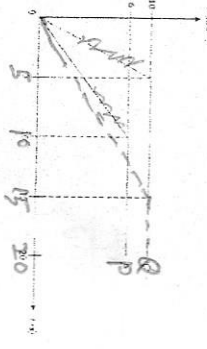


7)	a) vernier callipers	1
	b) To determine the average value so that the accuracy is increased.	1
	c) i) X : 2.40 cm ii) Y : 2.40 cm	2
	d) Same accuracy Average values and percentage errors are the same.	2
	e) Reading X Because its relative deviation is smaller. / student answer	2

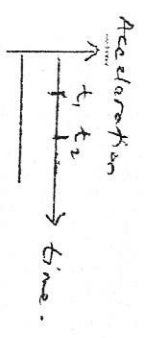
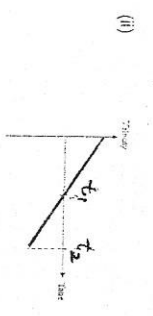
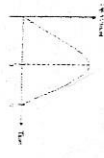
- 8.
- (a) AB - Zero acceleration
BC - Constant deceleration
CD - Zero acceleration
DE - constant acceleration
 - (b) Same.
They have zero resultant force
 - (c) Reason : Constant velocity, zero acceleration
 - (d) Distance = $15.8 \text{ m s}^{-1} \times 1.0 \text{ s}$
= 1.9 km
 - (e) From D to E:

The gradient of the road is smaller, the component of the weight of the bicycle down the slope is smaller. The engine force is the same, therefore there is a resultant force and an acceleration.

- 9.
- (a)(i) Velocity is the rate of change of displacement.
 - (ii) Acceleration is the rate of change of velocity.
 - (b)(i)
 - (b)(ii)



- (ii) $P.s = \frac{1}{2} (5 + 15) (5)$
= 60 m [2 m]
- $Q.s = \frac{1}{2} (10 + 15)(10)$
= 125 m [1 m]
- $\frac{1}{2} \times 15 \times 10$ [1 m]
- (iii) Q is in the lead after 15 s. [1 m]



- (iii) Retardation = $\frac{18}{3} = 6 \text{ m s}^{-2}$ [1 m]
- (d) (i) 5 second [2 m]
- (ii) 3 seconds [1 m]
- (iii) Retardation = $\frac{18}{3} = 6 \text{ m s}^{-2}$ [1 m]

- 10.
- (a) (i) Momentum of an object is equal to the product of mass and velocity of the object. [1 m]
 - (ii) Figure A : Total momentum = $(4 \times 2.5) + (2 \times 1.9)$ [1 m]
= 13.8 N s
Figure B : Total momentum = $(4 \times 2.5) - (2 \times 1.9)$ [1 m]
= 6.2 N s
 - (iii) For a given object, momentum is directly proportional to velocity. [1 m]

- (b) (i) $u = \frac{0.22}{16}$ [1 m]
= 110 cm s⁻²
= 1.1 m s⁻² [1 m]
- (ii) $v = \frac{0.2}{16}$ [1 m]
= 80 cm s⁻²
= 0.8 m s⁻² [1 m]
- (iii) Impulse on Q = change of momentum [1 m]
= 2×0.8 [1 m]
= 1.6 N s [1 m]
- (iv) Impulsive force on Q = $\frac{1.6}{0.08}$ [1 m]
= 20 N [1 m]
- (v) Impulsive force on P = 20 N [1 m]
- (vi) $F = ma$ [1 m]
 $20 = 2(a)$ [1 m]
 $a = 10 \text{ m s}^{-2}$ [1 m]
- (vii) Impulse on P = 1.6 [1 m]
 $m(1.1 - 0.8) = 1.6$ [1 m]
Mass of P, m = 5 kg [1 m]

~The end~