2D and 3d motion analysis
Mazarik university
BMX trick

lenght of the skate :

I calibrated the system of pixel putting the coordinates of two points (upper and lower points of the skate) in the calibration section of excel.
-on the video : 1,53cm
-real lenght : 60cm
60/1,53=**39,21**

=>so each distance must be multipicate by 39,21 to become true

Lenght of the jump :

1^{st} picture :
distance from the skate : 3,94cm
real distance : 3,94*39,21= 154,5cm

2^{nd} picture :
distance from the skate : 2,04cm
real distance : 80cm

Total lenght of the jump :
154,5+80= 234,5cm
=>**2,345 metres**

Speed

Time in the air :
I toke the time written on the video at the beginning of the jump and then at the end.
Time at the first frame of the jump : 2,20 sec
Time at the last frame of the jump :3,00 sec

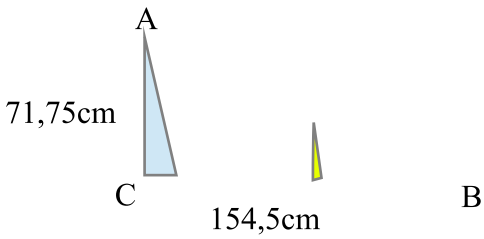
Total time in the air :
3,00-2,20=0,80 sec

Speed in the air :
2,345/0,80=2,93
2,93 m/s
and 10,55 km/h

Height

high of the jump : 1,83cm
real high : **71,75cm**

Angle of the jump



A= the highest point of the jump
B= the beginning of the jump

We need the angle B
Tan(B)=71,75/154,5
so Tan(B)=0,464
so B = **24.89°**