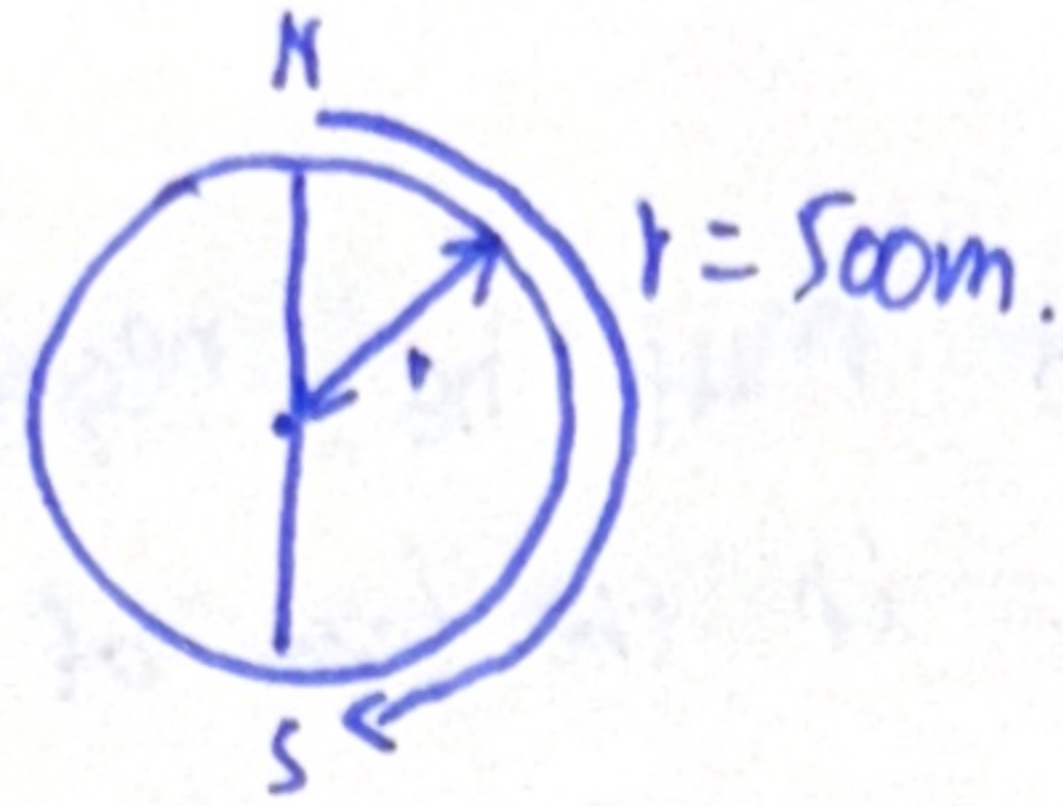
Q1.11



N to S = 180°, or π radians.

In this case, displacement = arc length of 180°.

a) Hence, displacement $= \pi r$

$= \pi (500m)$

$= 1570.80m.$

b) While the bicyclist would have traveled $2\pi r$ arc-length's worth of distance, her displacement = 0m, because she would be right where she started

Q1.12. Yes. The lengths must be negative of each other, in the form of $x : -x$.

For 3 vectors to have a vector sum of zero, the sum length of 2 of the vectors must be $\geq$ length of the 3rd vector. (Triangle Inequality).

Q1.13. No. Time is a scalar quantity (in Newtonian physics) while ~~it~~ time interval can be represented as a vector component, as a 4th dimensional component in a spacetime perspective, it is still not a vector quantity (in the relativistic perspective).

Note that this does not apply to time itself, which is a coordinate label.

Q1.14. No. Vectors actually include direction and magnitude. In this case, no magnitude is provided.

Q1.15 No. A vector's magnitude is a measure of its overall length, calculated using all of its constituent components. Thus, if even 1 component is non-zero, the vector will have some semblance of length, which will be contributive towards a non-zero magnitude.

No. Calculating magnitude requires the summative squaring of all ~~its~~ of a vector's components. This means that any given vector's magnitude is $\geq$ it's constituent components' value, and never lesser.

Q1.16(a) No. In a vacuum, vectors describe magnitude and direction. Saying that a vector is "negative" lacks context, as it fails to provide info on magnitude - such context only becomes possible when another vector is considered, and negativity is used together with it.

Q1.16(b) In this case, yes, because negativity precisely describes direction, with "the other vector" providing magnitude and initial direction as a contextual basis of comparison.

Q1.17 $\vec{C} = \vec{A} + \vec{B}$

if: $\vec{A}$ and $\vec{B}$ point in same direction,

$|\vec{C}| = |\vec{A}| + |\vec{B}|$

else:

$|\vec{C}| = |\vec{A}| - |\vec{B}|$.

for $\vec{C} = \vec{A} + \vec{B} = 0$

$\vec{B} = -\vec{A}$, or $\vec{A}$ and $\vec{B}$ are anti-parallel.