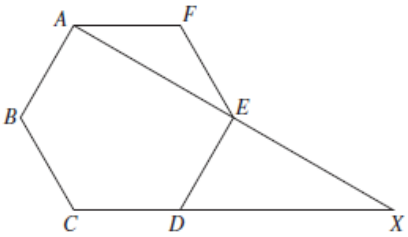
19 M **14 c** The regular hexagon *ABCDEF* has sides of length 1. The diagonal *AE* and the side *CD* are produced to meet at the point *X*.
Copy or trace the diagram into your writing booklet.
Find the exact length of the line segment *EX*, justifying your answer. **3**



Angle sum of hexagon = 720°

Internal angle of regular hexagon = 120° ✔

$\angle AFE = 120°$

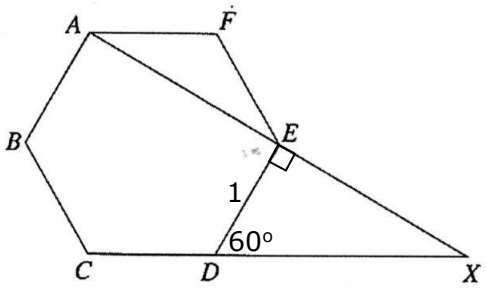
$\therefore \angle FEA = 30°$ (base angles of isosceles triangle *AFE* equal)

$\angle AED = 120° - 30°$

$= 90°$

$\therefore \angle DEX = 90°$ (straight angle)

$\angle EDC = 60°$ (exterior angle of regular hexagon) ✔



Using triangle *EDX*:

$\frac{x}{1} = \tan 60°$

$x = \sqrt{3}$ $\therefore$ the length of *EX* is $\sqrt{3}$ units. ✔

State Mean: **1.65/3**

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by NESA.

Marking Feedback:

Students should:
☐ calculate the interior or exterior angle of a polygon
☐ calculate the equal angles in an isosceles triangle given the third angle
☐ use exact ratios or the sine rule in trigonometry to evaluate the length of a side

In better responses, students were able to:
☐ correctly name angles
☐ substantiate all mathematical statements used
☐ understand the need to prove $\angle DEX = 90°$

Areas for students to improve include:
☐ setting out a proof in a logical order, stating reasons at each step