SAT Math Strategies Quiz

When you are stumped on an SAT or ACT math question, there are two very useful strategies that may help you to get the correct answer: 1) **work with the answers**; and 2) **plug in real numbers**. This review quiz will help you become familiar with these strategies so that they will be second nature when you take the SAT or ACT for real. Each problem can be solved using one of the two strategies. The quiz begins on the next page; answers are at the end. Good luck!

Examples

1. If w is a positive integer and $(2^w)^w = 2^8 \cdot 2^8$, then what is the value of w?

A) 0 B) 1 C) 2 D) 3 E) 4

Solution: Notice that the question gives an equation that w must satisfy, and then proceeds to list five possible numerical values for w, one of which *must* be correct. You can **work with the answers** by substituting each answer in for w until the left and right sides of the equation are equal (your calculator may be useful here). For example, substituting 1 for w into the equation gives $2 = 65536$, so answer B is incorrect. When you substitute 4 for w, you will find that the equation works, so E is the correct answer. It doesn't particularly matter which answer you use first. However, since number answers are ordered, if what you get is way off, you may want to skip the next answer or two (in this case, skip from B to D, at least).

You may also realize that the equation can be written: $2^{w \cdot w} = 2^{16}$, so that $w \cdot w = 16$, or $w = 4$. This is faster, but requires that you can remember and apply the rules for combining exponents. The "work with answers" strategy is best for multiple-choice questions with numerical answers.

2. If $-1 < y < 0$, which of the following is *not* between -1 and 0?

A) $-1 - y$ B) $\dfrac{y}{2}$ C) $-\sqrt{y+1}$ D) $\dfrac{1}{y}$ E) $-y^2$

Solution: The question is asking you to identify which of the answers is *not* between -1 and 0 whenever y is between -1 and 0. **Plug in a real number** for y to make this problem more concrete. In this question, any easy number will do as long as it is between -1 and 0. For example, try $y = -0.5$, and check each expression in the answers until you get a number that is *not* between -1 and 0. If $y = -0.5$, you will find that answer D is -2, so D is the correct answer. Use an *easy* number; in this case, -0.5 is better than, say, -0.29.

The "plug in real numbers" strategy is very powerful: it can also be used on the SAT when the answers are not given, i.e., in the student-produced response questions (also known as the "grid-in" questions).

SAT Math Strategies Quiz

Basic

See if you can do the basic questions in two ways: 1) using the mathematical methods that the test-makers want you to use (solving algebraic equations, setting up proportions, etc.), and 2) using one of the two strategies.

1. If y is 12 less than the product of a and b, then which of the following is an expression for y in terms of a and b?

(A) $12 - (a + b)$
(B) $(a + b) - 12$
(C) $12 - ab$
(D) $a/b - 12$
(E) $ab - 12$

$$\frac{7}{3x+4} = \frac{7}{6x-2}$$

2. If x satisfies the equation above, then what is the value of x?

(A) -2
(B) -1
(C) 0
(D) 1
(E) 2

3. At a fancy vegetable stand, Jim bought purple tomatoes for \$8 each and Aubrey bought organic giant cabbages for \$12 each. In total, they paid \$104 for 10 vegetables. How many cabbages did Aubrey buy?

(A) Four
(B) Five
(C) Six
(D) Seven
(E) Eight

4. A caterer will make cabbage sandwiches for special occasions by charging a one-time fee of \$50, plus \$8 for each sandwich. Which of the following is the total cost in dollars for an order of c cabbage sandwiches?

(A) $42c$
(B) $50c + 8$
(C) $58 + c$
(D) $50 + 8c$
(E) $50 + c + 8$

5. If $4^{n-2} + 4^2 = 32$, then what is the value of n?

(A) 2
(B) 4
(C) 6
(D) 8
(E) 10

6. What is the ratio of the area of a circle with radius r to the circumference of the circle?

(A) $\frac{r}{2}$

(B) $\frac{\pi}{2}$

(C) $\frac{2}{r}$

(D) $\frac{2}{\pi}$

(E) $\frac{r^2}{2}$

7. If $5500 > m + 2000 > 5000$, and m is an integer, then what is the least possible value of m?

SAT Math Strategies Quiz

Intermediate

1. The total cost of 30 identical erasers is y dollars. At this rate, what is the total cost in dollars of 70 of these erasers in terms of y?

(A) $\frac{3y}{7}$

(B) $\frac{4y}{7}$

(C) $\frac{7y}{4}$

(D) $\frac{7y}{3}$

(E) $70y$

2. Three consecutive integers are such that four times the smallest is three times the largest. What is the largest of these three integers?

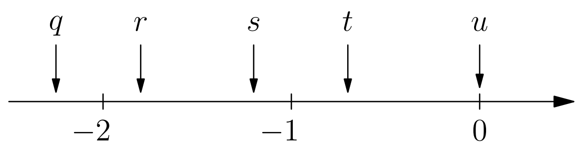
(A) 6
(B) 8
(C) 10
(D) 12
(E) 14

3. When the positive integer m is divided by 7, the remainder is 4. When $m + 26$ is divided by 7, what is the remainder?

(A) 0
(B) 2
(C) 4
(D) 5
(E) 6

4. When each side of a particular square is lengthened by 2 inches, the area of the square increases by 32 square inches. What is the length in inches of a side of the original square?

(A) 4
(B) 5
(C) 6
(D) 7
(E) 8



5. The numbers q, r, s, t, and u are indicated in the number line above. Which of the following is the largest in value?

(A) qu
(B) rs
(C) qr
(D) qt
(E) u

6. Keisha has a collection of dimes and nickels worth a total of \$4. If she has 50 coins in all, how many nickels does Keisha have?

(A) 20
(B) 25
(C) 30
(D) 35
(E) 40

7. The function g is defined by $g(x) = 6x^2 + x - 2$. In the x-y plane, the graph of $y = g(x)$ crosses the x-axis at $x = a$. Which of the following could be the value of a?

(A) $1/2$
(B) 1
(C) $3/2$
(D) 2
(E) $5/2$

$$\frac{z}{2} = \frac{y}{x}$$

8. In the equation above, the numbers x, y, and z are either positive or negative. Which of the following must be equal to 4?

(A) $2x$

(B) $2z$

(C) $\dfrac{xz}{2y}$

(D) $\dfrac{2y}{xz}$

(E) $\dfrac{2xz}{y}$

9. If $2^{p+2} + 2^{p+1} = 96$, then what is the value of p?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

10. If $1 < 6a - 1 < 2$, what is one possible value of a?

11. If x percent of y is z, then z is what percent of xy?

SAT Math Strategies Quiz

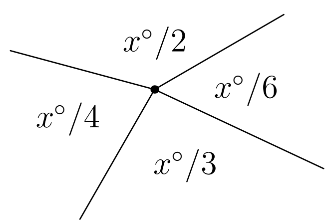
Difficult

1. A particular type of soup is made by combining water and cabbage so that the ratio of water to cabbage is 9 to 1 by weight. How many pounds of cabbage are needed to make 180 pounds of this type of soup?

(A) 9
(B) 18
(C) 20
(D) 160
(E) 162

2. A triangle is to be changed by increasing the length of its base by 40% and decreasing the length of its height by 40%. Which of the following must be true about the area of the triangle?

(A) It will increase by 40%.
(B) It will increase by 16%.
(C) It will not change.
(D) It will decrease by 16%.
(E) It will decrease by 40%.



Note: Figure not drawn to scale.

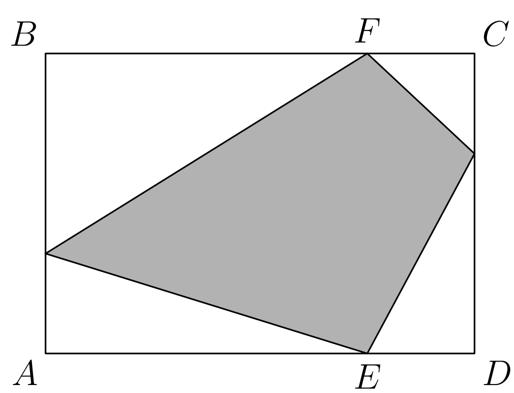
3. In the figure above, four line segments meet at a point to form four angles. What is the value of x ?

(A) 180
(B) 240
(C) 288
(D) 312
(E) 336

4. If $a^b = 4 - ab$ and $b^a = 1$, where a and b are positive integers, what is the value of a?

(A) 0
(B) 1
(C) 2
(D) 3
(E) 4

5. On a race, Aubrey ran 3/4 of the time with a good-luck cabbage, and 1/4 of the time without it. With the cabbage, her running speed was 6 miles per hour, and her running speed without the cabbage was 12 miles per hour. The distance that Aubrey ran with the cabbage was what fraction of the total distance that she ran?



6. In the figure above, $ABCD$ is a rectangle and $FC = ED$. What fraction of the rectangle is shaded?

SAT Math Strategies Quiz

Answers

Each answer below first gives the "strategy solution" to the question. Next, a solution that uses algebra or other "math class" knowledge is given; this solution is the one your math teacher might want to see you use. However, the algebra method may be the harder way for you to go, and your goal on any SAT question is to get it in whatever way is quick and which leads you to the correct answer.

Basic

1. E

Strategy: plug in real numbers. Put in easy numbers for a and b. For example, if $a = 3$ and $b = 5$, then $ab = 15$ and $y = 15 - 12 = 3$. Now go through each answer, putting in the same numbers for a and b, until you get an answer matching the value you obtained for y. For this question, you will get $y = 3$ only for answer E.

Math Teacher Solution: The product of a and b is ab, and 12 less than ab is $ab - 12$, so the answer is E.

2. E

Strategy: work with the answers. Go through the answers, substituting each for x until both sides of the equation are the same. You will find that the equation is true only when you use answer E.

Math Teacher Solution: Cross-multiply the given equation: $7(6x-2) = 7(3x+4)$ so that $6x - 2 = 3x + 4$. Solving for x gives $3x = 6$, so that $x = 2$.

3. C

Strategy: work with the answers. Go through the answers until you find one that works. For example, if Aubrey bought 4 cabbages, then she paid \$48, leaving \$104 – \$48 = \$56 for Jim, who would have bought 7 tomatoes since \$56/\$8 = 7. But, $4 + 7 = 11$, not 10, so answer A is incorrect. Continuing in this way, you will find that only answer C works.

Math Teacher Solution: Let t be the number of tomatoes and c be the number of cabbages. Set up two equations: $8t + 12c = 104$ and $t + c = 10$. Solve for t and c by solving one equation for one variable and substituting into the other equation. Here, $t = 10 - c$ so that $8(10 - c) + 12c = 104$. Simplifying, $80 - 8c + 12c = 80 + 4c = 104$ so that $c = 6$.

4. D

Strategy: plug in real numbers. Suppose 5 sandwiches were ordered (i.e., plug in 5 for c. These sandwiches would cost \$8 each, or \$40 in all. With the fee, the total cost would be $\$50 + \$40 = \$90$. Go through the answers, plugging in 5 for c until you get \$90. This occurs only for answer D.

Math Teacher Solution: If \$8 is the cost per sandwich (excluding the fee), then $8c$ is the cost in dollars for c sandwiches. Since the fee is a one-time charge, the total cost in dollars is just $50 + 8c$.

5. B

Strategy: work with the answers. Try answer C: let $n = 6$. The left hand side of the equation is now $4^{6-2} + 4^2 = 4^4 + 4^2 = 256 + 16 = 272$ so answer C is not correct. Since we got a number bigger than 16, and the answers are in increasing order, move to the left and try answer B by letting $n = 4$. Now we get $4^{4-2} + 4^2 = 4^2 + 4^2 = 32$ which equals the right-hand side, so answer B is correct.

Math Teacher Solution: $4^{n-2} + 16 = 32$ so that $4^{n-2} = 16 = 4^2$. If $4^{n-2} = 4^2$, the bases are equal, so the exponents must be equal: $n - 2 = 2$ so that $n = 4$.

6. A

Strategy: plug in real numbers. Choose an easy number for r, say, 2. The area of a circle with radius 2 is $\pi \cdot 2^2 = 4\pi$, and the circumference is $2\pi \cdot 2 = 4\pi$. The ratio is then $4\pi/4\pi = 1$. Which of the answers equals 1 when $r = 2$? Both answer A and answer C are equal to 1 when $r = 2$. If this happens when using the plug-in real numbers strategy, simply pick another number and try again. But now, we only need to check the remaining answers A and C. This time, let $r = 1$. The area of a circle with radius 1 is $\pi \cdot 1^2 = \pi$, and the circumference is $2\pi \cdot 1 = 2\pi$. The ratio is then $\pi/2\pi = 1/2$. Which of the remaining answers equals 1/2 when $r = 1$? Only answer A, so that is the correct answer.

Math Teacher Solution: The area of a circle is πr^2, and the circumference of a circle is $2\pi r$, so the ratio of the area to the circumference is:

$$\frac{\pi r^2}{2\pi r} = \frac{r^2}{2r} = \frac{r}{2}.$$

7. 3001

Strategy: plug in real numbers. The numbers in the problem are in the thousands, so let's try $m = 2000$. Then, $m + 2000 = 4000$, which is less than 5500 but not greater than 5000. Try a bigger number: $m = 3000$. Now, $m+2000 = 5000$, which is less than 5500, but still not bigger than 5000 (but almost!). Since m is an integer, the next number to try is 3001, making $m + 2000 = 5001$, which is both bigger than 5000 and less than 5500. Any other number that works will be bigger than 3001, so that is the correct answer.

Math Teacher Solution: Simplify the inequality by subtracting 2000 from all sides: $3500 > m > 3000$. Since m is an integer, the smallest value of m which is less than 3500 and greater than 3000 is 3001.

SAT Math Strategies Quiz

Intermediate

1. D

Strategy: plug in real numbers. Try using a real number in place of y. As always, use a number that makes life easy for yourself. In this case, since 30 erasers costs y dollars, we will try setting y equal to 30 dollars. In this way, each eraser costs 1 dollar, and 70 erasers will cost 70 dollars. Go through the answers putting in 30 for y until you get an answer of 70. This occurs only for answer D.

Math Teacher Solution: Let x be the total cost of 70 erasers. Then we set up a proportion:

$$\frac{30}{y} = \frac{70}{x}$$

and solve for x by cross-multiplying. This gives: $30x = 70y$ so that $x = 7y/3$.

2. B

Strategy: work with the answers. Suppose the answer is C so that the largest of the three consecutive integers is 10. Then, the group of integers must be 8, 9, and 10. Four times the smallest is 32, and three times the largest is 30, so answer C is incorrect. If we use answer D, our group of integers is 10, 11, and 12, but $40 \neq 36$, so answer D is incorrect as well. Since answer C was closer, try going the other way and work with answer B. Here, the group is 6, 7, and 8, and $4 \times 6 = 3 \times 8$, so answer B is the correct answer.

Math Teacher Solution: Let x be the smallest of the three integers. Then, $x + 1$ is the next integer, and $x + 2$ is the biggest integer. We need $4x = 3(x + 2)$, so that $4x = 3x + 6$, resulting in $x = 6$.

3. B

Strategy: plug in real numbers. Pick a number to plug in for m which, when divided by 7, leaves a remainder of 4. A good choice might be 11, but you could have also chosen 18, 25, etc. Now use the number that you chose: add 26 to it, and see what the remainder is when you divide the new number by 7. When $11+26 = 37$ is divided by 7, the remainder is 2, so choice B is correct.

Math Teacher Solution: Since the remainder is 4 when m is divided by 7, we can write $m = 7i + 4$ for some integer i. For example, if $i = 1$, then $m = 11$; if $i = 2$, then $m = 18$, and so forth. Then, $m + 26 = 7i + 30 = 7i + 7 \cdot 4 + 2$ so that $m + 26 = 7(i + 4) + 2$. So, the remainder is 2.

Ouch! Plugging in real numbers is a *much* easier solution method than the math teacher method for this question.

4. D

Strategy: work with the answers. Suppose the answer is C so that the original square has a side of 6 and an area of $6^2 = 36$ square inches. The new square will have a side of 8 and an area of 64, which is an increase of 28 square inches, so answer C is not correct. Answer D is correct since the original square is $7^2 = 49$ square inches, the new square is $9^2 = 81$ square inches, and $81 - 49 = 32$.

Math Teacher Solution: Let x be the side of the original square, so that x^2 is the area. The area of the new square is $(x+2)^2$, and the increase in area is $(x+2)^2 - x^2 = 4x + 4$. Since the increase is 32 square inches, $4x + 4 = 32$, and solving for x results in $x = 7$.

5. C

Strategy: plug in real numbers. Plug in numbers for the letters shown in the number line diagram. You don't need to worry about assigning exact values, just make sure that the numbers are reasonable. For example, choose: $q = -2.3$, $r = -1.8$, $s = -1.2$, $t = -0.7$, and $u = 0$. Then, $qu = 0$, $rs = 2.16$, $qr = 4.14$, $qt = 1.61$, and $u = 0$, so the answer is C.

Math Teacher Solution: Since the numbers are negative except for u, multiplying two of them will result in a positive number. We can therefore eliminate any answers with u since those answers will all be equal to 0. To get the biggest positive number, we need to multiply the two smallest (most negative) numbers marked in the diagram: qr is the correct answer.

6. A

Strategy: work with the answers. Suppose the answer is C so that Keisha has 30 nickels. Each nickel is five cents, so she has \$1.50 in nickels, and the rest (\$2.50) in dimes. But this is 30 nickels and 25 dimes, or 55 coins in all, so answer C is not correct. Since 55 coins was too many, we need fewer nickels and more dimes, so proceed to check answer A or B next. You will find that answer A works.

Math Teacher Solution: Let n be the number of nickels. Then, the number of dimes is $50 - n$, and we need $0.05n + 0.10(50 - n) = 4$. Solving for n gives $5 - 0.05n = 4$ so that $0.05n = 1$, or $n = 20$.

7. A

Strategy: work with the answers. First, what does it mean to say that "the graph of $y = g(x)$ crosses the x-axis at $x = a$?" It means that the y-value is zero when $x = a$, i.e., $y = g(x) = 0$ when $x = a$. Try setting a (and therefore, x) equal to each answer, and then check to see if $g(x)$ is zero. For example, if $x = 1/2 = 0.5$ (answer A), then $g(x) = g(0.5) = 6(0.5)^2 + 0.5 - 2 = 1.5 + 0.5 - 2 = 0$, so answer A is correct.

Math Teacher Solution: Since $g(x) = 0$ when the function crosses the x-axis, we set $g(x) = 0$ and solve for x by factoring. We get $6x^2 + x - 2 = (2x - 1)(3x + 2)$, so that either $2x - 1 = 0$ and $x = 1/2$, or $3x + 2 = 0$ and $x = 2/3$. Only $x = 1/2$ appears in the answers, so answer A is correct.

8. E

Strategy: plug in real numbers. Plug in easy, real numbers for x, y, and z, making sure that the numbers satisfy the given equation. Then, go through the answers, plugging in the values you chose until you get 4. For example, try $z = 1$, $y = 2$, and $x = 4$ (check for yourself that these values work in the given equation). Starting with A, the answers equal 8, 2, 1, 1, and 4, so answer E is correct.

Math Teacher Solution: Cross-multiply the given equation to get $xz = 2y$. Multiplying both sides by 2 gives $2xz = 4y$. Finally, dividing both sides by y gives $2xz/y = 4$, so answer E is correct.

9. D

Strategy: work with the answers. Go through the answers, using each in turn for p in the equation until the left-hand side equals 96. For example, if $p = 1$ (answer A), the left-hand side is $2^3 + 2^2 = 12$, so answer A is incorrect. If $p = 4$ (answer D), the left-hand side is $2^6 + 2^5 = 64 + 32 = 96$, so answer D is correct.

Math Teacher Solution: Rewrite the left-hand side of the equation using the rule that $x^a \cdot x^b = x^{a+b}$. We get: $2^p \cdot 2^2 + 2^p \cdot 2^1 = 96$. Since 2^p is common to both terms on the left, we have $2^p(2^2 + 2) = 2^p(6) = 96$ so that $2^p = 16$, or $p = 4$.

10. $1/3 < a < 1/2$ or $.333 < a < .5$

Strategy: plug in real numbers. Plug in real numbers for a until the inequality works! Notice that $a = 0$ is too small and $a = 1$ is too big. Also, $a = 0.5$ is too big since $6(0.5) - 1 = 2$ and our answer needs to be strictly *less* than 2. A number such as $a = 0.4$ works just fine: $6(0.4) - 1 = 1.4$ and $1 < 1.4 < 2$.

Math Teacher Solution: Adding 1 to all sides of the inequality gives $2 < 6a < 3$ so that $1/3 < a < 1/2$. You could grid any number between 0.333 and 0.5.

11. 1%

Strategy: plug in real numbers. Plug in easy, real numbers for x, and y in order to determine z. Then, plug those numbers into the second equation. For example, if $x = 20$ and $y = 100$, then 20% of 100 is 20 so that $z = 20$. Now, since $xy = 2000$, we have to answer: 20 is what percent of 2000 ? The answer is just $20/2000 \cdot 100\% = 1\%$.

Math Teacher Solution: We need to convert the phrase "x percent of y is z" into an equation:

$$\frac{x}{100} \cdot y = z.$$

However, this equation is the same as:

$$\frac{1}{100} \cdot xy = z,$$

which means that z is just 1% of xy.

Difficult

1. B

Strategy: work with the answers. Suppose the answer is A: 9 pounds of cabbage are needed. This means that 81 pounds of water are needed, since the ratio $81 : 9$ is equal to the ratio $9 : 1$. But this is only $81 + 9 = 90$ pounds of soup, so answer A is incorrect. Using answer B, we have 18 pounds of cabbage and $9 \cdot 18 = 162$ pounds of water (to get the $9 : 1$ ratio). This makes $162 + 18 = 180$ pounds of soup, so answer B is correct.

Math Teacher Solution: Let c be the number of pounds of cabbage, and w be the number of pounds of water. Then, $c + w = 180$ (cabbage and water add up to 180 pounds), and $w/c = 9$ (ratio of water to cabbage is $9 : 1$). Solving the second equation for w and substituting into the first gives: $c + 9c = 180$ so that $10c = 180$, or $c = 18$.

2. D

Strategy: plug in real numbers. Plug in easy, real numbers for the base (b) and height (h) of the triangle. For percents problems, 100 is often a good number to plug in: we set $b = 100$ and $h = 100$. This makes the original area of the triangle $(0.5)(100)(100) = 5000$. The new base will be $100 + (40/100) \cdot 100 = 140$ and the new height will be $100 - (40/100) \cdot 100 = 60$. So, the new area is $(0.5)(140)(60) = 4200$. The area has decreased by 800 from 5000, which is a 16% decrease (answer D).

Math Teacher Solution: If the original base is b, then the new base is $b + (0.40)b = (1.4)b$. If the original height is h, then the new height is $h - (0.40)h = (0.6)h$. So, the new area of the triangle is $(0.5)(1.4b)(0.6h) = (1.4)(0.6) \cdot (0.5)bh = (0.84) \cdot (0.5)bh$. The new area is 84% of the original area; in other words, the area has decreased by 16%.

3. C

Strategy: work with the answers. Suppose the answer is A, so that $x = 180$. This makes the four angles in the diagram $90°$, $60°$, $45°$, and $30°$ ($x/2$, $x/3$, $x/4$, and $x/6$, respectively). These angles sum to $225°$; however, the angles make a complete circle, so they must add to $360°$. Answer A is incorrect. Proceed in this way until the four angles $x/2$, $x/3$, $x/4$, and $x/6$ add to $360°$. If $x = 288$, the four angles are $144°$, $96°$, $72°$, and $48°$. Since these sum to $360°$, answer C is correct.

Math Teacher Solution: The four angles in the diagram must add to $360°$. We can set up and solve the following equation:

$$\frac{x}{2} + \frac{x}{3} + \frac{x}{4} + \frac{x}{6} = 360.$$

Factoring out the x, we have:

$$x\left(\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{6}\right) = x\left(\frac{6}{12} + \frac{4}{12} + \frac{3}{12} + \frac{2}{12}\right) = x\left(\frac{15}{12}\right) = 360,$$

so that

$$x = 360\left(\frac{12}{15}\right) = 288.$$

4. C

Strategy: plug in real numbers. Plug in real numbers for a and b. Since it isn't clear what numbers to plug in to satisfy the first equation, look at the second equation instead. First, realize that a cannot be 0 since a is a positive integer. (This is a difficult question, so it isn't unusual to have a "trap" answer; for this question, the trap is answer A.) Since $a \neq 0$, the only way to get $b^a = 1$ is if $b = 1$ (1 to any power is 1). Plugging $b = 1$ into the first equation, we get $a = 4 - a$ so that $2a = 4$ and $a = 2$.

Math Teacher Solution: For this question, the above solution *is* the math teacher solution. There really isn't any good algebraic solution here, if one exists at all. Let me know if you find one; if so, you can claim the prize (currently, a stuffed Erik the Red plush toy).

5. 3/5 or .6

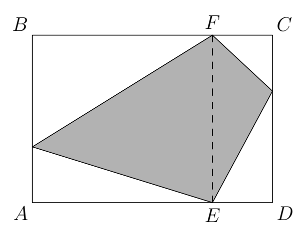
Strategy: plug in real numbers. Use an easy number for the total time of the race, say, 1 hour, and recall that $d = rt$ (distance is rate times time). Aubrey ran with the cabbage for 3/4 hour at 6 miles per hour (4.5 miles) and for 1/4 hour at 12 miles per hour (3 miles), for a total of 7.5 miles. The desired fraction is then $4.5/7.5 = 3/5$ (or 0.6).

Math Teacher Solution: Let T be the total time. The distance with the cabbage is then $(3/4) \cdot T \cdot 6 = (9/2)T$, and the distance *sans* cabbage is $(1/4) \cdot T \cdot 12 = 3T$. The desired fraction is then:

$$\frac{(9/2)T}{(9/2)T + 3T} = \frac{9/2}{15/2} = \frac{9}{15} = \frac{3}{5}.$$

6. 1/2 or .5

Strategy: plug in real numbers. On the SAT, you are only responsible for knowing the areas of rectangles, triangles, and circles. Any other strange-looking area (like the shaded region in this question's diagram) must somehow be constructed from these basic shapes. For this question, draw a line from E to F as in the figure below:



We see that the shaded region is just made up of two triangles. Each triangle's base is the dashed line, which is the same as the width of the rectangle. Now, plug in numbers for the relevant dimensions of the figure. For example, let $AB = 8$, $BC = 12$, and $FC = 3$ (making $BF = 9$). Then, the area of the rectangle is $8 \cdot 12 = 96$. The area of the shaded triangle on the right is $(1/2) \cdot 8 \cdot 3 = 12$ and the area of the triangle on the left is $(1/2) \cdot 8 \cdot 9 = 36$, so the shaded area is $12 + 36 = 48$, making the shaded area one-half the area of the rectangle.

Math Teacher Solution: Let l and w be the length and width of the rectangle, and let x be the distance FC. Using the diagram above, the area of the shaded triangle on the right is $(1/2) \cdot x \cdot w = xw/2$ and the area of the triangle on the left is $(1/2) \cdot w \cdot (l - x) = (lw - xw)/2$. Adding these two areas, we get the area of the shaded region: $xw/2 + (lw - xw)/2 = lw/2$ so the shaded region is one-half the area of the rectangle.