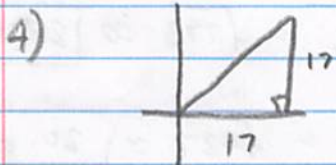


1)  $P(-5, -8)$   $Q(12, 9)$

$\vec{PQ} = \langle 17, 17 \rangle$

3)  $\|\vec{PQ}\| = \sqrt{17^2 + 17^2}$   
 $= \sqrt{578} = 17\sqrt{2}$

2)  $17i + 17j$



$\tan \theta = \frac{17}{17}$

$\tan^{-1}(\text{Ans}) = \theta$

$\theta = 45^\circ$

$u = \langle 5, 12 \rangle$   $v = \langle -3, 8 \rangle$   $w = \langle 5, 4 \rangle$   $f = \langle -2, -5 \rangle$   $d = \langle 4, -7 \rangle$

5)  $v + w = \langle 2, 12 \rangle$

6)  $(u \cdot v) w = -15 + 96 \langle 5, 4 \rangle$

$81 \langle 5, 4 \rangle$

$\langle 405, 324 \rangle$

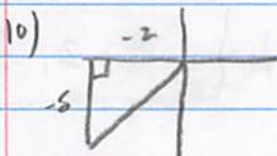
7)  $\|w\| = \sqrt{25 + 16}$

$= \sqrt{41} = 13$

8)  $3f - 2d$

$\langle -6, -15 \rangle - \langle 8, -14 \rangle = \langle -14, -1 \rangle$

9)  $\frac{1}{\sqrt{73}} \langle -3, 8 \rangle = \left\langle \frac{-3\sqrt{73}}{73}, \frac{8\sqrt{73}}{73} \right\rangle$



$\tan \theta = \frac{-5}{-2}$

$\tan^{-1}(\text{Ans}) = \theta$

$\theta = 68.20$

$\text{Dir } \theta = 248.20^\circ$

11)  $f \cdot d = -8 + 35$

$27$

12)  $\angle$  Blt  $f$  and  $d$

$\cos^{-1} \left( \frac{27}{\sqrt{29} \cdot \sqrt{65}} \right) = \cos^{-1} \left( \frac{27}{\sqrt{1885}} \right) = \theta = 51.55^\circ$

13) ORTHOGONAL  $\rightarrow$  2 VECTORS THAT ARE  $\perp$  B/C THEN  
DOT PRODUCT IS  $= \phi$

$$A = (7, 2, 15) \quad B = (3, -7, -11) \quad C = (-8, 2, 4) \quad D = (-5, -5, -5)$$

$$14) \overline{AB} = \sqrt{(7-3)^2 + (-7-2)^2 + (-11-15)^2} = \sqrt{4^2 + 9^2 + 26^2} = \sqrt{773} \approx \boxed{27.80}$$

$$15) \overline{BC} = \sqrt{(-8-3)^2 + (-7-2)^2 + (4+11)^2} = \sqrt{11^2 + 9^2 + 15^2} = \sqrt{427} \approx \boxed{20.66}$$

$$16) \overline{CD} = \sqrt{(-5+8)^2 + (-5-2)^2 + (4+5)^2} = \sqrt{3^2 + 7^2 + 9^2} = \sqrt{139} \approx \boxed{11.79}$$

$$17) \overline{AC} = \sqrt{(-8-7)^2 + (2-2)^2 + (15-4)^2} = \sqrt{15^2 + 0^2 + 11^2} = \sqrt{346} \approx \boxed{18.60}$$

$$18) \overline{AB} = \left( \frac{7-3}{2}, \frac{2-7}{2}, \frac{15-11}{2} \right) = \left( \frac{4}{2}, \frac{-5}{2}, \frac{4}{2} \right) = \boxed{\left( 2, -\frac{5}{2}, 2 \right)}$$

$$19) \overline{BC} = \left( \frac{3-8}{2}, \frac{-7+2}{2}, \frac{4-11}{2} \right) = \boxed{\left( -\frac{5}{2}, -\frac{5}{2}, -\frac{7}{2} \right)}$$

$$20) \overline{CD} = \left( \frac{-8-5}{2}, \frac{2-5}{2}, \frac{4-5}{2} \right) = \boxed{\left( -\frac{13}{2}, -\frac{3}{2}, -\frac{1}{2} \right)}$$

$$21) \overline{AC} = \left( \frac{7-8}{2}, \frac{2+2}{2}, \frac{15+4}{2} \right) = \left( -\frac{1}{2}, \frac{4}{2}, \frac{19}{2} \right) = \boxed{\left( -\frac{1}{2}, 2, \frac{19}{2} \right)}$$

$$22) \overrightarrow{BA} = \langle 4, 9, 26 \rangle$$

$$23) \overrightarrow{BC} = \langle -11, 9, 15 \rangle$$

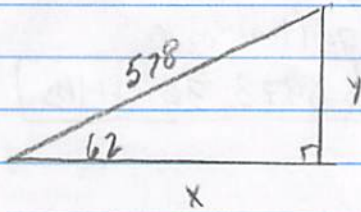
$$24) \overrightarrow{DA} = \langle 12, 7, 20 \rangle$$

$$25) \overrightarrow{BA} \cdot \overrightarrow{BC} \Rightarrow \cos^{-1} \left( \frac{-44 + 81 + 390}{\sqrt{773} \cdot \sqrt{427}} \right) = \cos^{-1} \left( \frac{427}{\sqrt{330071}} \right) =$$

Angle  $\theta$

$$\boxed{\theta = 41.99^\circ}$$

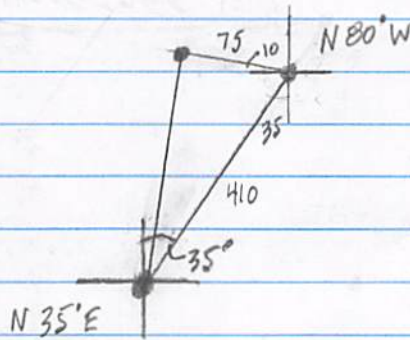
26)



$$578 \langle \cos 62, \sin 62 \rangle$$

$$\langle 271.35, 510.34 \rangle$$

27)



$$A) s^2 = 410^2 + 75^2 - 2(410)(75) \cos 65$$

$$s^2 = 147733.9769$$

$$s = 384.36 \text{ mph}$$

$$B) \frac{\sin P}{75} = \frac{\sin 65}{384.32}$$

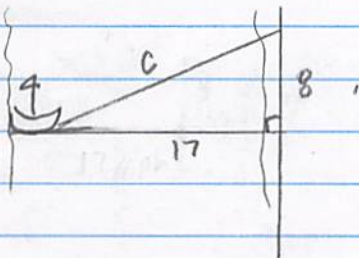
$$\sin P = .1768$$

$$P = 10.19^\circ$$

$$\text{DIRECTIONAL } \theta = 35 - 10.19$$

$$\theta = \text{N } 24.81 \text{ E}$$

28)

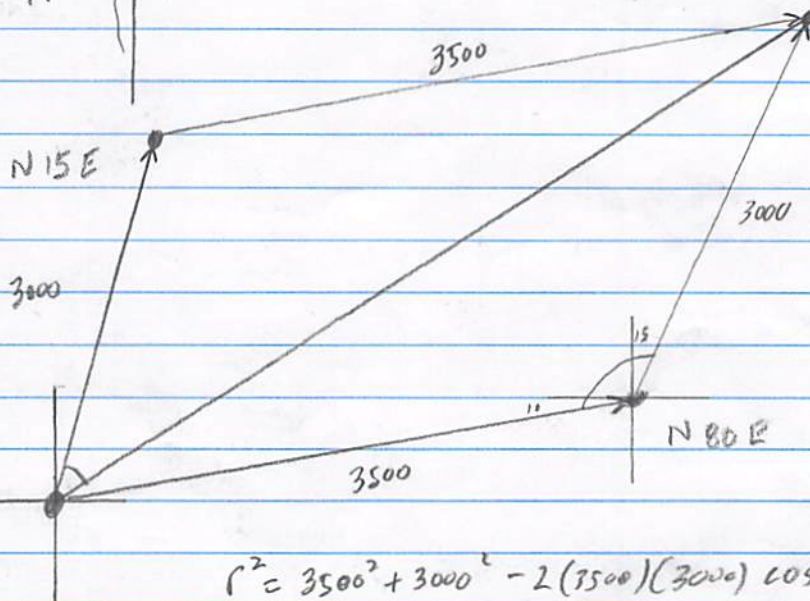


$$c^2 = 17^2 + 8^2$$

$$c^2 = 353$$

$$c = \sqrt{353} \approx 18.79 \text{ mph}$$

29)



$$\frac{\sin P}{3500} = \frac{\sin 115}{5488.62}$$

$$\sin P = .5779$$

$$P = 35.31^\circ$$

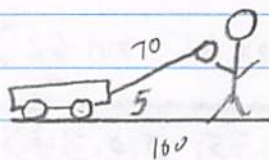
$$r^2 = 3500^2 + 3000^2 - 2(3500)(3000) \cos 115$$

$$r^2 = 30124983.5$$

$$r = 5488.62 \text{ lbs}$$

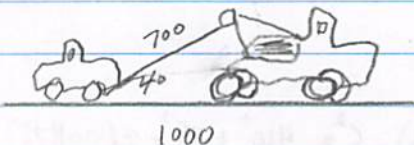
$$\text{Dir. } \theta = \text{N } 50.31 \text{ E}$$

30)



$$W = 70(100) \cos 5$$
$$= \boxed{6973.36 \text{ ft}\cdot\text{lbs}}$$

31)



$$W = 700(1000) \cos 40$$
$$= \boxed{536231.11 \text{ ft}\cdot\text{lbs}}$$