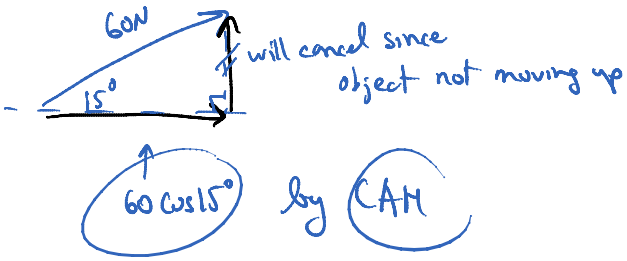
Practice Test Quest (test2)

March-01-13
8:51 AM

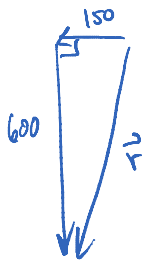
12. The vectors $\vec{a}$ and $\vec{b}$ have magnitudes 3 and 5, respectively. The angle between the vectors is 130°. Determine the magnitude of the vector $|\vec{a} \times 4\vec{b}|$.

$$= |\vec{a}||4\vec{b}| \sin 130^\circ$$
$$= |3(4)(5)\sin 130^\circ|$$
$$\doteq 46$$

13. Paul pulls on a rope attached to his sleigh with a force of 60 N. If the rope makes an angle of 15° with the horizontal, determine the force that pulls the sleigh forward.



4. An airplane heading south has an airspeed of 600 km/h, when it encounters a wind from the east at 150 km/h. How long does it take the airplane to travel 900 km?



$$|\vec{r}| = \sqrt{600^2 + 150^2}$$
$$\doteq 618 \text{ km/h}$$

$$T = \frac{D}{V} = \frac{900}{618} = 1.46 \text{ hrs}$$

19. Determine the value of k such that the vectors $(1, 2, 1)$ and $(k, 2k + 1, 8)$ are perpendicular.

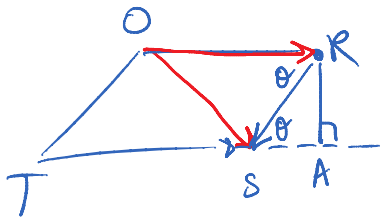
$$(1,2,1)\cdot(k,2k+1,8)=0$$

$$1k+4k+2+8=0$$

$$5k=-10$$

$$k=-2$$

The parallelogram $ORST$ is formed by the vectors $\overrightarrow{OR} = (2, -1, 4)$ and $\overrightarrow{OS} = (3, -2, 1)$. A line is drawn from the point R perpendicular to the side $\overline{ST}$. It intersects the segment $\overline{ST}$ at the point A. Determine the length of $\overline{RA}$.



$$\vec{OR}+\vec{RS}=\vec{OS}$$

$$\vec{RS}=\vec{OS}-\vec{OR}$$

$$=(3,-2,1)-(2,-1,4)$$

$$=(1,-1,-3)$$

$$|\vec{RS}|=\sqrt{1^2+1^2+3^2}$$

$$=\sqrt{11}$$

find angle between $\vec{RO}$ and $\vec{RS}$:

$$\vec{RO}\cdot\vec{RS}=|\vec{RO}||\vec{RS}|\cos\theta$$

$$(-2,1,-4)\cdot(1,-1,-3)=\sqrt{21}\sqrt{11}\cos\theta$$

$$\frac{-2-1+12}{\sqrt{231}}=\cos\theta$$

$$54^\circ\doteq\theta$$

$\therefore$ SOH

$$|\vec{RA}|=|\vec{RS}|\sin\theta$$

$$|\vec{RA}|=\sqrt{11}\sin 54^\circ\doteq 2.67$$