The Weekly Rigor

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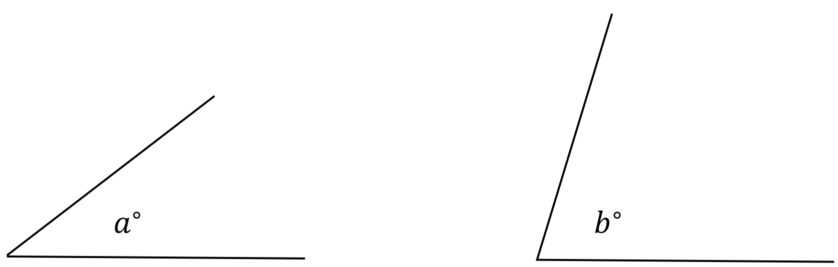
SAT Math Test Problem Children: Trigonometry
(Part 2)

3. In a right triangle, one angle measures $x°$, where $\sin x° = \frac{3}{5}$. What is $\cos(90° - x°)$?

4.



Note: Figures not drawn to scale.

The angles shown above are acute and $\sin(a°) = \cos(b°)$. If $a = 2k - 20$ and $b = 8k - 11$, what is the value of k ?

A) 4.5

B) 5.5

C) 12.1

D) 21.1

To solve the first problem, apply "SOHCAHTOA." Since $\frac{b}{a}$ is a ratio of the right triangle's two legs, the correct answer has to involve the tangent function. Hence, the correct answer can only be C or D. However, only answer D has the correct tangent function, since relative to angle *B*, the ratio of the opposite leg divided by the adjacent leg does indeed equal $\frac{b}{a}$.

The second problem is a straightforward application of the complementary angle relationship. Angles x and y are the two complementary angles of the given right triangle. Hence, the sine of $x°$ equals the cosine of $y°$. So, the cosine of $y°$ has to equal 0.7.

The third problem is a more indirect application of the complementary angle relationship. The angle equal to $90° - x°$ *is* the complement of angle measuring $x°$. Hence, $\sin x° = \cos(90° - x°)$. So, $\cos(90° - x°)$ has to equal $\frac{3}{5}$.

The fourth problem is the trickiest by far. We are given two acute angles consisting of $a°$ and $b°$such that $\sin(a°) = \cos(b°)$. By the complementary angle relationship, $\sin(a°) = \cos(90° - a°)$. Hence, $b° = 90° - a°$, by substitution. So, since $a = 2k - 20$ and $b = 8k - 11$, it follows that $8k - 11 = 90 - (2k - 20)$. Thus, $8k - 11 = 90 - 2k + 20$, i.e., $10k = 121$. Therefore, $k = \frac{121}{10} = 12.1$, answer C.