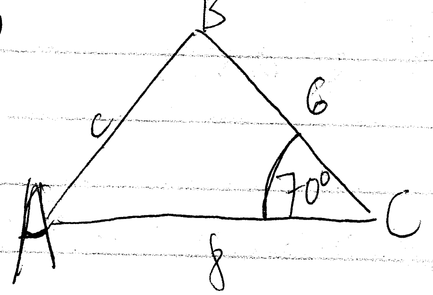
Quiz 6

① 

- Here we are given two sides and the included angle. Thus we should use the law of cosine.

- $c^2 = 6^2 + 8^2 - 2.6.8.\cos 70° \simeq 67.1660.$

  Thus $c \approx 8.20$

- We apply the law of cosine again to find angle B

  $$\cos B = \frac{c^2+6^2-8^2}{2.c.6} = \frac{8.20^2+6^2-8^2}{2\times 8.20\times 6} \approx 0.3987$$

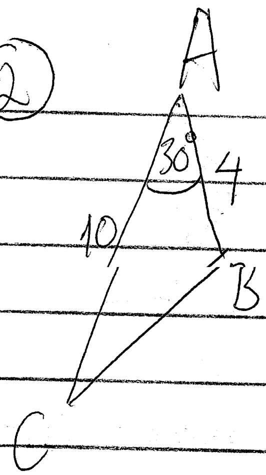
  Thus $B = \cos^{-1}(0.3987) \approx 66.498° \approx 66.50°$

- The angle A is given by $A = 180° - B - C$

  $$= 180° - 66.50° - 70°$$

  $$= 43.50°$$

②



- Here we are given ~~the~~ two sides and the angle in between. Thus we should apply the following formulas:

$$\text{Area} = \frac{1}{2}ab\sin C = \frac{1}{2}bc\sin A = \frac{1}{2}ca\sin B$$

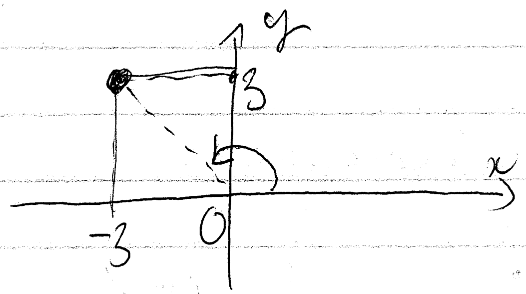
- We have

$$\text{Area} = \frac{1}{2}bc\sin A = \frac{1}{2}\cdot 10\cdot 4\cdot\frac{1}{2} = 10$$

Note:

- In the formula of area, we have sine, not cosine!

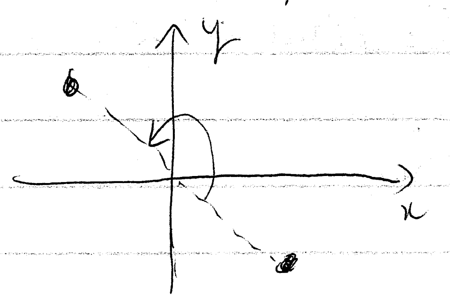
③



We have $r = \sqrt{x^2+y^2} = \sqrt{(-3)^2+3^2} = \sqrt{18} = 3\sqrt{2}$

$\tan\theta = \frac{y}{x} = \frac{3}{-3} = -1$. Thus $\theta = -\frac{\pi}{4} + k\pi$

Look at the picture, the point $(-3,3)$ is in the left half plane. Thus the point $(r,\theta) = \left(3\sqrt{2}, -\frac{\pi}{4}\right)$ is the opposite point with ~~w~~respect to the pole.



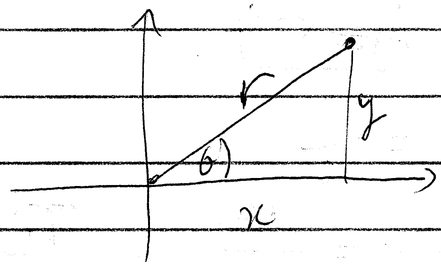
We need to add π to get the ~~θ~~ θ of the given point $(-3,3)$.

$\theta = -\frac{\pi}{4} + \pi = \frac{3\pi}{4}$

Thus $(r,\theta) = \left(3\sqrt{2}, \frac{3\pi}{4}\right)$.

④ $r^{\cancel{2}} = \cos\theta$

- Multiplying both sides by r, we get $r^2 = r\cos\theta$
- Remember that $r^2 = x^2 + y^2$ and $x = r\cos\theta$



- We get $x^2 + y^2 = x$

<u>Note</u> All conversion formulas are

$$\begin{cases} x = r\cos\theta \\ y = r\sin\theta \end{cases} \quad \text{and} \quad \begin{cases} r^2 = x^2 + y^2 \\ \tan\theta = \dfrac{y}{x} \end{cases}$$