2 men catch 2 fish in 2 minutes. At this rate, how many men could catch 500 fish in 500 minutes?

INDIRECT

DIRECT

Men	Fish	Minutes
2	2	2
$x = ?$	500	500

There is DIRECT PROPORTION between fish and minutes because as 1 goes up, the other does too.

Fewer men need more time to catch fish. More men need less time to catch fish.
∴ there is INDIRECT PROPORTION between number of men and ~~fish~~ minutes.

Fraction of quantities in table:

Men

$$\frac{x}{2} \cancel{\frac{2}{2}} = \frac{2}{500} \times \frac{500}{2}$$

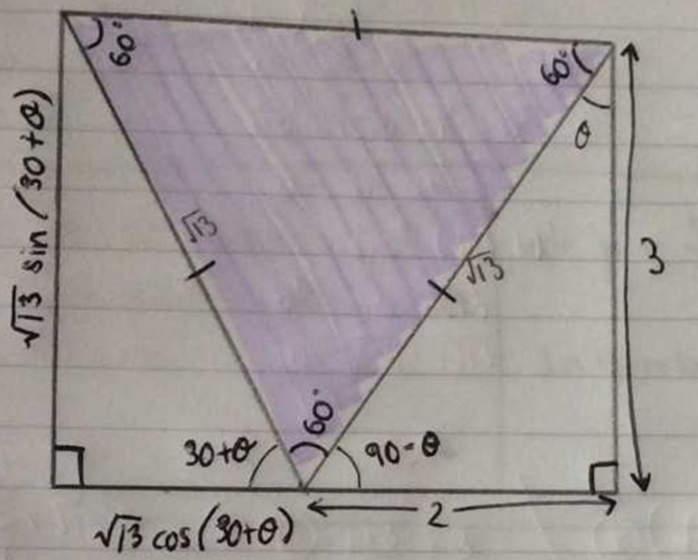
$$\frac{x}{2} \cancel{\frac{2}{2}} = 1 \rightarrow \times 2$$

$$x = 2 \text{ men}$$

If relation is DIRECT, keep number as it is. If it is INDIRECT, flip numbers in the fraction.

Louise's Solution (SAK Tutor Base) - Diversity

which has the larger area? The pink equilateral or the combined right angle triangles?



$\theta = \tan^{-1}\left(\frac{2}{3}\right)$

$\sqrt{13}\cos(30+\theta) = 1.598\ 076\ 211$

$\sqrt{13}\sin(30+\theta) = 3.232\ 050\ 808$

area = $2.582\ 531\ 754$ +

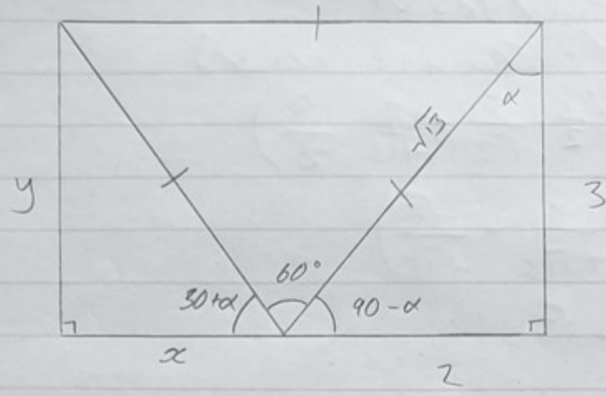
3

$5.582\ 531$

equilateral = $5.629\ 165\ 125$

equilateral area > 2 right angle triangle area.

Niall’s Solution (CPC Tutor Base) - Opportunity



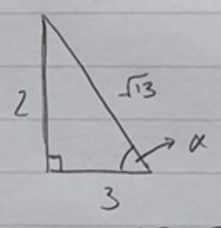
Equilateral Triangle side length

$$a^2 = 2^2 + 3^2$$
$$a = \sqrt{13}$$

$$\alpha = \arctan \frac{2}{3}$$

$$x = \sqrt{13}\cos(30+\alpha)$$
$$y = \sqrt{13}\sin(30+\alpha)$$

$$x = \sqrt{13}\cos(30+\alpha)$$
$$= \sqrt{13}\left(\cos 30 \cos\alpha - \sin 30 \sin\alpha\right)$$
$$= \sqrt{13}\left(\frac{\sqrt{3}}{2}\cos\left(\tan^{-1}\left(\frac{2}{3}\right)\right) - \frac{1}{2}\sin\left(\tan^{-1}\left(\frac{2}{3}\right)\right)\right)$$



$$\cos\alpha = \frac{3}{\sqrt{13}}$$

$$\sin\alpha = \frac{2}{\sqrt{13}}$$

$$x = \sqrt{13}\left(\frac{\sqrt{3}}{2}\cdot\frac{3}{\sqrt{13}} - \frac{1}{2}\cdot\frac{2}{\sqrt{13}}\right)$$
$$= \sqrt{13}\left(\frac{3\sqrt{3}}{2\sqrt{13}} - \frac{1}{\sqrt{13}}\right)$$
$$= \frac{3\sqrt{3}}{2} - 1$$

Niall's Solution (CPC Tutor Base) - Opportunity

$$y = \sqrt{13}\sin(30+\alpha)$$
$$= \sqrt{13}\left(\sin 30 \cos\alpha + \sin\alpha\cos 30\right)$$
$$= \sqrt{13}\left(\frac{1}{2}\cdot\frac{3}{\sqrt{13}} + \frac{2}{\sqrt{13}}\cdot\frac{\sqrt{3}}{2}\right)$$
$$= \sqrt{13}\left(\frac{3}{2\sqrt{13}} + \frac{\sqrt{3}}{\sqrt{13}}\right)$$
$$= \frac{3}{2} + \sqrt{3}$$

Area of left triangle

$$\text{area} = \frac{xy}{2}$$
$$= \left(\frac{3\sqrt{3}-2}{2}\right)\left(\frac{3+2\sqrt{3}}{2}\right)\cdot\frac{1}{2}$$
$$= \frac{9\sqrt{3}+18-6-4\sqrt{3}}{8}$$
$$= \frac{12+5\sqrt{3}}{8}$$

Area of right triangle

$$\text{area} = \frac{3\cdot 2}{2}$$
$$= 3$$

Non-equilateral triangle sum

$$= 3 + \frac{12+5\sqrt{3}}{8}$$
$$= \frac{36+5\sqrt{3}}{8} \approx 5.582532$$

Equilateral Triangle area

$$\text{area} = \frac{1}{2}\cdot\sqrt{13}\cdot\sqrt{13}\cdot\sin 60^\circ$$
$$= \frac{13}{2}\cdot\frac{\sqrt{3}}{2}$$
$$= \frac{13\sqrt{3}}{4} \approx 5.629165$$

$\therefore$ The equilateral triangle is larger