SAT Math Strategies Mini Quiz

1. When a number x is subtracted from 36 and the difference is divided by x, the result is 2. What is the value of x?

(A) 2
(B) 4
(C) 6
(D) 12
(E) 18

2. The senior class spent 20% of its budget on a big box of tomatoes. It then spent one-fourth of the remaining funds on a helium blimp. Finally, it spent 1/3 of the remaining funds on an extra-large helicopter for the prom. What fraction of the original funds were not spent?

(A) 20%
(B) 25%
(C) 40%
(D) 50%
(E) 60%

3. The sum of the integers p and q is 495. If p is divided by 10, the result is equal to q. What is the value of p?

(A) 40
(B) 45
(C) 245
(D) 250
(E) 450

4. In a box containing only purple and green marshmallows, 6 marshmallows are purple. If the probability of choosing a purple marshmallow from the box is $\frac{1}{3}$, how many green marshmallows are in the box?

(A) 2
(B) 6
(C) 9
(D) 12
(E) 18

5. If m and n are prime numbers greater than 2, which of the following could also be a prime number?

(A) $m+n$
(B) $m+n+1$
(C) $m+n+2$
(D) mn
(E) $mn+1$

$$\frac{a}{3}+\frac{b}{6}=1$$

6. If a and b are positive integers in the equation above, then what is the value of $a \cdot b$?

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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.

1. D

Strategy: work with the answers. Go through the answers, substituting each for x and using it in the problem until it works. For example, to check $x = 4$ (answer B), subtract 4 from 36 to get 32, and divide by 4, resulting in 8, so answer B is incorrect. You will find that only answer D gives you the final result of 2.

Math Teacher Solution: Convert the words into an equation for x:

$$\frac{36 - x}{x} = 2.$$

Multiplying both sides by x gives $36 - x = 2x$ so that $x = 12$.

2. C

Strategy: plug in real numbers. Notice that the actual budget figure is never specified and yet you have to come up with an answer! This means that the actual budget amount doesn't matter, so we can plug in an easy number of our choice. For percents problems, the number 100 is often a good choice. With a \$100 budget, the seniors spent 20% (\$20) on the tomatoes, leaving \$80. They spent one-fourth of the \$80 (another \$20) on the blimp, leaving \$60. Finally, they spent 1/3 of the \$60 (another \$20) on the helicopter, leaving \$40, which is 40% of the original \$100.

Math Teacher Solution: Let x be the original budget. After the tomatoes, the seniors have $x - 0.2x = 0.8x$. After the blimp, they have $0.8x - (1/4)(0.8x) = 0.6x$. After the helicopter, they have $0.6x - (1/3)(0.6x) = 0.4x$, so the answer is 40%.

3. E

Strategy: work with the answers. Use the answers to try various values for p. Using answer E, $p = 450$, and $q = p/10 = 45$, so the sum of p and q is 495. Answer E is correct. Note that if you start with answer A here, you will find that the sum of p and q is way off (44 instead of what we want: 495). Since the answers are in order, skip one or two answers before trying the next one. In this case, try C or D next.

Math Teacher Solution: Set up two equations:

$$p + q = 495$$

and

$$\frac{p}{10} = q$$

Substituting the second equation into the first, we get $p + p/10 = (1.1)p = 495$ so that $p = 450$.

4. D

Strategy: work with the answers. Use the answers to try choices for the number of green marshmallows. If there are 9 green marshmallows (answer C), then there are $6 + 9 = 15$ total marshmallows, so the probability of choosing a purple one is $6/15 = 2/5 > 1/3$, so answer C is incorrect. We need more green marshmallows to get a lower probability for choosing a purple marshmallow, so we try an answer to the right. If there are 12 green marshmallows (answer D), then there are $6 + 12 = 18$ total marshmallows, so the probability of choosing a purple one is $6/18 = 1/3$. Answer D is correct.

Math Teacher Solution: Let x be the number of green marshmallows. Then, $6 + x$ is the total number of marshmallows. The probability of choosing a purple marshmallow is the number of purple marshmallows (6) divided by the total number of marshmallows $(6 + x)$. So, we need:

$$\frac{6}{6+x} = \frac{1}{3}.$$

Cross-multiplying, $18 = 6 + x$ so that $x = 12$.

5. B

Strategy: plug in real numbers. Try easy prime numbers for m and n and plug them in, checking to see which of the answers is prime. For example, let $m = 3$ and $n = 5$. For this choice, *none* of the answers is prime! When you are plugging in numbers, you need to be able to eliminate all answers except for one. If you can only eliminate a few answers, or none at all, try different numbers to plug in. However, if you do eliminate some answers, you don't need to check those particular answers again. For this question, if you try $m = 3$ and $n = 7$ next, you will find that only answer B is prime, so it must be correct.

Math Teacher Solution: If m and n are prime numbers, then answer D is a composite number and can't be prime. Answers A and C are even: since m and n are odd numbers, $m + n$ is even, and $m + n + 2$ is even as well. Also, mn is odd, so that $mn + 1$ (answer E) is even. By process of elimination, answer B is correct.

6. 4

Strategy: plug in real numbers. Try easy integers for a and b and plug them in. When the equation works, you are done! You will find that setting a and b to 2 works, as well as setting one to 1 and the other to 4. Either way, $a \cdot b = 4$.

Math Teacher Solution: Combine the fractions using a common denominator of 6:

$$\frac{a}{3} + \frac{b}{6} = \frac{2a}{6} + \frac{b}{6} = \frac{2a + b}{6} = 1$$

so that $2a + b = 6$. Since a and b are positive integers, either $a = 1$ and $b = 4$, or $a = 2$ and $b = 2$. In either case, $a \cdot b = 4$.