Pygame

第四組

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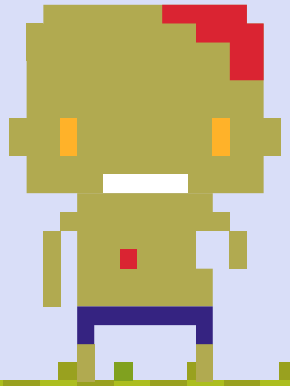
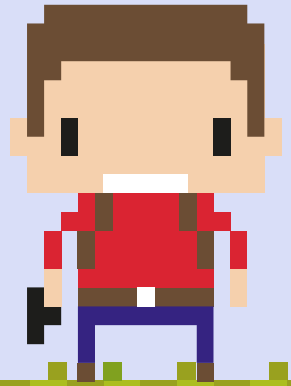
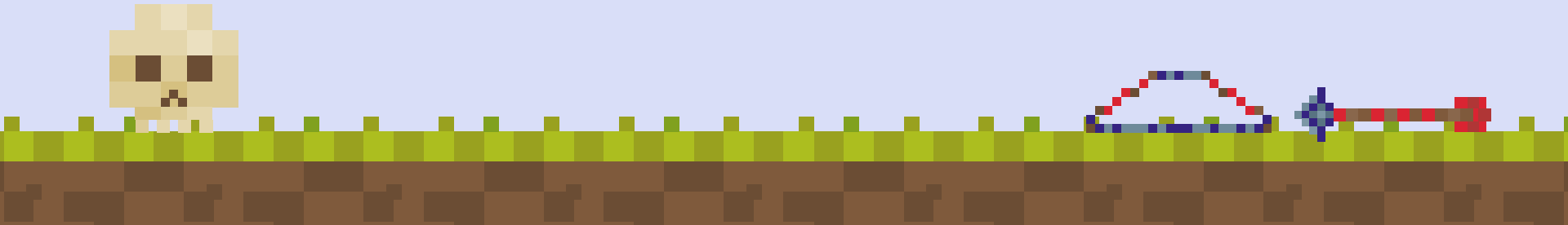




01.

INTRODUCTION



INTRODUCTION

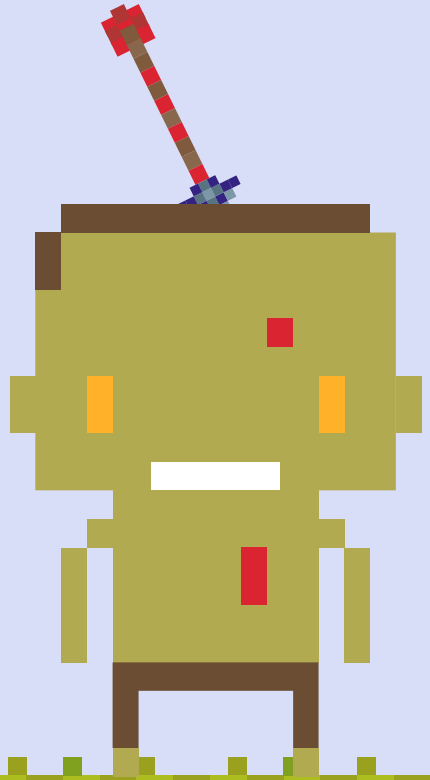
Pygame是跨平台Python模組，專為電子遊戲設計，
包含圖像、聲音。

建立在SDL基礎上，允許即時電子遊戲研發而無需被
低階語言，如C語言或是更低階的組合語言束縛。

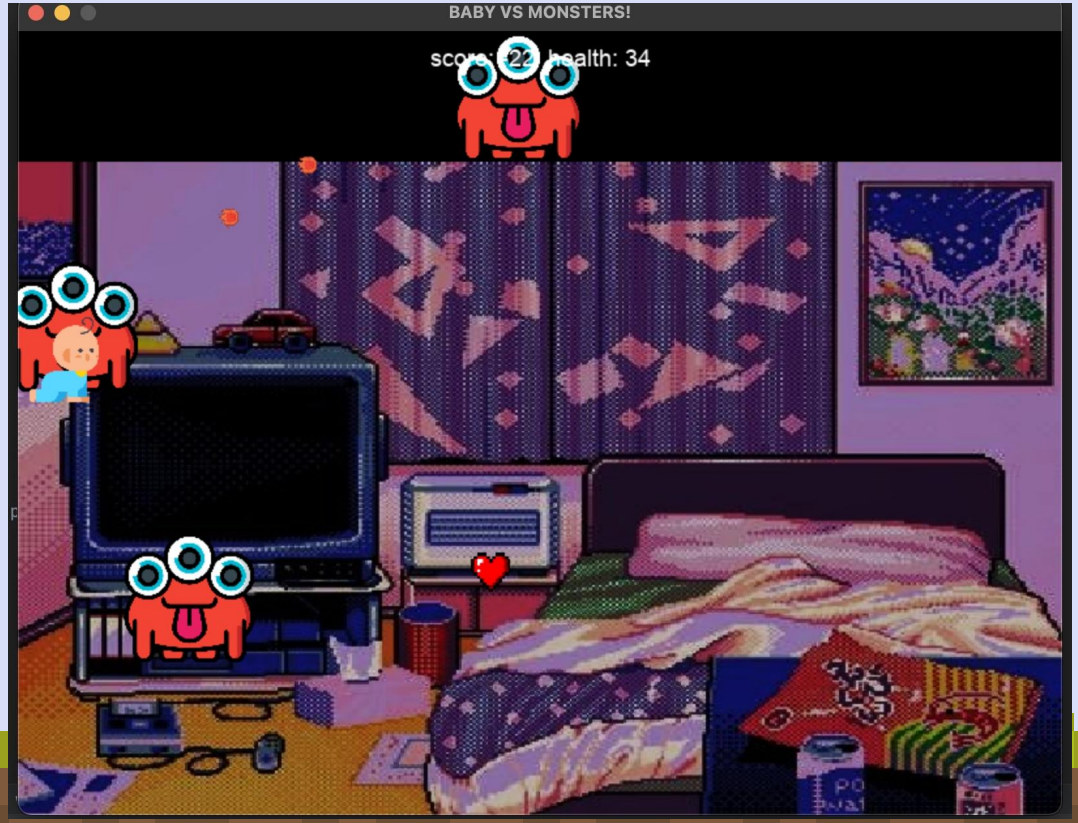
基於這樣的設想，所有需要的遊戲功能和理念都
（主要是圖像方面）完全簡化遊戲邏輯本身，所有的資源結構都
能由高階語言提供，Python本身就是個高階程式語言。

SDL(Simple DirectMedia Layer)：
一套開放原始碼的跨平台多媒體函式庫，以C語言撰寫

資料來源：https://zh.wikipedia.org/zh-tw/Pygame



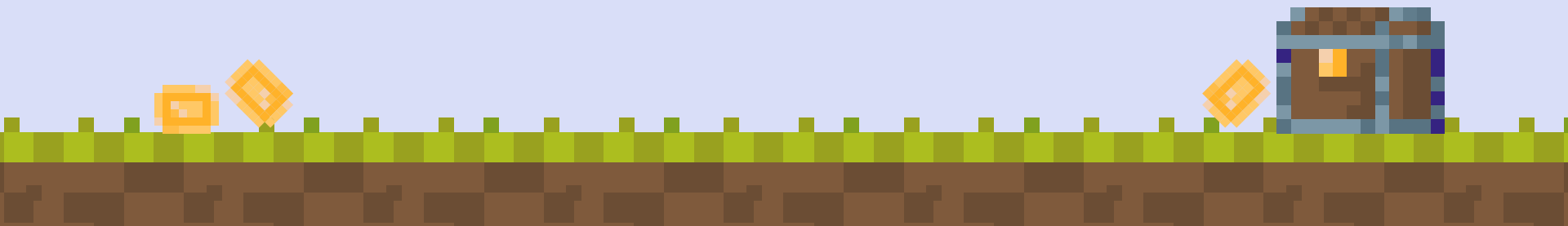
PROJECT INTRODUCTION



Project introduction

遊戲目標

擊敗怪物，最後將以遊戲時間、對怪物造成的傷害
及自身所受的傷害為評分標準。



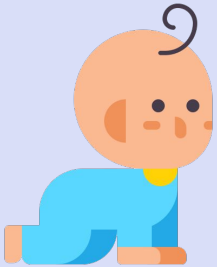
Project introduction

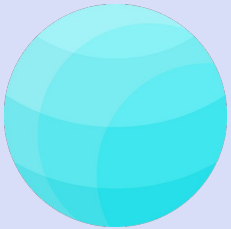
操作方法：

1. 遊戲主選單按下Ｐ開始遊戲，按Ｑ退出遊戲
2. WASD鍵：上下左右移動
3. IJKL鍵：視角（射擊方向改變）
4. 空白鍵：發射子彈
5. 遊戲過程中或結束後可按e鍵返回主畫面

Project introduction

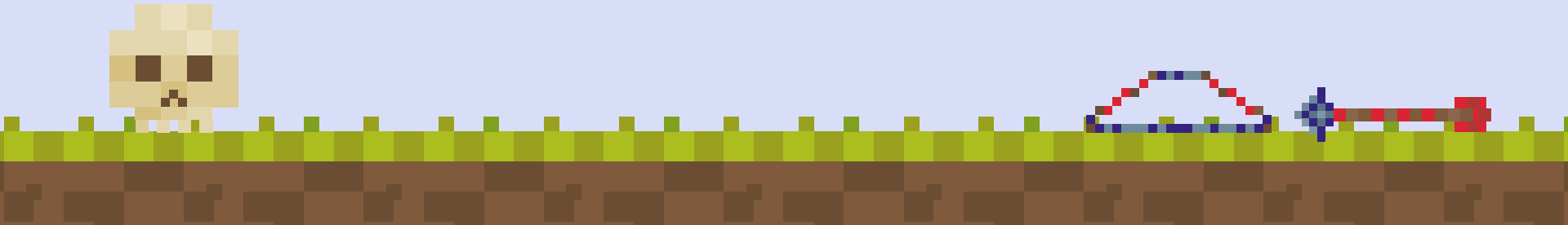
遊戲物件：



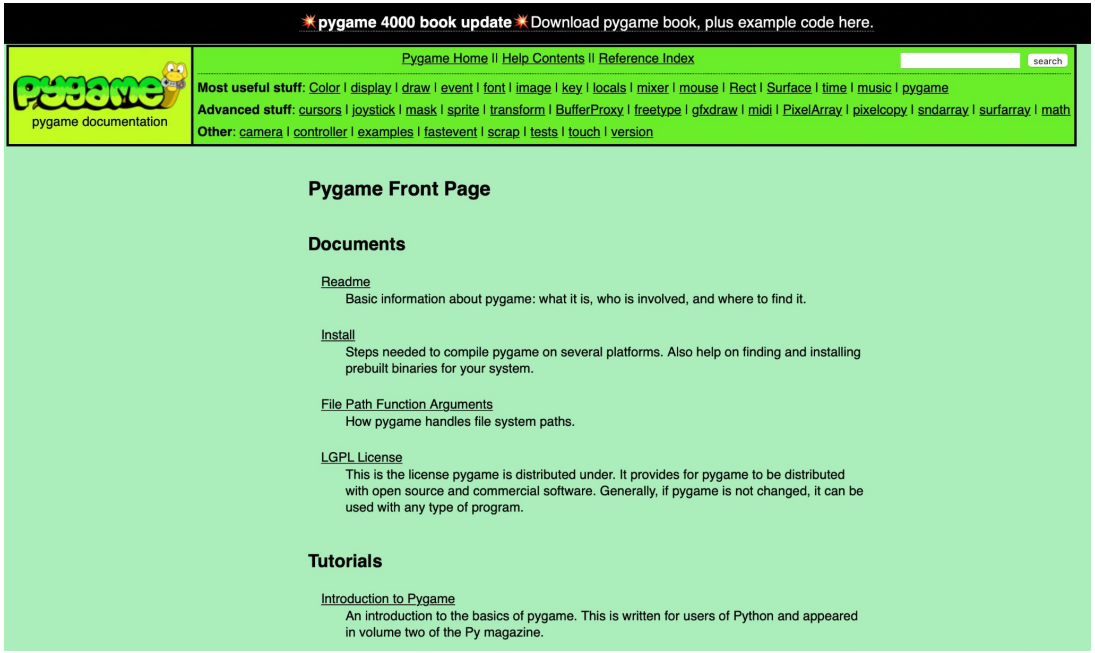


02.

REFERENCE



Pygame documentation



https://www.pygame.org/docs/index.html

Opengameart.org

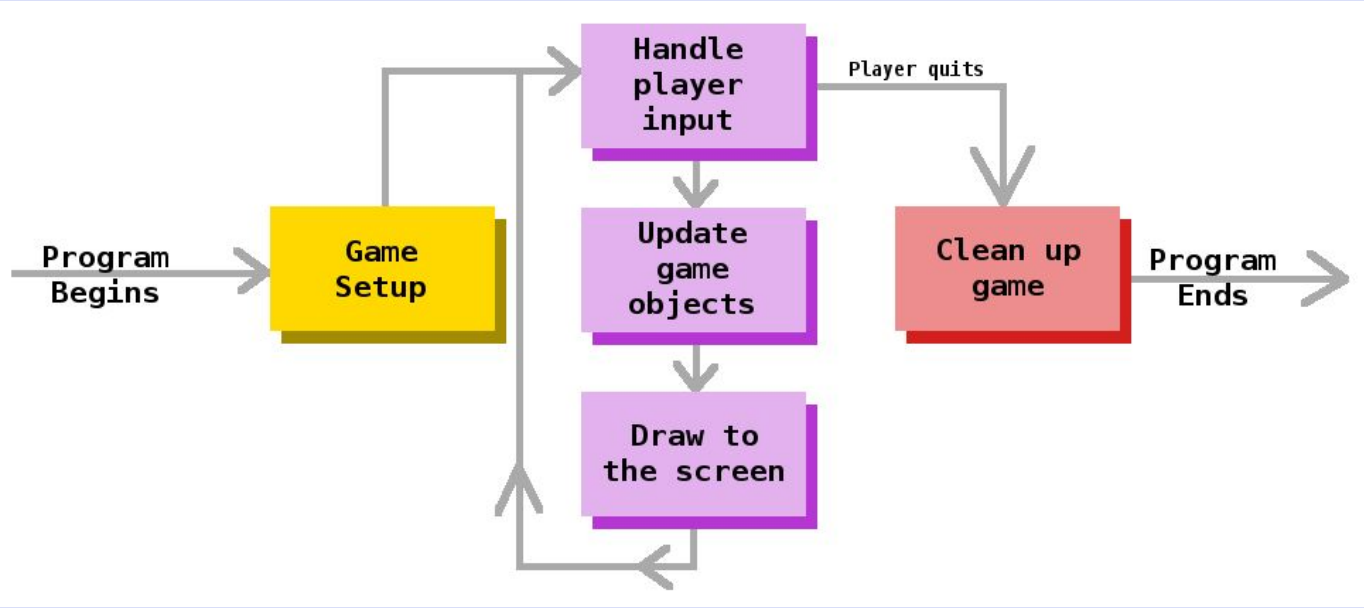
套件使用

pygame：遊戲主要使用的套件，提供遊戲運作的功能

math：提供較複雜的運算，如sin、cos、pi等

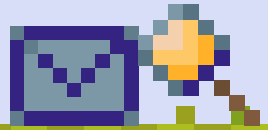
random：提供隨機的數值，讓遊戲內容更多變

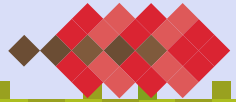
遊戲迴圈


Program Begins
Game Setup
Handle player input
Update game objects
Draw to the screen
Player quits
Clean up game
Program Ends

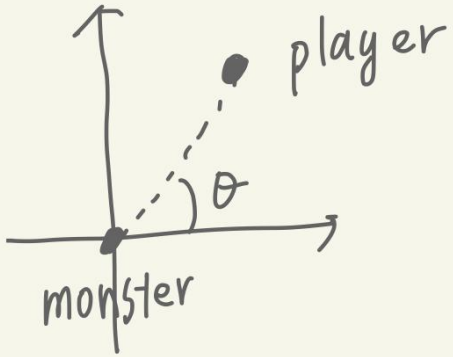
數學運用

該如何讓怪物自動瞄準玩家？





數學運用

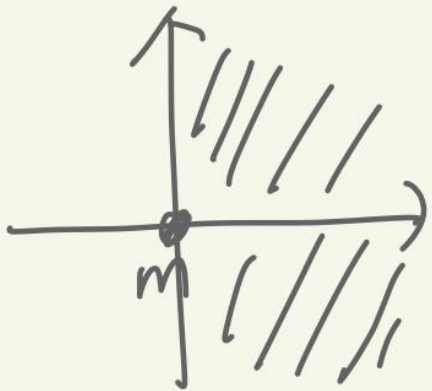


$$m = \frac{\Delta y}{\Delta x} = \tan\theta \cdot$$

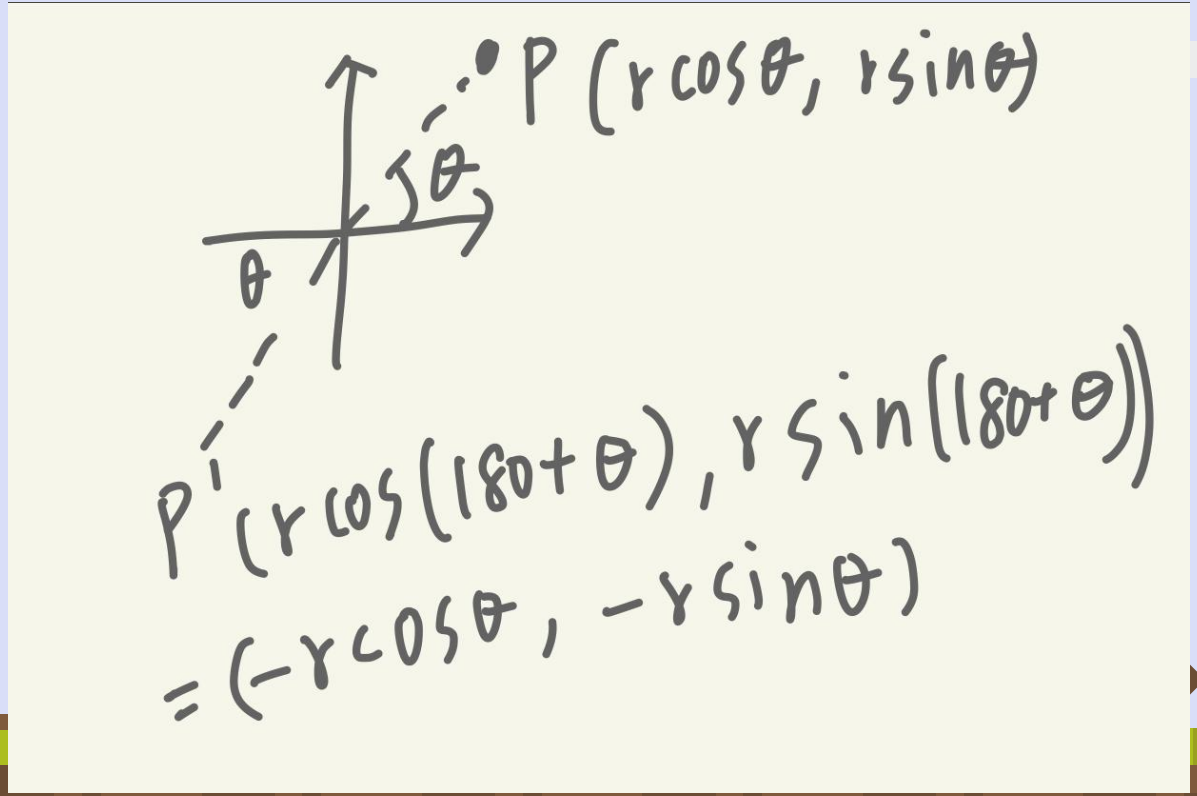
$$\theta = \arctan m$$

數學運用

$$-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$$



數學運用




03.
PROGRAMMING

初始化

```python
import pygame
import random
import math
```

```python
#initiatize the pygame
pygame.init()

#setting
FPS = 60
NAME = 'BABY VS MONSTERS!'
HEIGHT = 800
WIDTH = 600
GAMEMODE = 1
SCORE = 0
START = 0 #game state
STATE = 0 #player's state
MOUSEX = pygame.mouse.get_pos()[0]
MOUSEY = pygame.mouse.get_pos()[1]
TICK1 = 300
TICK2 = random.randrange(500, 1000)
TICKM = random.randrange(10,60)
TICKS = 500
POISONNUM = 0
is_ADDED = False
```

初始化

```
#loading image
KIDSIMAGE = pygame.image.load('baby-boy.png')
MONSTER1 = pygame.image.load('monster.png')
MONSTER1_HURTED = pygame.image.load('monster_hurted.png')
POISON = pygame.image.load('poison.png')
THREE = pygame.image.load('three.png')
TWO = pygame.image.load('2.png')
ONE = pygame.image.load('1.png')
BALL = pygame.image.load('fitness-ball.png')
FIREBALL = pygame.image.load('fireball.png')
HEALTHPACK = pygame.image.load('heart pixel art 48x48.png')
BACKGROUND = pygame.image.load('background.jpg')
BACKGROUND = pygame.transform.scale(BACKGROUND, (800, 500))
BACKGROUND_DARK = pygame.image.load('background_dark.jpg')
BACKGROUND_DARK = pygame.transform.scale(BACKGROUND_DARK, (800, 500))
ICON = pygame.image.load('monster.png')
MENU = pygame.image.load('play button.png')
BGSOUND = pygame.mixer.Sound('Lull.mp3')
SHOOTINGSOUND = pygame.mixer.Sound('8bit_bomb_explosion.wav')
```

初始化

```
#loading fonts
FONT = pygame.font.match_font('arial')


clock = pygame.time.Clock()

#icon setting
screen = pygame.display.set_mode((HEIGHT, WIDTH))  #the size of your screen
pygame.display.set_caption(NAME)#title
pygame.display.set_icon(ICON)
```

Class player 1

```
class Player(pygame.sprite.Sprite):
    def __init__(self):
        pygame.sprite.Sprite.__init__(self)
        self.image = pygame.transform.scale(KIDSIMAGE, (70, 70))
        self.rect = self.image.get_rect()
        self.rect.x = 200
        self.rect.y = 200
        self.speedx = 8
        self.speedy = 8
        self.rect.centerx = 800/2
        self.rect.bottom = 600-10
        self.face = 0
        self.isrotated = 0
        self.health = 100
```

Class player 2

```
def update(self):
    self.faces()
    key_pressed = pygame.key.get_pressed()#return a boolean that whether the key is pressed
    if key_pressed[pygame.K_d]:
        self.rect.x += self.speedx
    if key_pressed[pygame.K_a]:
        self.rect.x -= self.speedx
    if key_pressed[pygame.K_s]:
        self.rect.y += self.speedy
    if key_pressed[pygame.K_w]:
        self.rect.y -=self.speedy
    if self.rect.right > 800:
        self.rect.right = 800
    if self.rect.left < 0:
        self.rect.left = 0
    if self.rect.top < 0:
        self.rect.top = 0
    if self.rect.bottom > 600:
        self.rect.bottom = 600
```

Class player 3

```
def shoot(self, direction):
    global STATE
    if STATE == 0:
        bullet = Bullet(self.rect.centerx, self.rect.top, direction, STATE)
    elif STATE == 1:
        bullet = Bullet(self.rect.centerx, self.rect.top, direction, STATE)
    bullets.add(bullet)
    all_sprites.add(bullet)
    SHOOTINGSOUND.play()

def faces(self):
    if(self.isrotated == 1):
        self.image = pygame.transform.flip(self.image, True, False)
        self.isrotated = 0

def getHurted(self, damage):
    global SCORE, START
    self.health -= damage
    if(self.health <= 0):
        self.kill()
        START = 3
    if(START == 2):
        SCORE -=1
```

Class bullet

```python
class Bullet(pygame.sprite.Sprite):
    def __init__(self, x, y, direction, type):
        pygame.sprite.Sprite.__init__(self)
        self.image = pygame.Surface((10, 10))
        self.image.fill((255,255,0))
        self.rect = self.image.get_rect()
        self.rect.centerx = x
        self.rect.bottom = y
        self.speed = 10
        self.direction = direction
        self.type = type
        self.damage = 1

    def update(self):
        if self.type == 1:
            self.image = pygame.transform.scale(BALL, (20,20))
            self.speed = 6
            self.damage = 10
        self.rect.y += self.speed*math.sin(self.direction)
        self.rect.x += self.speed*math.cos(self.direction)
        if self.rect.bottom < 0:
            self.kill()
```

Class monster 1

```python
class Monster(pygame.sprite.Sprite):
    def __init__(self):
        pygame.sprite.Sprite.__init__(self)
        self.image = pygame.transform.scale(MONSTER1, (100, 100))
        self.rect = self.image.get_rect()
        self.rect.x = random.randrange(100,700)
        self.rect.y = random.randrange(0,600)
        self.v = 3
        self.direction = math.pi*2/random.randrange(1,6)
        self.health = 50
        self.tick = random.randrange(20,70)
        self.animation = 30
        self.is_animated = False
```

Class monster 2

```
def update(self):
    global START
    if self.rect.top < 0 or self.rect.bottom > 600 or self.rect.left > 800 or self.rect.right < 0:
        self.v = -self.v
        self.direction = math.pi*2 / random.randrange(1, 6)
    self.rect.y += self.v*math.sin(self.direction)
    self.rect.x += self.v*math.cos(self.direction)
    self.tick -= 1
    if self.is_animated == True:
        self.image = pygame.transform.scale(MONSTER1_HURTED, (100, 100))
        self.animation -= 1
    if self.animation <= 0:
        self.is_animated = False
        self.image = pygame.transform.scale(MONSTER1, (100,100))
        self.animation = 30

def getHurted(self, damage):
    self.health -= damage
    self.is_animated = True
    if(self.health <= 0):
        self.kill()
  #  self.image = pygame.transform.scale(MONSTER1, (100, 100))
    global SCORE, START
    if(START == 2):
        SCORE += damage
```

Class monster 3

```
def attack(self, player):
    playerx = player.rect.x
    playery = player.rect.y
    monsterx = self.rect.x
    monstery = self.rect.y
    deltax = monsterx - playerx
    if deltax == 0:
        deltax = 1
    angle = math.atan((monstery - playery)/deltax)
    if deltax > 0:
        direction = 0
    elif deltax <= 0:
        direction = 1
    monsterbullet = MonsterBullet(self.rect.centerx, self.rect.top, angle, 1, direction)
    monsterbullets.add(monsterbullet)
    all_sprites.add(monsterbullet)
```

Class monsterbullets

```python
class MonsterBullet(pygame.sprite.Sprite):
    def __init__(self, x, y, angle, type, direction):
        pygame.sprite.Sprite.__init__(self)
        self.image = pygame.transform.scale(FIREBALL, (20,20))
        self.rect = self.image.get_rect()
        self.rect.centerx = x
        self.rect.bottom = y
        self.speed = 10
        self.angle = angle
        self.direction = direction
        self.type = type
        self.damage = 3

    def update(self):
        global START
        if START == 2:
            if self.type == 1:
                pass
        if(self.direction == 0):
            self.rect.y -= self.speed * math.sin(self.angle)
            self.rect.x -= self.speed * math.cos(self.angle)
        if self.direction == 1:
            self.rect.y += self.speed * math.sin(self.angle)
            self.rect.x += self.speed * math.cos(self.angle)
        if self.rect.bottom < 0:
            self.kill()
```

Class poison

```
class Poison(pygame.sprite.Sprite):
    def __init__(self):
        pygame.sprite.Sprite.__init__(self)
        self.image = pygame.transform.scale(POISON, (50,50))
        self.rect = self.image.get_rect()
        self.rect.x = random.randrange(100,700)
        self.rect.y = random.randrange(100,400)
        self.type = random.randrange(0,3)

    def update(self):
        if self.type == 2:
            self.image = pygame.transform.scale(HEALTHPACK, (30,30))
```

Class menu

```
class Menu(pygame.sprite.Sprite):
    def __init__(self):
        pygame.sprite.Sprite.__init__(self)
        BGSOUND.play()
        self.image = pygame.transform.scale(MENU, (200 ,100))
        self.rect = self.image.get_rect()
        self.rect.x = 0
        self.rect.y = 0

    def update(self):
        global START
        if(START == 0):
            pass
        elif(START == 1 or START == 2):
            self.kill()
```

Class number

```
class Number(pygame.sprite.Sprite):
    def __init__(self):
        pygame.sprite.Sprite.__init__(self)
        self.image = pygame.transform.scale(THREE, (100, 100))
        self.rect = self.image.get_rect()
        self.rect.centerx = 400
        self.rect.top = 300
        self.tick = 300

    def update(self):
        self.tick -= 1
        if self.tick <= 200:
            self.image = pygame.transform.scale(TWO, (100,100))
        if self.tick <= 100:
            self.image = pygame.transform.scale(ONE, (100,100))
        if self.tick < 0:
            global START
            START = 2
            self.kill()
```

Sprites Group

```
#sprites adding
all_sprites = pygame.sprite.Group()
poisons = pygame.sprite.Group()
bullets = pygame.sprite.Group()
monsterbullets = pygame.sprite.Group()
monsters = pygame.sprite.Group()
players = pygame.sprite.Group()
player = Player()
num = Number()
menu = Menu()
menus = pygame.sprite.Group()
menus.add(menu)
nums = pygame.sprite.Group()
nums.add(num)
players.add(player)
for i in range(3):
    monster = Monster()
    all_sprites.add(monster)
    monsters.add(monster)
all_sprites.add(player)
```

自訂函數、簡化主程序

```
#display the scores
def draw_text(surface, text, size, x, y):
    font = pygame.font.Font(FONT, size)
    text_surface = font.render(text, True, (255,255,255))
    text_rect = text_surface.get_rect()
    text_rect.centerx = x
    text_rect.top = y
    pygame.font.Font.set_bold(font, True)
    surface.blit(text_surface, text_rect)
```

主程序

```
#Game Loop
running = True
while running:
    TICK2 -= 1
    clock.tick(FPS) #一秒中只能被執行10次
```

主程序：按鍵偵測

```
for event in pygame.event.get():
    if event.type == pygame.QUIT:
        running = False
        # saving()
    if event.type == pygame.KEYDOWN:
        if event.key == pygame.K_p and START == 0:
            START = 1
            BGSOUND.fadeout(5000)
        if event.key == pygame.K_q and START == 0:
            running = False
        if event.key == pygame.K_e and (START == 2 or START == 3):
            START = 0
            BGSOUND.play()
        if event.key == pygame.K_l and player.face != 0:
            player.face = 0
            player.isrotated =1
        if event.key == pygame.K_i:
            player.face = math.pi*3/2
        if event.key == pygame.K_j and player.face != math.pi:
            player.face = math.pi
            player.isrotated = 1
        if event.key == pygame.K_k:
            player.face = math.pi/2
        if event.key == pygame.K_SPACE:
            player.shoot(player.face)
```

主程序：遊戲狀態

```
if(START == 0):
    if len(menus) == 0:
        menu = Menu()
        menus.add(menu)
    menus.update()
elif(START == 1):
    if len(nums) == 0:
        print(True)
        num = Number()
        nums.add(num)
    nums.update()
elif(START == 2):
    all_sprites.update()
    if len(monsters) == 0:
        START = 3
        all_sprites = pygame.sprite.Group()
elif(START == 3):
    pass
```

主程序：物件碰撞

```
for monster in monsters:
    hits = pygame.sprite.spritecollide(monster, bullets, True)
    for hit in hits:
        monster.getHurted(hit.damage)

for player in players:
    hits = pygame.sprite.spritecollide(player, monsterbullets, True)
    for hit in hits:
        player.getHurted(hit.damage)

for player in players:
    hits = pygame.sprite.spritecollide(player, poisons, True)
    STATE = random.randrange(0,2)
    POISONNUM -= 1
    for hit in hits:
        if hit.type == 2:
            player.health += 20
```

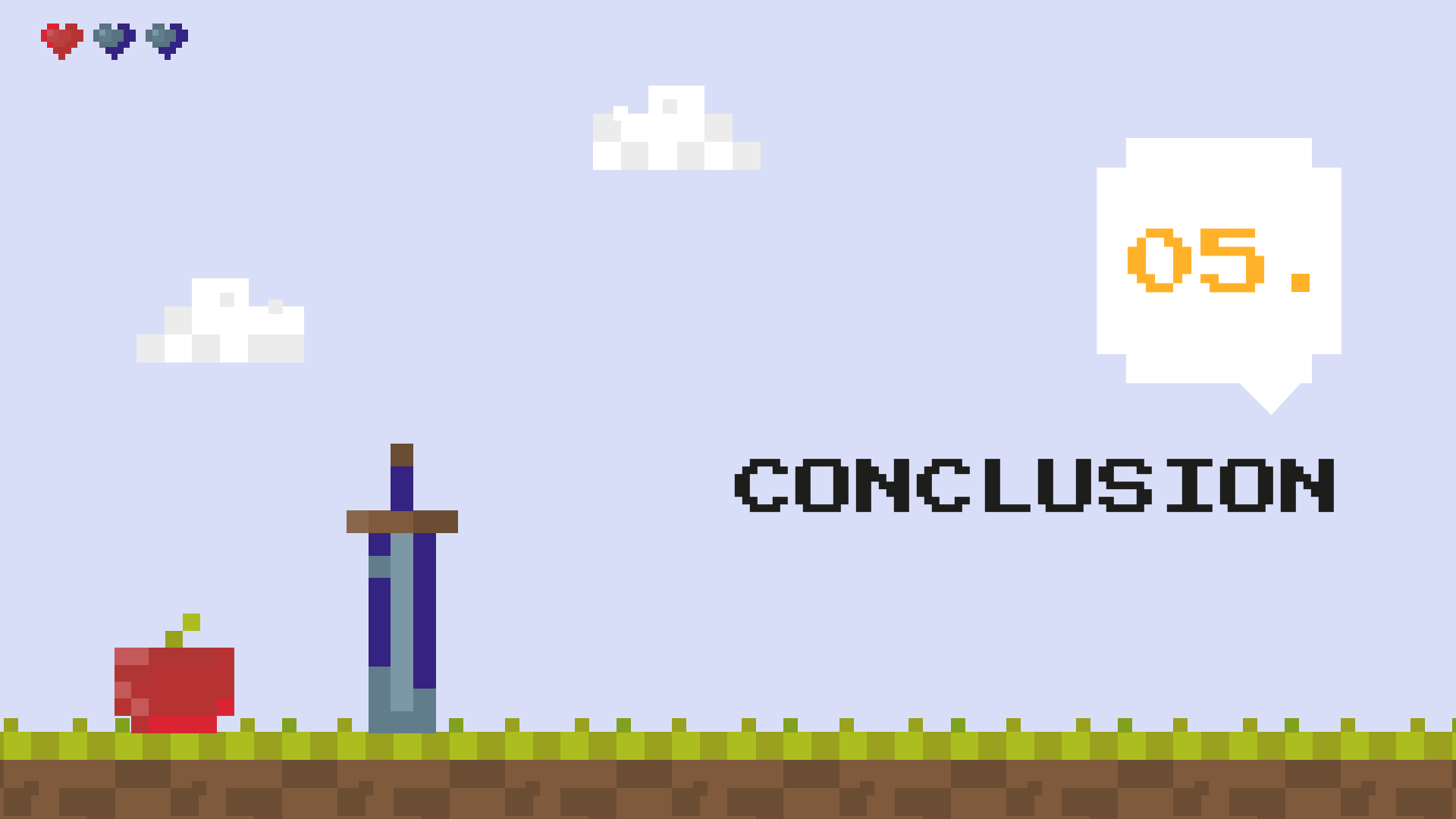
主程序：怪物攻擊時機

```
TICKM -= 1
for player in players:
    #if TICKM <= 0:
    for monster in monsters:
        if monster.tick <= 0:
            monster.attack(player)
            monster.tick = random.randrange(10,60)
```

主程序

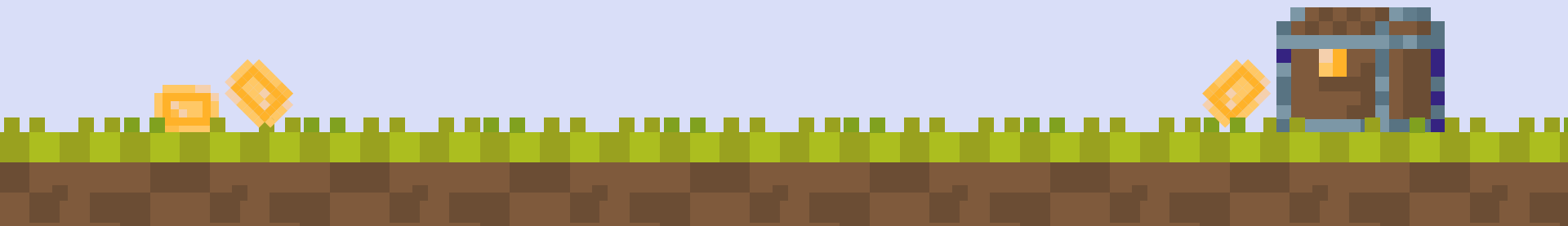
```
    screen.fill((0,0,0)) #上色rgb
    if TICK1 > 0:
        screen.blit(BACKGROUND, (0,100))
        if START != 0:
            TICK1 -=1
    else:
        screen.blit(BACKGROUND_DARK, (0,100))
    if TICK2 < 0 and POISONNUM < 2:
        poison = Poison()
        poisons.add(poison)
        all_sprites.add(poison)
        TICK2 = random.randrange(400,700)
        POISONNUM += 1
    if START == 0:
        menus.draw(screen)
    elif START == 1:
        nums.draw(screen)
    elif START == 2:
        all_sprites.draw(screen)
        draw_text(screen, f'score: {str(SCORE)}  health: {player.health}', 18, 400, 10)
        TICKS -= 0.1
    elif START == 3:
        totalscores = int(SCORE + TICKS)
        draw_text(screen, f'Total Score: {str(totalscores)} press E to exit', 18, 400, 10)
    pygame.display.update()

pygame.quit()
```


04.
DEMO


05.
CONCLUSION

結論

- Class的使用，能快速的建立一個內容豐富的程式
- 遊戲的運作流程
- 事前若能製作diagram，有助於編寫程式時宏觀地了解目前掌握的部分



不要忘記，寫組別互評表。
因為非~常好程式，簡報非~常好
差不多一樣，🍦！　再見~

祝各位期末歐趴 暑假愉快👍👍

Thanks for listening!