

## → RIDDLE #3

### ESA's NEO Coordination Centre

#### A visitor from outer space

Comet C/2020 F3 (NEOWISE) is a visitor that usually stays far away from the Sun. With an aphelion at about 700 au (more than 100 billion km!) it takes the comet more than 6000 years to complete an orbit around the Sun. At its perihelion it has an orbital velocity of 77.6 km/s, just 16 m/s too slow to escape from the solar system. But quite some dust that it ejects before or after its perihelion passage on 3 July 2020 will leave our solar system.



Figure 1: Comet C/2020 F3 (NEOWISE). Credit: R. Kresken

And here comes our next riddle:

- A comet with a semi-major axis of 700 au releases a jet of dust particles when reaching a distance to the Sun of 1.6 au.

What is the size threshold where the dust particles will be ejected from the solar system because of the solar radiation pressure?

Assume that the dust particles are ejected with zero velocity from the comet and ignore the gravity of the comet. Also assume perfectly absorbing surfaces and a specific density  $\rho$  of the particles of  $1000 \text{ kg/m}^3$ .

Please, send your responses before the proposed deadline to the following e-mail: [neocc@ssa.esa.int](mailto:neocc@ssa.esa.int).

Use as subject of your e-mail: "Riddle #3 – solution".

Moreover, please let us know if you would prefer not to have your name included in the list of correct replies.

If you like to get some additional help, here is a spoiler (coded in the ROT 13/5 encryption commonly used in Geocaching):

*Uvag: Gur fbyne enqvnvba cerffher npgf bccbfvgr gb gur Fha tenivgl. Guvf pna or rkcybvgrq gb erqhpr gur tenivngvbany pbafgnag zh va gur ivf-ivin rdhngvba.*

#### Decryption Key

A	B	C	D	E	F	G	H	I	J	K	L	M
N	O	P	Q	R	S	T	U	V	W	X	Y	Z

(letter above equals below, and vice versa)

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