

1. A cylindrical tank with radius $5m$ is being filled with water at a rate of $3m^3/\text{min}$. How fast is the height of the water rising?
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2. Two sides of a triangle have lengths $12m$ and $15m$. The angle between them is increasing at a rate of $2^\circ/\text{min}$. How fast is the length of the third side increasing when the angle between the sides of fixed length is 60° ? For your reference, if the sides of the triangle are a, b, c and the angle α of the triangle is opposite the side of length a then the law of cosines reads

$$a^2 = b^2 + c^2 - 2bc \cos \alpha .$$

3. Estimate $1001^{1/3} = \sqrt[3]{1001}$ using a linear approximation.