Ex2

1) In the right $\triangle AHH$ at H (given) $\cos a = \dfrac{adj}{hyp} = \dfrac{AH}{AM}$

In the right $\triangle AMB$ at M (angle facing diameter), $\cos a = \dfrac{AM}{AB} = \dfrac{AM}{2}$. $\left(\dfrac{1}{2} + \dfrac{1}{2}\right)$

2) a) In the right $\triangle MOH$ at H (given), $\cos b = \dfrac{OH}{OM} = \dfrac{OH}{1}$, so $OH = \cos b$ unit of length $\left(\dfrac{1}{2}\right)$

b) Since A, O, and H are given collinear so $AH = AO + OH = 1 + \cos b$ unit of length $\left(\dfrac{3}{4}\right)$

c) $\widehat{MAB} = \dfrac{\overset{\frown}{MB}}{2}$ (inscribed angle) and $\widehat{MOB} = \overset{\frown}{MB}$ (central angle)

so $\widehat{MOB} = 2\widehat{MAB}$ then $b = 2a$ $\left(\dfrac{1}{2}\right)$

we have that $AH = 1 + \cos b$ and using part 1

$AH = AM \cos a = 2\cos a (\cos a) = 2\cos^2 a$ so

$1 + \cos b = 2\cos^2 a$ then $1 + \cos 2a = 2\cos^2 a$ $\left(\dfrac{1}{2} pt\right)$

3) let $a = 15°$ in the above relation

$2\cos^2 15° = 1 + \cos 2(15°)$ so $\cos^2 15° = \dfrac{1 + \cos 30°}{2} = \dfrac{1 + \frac{\sqrt{3}}{2}}{2}$

so $\cos^2 15° = \dfrac{2 + \sqrt{3}}{4}$ then $\cos 15° = \dfrac{\sqrt{2 + \sqrt{3}}}{2}$ $\left(15° \text{ is acute}\right)$ $\left(\dfrac{3}{4} pt\right)$

Ex3

1) Population : set of 90 students in Gr9
character : number of double sheet papers used
Nature : quantitative since the values of the character are numbers $\left(\dfrac{1}{2} pt\right)$

2) $\dfrac{360°}{x} = \dfrac{90 \text{ students}}{10 \text{ students}}$ so $x = \dfrac{3600}{90} = 40°$ then

$y = 360° - (72° + 216° + 40°) = 32°$ which represents the central angle of the sector representing the students who used 4 double sheet papers. $\left(\dfrac{3}{4}, \dfrac{1}{4}, \dfrac{1}{2}\right)$

3)

n° of double sheet papers	1	2	3	4	total
n° of students	$\dfrac{360°}{72°} = \dfrac{90}{M}$	54	10	8	90

(1pt)