as ratio of these areas to form and solve an equation for *OP*. Other method may be possible. Or $\frac{1}{2}OP.h = 3.75,\ h = 5\sin 1.2 \Rightarrow OP = ...$

A1: Achieves distance *OP* = awrt 1.6 (allow if called *AP*). May be implied by subsequent work.

M1: Attempts the cosine rule, or other full method, to find at least AP^2 using angle 1.2, *OA* = 5 and their *OP*. Condone if AP^2 is missing or labelled *AP*.

Again there are longer winded ways, e.g. using right angle triangle *OAX* where *X* is the base of perpendicular to *OB* through *A*, then $AX = 5\sin 1.2,\ PX = \frac{AX}{\tan 1.2} - OP$ and $AP^2 = AX^2 + PX^2$ can be used to find *AP*.

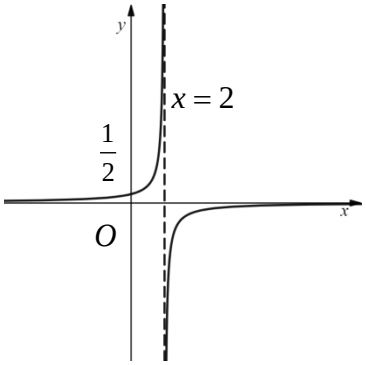
A1cso: $AP = 4.7\text{km}$ or 4700m (isw once seen if further rounding occurs). Must include the correct units and be given to nearest 100m.

Watch out for using of $\frac{1}{2} \times 5 \times OP \times 1.2 = 3.75 \Rightarrow OP = 1.25$ which also leads to 4.7km. This scores at most M0A0M1A0 despite giving the same answer.

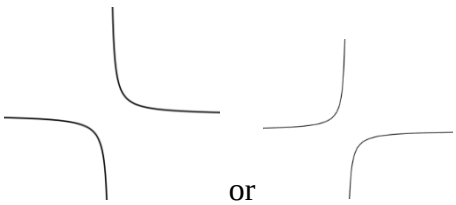
SC If R_1 and R_2 are mixed up in part (c) then score as a misread if the work is otherwise correct – so M1 for attempting $\frac{1}{2} \times 5 \times OP \times \sin 1.2 = 11.25 \Rightarrow OP = ...$ and dM1 for a correct use of the cosine rule to find *AP*.

Some methods do not find *OP*, but a different intermediate length for a triangle containing *AP*. Such methods score the M1 for the attempt to find two other side lengths for a triangle with side *AP* and the A1 for a correct length, then second M for full method to find at least AP^2. For example

Question Number	Scheme	Marks
5(c) Alt	Let *X* be base of perpendicular to *OA* though *P*, then $\frac{1}{2} \times 5 \times XP = 3.75 \Rightarrow XP = 1.5 \Rightarrow OX = \frac{"1.5"}{\tan 1.2}$ so $AX = 5 - \frac{"1.5"}{\tan 1.2} = ...$ $AX = 4.416...$ $AP^2 = "4.416..."^2 + "1.5"^2 = ...$ $AP = 4.7\text{km}$ or 4700m	M1 A1 M1 A1 **(4)** **(9 marks)**

Question Number	Scheme	Marks
6.(a)	 1/*x* type shape Fully correct Correct equation of vertical asymptote and *y* intercept	M1 A1 B1 **(3)**
(b) (i)	Sets $kx-4=\dfrac{1}{2-x}\Rightarrow(kx-4)(2-x)=1$	M1
	$kx^2+(-4-2k)x+9=0$	A1
	Attempts use $b^2-4ac\ldots0\ \Rightarrow(-4-2k)^2-4k\times9\ldots0$	dM1
	$\Rightarrow 4k^2-20k+16\ldots0\Rightarrow k^2-5k+4\ldots0$ *	A1*
(ii)	$(k-1)(k-4)\ldots0\Rightarrow k\ ,,\ 1,\ k\ldots4$	M1, A1
		(6) **(9 marks)**

(a)

M1: Correct shape for a $\dfrac{1}{x}$ type graph. Look for  or

Must have two branches, be generous with curves that bend back on themselves if the intent is clear.

A1: Fully correct shape and position. Do not accept curves that clearly bend back on themselves, but "pen flicks" at the end of a curve can be condoned.

B1: Correct equation (must be an equation) of asymptote and *y* intercept. The graph must be asymptotic here and in the correct places (e.g. the equation must match the placement), though it need not be fully correct – as long as these features are shown. Information stated on the graph takes precedence but if coordinates or equation are missing, allow if they are stated in the text. Accept ½ labelled on the *y*-axis for the intercept. Condone (½ , 0) if it is in the correct position on the axis.

(b)(i)

M1: Sets $kx-4=\dfrac{1}{2-x}\Rightarrow(kx-4)(2-x)=1$