



Province of the
EASTERN CAPE
EDUCATION

PHYSICAL SCIENCES P1

MEMORANDUM

COMMON TEST

JUNE 2014

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

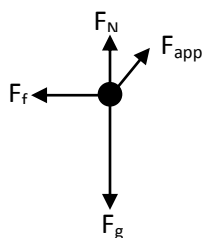
N.B. This memorandum consists of 6 pages including this page.

SECTION A**QUESTION 1**

- 1.1 C ✓✓
 1.2 D ✓✓
 1.3 C ✓✓
 1.4 A ✓✓
 1.5 A ✓✓
 1.6 B ✓✓
 1.7 A ✓✓

(7 x 2) [10]**QUESTION 2**

2.1



- F_N – normal force ✓
 F_g – weight ✓
 F_f – friction ✓
 F_{app} – applied force ✓

 $(F_N \text{ must be less than } F_g)$

(4)

2.2

$$F_{net} = ma \checkmark$$

$$29 \cos 36^\circ + (-F_f) = 20 \times 0 \checkmark$$

$$F_f = 23,46 \text{ N} \checkmark$$

(3)

2.3 Increase ✓

(1)

- 2.4 F_N increases ✓
 Co-efficient of kinetic friction remains constant ✓
 From the equation $f_k = \mu_k N$
 Friction directly proportional to normal force ✓

(3)

[11]

QUESTION 3

$$3.1 \quad \Delta t = \frac{2,9 - 1,76}{2} \checkmark$$

$$= 0,57 \text{ s} \checkmark \quad (2)$$

$$3.2 \quad v_f = v_i + a\Delta t \checkmark$$

$$0 = v_i + (-9,8)(0,57) \checkmark$$

$$= 5,586 \text{ m}\cdot\text{s}^{-1} \checkmark$$

$$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2 \checkmark$$

$$= (5,586)(0,57) \checkmark + \frac{1}{2}(-9,8)(0,57)^2 \checkmark$$

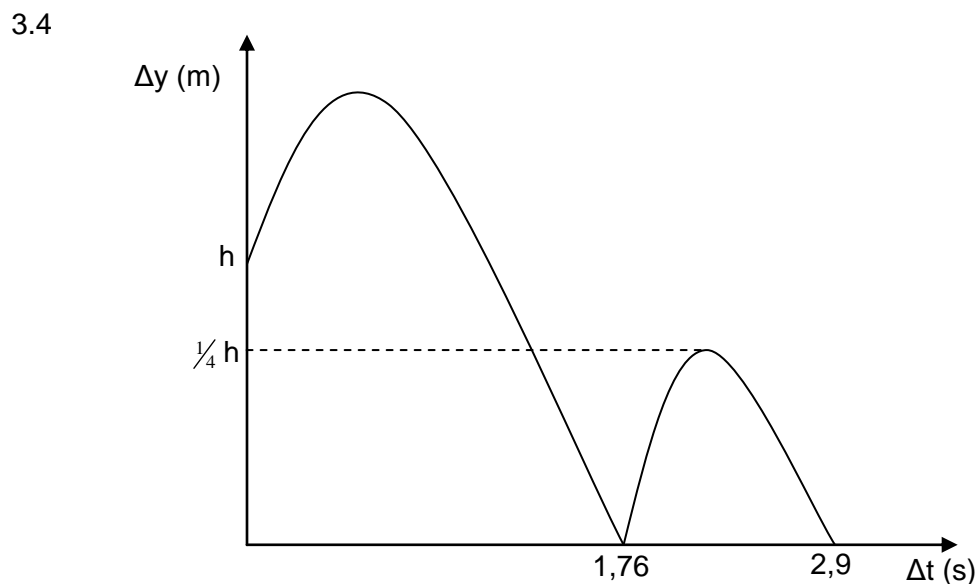
$$= 1,59201 \text{ m} \checkmark$$

$$y = 4 \times y_1 = 4 \times 1,59201 = 6,37 \text{ m} \checkmark \quad (8)$$

3.3 Inelastic \checkmark



The ball does not bounce to the original height. \checkmark (2)



Checklist	Marks
Criteria for graph	
y and y ₁ correctly shown	✓
1,76 and 2,9 correctly shown	✓
Correct shape from 0 to 1,76 s	✓
Correct shape from 1,76 to 2,9 s	✓
Axes correctly labelled	✓

(5)
[17]

QUESTION 4

4.1 The total linear momentum of an isolated system remains constant in magnitude and direction. ✓✓ (2)

4.2 Total p before = Total p after
 $mv_i + mv_i = mv_f + mv_f$ ✓
 $(75 \times 3) + (2 \times -5) = (77) v_f$ ✓
 $v_f = 2,79 \text{ m.s}^{-1} \text{ to the right}$ ✓ (4)
[6]

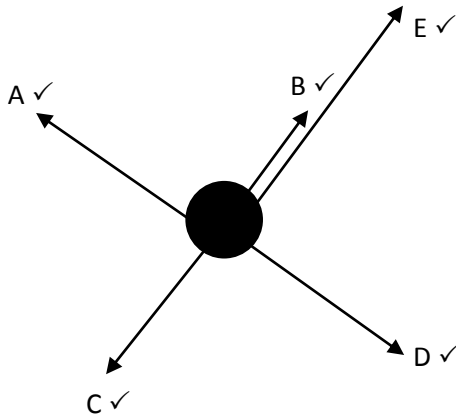
QUESTION 5

5.1 No. ✓

The crate experiences a frictional force/non-conservative force. ✓
 The work done by the frictional force/non-conservative force changes the mechanical energy of the crate. ✓ (3)

5.2 A force for which the work done in moving an object between two points is independent of the part taken. (2)

5.3



(5)

5.4 $F_{g//} = mg \sin \theta$ ✓
 $= 120 \times 9,8 \times \frac{1,5}{10}$ ✓
 $= 176,4 \text{ N}$ ✓ (3)

5.5 O J ✓ force acts at right angles to the direction of motion. ✓ ($\cos 90^\circ = 0$) (2)

5.6 The net/total work done on an object is equal to the object's change in kinetic energy. ✓✓ (2)

5.7.1 $W_{F_f} = F_f \Delta x \cos \theta$ ✓
 $= 50 \times 10 \times \cos 180^\circ$ ✓
 $= -500 \text{ J}$ ✓ (3)

5.7.2 $W_{F_{g//}} = F_{g//} \Delta x \cos \theta$
 $= 176,4 \times 10 \times \cos 0^\circ$ ✓
 $= 1764 \text{ J}$ ✓ (2)

$$5.8 \quad W_{\text{net}} = \Delta K \quad \checkmark$$

$$W_A + W_B + W_C + W_D + W_E = \Delta K$$

$$(0) + (-500) + 1764 + 0 + W_E \quad \checkmark = 0 \quad \checkmark$$

$$W_E = -1264 \text{ J} \quad \checkmark \quad (4)$$

OR

$$W_{\text{nc}} = \Delta K + \Delta U \quad \checkmark$$

$$W_B + W_E = 0 + mgh_f - mgh_i$$

$$-500 + W_E \quad \checkmark = 0 - (120)(9,8)(1,5) \quad \checkmark$$

$$W_E = -1264 \text{ J} \quad \checkmark$$

$$5.9 \quad W_E = F\Delta x \cos\theta$$

$$-1264 \quad \checkmark = F\Delta x \cos 180^\circ \quad \checkmark$$

$$F = 126,4 \text{ N}$$

$$P = Fv \quad \checkmark$$

$$= 126,4 \quad \checkmark \times 1,25 \quad \checkmark$$

$$= 158 \text{ W} \quad \checkmark \quad (6)$$

[32]

QUESTION 6

$$6.1 \quad f_L = \frac{v \pm v_L}{v \pm v_S} f_s \quad \checkmark$$

$$580 \quad \checkmark = \frac{340 + 0}{340 - 37,5} \times f_s \quad \checkmark$$

$$f_s = 516,03 \text{ Hz} \quad \checkmark \quad (4)$$

6.2 The apparent change in the frequency of a wave when there is relative motion between the source of the wave and an observer. $\checkmark \checkmark$ (2)

6.3 No \checkmark
An increase in the speed of the source producing the sound waves results in a greater number of complete waves reaching the listener per second. \checkmark
The apparent frequency increases and becomes greater than 580 Hz, the detector cannot detect frequencies greater than 580 Hz. \checkmark (3)

6.4 Equal to. \checkmark
There is no relative motion between the source and the listener. \checkmark (2)

6.5 6.5.1 change in pitch \checkmark (1)

6.5.2 change in colour \checkmark (1)

- 6.6 The Doppler flow meter ✓ uses the Doppler effect to measure the speed of blood flowing through a person's blood vessels. ✓
Abnormal blood speeds could be an indicator of a health risk. ✓ (3)

[16]**QUESTION 7**

- 7.1 The badge is referring to a blue shift caused by the Doppler Effect. ✓
For the badge to appear blue the car must be travelling at an extremely high speed. ✓ (2)

- 7.2 The claim made by the badge is not possible. ✓
The car will have to travel at a speed comparable to the speed of light. } ✓
This is too large for the car. } (2)

[4]**TOTAL SECTION B: 86
GRAND TOTAL: 100**