PICKING NUMBERS A

It's really important that you read and understand the following:

1) **When to "sub in numbers":** Substitute numbers for variables whenever you see variables in both the problem's information and answer choices.
2) **What numbers to pick: If possible, pick 3 or 5:** If you need even numbers, try 4 or 6!
3) **Write down which number you choose for each variable**. If you don't write down your numbers (for example $a = 3$; $b = 5$), you might mix up which number to sub for which variable when you reach step 5.
4) **Write down and box your Target Number:** Subbing your number(s) into the problem will give you a numerical result. That's your Target Number.
5) **Plug your chosen number(s) into the answer choices:** When you do so, one of the choices will return your Target Number.

1) A number z is increased by 5 and the result is multiplied by 5. This result is decreased by 5. Finally, that result is divided by 5. In terms of z, what is the final result?

a) $z - 3$ c) z e) $z + 4$
b) $z - 1$ d) $z + 2$

2) If e and v are positive numbers and $e > v$, which of the following must be negative?

a) e times $\frac{1}{v}$ b) $e + v$ d) $-(v - e)$
c) $e - v$ e) $-(e - v)$

3) When n is divided by 9, the remainder is 5. What is the remainder when $3n$ is divided by 9?

a) 4 c) 6 e) 8
b) 5 d) 7

PLEASE READ THE ANSWERS AND EXPLANATIONS FOR PROBLEMS 1 THROUGH 3 NOW

4) If $e = dc$, which of the following must be equal to d/e?

a) dec c) d^2c e) $1/c$
b) dc^2 d) e/c

5) If the sum of 5 consecutive integers is z, then, in terms of z, what is the least of these integers?

a) $\frac{z-2}{5}$ c) $\frac{z-6}{5}$ e) $\frac{z-10}{5}$

b) $\frac{z-4}{5}$ d) $\frac{z-8}{5}$

6) How many seconds are there in m minutes and s seconds?

a) $60m + s$ c) $60(m + s)$ e) $\frac{m}{60s}$

b) $m + 60s$ d) $\frac{m+s}{60}$

Add 5 to y
Divide this sum by 3
Subtract 4 from this quotient.

7) Which of the following is the result obtained by performing the operations described above?

a) $\frac{y-7}{3}$ c) $\frac{y-3}{3}$ e) $\frac{y}{3}$

b) $\frac{y+1}{3}$ d) $\frac{3y-7}{3}$

8) If $b = 5a$ and the value of a is increased by 3, then the value of b will increase by how much?

a) 1 c) 5 e) 20

b) 3 d) 15

9) To celebrate Arbor Day, the s members of the local Treehuggers Club agreed to contribute equally to buy a tree thermometer that costs a total of t dollars. If r of the members failed to contribute, which of the following represents the additional amount, in dollars, that each of the remaining members must contribute to pay for the thermometer?

a) $\frac{t}{s}$ c) $\frac{rt}{s-r}$ e) $\frac{t}{s-r}$

b) $\frac{rt}{s(s-r)}$ d) $\frac{t(s-r)}{s}$

10) If x is a prime number greater than 3, which of the following is NOT a factor of $6x$?

a) x^2 c) $3x$ e) 3

b) $6x$ d) $2x$

PICKING NUMBERS A

1) **E**. I can't imagine why one would want to do this problem without picking numbers. Let's pick 3 for *z*. Adding 5, we have 8; multiplying by 5 gives us 40; subtracting 5 gives us 35; dividing by 5 gives us 7, which is what in terms of *z*? Let's plug 3 into our answer choices to find out which one gives us 7.

2) **E**. Can we plug in, say, 3 for *v* and 5 for *e*? Great. When we do so, we find that (e) gives us –(5 – 3), or -2.

3) **C**. Any time you're having trouble coming up with a number that yields a certain remainder (here, 5) when divided by a certain number (here, 9), just add the divisor to the remainder (9 + 5 = 14)! Let's check: 9 divides into 14 once, and leaves a remainder of 5! So, 3 x 14 = 42; 9 divides into 42 four times, leaving a remainder of 6.#

PLEASE RETURN AND FINISH PROBLEMS 4 THROUGH 10

4) **E**. Here we see three unknowns: One is a product of the other two. Wouldn't it make sense to Pick Numbers for the two that we need to multiply to get the third? So, let's sub in 3 for *d* and 5 for *c*, which means that *e* is 15. Now, using the numbers we've picked (did you write them down or are you trying to remember what they are?), let's find the answer that's the same as our Target Number of 3/15. We can quickly get rid of (a), (b), and (c) because each of them has no denominator and so must be more than 1, while our Target Number is clearly less than 1. Trying (d), we get 15/5, or 3; trying (e), we get 1/5. Bingo.

5) **E.** Shall we Pick five consecutive integers (like 1 through 5) and add them to get *z*? Now let's plug in that sum (15) for *z* and find the answer choice formula that yields our Target Number of 1.

6) **A**. How about we sub in 3 for *m* and 5 for *s*? So, 3 minutes equals 180 seconds; add five seconds and we get 185. So, 185 is our Target Number. Plugging our values in for *m* and *s* into (a) gets us to the right answer very quickly. This is the kind of problem that causes many smart test-takers to make "dumb mistakes."

7) **A**. Although any number we pick will help us solve this problem, this is our first glimpse at how we can make life easier by picking a convenient number. In this case, after we add 5 to *y* we'll need to divide the result by 3; so, wouldn't it be a good idea to pick a number for *y* that, when we add 5 to it, becomes a multiple of 3?

Here's a way to calculate remainders: Let's find what the remainder is when we divide 87 by 7. First, punch 87/7 into your calculator. The answer is 12 and a decimal, right? OK, let's now subtract the whole number (12), leaving just the decimal. Now, multiply that remaining decimal by the number we originally divided by (7). Did you get a remainder of 3? If so, great. If not, be sure to ask! Now try this one: **94/11**.

Let's try 4; so 4 + 5 = 9/3 = 3 – 4 = -1. What's our Target Number? Right, $\boxed{-1}$. When we plug in 4, we find that only (a) works. Now try the problem picking $y = 7$. Piece of cake, right?

8) **D**. We can pick numbers here even though the answer choices are numerical! Let's make a 3; so b is 15. $a + 3 = 6$; now b is 30, which is an increase of $\boxed{15}$.

9) **B**. This is the problem you've been training for. Let's choose 5 for s, 30 for t, and 3 for r. Using these numbers, the members would each have to pay \$6 if everyone contributed equally. However, if three members don't contribute, then the two who do contribute would have to pay \$15, or $\boxed{\$9}$ extra. When we plug our numbers into (b), we get a numerator of 90 and a denominator of 10. Nice.

10) **A**. A prime number has exactly two different factors, itself and 1 (Is 1 prime?*). Let's pick 5 and plug it in for x—what's our Target Number? It's $6x$ or $\boxed{30}$, right? When we plug 5 into the answer choices, the only choice that doesn't work is (a), since $5^2 = 25$.

* No, since 1 has only 1 distinct factor, itself.

GEOMETRY: CIRCLES AND TRIANGLES A

First, this: Circle problems are all about conversion. Study the table below:

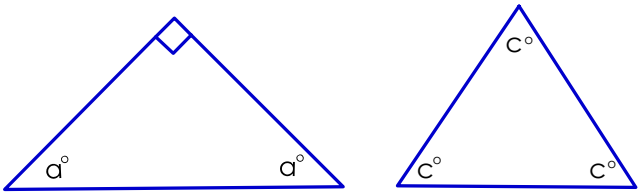
C		To get C from d, just tack on pi
d		C = πd; to get d from C, drop the pi
r		Divide d by 2
A		$A = \pi r^2$

Please assume that none of the figures in this TEN FOR TEN® are drawn to scale.* If what you see differs from what you read, believe what you read.

1) What is the area of a circle that has a circumference of 12π?

a) 9π
b) 12π
c) 27π
d) 36π
e) 144π

2)



[Grid In] In the triangles to the left,

5(c – a) = ?

(Ignore degrees when gridding your answer.)

3) **[Grid In]** A triangle is inscribed inside a circle. One vertex of the triangle is at the center of the circle, and the other two vertices are on the circle. If the angle at the center of the circle measures 80°, what is the measurement in degrees of one of the other angles?

PLEASE READ THE ANSWERS AND EXPLANATIONS FOR PROBLEMS 1 THROUGH 3 NOW

4) Which of the following CANNOT be the lengths of the sides of a triangle?

a) 1, 1, 1
b) 2, 3, 5
c) 2, 85, 85
d) 3, 4, 6
e) 5, 7, 8

5) What is the area of a right triangle whose perimeter is 36 and whose sides are d, $d + 3$, and $d + 6$?

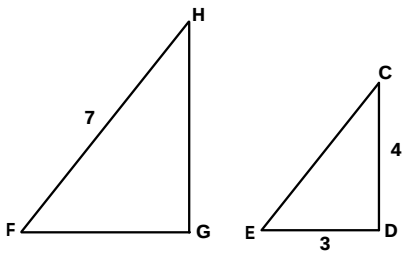
a) 54
b) 72
c) 88
d) 92
e) 115

* On the actual SAT, all figures are drawn to scale unless accompanied by the note: "Figure not drawn to scale."

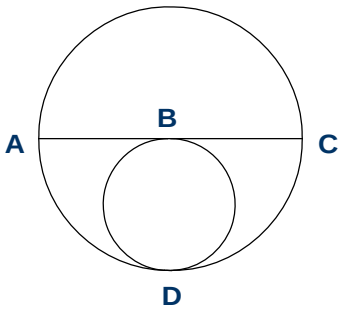
6) Five spheres, each of radius 3.5 inches, are placed side by side in a straight row with adjacent spheres touching. What is the distance, in inches, between the center of the first sphere and the center of the last sphere?

a) 14 c) 20 e) 35

b) 17½ d) 28

7) 

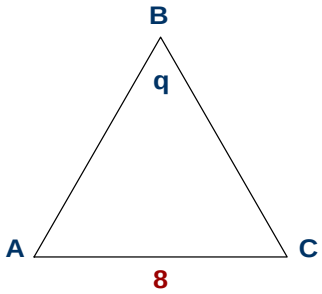
[Grid In] In the figure to the left, triangle EDC is similar to right triangle FGH. What is the length of the side FG?

8) 

In the figure to the left, B is the center of the larger circle. The smaller circle is tangent to the larger circle at D and contains point B. If the circumference of the larger circle is 20 π, what is the area of the smaller circle?

a) 10 π c) 25 π e) 81 π

b) 20 π d) 36 π

9) 

[Grid-In] In the triangle to the left, AB = BC. If $q = 60°$, then AB = ?

10) One circle has a radius of ½ and another circle has a radius of 1. What is the ratio of the area of the larger circle to the area of the smaller circle?

a) 4:1 c) 8:1 e) 64:1

b) 6:1 d) 16:1

GEOMETRY: CIRCLES AND TRIANGLES A

1) **D.** If we know one thing about a circle, we know everything about the circle. Here, we our circle has a circumference 12π. Let's use the CdrA table to get from C to A:

C	12π	C = πd; to get C from d, just tack on pi
d	12	To get d from C, just drop the pi
r	6	Divide d by 2
A	36π	$A = \pi r^2$

2) **75**. A triangle's interior angles always add up to 180°. The triangle on the left is an isosceles (the sides opposite both ***a*** angles are equal and so must be 45°) right (90°) triangle. Because the triangle on the right is equilateral*, all three angles (***c***) must be the same, or 60°. So, when we subtract 45 from 60, we get 15. Multiplying that by 5 …

3) **50**. Did you draw the circle and inscribed triangle? If so, you found that each angle at the circle's circumference was opposite a side that also served as the circle's radius. Since all radii of any particular circle must be of equal length, those sides must be equal; next, equal angles opposite equal sides, right? After we take the central 80° angle out of the 180° total, we have 100° left to divide between our two equal angles.

PLEASE RETURN AND FINISH PROBLEMS 4 THROUGH 10

4) **B**. Just remember this: The three sides of any triangle must be long enough to meet (and create a triangle—not two flat lines). This is another way of saying that **the longest side must be shorter than the other two sides combined**. So, with sides of 2, 3, and 5, won't we have one straight line (2 + 3) lying flat on top of another (5)?

5) **A**. The perimeter is the sum of the sides. Adding up the sides we get $3d + 9 = 36$, which means that $d = 9$, making the sides 9, 12, and 15. Notice that we're told that this is a right triangle (if it weren't, wouldn't it be a lot tougher to identify the base and height?), so let's draw it and label the sides. Doing so, we note that in a right triangle, the short sides are always the base and height!! A = bh/2, so 9 x 12 = 108; 108/2 = 54.

6) **D.** Please draw the five touching spheres (use circles—like many three-dimensional problems, this can be solved as a two-dimensional problem) in a row. Since the radius of each sphere is 3.5 inches, wouldn't the distance from the first to the second, say, be 3.5

* We know this because all of the angles are labeled ***c***. While a variable, such as *x* in the inequality $x < 4$, can have a range of values, within a problem a single variable will never represent different values.

plus 3.5, or 7 inches? So, the distance from the first to the last (one sphere at a time) must be 4 times that.

7) **21/5** or **4.2**. Similar triangles have angles that are exactly the same, which means that their corresponding sides must be proportional. Thinking "real life," couldn't we make our own similar triangles by photocopying any triangle at, say, 80% or 150%? We're told that FGH is a right triangle, so EDC must also be a right triangle. (Did you mark the right angles in both triangles?) Since all we know about FGH is its hypotenuse (which is 7), to compare the triangles we'll need to calculate the hypotenuse of EDC (using the Pythagorean Theorem, $3^2 + 4^2 = 5^2$), which is 5. OK, now we have two "same" sides to compare; if one is 7 and the other is 5, isn't their ratio 7 to 5 (or 7/5)? So, the unknown side *x* can be found using the equation $x/3 = 7/5$ and then cross-multiplying.

8) **C.** Here, since we have two circles, we've added a column to our CdrA table. Note that because the smaller circle touches the edge and center of the larger circle, it must have a diameter half as long as that of the larger circle. Using our table, the rest is easy.

	Large	**Small**	
C	20 π		
d	20	10	To get d from C, drop the pi
r		5	Divide d by 2
A		25 π	$A = \pi r^2$

9) **8.** One of the rules SAT winners know by heart is that, in a triangle, "equal sides opposite equal angles." If the sides AB and BC are equal, then the angles opposite them are equal, too. If $q = 60°$, that leaves 120° for the other two angles (which are equal).

10) **A**. To calculate the area we must square the radius, so the ratio of the areas of two circles will equal the ratio of the squares of their radii. How many fourths are there in 1?

	Large	**Small**	
C			
d			
r	½	1	Divide d by 2
A	¼ π	π	$A = \pi r^2$