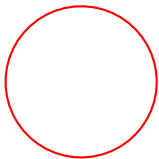# **Precalculus**
Inverse trig word problem

Todor Milev

2019

Example

The horizon at sea is viewed at from a ship height of 10m. How far does the ship need to travel to reach the horizon just observed?
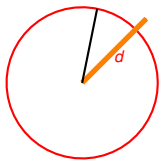
2/2

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The horizon at sea is viewed at from a ship height of 10m. How far does the ship need to travel to reach the horizon just observed? Assume earth is round with radius 6371 km and that the ship sails along the shortest curved path.

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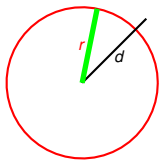
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not to scale

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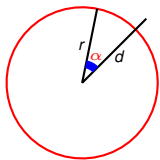- Let *d* be the distance from eyes of seaman to the center of earth.

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not to scale

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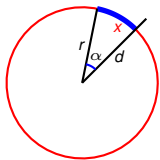- Let r be the radius of earth.

2/2

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not to scale

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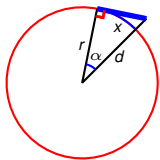- Let r be the radius of earth. Let α be the indicated angle.

Example

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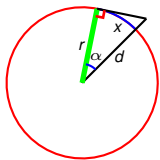- Let the distance to the horizon be x.

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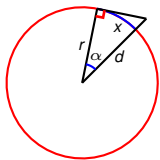- Let the distance to the horizon be x.

r=6371km

Example

not to scale

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$r = 6371 \text{km}$

$d = ?$
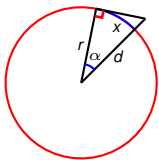
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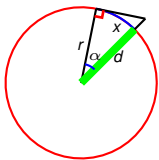$d = 6371\text{km} + 0.01\text{km}$

Example

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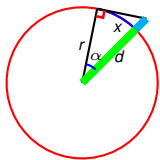$d = 6371\text{km} + 0.01\text{km}$

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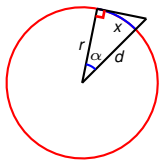$d = 6371\text{km} + 0.01\text{km}$

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$r = 6371\text{km}$
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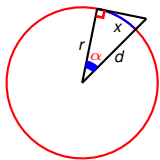
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$\cos \alpha = ?$

Example

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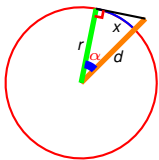
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$\cos \alpha = \dfrac{r}{d}$

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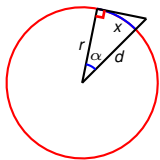
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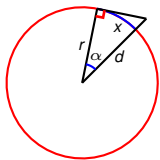- Let the distance to the horizon be x.

$$r = 6371 \text{km}$$
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$$\cos \alpha = \frac{r}{d}$$
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Example

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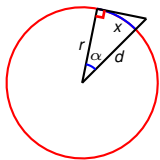- Let the distance to the horizon be x.

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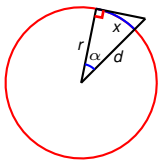- Let the distance to the horizon be x.

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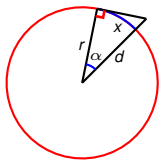
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$\cos \alpha = \dfrac{r}{d}$

$\alpha = \arccos\left(\dfrac{r}{d}\right)$

$x = r\alpha = r \arccos\left(\dfrac{r}{d}\right)$

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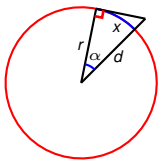
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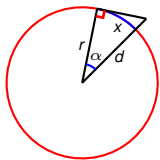
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Todor Milev   Inverse trig word problem   2019