4) a) In $\triangle$ OFD & ACE we have:

$O\hat{D}C = 90^\circ$ (proved)
(EA) is tangent to (C) of radius of [OA] at A (proved)
So $E\hat{A}O = 90^\circ$ (tangent theorem: ①)

So, $O\hat{D}C = E\hat{A}O = 90^\circ$.

1 pt

(OF) // (EA) (proved)

So $A\hat{E}F = O\hat{F}D$ (corresponding angles enclosed btw parallel st. lines)
Finally, Triangles OFD & ACE are similar by A.A postulate

ratio: $\begin{array}{c} \triangle OFD \\ CEA \end{array} \Big| \dfrac{OF}{CE} = \dfrac{FD}{EA} = \dfrac{OD}{CA} = cst$
① ② ③

b) Using ratio ③:
$\dfrac{OD}{CA} = \dfrac{3}{AB+BC} = \dfrac{3}{8}$

½ pt

Thus, $K = \dfrac{FD}{EA} = \dfrac{3}{8}$.

5) M is mid pt of [OE] (given) / then (AM) is median relative to [OE]
but $\triangle$ EAO is right at A (proved)
then M is equidistant from pts E, A & O (median relative to a hyp of a right $\triangle$)
but A & O are fixed pts
Thus, As C varies on [Bx) then, M describes the perpendicular bisector of [AO].

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