Student: _____ **Date:** _____	**Instructor:** Joe Betters **Course:** Pre-Calculus Pre AP (Master Course)	**Assignment:** 9.6 Classwork Day 1

1. The vector **v** has initial point P and terminal point Q. Write **v** in the form **ai + bj + ck**. That is, find its position vector.

   $P = (-4, 5, -1)$; $Q = (4, 1, -2)$

   v = **ai** + **bj** + **ck** where

   a = _____, b = _____, and c = _____.
   (Simplify your answers. Type exact values, using fractions and radicals as needed. Type 1, − 1, or 0 when appropriate, even though these values are not usually shown explicitly when writing a vector in terms of its components.)

   ID: 9.6.31

2. Find the following quantity if **v** = **2i** − **5j** + **4k** and **w** = − **2i** + **4j** − **4k**.

   4v + **5w**

   4v + **5w** = (_____)**i** + (_____)**j** + (_____)**k**
   (Simplify your answer.)

   ID: 9.6.39

3. Find the dot product **v** • **w** and the angle between **v** and **w**.

   v = **i** − **k**, **w** = − **i** − **j** − **k**

   v • **w** = _____
   (Simplify your answer. Type an exact value, using fractions and radicals as needed.)

   The angle between **v** and **w** is θ = _____ degrees.
   (Round to the nearest tenth of a degree, if necessary.)

   ID: 9.6.51

4. Find the direction angles of the given vector. Write the vector in terms of its magnitude and direction cosines as **v** = ‖**v**‖ [(**cos** α)**i** + (**cos** β)**j** + (**cos** γ)**k**].

   v = **2i** − **2j** − **2k**

   $\alpha \approx$ _____ degrees
   (Round to the nearest tenth of a degree.)

   $\beta \approx$ _____ degrees
   (Round to the nearest tenth of a degree.)

   $\gamma \approx$ _____ degrees
   (Round to the nearest tenth of a degree.)

   v = _____ [(**cos** _____°)**i** + **cos** (_____°)**j** + **cos** (_____°)**k**]
   (Simplify your answers. Type an exact value for ‖**v**‖, using fractions and radicals as needed. Round each angle measure to the nearest tenth of a degree, if necessary.)

   ID: 9.6.61

5. Find the equation of a sphere with radius r and center P_0.

$r = 5$; $P_0 = (4,3,5)$

Choose the correct answer below.

- A. $(x-3)^2 + (y-4)^2 + (z-5)^2 = 25$
- B. $(x-4)^2 + (y-3)^2 + (z-5)^2 = 25$
- C. $(x-5)^2 + (y-3)^2 + (z-5)^2 = 16$
- D. $(x-5)^2 + (y-5)^2 + (z-4)^2 = 25$

ID: 9.6.69

6. The work W done by a constant force F in moving an object from a point A in space to a point B in space is defined as $W = \mathbf{F} \cdot \overrightarrow{AB}$. Find the work done by a force of 3 newtons acting in the direction $2\mathbf{i} + 2\mathbf{j} + \mathbf{k}$ in moving an object 3 meters from (0,0,0) to (0,3,0).

W = _____ newton-meters (joules)

ID: 9.6.77

1. 8

   -4

   -1

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2. -2

   0

   -4

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3. 0

   90

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4. 54.7

   125.3

   125.3

   $2\sqrt{3}$

   54.7

   125.3

   125.3

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5. B. $(x-4)^2 + (y-3)^2 + (z-5)^2 = 25$

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6. 6

9.6 classwork day 1

① $P = (-4, 5, -1)$

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

$v = (4-(-4))i + (1-5)j + (-2-(-1))k$

$\boxed{v = 8i - 4j - k}$

② $v = 2i - 5j + 4k$

$w = -2i + 4j - 4k$

$4v + 5w$

$4(2i - 5j + 4k) + 5(-2i + 4j - 4k)$

$\boxed{-2i - 4k}$ or $-2i + 0j - 4k$

③ $v = i - k$

$w = -i - j - k$

$v \cdot w = (1)(-1) + 0(-1) + (-1)(-1) = 0$ orthogonal

$\cos\theta = \frac{v \cdot w}{\|v\|\|w\|} = \frac{0}{\sqrt{2}\sqrt{3}} = 0 \rightarrow \theta = 90°$

9.6 classwork day 1 continued

④ $v = 2i - 2j - 2k$

$$||v|| = \sqrt{2^2 + (-2)^2 + (-2)^2} = 2\sqrt{3}$$

$$\cos\alpha = \frac{2}{2\sqrt{3}} \quad \alpha = 54.7^\circ$$

$$\cos\beta = \frac{-2}{2\sqrt{3}} \quad \beta = 125.3^\circ$$

$$\cos\gamma = \frac{-2}{2\sqrt{3}} \quad \gamma = 125.3^\circ$$

$$v = 2\sqrt{3}\left(\cos 54.7^\circ i + \cos 125.3^\circ j + \cos 125.3^\circ k\right)$$

⑤ $r = 5$

$P_0 = (4, 3, 5)$

$$(x-4)^2 + (y-3)^2 + (z-5)^2 = 25$$

$$(x-h)^2 + (y-j)^2 + (z-k)^2 = r^2$$

9.6 classwork day 1 continued

⑥ $W = F \cdot \overrightarrow{AB}$

Force = 3

direction $2i+2j+k$

moving 3 meters

From (0,0,0) to (0,3,0)

$v = 2i+2j+k$

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

$\cos\alpha = \frac{2}{3}$

$\cos\beta = \frac{2}{3}$

$\cos\gamma = \frac{1}{3}$

$F = 3\left(\frac{2}{3}i + \frac{2}{3}j + \frac{1}{3}k\right)$

$W = 3\left(\frac{2}{3}i + \frac{2}{3}j + \frac{1}{3}k\right) \cdot 3j$

$W = 3\left(\frac{2}{3}(0) + \frac{2}{3}(3) + \frac{1}{3}(0)\right) \cdot 3j$

$w = 3\left(\frac{2}{3}(3)\right) = \boxed{6}$