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## Mercury

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### Question - Indices and simplification

Simplify

$$\frac{\sqrt{x}(yz)^2}{x^3y^{-3/2}}$$

into the form  $x^a y^b z^c$  for numbers  $a$ ,  $b$  and  $c$ .

### Question - Algebra simplification and factorization

Simplify this expression and then take out a common factor to factorize:

$$3x^2 + 4xy - x^2 - 6xy$$

## Question - Trigonometry

If a right-angled triangle's two shortest sides are 5 and 12, work out how long the longest side is, and give a formula for the smallest of the three angles inside the triangle using an inverse trigonometric function.

## Good link - Reciprocal trigonometric functions

Give definitions of the functions sec, cot and cosec.

Then for practice of sec, cot and cosec use the [Khan Academy link](#)

**Question - See HELM notes on Trigonometric identities page 15/17**

Show that

$$(1 + \sin(t))(1 + \sin(-t)) \equiv \cos^2(t)$$

**Question - Hyperbolic functions**

Calculate  $2 \sinh(x) \cosh(x)$ , what function is it equal to? Use the  $e^x + e^{-x}$  formula etc.