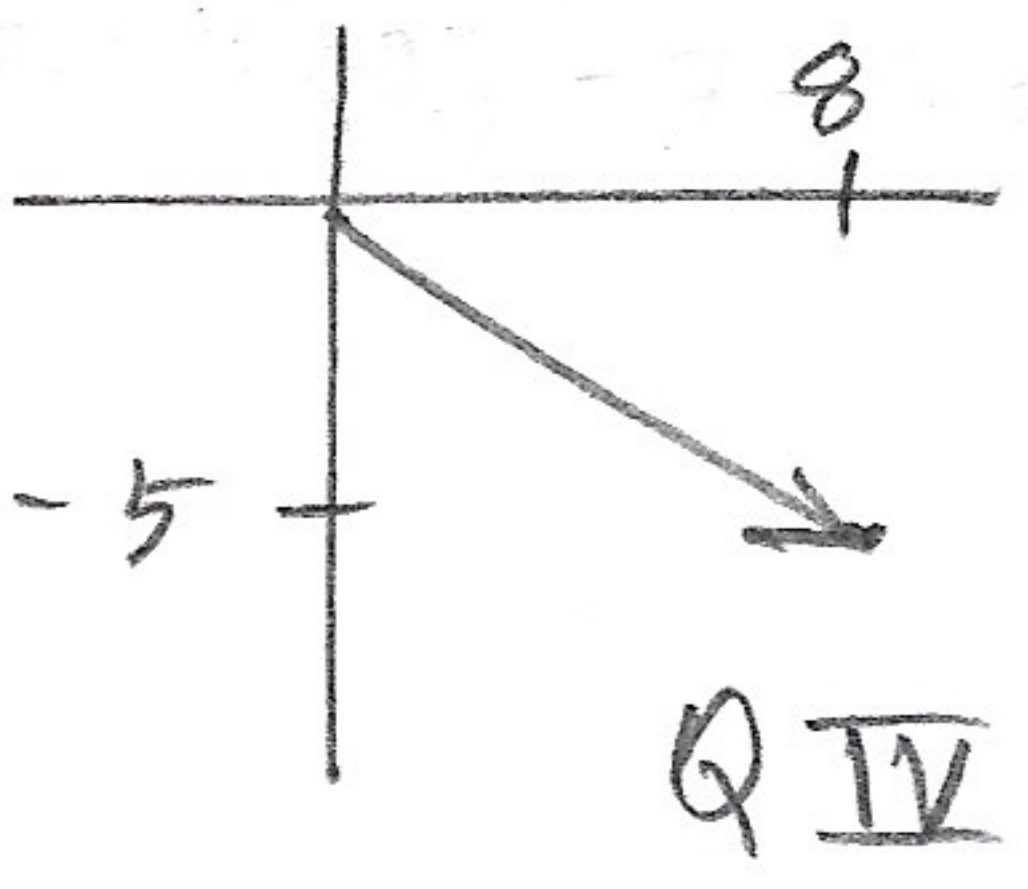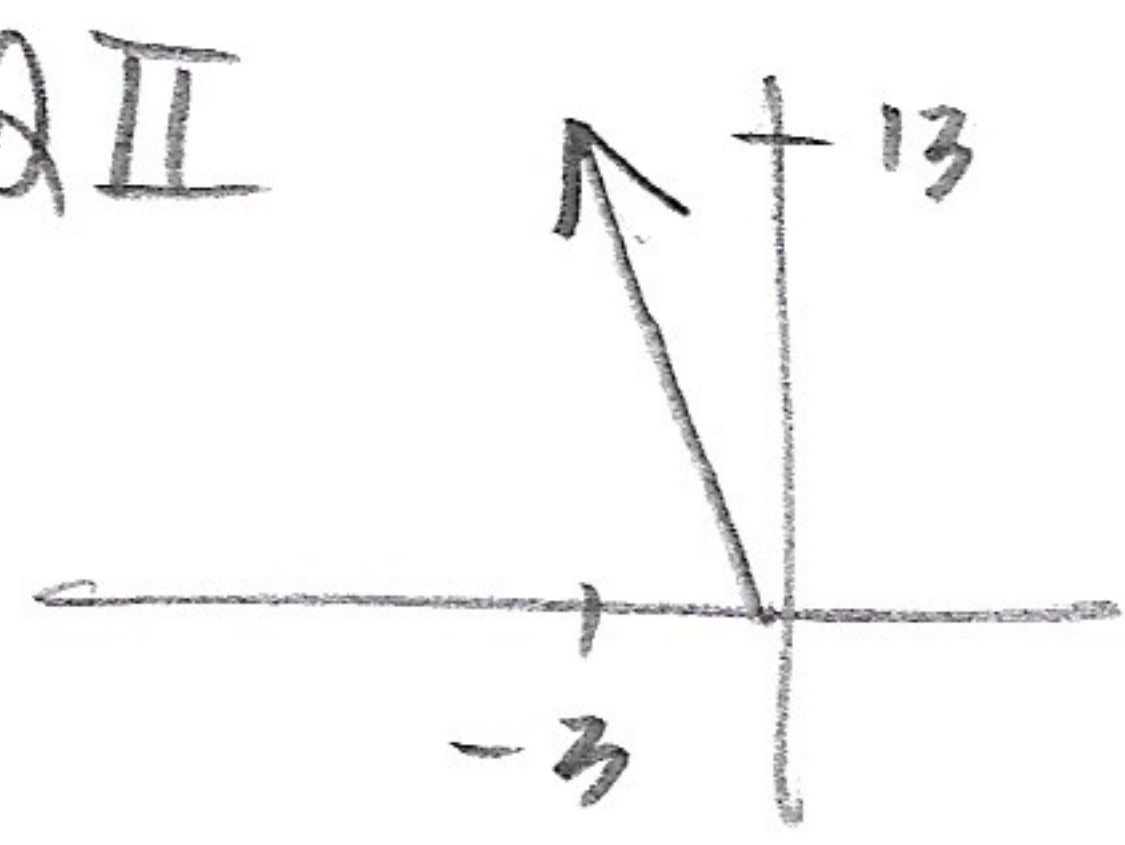# More Vector Practice!
2020

Name ___T Fuston___

For each of the following vectors, find ...
... component form, sum of unit vectors form, sketch in standard position, magnitude, and direction.
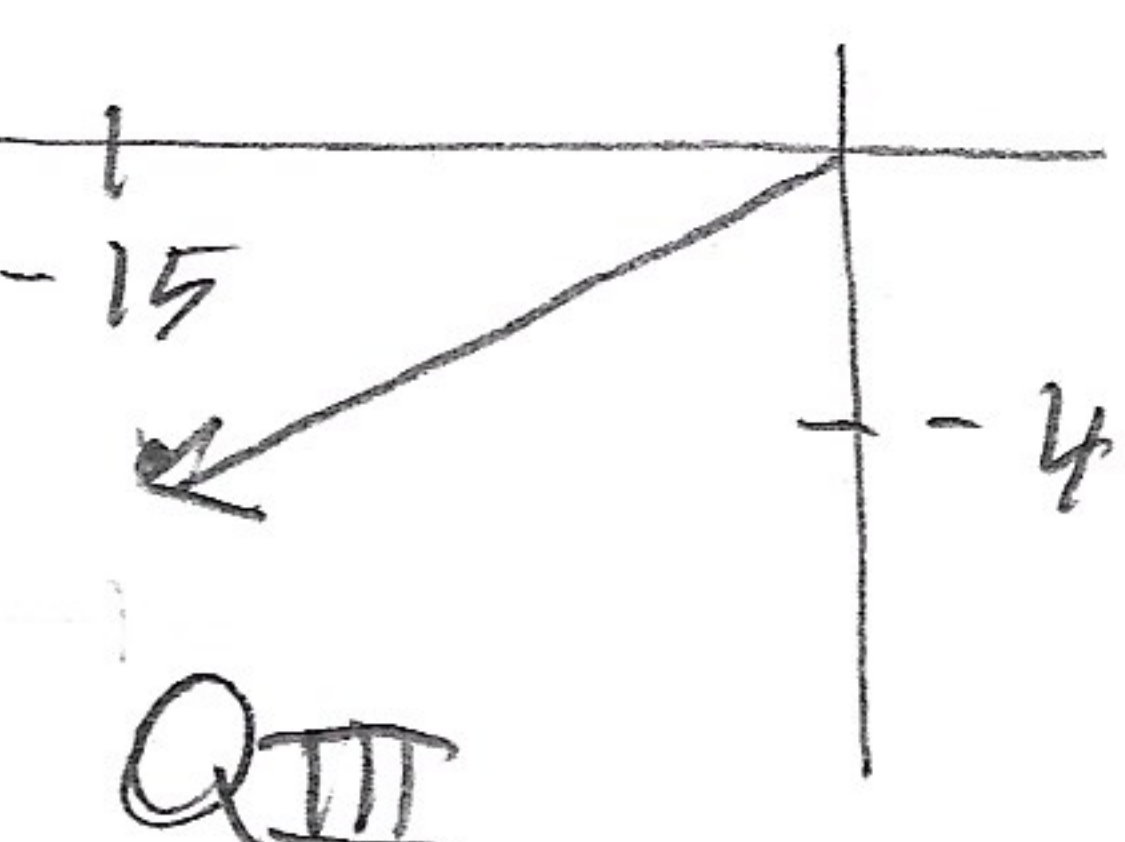
1. Point S is at (–3, –2) and T is at (5, –7). Find $\overrightarrow{ST}$. $\langle 5-(-3), -7-(-2) \rangle$

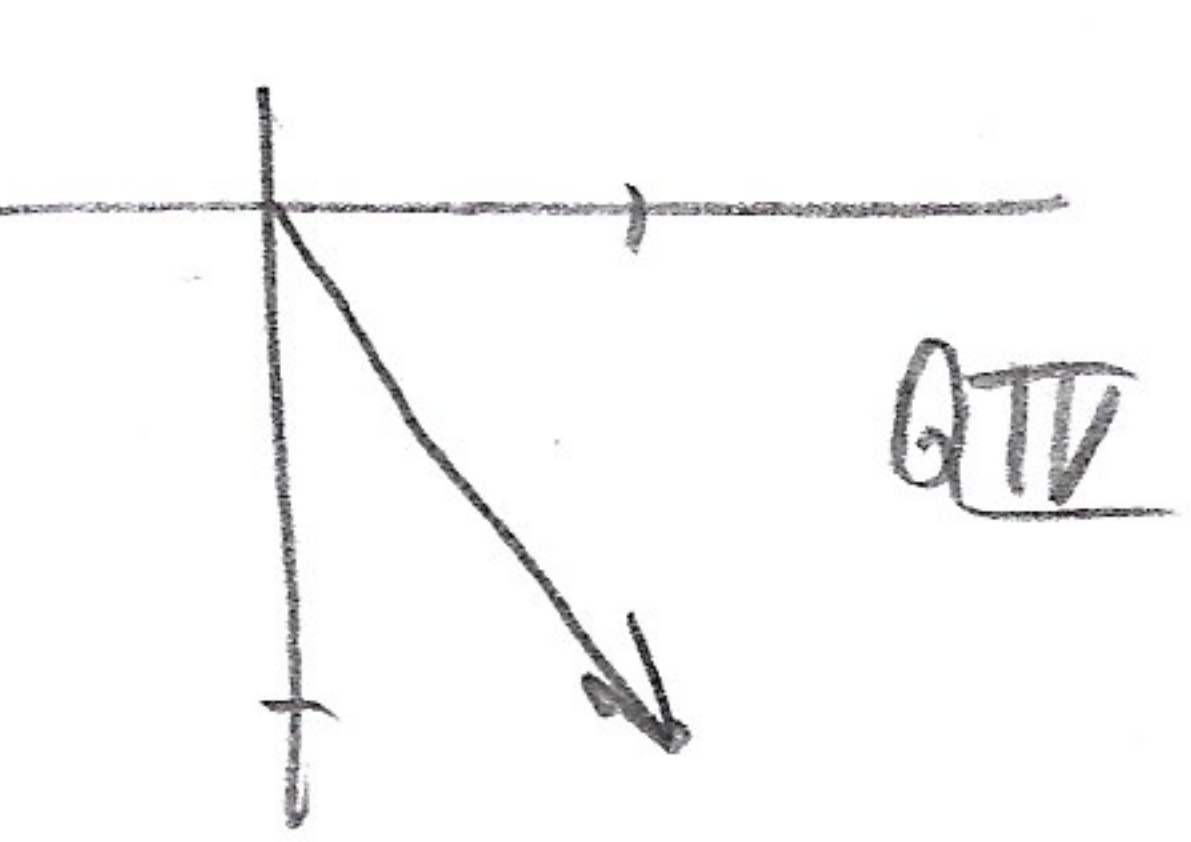| a. component form	c. sketch in standard position	d. magnitude (nearest hundredth)	e. direction (nearest hundredth)
$\langle 8, -5 \rangle$	Q IV	$\sqrt{64+25}$ $= \sqrt{89}$ $= \boxed{9.43}$	$\theta' = \tan^{-1}\left(-\frac{5}{8}\right) = 32.01°$ $\theta = 360° - 32.01°$ $= \boxed{327.99°}$
b. sum of unit vectors $8\vec{i} - 5\vec{j}$			

2. Point F is at (–5, 2) and G is at (–8, 15). Find $\overrightarrow{FG}$. $\langle -8-(-5), 15-2 \rangle$

a. component form	c. sketch in standard position	d. magnitude (nearest hundredth)	e. direction (nearest hundredth)
$\langle -3, 13 \rangle$	Q II	$\sqrt{9+169}$ $= \sqrt{178}$ $= \boxed{13.34}$	$\theta' = \tan^{-1}\left(-\frac{13}{3}\right) = 77.01°$ $\theta = 180° - 77.01°$ $= \boxed{102.99°}$
b. sum of unit vectors $-3\vec{i} + 13\vec{j}$			

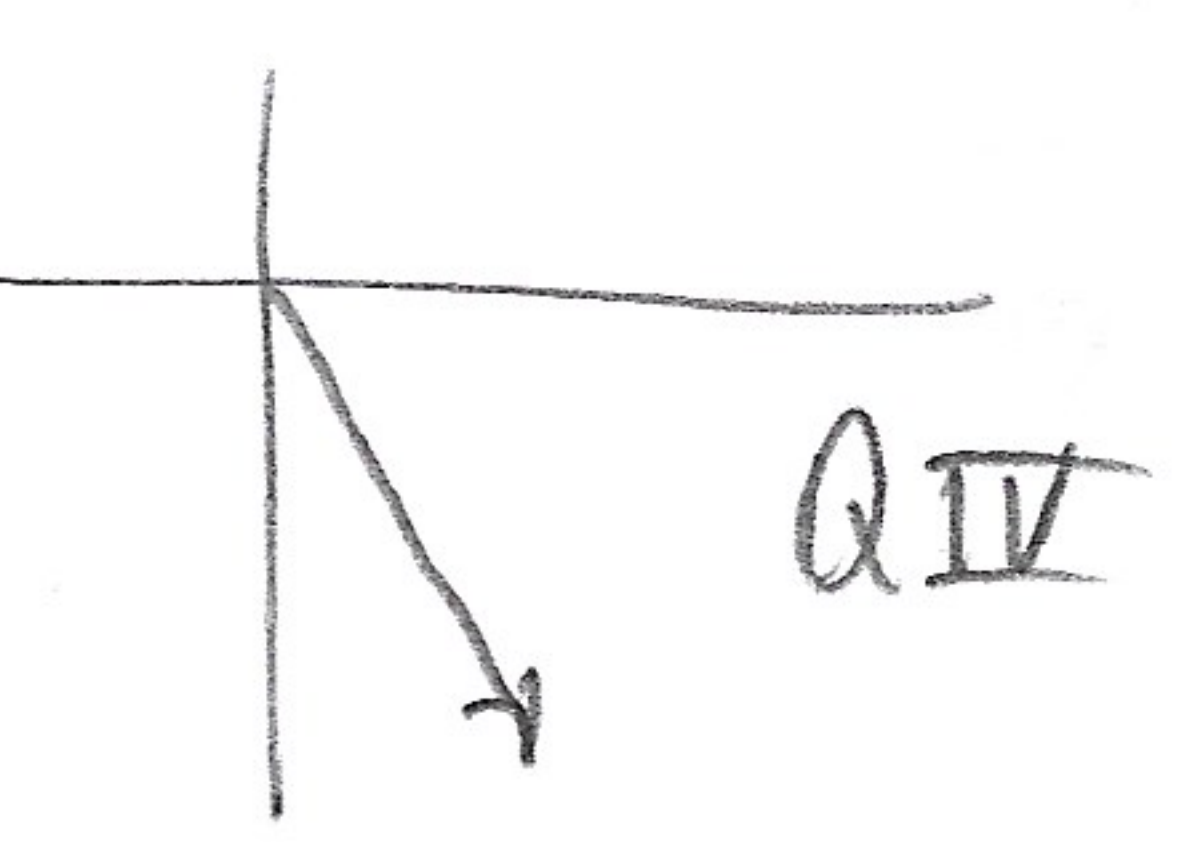3. Point J is at (6, –7) and K is at (–9, –11). Find $\overrightarrow{JK}$. $\langle -9-6, -11-(-7) \rangle$

a. component form	c. sketch in standard position	d. magnitude (nearest hundredth)	e. direction (nearest hundredth)
$\langle -15, -4 \rangle$	Q III	$\sqrt{225+16}$ $= \sqrt{241}$ $= \boxed{15.52}$	$\theta' = \tan^{-1}\left(\frac{4}{15}\right) = 14.93°$ $\theta = 180° + 14.93°$ $\boxed{194.93°}$
b. sum of unit vectors $-15\vec{i} - 4\vec{j}$			

4. Point L is at (0, 6) and M is at (2, 2). Find $\overrightarrow{LM}$. $\langle 2-0, 2-6 \rangle$

a. component form	c. sketch in standard position	d. magnitude (nearest hundredth)	e. direction (nearest hundredth)
$\langle 2, -4 \rangle$	Q IV	$\sqrt{4+16}$ $= \sqrt{20}$ $= \boxed{4.47}$	$\theta' = \tan^{-1}(-2) = 63.43°$ $\theta = 360° - 63.43°$ $= \boxed{296.57°}$
b. sum of unit vectors $2\vec{i} - 4\vec{j}$			

5. Point Q is at (1.9, –4.7) and R is at (6.8, –12.3). Find $\overrightarrow{QR}$. $\langle 6.8-1.9, -12.3-(-4.7) \rangle$

a. component form	c. sketch in standard position	d. magnitude (nearest hundredth)	e. direction (nearest hundredth)
$\langle 4.9, -7.6 \rangle$	Q IV	$\sqrt{4.9^2+(-7.6)^2}$ $= \sqrt{81.77}$ $= \boxed{9.04}$	$\theta' = \tan^{-1}\left(-\frac{7.6}{4.9}\right) = 57.19°$ $\theta = 360° - 57.19°$ $= \boxed{302.81°}$
b. sum of unit vectors $4.9\vec{i} - 7.6\vec{j}$			

Find: a) $-\frac{1}{2}\vec{u} - 5\vec{v}$ and b) $-3\vec{u} + 6\vec{v}$ for each of the following.
Write your answer in the form of the given vectors.

6. $\vec{u} = <4, -4>$ and $\vec{v} = <6, 9>$

a) $-\frac{1}{2}\langle 4, -4\rangle - 5\langle 6, 9\rangle$
$= \langle -2, 2\rangle + \langle -30, -45\rangle = \boxed{\langle -32, -43\rangle}$

b) $-3\langle 4, -4\rangle + 6\langle 6, 9\rangle$
$= \langle -12, 12\rangle + \langle 36, 54\rangle = \boxed{\langle 24, 66\rangle}$

7. $\vec{u} = 2\vec{i} - 3\vec{j}$ and $\vec{v} = -\vec{i} + 5\vec{j}$

a) $-\frac{1}{2}\langle 2, -3\rangle - 5\langle -1, 5\rangle$
$= \langle -\frac{2}{2}, \frac{3}{2}\rangle + \langle 5, -25\rangle$
$= \langle -1, \frac{3}{2}\rangle + \langle 5, \frac{-50}{2}\rangle = \boxed{4\vec{i} - \frac{47}{2}\vec{j}}$

b) $-3\langle 2, -3\rangle + 6\langle -1, 5\rangle$
$= \langle -6, 9\rangle + \langle -6, 30\rangle$
$= \boxed{-12\vec{i} + 39\vec{j}}$

For the following find the unit vector in the direction of the given vector.
Use simplified radicals, not decimals.

8. $\vec{v} = <-3, 9>$

$\|\vec{v}\| = \sqrt{9 + 81} = \sqrt{90} = 3\sqrt{10}$

$\vec{u} = \frac{\langle -3, 9\rangle}{3\sqrt{10}} = \langle \frac{-3}{3\sqrt{10}}, \frac{9}{3\sqrt{10}}\rangle$

$= \langle -\frac{1}{\sqrt{10}}, \frac{3}{\sqrt{10}}\rangle = \boxed{\langle -\frac{\sqrt{10}}{10}, \frac{3\sqrt{10}}{10}\rangle}$

9. $\vec{v} = <8, 2>$

$\|\vec{v}\| = \sqrt{64 + 4} = \sqrt{68} = 2\sqrt{17}$

$\vec{u} = \frac{\langle 8, 2\rangle}{2\sqrt{17}} = \langle \frac{4}{\sqrt{17}}, \frac{1}{\sqrt{17}}\rangle$

$= \boxed{\langle \frac{4\sqrt{17}}{17}, \frac{\sqrt{17}}{17}\rangle}$

10. $\vec{w} = <-5, 5>$

$\|\vec{w}\| = \sqrt{25 + 25} = \sqrt{50} = 5\sqrt{2}$

$\vec{u} = \frac{\langle -5, 5\rangle}{5\sqrt{2}} = \langle \frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\rangle$

$= \boxed{\langle -\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\rangle}$

11. $\vec{w} = 3\vec{i} + 3\vec{j}$

$\|\vec{w}\| = \sqrt{9 + 9} = \sqrt{18} = 3\sqrt{2}$

$\vec{u} = \frac{\langle 3, 3\rangle}{3\sqrt{2}} = \langle \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\rangle = \boxed{\frac{\sqrt{2}}{2}\vec{i} + \frac{\sqrt{2}}{2}\vec{j}}$

12. $\vec{v} = -\frac{1}{2}\vec{i} + \frac{3}{2}\vec{j}$

$\|\vec{v}\| = \sqrt{\frac{1}{4} + \frac{9}{4}} = \sqrt{\frac{10}{4}} = \frac{\sqrt{10}}{2}$

$\vec{u} = \frac{\langle -\frac{1}{2}, \frac{3}{2}\rangle}{\frac{\sqrt{10}}{2}} = \frac{2}{\sqrt{10}}\langle -\frac{1}{2}, \frac{3}{2}\rangle = \langle \frac{-1}{\sqrt{10}}, \frac{3}{\sqrt{10}}\rangle$

$= \boxed{-\frac{\sqrt{10}}{10}\vec{i} + \frac{3\sqrt{10}}{10}\vec{j}}$

13. $\vec{w} = -7\vec{j}$

$\|\vec{w}\| = \sqrt{0 + 49} = \sqrt{49} = 7$

$\vec{u} = \frac{\langle 0, -7\rangle}{7} = \langle 0, -1\rangle = \boxed{-\vec{j}}$

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1) $\langle 8, -5\rangle$; 9.43; 327.99°   2) $\langle -3, 13\rangle$; 13.34; 102.99°   3) $\langle -15, -4\rangle$; 15.52; 194.93°

4) $\langle 2, -4\rangle$; 4.47; 296.57°   5) $\langle 4.9, -7.6\rangle$; 9.04; 302.81°

6) $\langle -32, -43\rangle$; $\langle 24, 66\rangle$ 7) $4\vec{i} - \frac{47}{2}\vec{j}$; $-12\vec{i} + 39\vec{j}$

8) $\langle \frac{-\sqrt{10}}{10}, \frac{3\sqrt{10}}{10}\rangle$ 9) $\langle \frac{4\sqrt{17}}{17}, \frac{\sqrt{17}}{17}\rangle$ 10) $\langle \frac{-\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\rangle$

11) $\frac{\sqrt{2}}{2}\vec{i} + \frac{\sqrt{2}}{2}\vec{j}$ 12) $-\frac{\sqrt{10}}{10}\vec{i} + \frac{3\sqrt{10}}{10}\vec{j}$ 13) $-\vec{j}$