

파이썬 물리 코딩

Chapter 1. 기초 물리 코딩

박형묵



명신여자고등학교

강의 자료 다운로드



파이썬 물리학 강의 자료

<https://github.com/PigeonDove/PythonPhysics>

개발 환경

GlowScript

파이썬 코딩 웹 사이트

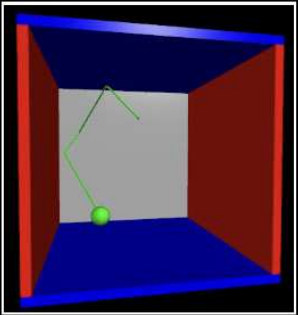
Web VPython

Signed in as **PigeonSensei**(Sign out)
Help

VPython is an easy-to-use, powerful environment for creating 3D animations. Here at glowscript.org (or webvpython.org, which takes you here), you can write and run VPython programs right in your browser, store them in the cloud for free, and easily share them with others. You can also use VPython with installed Python: see vpython.org.

The [Help](#) provides full documentation.
[Welcome to VPython](#), a [Trinket](#) tutorial, is useful for anyone new to programming in VPython.

You are signed in as **PigeonSensei** and your programs are [here](#).
Your files will be saved here, but it is a good idea to backup your folders or individual files occasionally by using the download options that are provided.



Version 3.2
Example programs | Forum

1) 로그인

2) 클릭 후 Create New Program으로 시작

파이썬 물리 코딩 기초

물체의 표현

공 만들기

```
Web VPython 3.2  
myBall = sphere()
```

박스 만들기

```
Web VPython 3.2  
myBox = box()
```

물체의 크기 변경

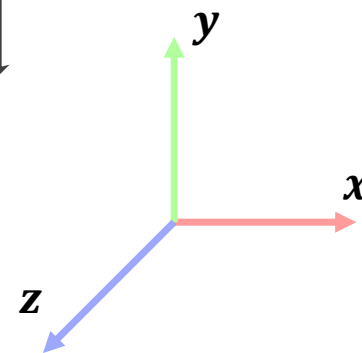
```
Web VPython 3.2  
myBox = box()  
myBox.size.x = 1
```

물체의 색상 변경

```
Web VPython 3.2  
myBall = sphere()  
myBall.color = color.green
```

물체의 좌표 변경

```
Web VPython 3.2  
myBall = sphere()  
myBall.pos.x = 10
```



파이썬 물리 코딩 기초

벡터

스칼라 – 크기만 있는 값 (거리, 속도, 가속력, 질량, 에너지 등)

벡터 – 크기와 방향을 가지는 값 (힘, 위치, 속도, 가속도 등)

벡터 생성

Web VPython 3.2

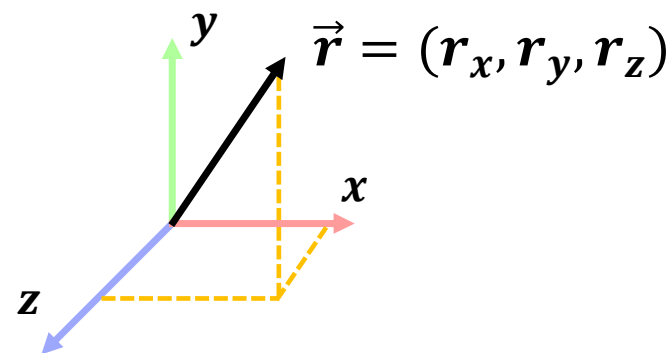
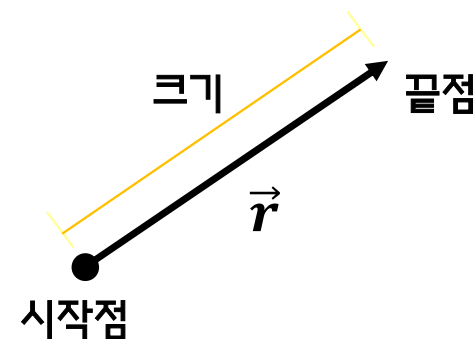
```
r = vector(3, 4, 5)
```

벡터 시각화

Web VPython 3.2

```
r = vector(3, 4, 5)
```

```
r_arrow = arrow(axis=r, shaftwidth=0.2)
```



파이썬 물리 코딩 기초

벡터

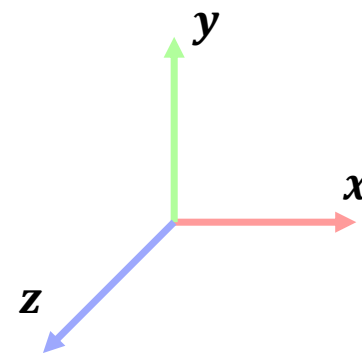
3차원 좌표축 표현

Web VPython 3.2

```
x_arrow = arrow(axis = vec(10,0,0), color = color.red, shaftwidth=0.2)
```

```
y_arrow = arrow(axis = vec(0,10,0), color = color.green, shaftwidth=0.2)
```

```
z_arrow = arrow(axis = vec(0,0,10), color = color.blue, shaftwidth=0.2)
```



파이썬 물리 코딩 기초

벡터

벡터의 합 $\vec{a} + \vec{b} = (a_x, a_y, a_z) + (b_x, b_y, b_z) = (a_x + b_x, a_y + b_y, a_z + b_z)$

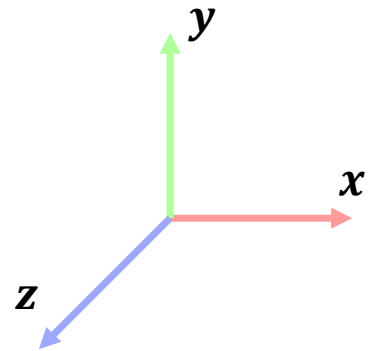
```
Web VPython 3.2
```

```
a = vector(3, 4, 5)
```

```
b = vector(-3, 0, -5)
```

```
c = a+b
```

```
c_arrow = arrow(axis=c, shaftwidth=0.2)
```



파이썬 물리 코딩 기초

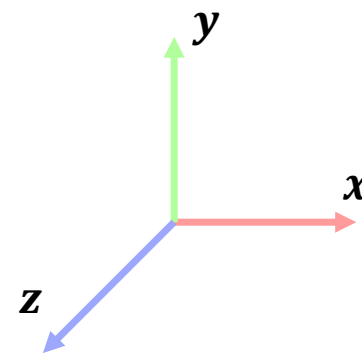
벡터

벡터의 스칼라 곱 $3\vec{r} = 3(r_x, r_y, r_z) = (3r_x, 3r_y, 3r_z)$

Web VPython 3.2

```
r = 3 * vector(3, 4, 5)
```

```
r_arrow = arrow(axis=r, shaftwidth=0.2)
```



파이썬 물리 코딩 기초

벡터

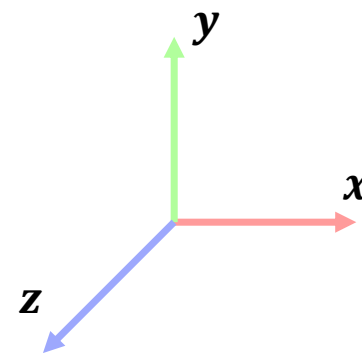
벡터의 크기 $|\vec{r}| = \sqrt{r_x^2 + r_y^2 + r_z^2}$

Web VPython 3.2

```
r = vector(3, 4, 5)
```

```
mag_r = sqrt( r.x**2 + r.y**2 + r.z**2 )
```

```
print(mag_r)
```



파이썬 물리 코딩 기초

벡터

단위 벡터 $\vec{r} = |\vec{r}|\hat{r}$

Web VPython 3.2

```
r = vector(3, 4, 5)
```

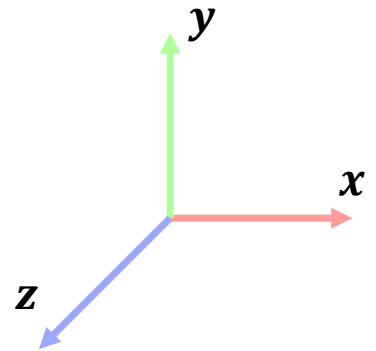
```
mag_r = sqrt( r.x**2 + r.y**2 + r.z**2 )
```

```
norm_r = r / mag_r
```

```
print(norm_r)
```

```
r_arrow = arrow(axis=r, color = color.red, shaftwidth=0.2)
```

```
norm_r_arrow = arrow(axis= norm_r, color = color.green, shaftwidth=0.2)
```



파이썬 물리 코딩 기초

벡터

벡터의 내적 $\vec{a} \cdot \vec{b} = a_x b_x + a_y b_y + a_z b_z = |\vec{a}| |\vec{b}| \cos \theta$

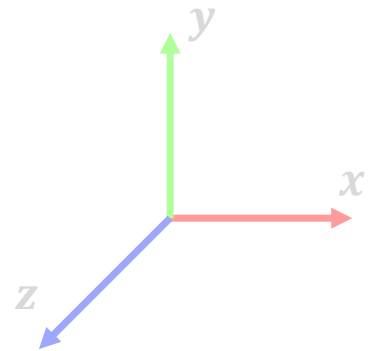
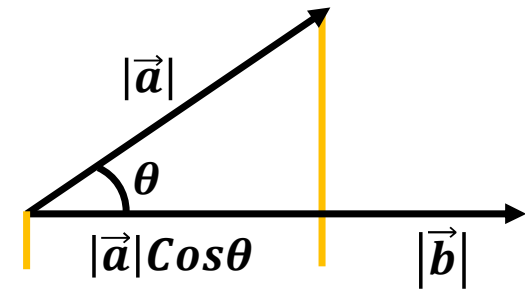
Web VPython 3.2

```
a = vector(3, 4, 5)
```

```
b = vector(5, 6, 7)
```

```
c = dot(a, b)
```

```
print(c)
```



파이썬 물리 코딩 기초

벡터

벡터의 외적

$$\begin{aligned}\vec{a} \times \vec{b} &= \begin{vmatrix} \hat{r}_x & \hat{r}_y & \hat{r}_z \\ a_x & a_y & a_z \\ b_x & b_y & b_z \end{vmatrix} = (a_y b_z - a_z b_y) \hat{r}_x - (a_x b_z - a_z b_x) \hat{r}_y + (a_x b_y - a_y b_x) \hat{r}_z \\ &= (a_y b_z - a_z b_y, a_z b_x - a_x b_z, a_x b_y - a_y b_z)\end{aligned}$$

Web VPython 3.2

```
a = vector(10, 0, 0)
```

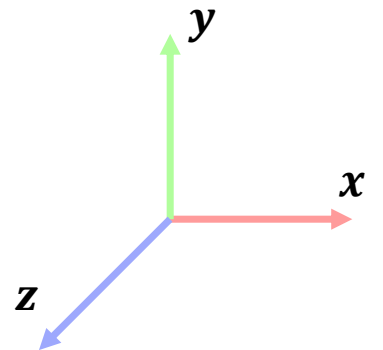
```
b = vector(0, 10, 0)
```

```
c = cross(a,b)
```

```
a_arrow = arrow(axis= a, color = color.red, shaftwidth=0.2)
```

```
b_arrow = arrow(axis= b, color = color.green, shaftwidth=0.2)
```

```
c_arrow = arrow(axis= c, color = color.blue, shaftwidth=0.2)
```



감사합니다

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