2} + \sqrt{5})(\sqrt{27})}{\sqrt{27}^2} = \frac{\sqrt{54} + \sqrt{135}}{27} = \frac{3\sqrt{6} + 3\sqrt{15}}{27} = \frac{\sqrt{6} + \sqrt{15}}{9}$. Quantity A is $\left(\sqrt{15} + \sqrt{6}\right) \times \frac{2}{3}$ and Quantity B is $\left(\sqrt{15} + \sqrt{6}\right) \times \frac{1}{9}$,

so Quantity A is greater.

9. **D**

Plug In. If $a = 3$, $b = 6$, $c = 3$, $d = 5$, and $e = 10$, the value of the equation is $\frac{(10)\left(3+\frac{6}{3}\right)}{5} = 10$. Half of 10 is your target of 5. Try doubling each variable to find the one that yields 5. The only one that works is doubling d to 10 so that the equation is $\frac{(10)\left(3+\frac{6}{3}\right)}{10} = 5$.

10. **A, B,** and **E**

You have variables in the question and variables in the answers, so Plug In. If $x = 6$, then $a = 2$, and if $y = 36$, then $b = 4$. $2(x + y)$ equals 84, so that is your target number. Check your answer choices. A = 48, B = 60, C = 84, D = 84, and E = 96. Since we're looking for the ones that *don't* equal 84, the correct answers are A, B, and E.

CHAPTER 10: REAL WORLD MATH

Real World Math Drill (Page 260)

1. **A**

Plug In for r. If $r = 2$, we can now solve for s. $3(2 + s) = 7$, $2 + s = \frac{7}{3}$, $s = \frac{7}{3} - 2$. Convert the 2 to a fraction and get $s = \frac{7}{3} - \frac{6}{3} = \frac{1}{3}$. Go through the answer choices, Plugging In 2 for r. Choice (A) yields the target of $\frac{1}{3}$.

2. $\frac{1}{6}$

Plugging In your own number is a good way to tackle this. The fractions used in the problem are $\frac{1}{3}$ and $\frac{1}{2}$, and multiplying the denominators will produce a good number with which to work. Sadie started with 6 paintings and gave away one third of them: $6 \times \frac{1}{3} = 2$. She has 4 paintings left. She then sold another half of the original 6: $6 \times \frac{1}{2} = 3$. So, she's has 1 painting left, or $\frac{1}{6}$ of the total.

3. **B, C,** and **D**

A \$20 scarf can be discounted as much as 50 percent, and $\$20 \times \frac{50}{100} = \$10$, so the minimum sale price of a scarf is \$20 – \$10 = \$10. The smallest discount is 25 percent, and $\$20 \times \frac{25}{100} = \$5$, so the maximum sale price of a scarf is \$20 – \$5 = \$15. You have determined the range of possible sale prices for scarves is \$10 to \$15. Now, you need to eliminate answers that fall outside of that range: Choice (A) is too small, and choice (E) is too large.

4. **C**

To find the value in each column, translate the words into arithmetic. Rewrite Quantity A as $\frac{12}{100} \times 35 = \frac{12 \times 35}{100}$ and Quantity B as $\frac{35}{100} \times 12 = \frac{35 \times 12}{100}$. The expression in Quantity A is the same as the expression in Quantity B.

5. **A**

Use the bowtie to compare the quantities: Multiply opposing numerators and denominators, and compare the resulting products. Think of Quantity B as $\frac{10}{1}$. Multiply 2.6 × 1 to get 2.6 on the Quantity A side. Multiply 0.259 × 10 to get 2.59 on the Quantity B side. Because 2.6 is greater than 2.59, Quantity A is greater.

6. **D**

The population rankings for Year *X* are: (1) Massachusetts, (2) Connecticut, (3) Maine, (4) Rhode Island, (5) New Hampshire, (6) Vermont. And for Year *Y*: (1) Massachusetts; (2) Connecticut; (3) Rhode Island; (4) New Hampshire; (5) Maine; (6) Vermont. Maine, Rhode Island, and New Hampshire have different rankings from Year *X* to Year *Y*.

7. **E**

In Year *Y*, Vermont's population is 3 percent of 25 million (or 0.75 million), and Massachusetts' population is 37 percent of 25 million (or approximately 9 million). 9 million is what percent of 0.75 million? Now translate: 9 million = $\frac{x}{100}$ × 0.75 million: $x = 1{,}200$.

8. **D**

In Year *X* the population of Rhode Island was 10 percent of 15 million, or 1.5 million. In Year *Y* the population of Rhode Island was 15 percent of 25 million, or 3.75 million. The increase was 2.25 million, or 2,250,000.

9. **B**

The percent change of Connecticut's percent of total New England population from Year *X* (24 percent) to Year *Y* (27 percent) is: $\frac{3}{24} = 12.5$ percent. The percent change of Massachusetts's percentage of total New England population from Year *X* (40 percent) to Year *Y* (37 percent) is: $\frac{3}{40} = 7.5$ percent. The approximate difference is 5.

10. **D**

You are given that towns *A* and *B* each have 3,000 supporters of the referendum and that *B* and *D* have an average of 3,500 supporters. Using the average circle you find out that *D* has 4,000 supporters. You know nothing about *C*. Because *C* and *D* are the two southern–most towns, we cannot tell what their average is. For example, if *C* had zero supporters, the average of *C* and *D* would be 2,000, which is less than Quantity B. If *C* had 4,000 supporters, the average of *C* and *D* would be 4,000, which is greater than Quantity B.

11. **E**

Plug In the answers, starting in the middle with choice (C). If each A employee was given $740, each *C* employee was given half of that, or $370. Each *B* employee received one-and-a-half times the *C* raise, so 1.5 × $370 = $555. Now calculate the total money spent on raises. 50 *A* employees got $740 each, for a total of 50 × $740 = $37,000. 100 *B* employees got $555 each, for a total of 100 × $555 = $55,500. 150 *C* employees got $370 each: 150 × $370 = 55,500. These add up to a total of $148,000, but the problem says that the total raise amount is $500,000. You need a much bigger answer. Rule out choices (A), (B), and (C). Try skipping directly to (E). If the *A* workers got $2500, the *C* workers got $1250, and the *B* workers got $1875. 50 × $2500 = $125,000; 100 × $1875 = $187,500; and 150 × $1250 = $187,500. Because these numbers add up to $500,000, choice (E) is correct.

12. **19**

Plug In $100 for the price the retailer pays for the item. This means the original selling price is 40 percent more, or $140. To find the reduced selling price, subtract 15 percent of $140 from $140 to get $119. The retailer's profit (selling price – cost) is $19. Translating the last line of the , we get $19 = (x ÷ 100) × 100, or 19 percent.

13. **B**

Median means middle. In other words, if you put all the ninth graders in order by score, the middle student would have the median score. Thinking in terms of percentiles, the 50th percentile is the middle, so on the ninth grade pie chart, whatever score includes the 50th percentile when you put the scores in order is the median score. According to the chart, 16 percent of the ninth graders scored below 65, and 37 percent scored between 65 and 69 points. 16 percent + 37 percent = 53 percent. The 50th percentile, then, falls within the group that received 65–69, so 65–69 is the median score.

14. **A**

In 1975 there were 1350 + 950 + 625 + 47, or 3,400 students in grades 9 through 12. 3,400 is 35 percent of School District *X*, so $3400 = \frac{35}{100} \cdot x$, $x \approx 9700$, so there were 9,700 students.

15. **E**

There were 1,200 ninth graders in 1993. 25 percent of them, or 300, scored in the 70–79 point range. 14 percent, or 168, scored in the 80–89 point range. The difference between 300 and 168 is 132. (E) is the closest choice.

16. **A**

Use the bowtie method to subtract the numbers in Quantity A. This gives you $\frac{50-27}{25} = \frac{23}{25}$. If you bowtie the fractions in Quantity B, you get $\frac{375+60}{625} = \frac{435}{625}$. To compare the two quantities, multiply the fraction in Quantity A by $\frac{25}{25}$. This gives you a value of $\frac{575}{625}$ for Quantity A, making it the larger value.

17. **D**

Use several ratio boxes on this problem. Because *X* has 2 parts of *a* and 3 parts of *b*, there are 5 parts total for *X*, while *Y* has 1 + 2 = 3 parts total. Convert these ratios so that they have the same total, which will allow you to compare them. Multiply *X* by 3 and *Y* by 5 so that each have 15 total. The new *X* is 6 parts *a* and 9 parts *b*, and the new *Y* is 5 parts *a* and 10 parts *b*. For solution *Z* there are 2 parts *X*, so 3 × 6 = 18 parts *a* and 3 × 9 = 27 parts *b*. There are 11 parts of *Y* in *Z*, so there are 11 × 5 = 55 parts *a* and 11 × 10 = 110 parts *b*. Thus, solution *Z* has 18 + 55 = 73 parts a and 27 + 110 = 137 parts *b*, and 73 + 137 = 210 total in the ratio. Because the actual total is 630, which is 210 × 3, there must be 73 × 3 = 219 parts of *a* in the final solution of *Z*.

18. **25**

The library has 160 books on Sunday. Monday's total is 160 – 40, or 120. Tuesday is $120 + (\frac{1}{2} \times 40)$, or 140. Wednesday is $140 + (\frac{1}{2} \times 20) - 20$, or 130. Thursday is $130 + 80 + (\frac{1}{6} \times 30)$, or 215. Friday and Saturday see 65 more books leave, so the total for the end of Saturday is 215 – 65 = 150. Note that the asks for Monday, not the first Sunday. The percent change from Monday to Saturday is $\frac{(150-120)}{120} \times 100$, or 25 percent.

19. **B and D**

Use the Average Pie to find that Jill's mean of 3.75 for 8 evaluations gives her a current total of 3.75 × 8 = 30 points. Use the Average Pie to find that if she needs an average of 4.0 for 12 scores, she needs 4.0 × 12 = 48 total points. Jill still needs 48 – 30 = 18 points. Her four remaining scores must total 18 or greater. Only answers (B) and (D) have a total of at least 18.

CHAPTER 11: GEOMETRY

Geometry Drill (Page 296)

1. **A, B, and C**

You need to check if the two angles in each answer choice can be part of a right triangle. A right triangle has a 90-degree angle, and because the sum of all the angles of a triangle is 180 degrees, the sum of the other two angles must equal 180 – 90 = 90 degrees. In answer choice (A), 20 + 70 = 90 degrees, so these could be the other two angles in a right triangle. Answer choices (B) and (C) also add up to 90 degrees, and so they are correct as well. In choices (D) and (E), the two angles have a sum greater than 90 degrees, so they are incorrect.

2. **B**

To find the perimeter of the figure, you need to add up all of its external sides. As written, you're missing the measure of one side of the rectangle. Because the side of the rectangle is equal to the hypotenuse of the right triangle, use the triangle to find the missing side. To find the hypotenuse of the right triangle recognize the common right triangle (5:12:13), or use the Pythagorean Theorem ($5^2 + 12^2 = x^2$). The missing sides of the rectangle are each 13. Therefore, the perimeter equals 5 + 12 + 17 + 13 + 17 = 64. Answer choice (A) is the perimeter without the missing side of the rectangle. If you chose answer choice (D), you included in interior side of the rectangle.

3. **A**

We know that the triangle *EFG* is equilateral because all three angles are equal. That means all of its sides equal 8. From the first equation, we know that the sides of the square also equal 8. The area of the square is $s \times s = 8 \times 8 = 64$, which is larger than Quantity B.

4. **D**

Draw it on your scratch work, and plot the points. Both *a* and *b* must be positive, but their values could be equal or unequal. Region I has (+, +) coordinates, Region II has (–, +) coordinates, Region III has (–, –) coordinates, and Region IV has (+, –) coordinates.

5. **E**

There are variables in the answers, so Plug In. If the shorter piece is 2 yards long, then the longer piece is 3(2) + 2 = 8 yards and *T* must be 2 + 8 = 10. The target answer, the length of the longer piece, is 8. Plug In 10 for *T* into all of the answers. Answer choice (E) is the only answer choice that matches your target of 8.

6. **D**

If *CD*, the radius of the smaller circle, is 3, then the diameter of the smaller circle is 6. The diameter of the smaller circle is equal to the radius of the larger circle because the smaller circle touches the center and the edge of the larger circle. The formula for the area of a circle is πr^2, so the area of the larger circle is 36π. To find the area of the semicircle, divide by 2 to find 18π.

7. **24**

Because Karl's turn from due south to due east forms a right angle, you can use the Pythagorean theorem, in which the hypotenuse is 25, one leg is 7, and the other leg is *x*. Therefore, you have $7^2 + x^2 = 25^2$. Solving for *x*, you get $49 + x^2 = 625$, or $x = 24$.

8. **A**

Circumference of a circle is $2\pi r$, which is greater than 6 times the radius. Perimeter of a square is 4 times the length of a side, or $4r$. Try plugging in values for *r*, and you will see that Quantity A is always greater than Quantity B.

9. **C**

The area of the circle is 25π, so the radius of the circle is 5. This means that both *AC* and *BC* have length 5, and angles *A* and *B* are equal to each other. Because angle *C* is 60° and the total angle measure of a triangle is 180°, the sum of angle *A* and *B* must be 120°. Thus, each angle in triangle *ABC* is 60°, making this is an equilateral triangle. An equilateral triangle has equal sides and equal angles, so the only possible length of the triangle legs is 5.

10. **A**

Remember the third side rule. The third side of a triangle must be less than the sum of the other two sides of a triangle, but greater than the difference. That gives us a clear range for *x*. It must be greater than 6 but less than 12. Quantity A, therefore, is greater than Quantity B; the answer is (A).

11. **A**

One trick to interpreting geometry problems is to exaggerate whatever is going on in your picture. You can see that the two triangles are almost the same, except that the base length in the triangle to the right is slightly larger. Well, what happens as you keep stretching out that base length? The triangle starts to collapse and its height gets smaller and smaller. Thus, height *f* must be greater than height *g*. This technique works quite well in a number of GRE quant comp geometry problems!

12. **B**

In order to find the *x*-coordinate of a point on a line, you must first find the slope of the line. Notice that along with points *A* and *B*, the origin is also a point on the line in the figure. Using the coordinates of (0, 0) and *A* (2, 3), the slope is $\frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{3}{2}$. Because the slope of a line stays constant, you can use the value you just found to solve for the missing *x*-coordinate of point *B*. Using points *A* (2, 3) and *B* (*x*, 4.2), solve $\frac{(4.2-3)}{(x-2)} = \frac{3}{2}$. Cross-multiply to find that $3x - 2 = 2.4$, so $x = 2.8$ or choice (B).

13. **A**

Use the 3 : 4 : 5 ratio or the Pythagorean theorem to determine that the length of *AB* is 4. Because the area of a triangle equals $\frac{1}{2} \times$ base × height, triangle *ABD* has an area of $\frac{1}{2} \times 3 \times 4$, or 6. Be wary of answer choice (D), which is the area of the rectangle.

14. **B**

Because the two angles have the same measure, the wedges of the circle they mark off will have the same area. The triangle is smaller than the wedge, so Quantity B is greater than Quantity A.

15. **C**

Because *LMNO* is a parallelogram and $c = 108$, angle *LON* must be 180 – 108 = 72. Angle *LON* is the same fraction of the entire circle (360 degrees) that arc *d* is of the entire circumference, $\frac{72}{360} = \frac{1}{5}$. Thus, arc *d* must be $\frac{1}{5}$ of the circumference. So, $\frac{1}{5} \times 15\pi = 3\pi$. If you were stuck on this problem, you could have estimated that *d* looks to be about a fourth or fifth of the circle's circumference. Thus, eliminate answers (A) and (B).

CHAPTER 12: MATH ET CETERA

Et Cetera Drill (Page 316)

1. C

If there is one more red marble than blue, there must be 7 blue marbles and 8 red ones, for a total of 15. The probability of choosing a blue marble is $\frac{\#\text{ of blue marbles}}{\text{Total }\#\text{ of marbles}}$, or $\frac{7}{15}$. If you selected choice (E), you probably computed the probability of drawing a red marble rather than the probability of drawing a blue one.

2. D

Plug the values into the function. First, find ¥(5): (5 × 10 – 1) = 49. Next, find ¥(3) = (3 × 10 – 1) = 29. Now subtract them: ¥(5) – ¥(3) = 49 – 29 = 20.

3. A

Find all the factors of 78. 78 = 1 × 78 = 2 × 39 = 3 × 26 = 6 × 13. The largest odd factor is 39; the largest prime factor is 13. Quantity A is greater than Quantity B.

4. 20

All 5 finalists could be awarded "Best in Show." There are 4 choices left for "Honorable Mention," because a different dog must be chosen. Therefore, the total number of possibilities is 5 · 4, or 20.

5. A

Use the group equation: Group 1 + Group 2 – Both + Neither = Total. So, $40,000 + $30,000 – $15,000 + Neither = $90,000. Thus, $55,000 + Neither = $90,000. So, the company spends $35,000 on other products.

6. B

List out the two-digit prime numbers less than 50: 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, and 47. The numbers in which the tens digit is greater than the units digit are 31, 41, and 43. Because 3 out of the 11 possibilities meet the requirement, choice (B) is correct.

7. A

Plug In the answer choices, starting with (C). With 9 staff members, the elected official has $\frac{9!}{5!4!}$ (alternatively, you may have set this up as $\frac{9\times8}{1\times2}$). This works out to 36, which is too large. Try plugging in answer choice (A). With 7 staff members, the elected official has $\frac{7!}{5!2!}$ = 21 different groups of 5 from which to choose (again, you may have set this up the alternative way as $\frac{7\times6}{1\times2}$).

8. E

Plug In: Make $x = 2$ and $y = 3$. Now $x \# y = 2(2 - 3) = -2$. Watch out for traps: Answer choices (A) and (C) will give you –2, but because the asks for $x \# (x \# y)$, you need to perform the operation again. $2 \# (-2) = 2[2 - (-2)] = 2(4) = 8$. Now put $x = 2$ and $y = 3$ into the answer choices to find a match for your target answer, 8. Be sure to eliminate choices (A), (B), (C), and (D) as soon as you realize they are negative. The only answer that matches is choice (E).

9. B

Use a ratio box to find that if there are twice as many yellow as green and 12 total, then there are 8 yellows and 4 greens. Two situations would fit the requirements of the problem: pull out a yellow and then green, or pull out a green and then yellow. So, find the probability of each of these situations, then add these two probabilities together. The probability of yellow and then green is $\frac{8}{12}\times\frac{4}{11}=\frac{8}{33}$. The probability of green and then yellow is $\frac{4}{12}\times\frac{8}{11}=\frac{8}{33}$. Add these two probabilities to find $\frac{8}{33}+\frac{8}{33}=\frac{16}{33}$.

10. B

You could try to draw this all out, but it would probably be quite a headache. For Quantity A, if you're creating triangles, you're really choosing three points from the set of 10. This is a combination problem—order doesn't matter, because triangle *ABC* would be the same as triangle *BCA*. You could use the formula: $\frac{10!}{3!(10-3)!}=\frac{10!}{3!(7!)}=\frac{10\times9\times8}{3\times2\times1}$ = 120. Alternatively, if you used the "make slots" method, you'd have: $\frac{10\times9\times8}{3\times2\times1}$ = 120. For Quantity B, note that quadrilaterals are any four-sided figures, so you're just choosing 4 points from 10. You could use the formula for combinations: $\frac{10!}{4!(10-4!)}=\frac{10!}{4!(6!)}=\frac{10\times9\times8\times7}{4\times3\times2\times1}$ = 210. Alternatively, if you used the "make slots" method, you'd have: $\frac{10\times9\times8\times7}{4\times3\times2\times1}$ = 210.

Comprehensive Math Drill (Page 318)

1. C

Cross multiply. $\frac{0.05}{0.6}=\frac{x}{0.18}$, so $0.6x = (0.05)(0.18)$, and $x=\frac{(0.05)(0.18)}{0.6}$ = (0.05)(0.3) = 0.015.

2. C

Simplify the expression in Quantity B: $\frac{\frac{x}{5}}{2}=\frac{x}{5}\div\frac{2}{1}=\frac{x}{5}\times\frac{1}{2}=\frac{x}{10}$. The expressions in Quantity A and in Quantity B are the same.

3. C

Remember that the percentages for standard deviation s are 34 percent, 14 percent, 2 percent in both directions from the mean. If the mean is 50, then 34 percent score between 50 and 54, 14 percent score between 54 and 58, and 2 percent score above 58. The same idea applies in the other direction: If the mean is 50, then 34 percent score between 50 and 46, 14 percent score between 46 and 42, and 2 percent score below 42. So, the quantities are both equal to 2 percent.

4. B

The equation $y = mx + b$ describes a line where m is the slope and b is the y-intercept—the place where the line crosses the y-axis. Hence, the y-intercept of our line, or P, is (0, 1), which means the length of OP is 1. Because R is on the x-axis, the y-coordinate must be 0, and we can use the line equation to solve for x: $0 = -\frac{5}{6}x + 1$, so $-1 = -\frac{5}{6}x$, and $x = \frac{6}{5}$. That means OR = $\frac{6}{5}$, and Quantity A is greater. Because this is a Quant Comp, though, we can actually compare the Quantities without solving them. If you recognize from the line equation that our slope is $-\frac{5}{6}$, and you remember that slope is defined as $\frac{rise}{run}$, you might also recognize that Quantity A, OR, is our run, and Quantity B, OP, is our rise. Disregarding the negative sign—distance is always an absolute value, and therefore positive—we can see that our rise is less than our run, and Quantity A is greater.

5. B

For Quantity A, "pairs" tells you that you're picking two and that order does not matter: This is a combination. You could use the formula: $\frac{20!}{2!(20-2)!} = \frac{20!}{2!(18)!} = \frac{20\times19}{2} = 190$. Alternatively, you may have learned the "make slots" way: $\frac{20\times19}{1\times2} = 190$. For Quantity B, the "rankings" tells you that order matters: This is a permutation. So, you could use the formula: $\frac{10!}{(10-3)!} = \frac{10!}{7!} = 10 \times 9 \times 8 = 720$. Alternatively, the "make slots" way would be $10 \times 9 \times 8 = 720$.

6. D

The denominator is the same for both expressions, so we only need to compare numerators to determine which fraction is greater. Plug In to see whether kl is greater than or less than 1. Let $k = 0.5$ and $l = 1.5$, $kl = 0.75$. Eliminate answer choices (B) and (C). Now let $k = 10$ and $l = 10$, $kl = 100$. Eliminate answer choice (A).

7. A

Approximate your values. In Column A, $\sqrt{3} + \sqrt{4} \cong 1.7 + 2 = 3.7$. In Column B, $\sqrt{7}$ is less than 3, so Column A is greater.

8. 4

If Joe starts with $200 and spends $150 on a CD player, he only has $200 – $150 = $50 left. Each CD is $12, so divide $50 by $12. It goes in 4 times with $2 left over. Don't round! Joe can only buy 4.

9. A

For triangle ABC, the base is the difference between C and B, 1. Finding the height is a little more difficult. The height of a triangle is any perpendicular line dropped from the highest point to the level of the base. The height does not need to touch segment CB as long as it extends from A to the level of CB. For this triangle, distance from A to the origin is the height, 4. Plugging In the base and height: Area = $\frac{1}{2} \times 1 \times 4 = 2$.

10. B, C, and D

To solve this problem, first use PEMDAS: $10(3^2 - 2) = 10(9 - 2) = 10(7) = 70$. The states that 70 is divided by a positive integer, so try dividing 70 by different integers. Choices (B), (C) and (D) could work because you can divide 70 by 1, 2, and 7 respectively. Choice (A) does not work because to get 140, you would have to divide 70 by $\frac{1}{2}$, which is not an integer. Also, 0 is neither positive nor negative, and you cannot divide a number by 0, so choice (E) could not work either.

11. B and C

Roberta's rate is 50 miles in 2 hours. Notice that the first number in this proportion is greater than the second. Use that to eliminate choices (A) and (D). For choice (B), $\frac{100}{4} = \frac{50}{2}$, so this is the same as the original proportion. For choice (C), $\frac{400}{16} = \frac{50}{2}$, so this is also the same as the original proportion.

12. C

There were seven cities with higher temperatures in Year Y: Baltimore, Detroit, Las Vegas, Minneapolis, New York, Phoenix, and San Francisco.

13. C

The lowest average temperature was 34° F in Anchorage, and the highest was 83° F in Las Vegas.

Percent change = $\frac{\text{difference}}{\text{original}} = \frac{49}{34} \approx 144$ percent.

14. C

You're averaging the highs and lows for Years X and Y, so the number of things is 4. The bar shows the average of Years X and Y, which reads 60. Multiply 60 by 4 to get the total, 240. Get the average high temperatures for Years X and Y from the straight and dotted lines on the chart. They're about 103 degrees and 97 degrees. The total is 240 = 103 + 97 + low Year X + low Year Y. If you subtract the highs from the total, you're left with 40 degrees as the total for the lows. Because you want the average of the lows, divide this total by 2. The closest answer is 20°.

15. A, B, and C

First, simplify the inequality by subtracting 2 from both sides: $|2x - 3| > 5$. Now plug each answer choice into the inequality to see which value of x makes the inequality true. The correct values are those in choices (A), (B), and (C).

16. A

The question states that x is an odd integer, so eliminate choice (C) because 0 is not odd. Simplify $x + y + z < z$ by subtracting z from each side: $x + y < 0$. Because x is less than y, x must be negative so that when added to y the answer will be less than zero. Therefore, eliminate choices (D) and (E). Now Plug In the remaining answers to see which value of x will work in the inequality. Choice (A) is the only choice that works.

17. E

First, solve for x by multiplying 4 by itself until you get 1024. This means that x equals 5. Substituting 5 for x in the second equation, the reads, "What is $4^6 \times 5^4$?" Because the answers are expressed in terms of 4^n, 5^n, and 10^n, expand out $4^6 \times 5^4$ to get $4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 5 \times 5 \times 5 \times 5$. Now try to express it using 10^n. We need to factor two of the fours and rewrite this as $4 \times 4 \times 4 \times 4 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$. Now, convert this back into exponents to get $4^4 \times 2^4 \times 5^4$, or $4^4 \times 10^4$.

18. D

First, use the volume formula to find the width: $V = l \times w \times h$. So, $780 = 12 \times w \times 5$. Thus, the width is 13. Next, draw the figure. Notice that the greatest distance is from one corner to the opposite corner, such as from the front left bottom corner diagonally to the rear right top corner. You can use the formula for diagonal of a rectangular solid, $a^2 + b^2 + c^2 = d^2$, in which a, b, and c are the dimensions of the rectangular solid and d is the diagonal, and love that you have a calculator. Thus, $(5)^2 + (12)^2 + (13)^2 = d^2$. So, $25 + 144 + 169 = d^2$, and thus $d = \sqrt{338}$ or $13\sqrt{2}$.

19. D

There are six spots to fill. Because no boys can sit on the end of the bench, 3 girls are available to fill one spot at one end of the bench. Once one girl has been chosen to fill that spot, there are 2 girls available to fill the spot on the other end of the bench. Then, there are 4 children (boys and girls) available to fill the other four spots. Because $3 \times 2 \times 4 \times 3 \times 2 \times 1 = 144$, choice (D) is correct.

20. C

Use the average pie. If 16 is the average of 3 numbers, their total is 48. You know that one of the numbers is 24, so $p + q + 24 = 48$. Thus, $(p + q) = 24$. You need to find $16(p + q)$, so find 16(24). Ballpark that $10(24) = 240$ and $5(24) = 120$. Look for an answer a little more than $240 + 120 = 360$.

Part VI
The Princeton Review GRE Practice Tests and Explanations

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17 Answers and Explanations for Practice Test 1
18 Practice Test 2
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