Calculator Exercise

The purpose of this exercise is to emphasize to the students the appropriate use of a calculator on the exam. The exercise asks the students to rate the items in one of three categories:

Category 1: A calculator would be very useful (saves valuable test time).
Category 2: A calculator might or might not be useful.
Category 3: A calculator would be counterproductive (wastes valuable test time).

(Student Text, p. 350)

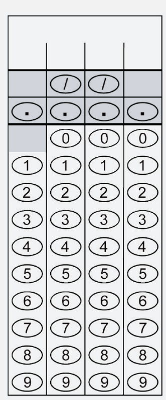
This exercise is designed to illustrate when and when not to use your calculator. Make sure that the calculator you bring to the test is one with which you are thoroughly familiar. You may bring any of the following types of calculators: graphing, four-function, or scientific. Although no item requires the use of a calculator, a calculator may be helpful to answer some items. The calculator may be useful for any item that involves complex arithmetic computations, but it cannot take the place of understanding how to set up a mathematical item. The degree to which you can use your calculator will depend on its features. Answers are on page 538.

(Student Text, p. 350)

DIRECTIONS: Label each of the items that follow according to one of the following categories.

Category 1: A calculator would be very useful (saves valuable test time).
Category 2: A calculator might or might not be useful.
Category 3: A calculator would be counterproductive (wastes valuable test time).

1. If $2m + 4n$ is equal to 175 percent of $4n$, what is the value of $\frac{m}{n}$?



1. (**3/2 or 1.5**) (**Category 3**) ***Math: Student-Produced Responses/Algebra/Manipulating Algebraic Expressions/Evaluating Expressions*** *and* ***Problem Solving and Advanced Arithmetic/Common Problem Solving Items/ Percentages***

SAT Topic: PSD.2; CC: HSA-CED.A.4

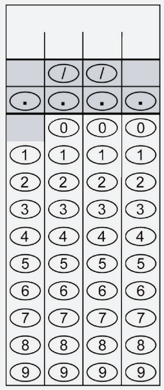
175% is equal to 1.75 or $\frac{7}{4}$. Therefore,

$$2m+4n=\frac{7}{4}(4n)\Rightarrow 2m+4n=7n\Rightarrow 2m=3n\Rightarrow$$

$\frac{m}{n}=\frac{3}{2}$. A calculator is not useful for this item. The result 3/2 can be gridded directly, and converting it to the decimal equivalent (1.5) doesn't require a calculator.

(Student Text, p. 350)

2. A company distributes samplers that include 1 jar of jam and 2 jars of jelly. If the company makes 4 different jams and 4 different jellies, how many different samplers are possible?



2. (24) (Category 3) ***Math: Student-Produced Responses/Problem Solving and Advanced Arithmetic***

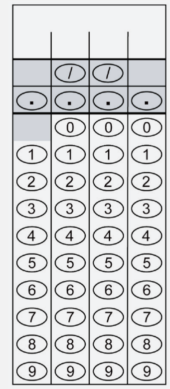
SAT Topic: PSD.1; CC: HSS-CP.B.9

The formula for combinations is:
$C=\frac{n!}{k!(n-k)!}$, where n is the number of elements in the larger set and k is the number of elements being arranged. Therefore, the number of combinations of jellies in each sampler is: $\frac{4!}{2!(4-2)!}=\frac{4 \cdot 3 \cdot \cancel{2} \cdot \cancel{1}}{2 \cdot 1 \cdot \cancel{2} \cdot \cancel{1}}=6$. And for each of those jelly combinations, there are 4 possible jams. Therefore, the total number of possible sampler combinations is: $4 \cdot 6=24$. A calculator is not useful in solving this item. The required calculations ($12 \div 2=6$ and $4 \cdot 6=24$) are easily done without a calculator.

Alternatively, simply count the possible pairs of jellies. If there are 4 jellies (labeled 1 through 4), the combinations are: 1-2, 1-3, 1-4, 2-3, 2-4, and 3-4. Since there are also 4 different jams, there are a total of $4 \cdot 6=24$ possible combinations.

(Student Text, p. 350)

3. Lyle played in 5 basketball games and scored at least 1 point in each game. If Lyle scored an average of 8 points for the 5 games, what is the greatest possible number of points he could have scored in any one game?

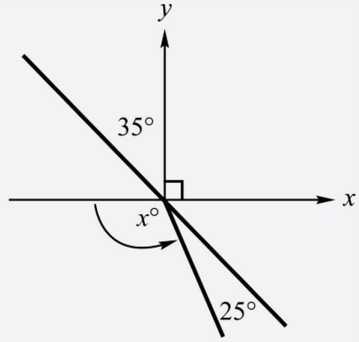


3. (36) (Category 3) ***Math: Student-Produced Responses/Statistics/Measures of Center and Spread/Averages***

SAT Topic: PSD.9; CC: 6.SP.B.5c

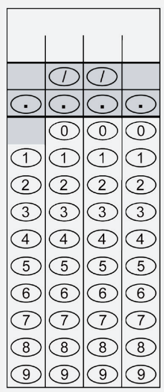
Since Lyle scored an average of 8 points for 5 games, he scored a total of 40 points. If he scored no more than 1 point in each of four games, then his score for the fifth game must be 36 points. A calculator is not useful in solving this item. The solution requires multiplying $5 \cdot 8$ and then subtracting 4—calculations easily done without a calculator. In fact, using a calculator requires at least 5 keystrokes, and each one creates the possibility of error.

*(**Student Text**, p. 351)*



NOTE: Figure not drawn to scale.

4. In the figure above, what is the value of x?



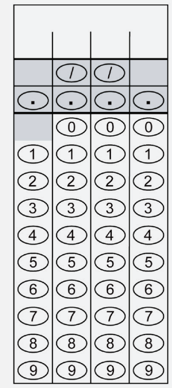
4. (**100**) (**Category 2**) ***Math: Student-Produced Responses/Geometry/Lines and Angles***

SAT Topic: ATM.6; CC: 7.G.B.5

The unlabeled angle between the 35°-angle and the x°-angle has a degree measure of: $90-35=55$. And: $55+x+25=180$. Therefore, $x=100$. A calculator might be useful in solving this item: the math is simple, but a calculator can provide reassurance. It would not be counterproductive to use the calculator here.

*(**Student Text**, p. 351)*

5. Let the function $g(x)$ be defined by $g(x)=12+\frac{x^2}{9}$. If $g(3n)=7n$, what is one possible value of n?



5. (**3 or 4**) (**Category 3**) ***Math: Student-Produced Responses/Algebra/Creating, Expressing, and Evaluating Algebraic Equations and Functions/Function Notation*** *and* ***Solving Quadratic Equations and Functions***

SAT Topic: PAM.13; CC: HSF-IF.A.2

Substitute $3n$ for x in the given function, set it equal to $7n$, and then solve for n: $12+\frac{(3n)^2}{9}=7n \Rightarrow 12+\frac{9n^2}{9}=7n \Rightarrow n^2-7n+12=0 \Rightarrow (n-4)(n-3)=0$. So, $n = 4$ or $n=3$. A calculator is not useful in solving this item. The quadratic equation is so basic that using a calculator to solve it would take longer than solving by hand.

What this Calculator Exercise illustrates is that most of the time a calculator is not likely to be useful. This is not to say that a calculator will never be useful, but it is not a magic wand. The user must exercise judgment when determining whether to utilize the calculator—otherwise, trouble may follow.