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2015 11 d Express $5 \cos x - 12 \sin x$ in the form $A \cos(x + \alpha)$, where $0 \leq \alpha \leq \frac{\pi}{2}$. **2**

$$A = \sqrt{5^2 + (-12)^2}$$

$$= 13$$

$$\therefore 5 \cos x - 12 \sin x = 13 \cos(x + \alpha)$$

$$\frac{5}{13} \cos x - \frac{12}{13} \sin x = \cos x \cos \alpha - \sin x \sin \alpha$$

$$\therefore \cos \alpha = \frac{5}{13}$$

$$\alpha = \frac{5}{13}$$

$$\alpha = 1.176005207\dots$$

$$= 1.18 \text{ (2 dec pl)}$$

$$\therefore 5 \cos x - 12 \sin x = 13 \cos(x + 1.18)$$

State Mean:
1.66

* These solutions have been provided by [projectmaths](#) and are not supplied or endorsed by BOSTES.

Board of Studies: Notes from the Marking Centre

The question was attempted well by the majority of candidates.

In the better responses, candidates used appropriate formulae to directly obtain the values of A and α .

Common problems were:

- not using the information, $0 < \alpha < \frac{\pi}{2}$, which was given in the question. In such cases, responses typically stated that $\tan \alpha = \frac{12}{5}$
- incorrect reasoning after expanding $A \cos(x + \alpha)$
- giving α in degrees, even though the question asked for α in radians.