education

Department:
Education
PROVINCE OF KWAZULU-NATAL

PHYSICAL SCIENCES P1

COMMON TEST

JUNE 2019

MARKING GUIDELINE

NATIONAL SENIOR CERTIFICATE

GRADE 11

NB: This marking guideline consists of 9 pages.

QUESTION ONE

1.1 C ✓✓

1.2 B ✓✓

1.3 C ✓✓

1.4 C ✓✓

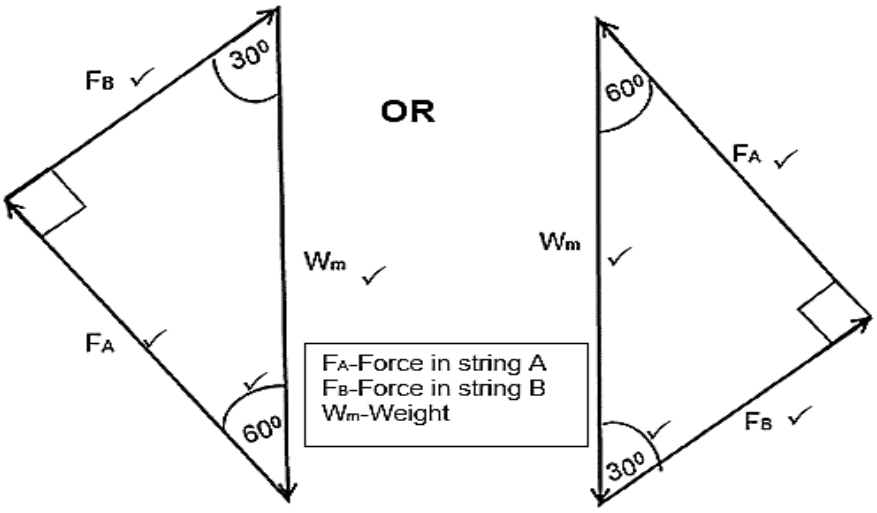
1.5 D ✓✓

[10]

QUESTION TWO

2.1 The forces are balanced. ✓✓ OR $F_{net} = 0$ ✓✓ (2)

2.2



Marking Rubric : Diagram	
Criteria	Mark allocation
Forces A , B and W correctly drawn and labelled in a closed triangle.	3 x 1 = 3
Any two angles shown correctly	1
If no arrows shown penalise once (max ¾)	

(4)

2.3 $F_B = m \cdot g$

$= 2,04 \times 9,8$

$= 19,99$ N } Any one ✓

$\sin 60^0 = \frac{O}{H}$

$\sin 60^0 = \frac{19.99}{W_m}$ ✓

$W_m = 23,082$N

$W_m = m \cdot g$

$23,082 = m \times 9,8$ ✓

$m = 2,36$ kg ✓

OR

$\cos 30^0 = \frac{A}{H}$

$\cos 30^0 = \frac{19.99}{W_m}$ ✓

$Wm = 23,082$ N

(4)

[10]

QUESTION THREE

3.1 The force that opposes the motion of a moving object relative to a surface. ✓✓ (2)

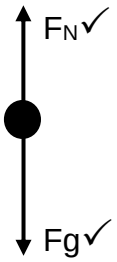
3.2 $F_{NET} = m \cdot a$

$F_X + (-f_K) = m \cdot a$ } Any one ✓

$F \bullet \cos 60^0 + (-6,5)$ ✓ $= 100 \bullet (5)$ ✓

$F = 1013$ N ✓ (4)

3.3



(2)

3.4 **Positive marking from Q 3.2**

$F_N = W - F_y$
$F_N = m \cdot g - F \bullet \sin\theta$ } Any one ✓

$= (100)(9,8) - 1013 \sin(60^0)$ ✓
$= 102,716$ N

$f_K = \mu_K \bullet F_N$ ✓ ⊕

$\underline{6,5 = \mu_K \bullet 102,716}$ ✓

$\mu_K = 0.063$ ✓

(5)

3.5 Remains the same ✓ (1)

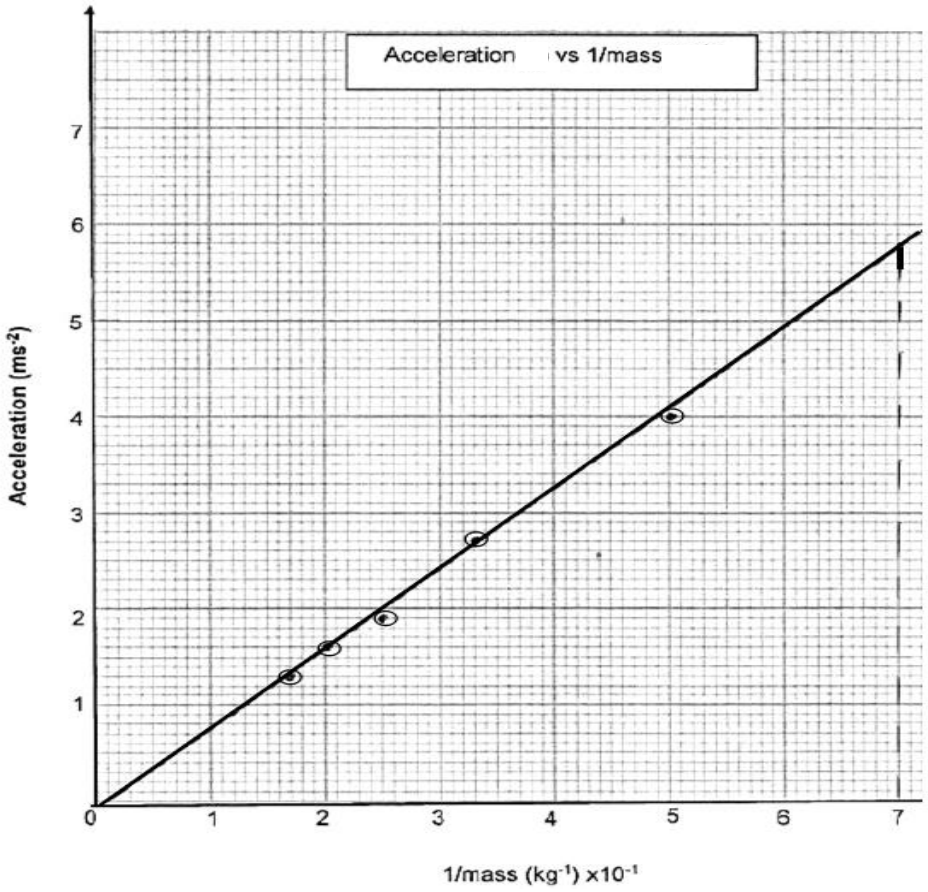
[14]

QUESTION FOUR

4.1 (a) = 0,25
(b) = 0,20 } ✓ (1)

4.2 Force exerted on the trolley ✓ (1)

4.3



Marking Rubric : Diagram	
Criteria	Mark allocation
• Appropriate scale used on x and y axis	1
• All points correctly plotted • 3 out of 5 points correctly plotted	2 1
• Best fit line showing direct proportion(graph passing through the origin)	1
• Correct choice of axes	1

(5)

4.4 Directly proportional✓ (1)

4.5 Gradient : $F = \frac{\Delta a}{1/\Delta m}$

$= \frac{5,8 - 0}{0,7 - 0.01}$ ✓✓

$= 8,41$

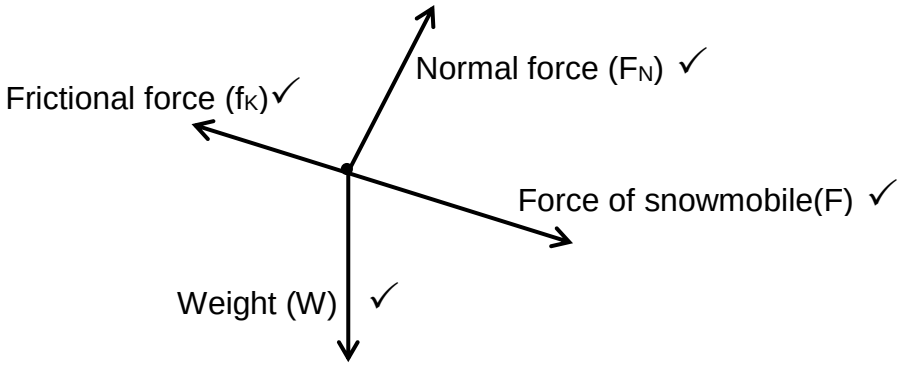
F = 8,41 N✓ (accept range 8,21 N – 8,61 N) (3)

[11]

QUESTION FIVE

5.1.1 If a non zero NET force acts on an object, then the object accelerates in the direction of the NET force where the acceleration of the object is directly proportional to the NET force ✓ and inversely proportional to the mass of the object. ✓ (2)

5.1.2



(Accept the parallel and perpendicular components of weight.) (4)

5.1.3 $F_{g//} = m \bullet g \sin\theta$
$= 50(9,8) \sin 25^0$
$= 207,083$ N ✓

Take the motion of the sled down the incline as being positive.

$F_{NET} = m \cdot a$
$F + F_{g//} + (-f) = m \bullet a$ Any one ✓
$\underline{F + 207,083 + (-17,76) = 50(5)}$ ✓
$F = 60.677$ N ✓ (4)

5.2 **Sphere B**
$F_{NET} = m \bullet a$
$40 = 8 \cdot a$ ✓
$a = 5\ ms^{-2}$

$F_{NET} = m \cdot a$
$T + (-W) = m \bullet a$
$\underline{T - 8(9,8) = 8(5)}$ ✓
$T = 118,4$ N ✓

Sphere A
$F_{NET} = m \bullet a$
$P + (-W) + (-T) = m \bullet a$ Any one ✓
$\underline{200 - (m)(9,8) - 118,4 = m \cdot (5)}$ ✓
$m = 5,51$ kg ✓ (6)

[16]

QUESTION SIX

6.1 Every body in the universe attracts every other body with a gravitational force that is directly proportional to the product of their masses ✓ and inversely proportional to the square of the distance between their centres. ✓ (2)

6.2 The mass of an object is the amount of matter found in an object. ✓ The weight of an object is the force with which the centre of a planet attracts ✓ an object/an object is attracted to a large mass . (2)

6.3.1 $F_{Moon \rightarrow Earth} = \frac{Gm_1m_2}{r^2}$ ✓

$= \frac{6,67x10^{-11} \cdot (7,35x10^{22}) \cdot (5,97x10^{24})}{(3,84x10^{8})^2}$ ✓ ✓

$= 1,985x10^{20}$ N ✓ (4)

6.3.2 $3,522 \times 10^{22}$ N ✓ (1)

6.3.3 Take the direction to the right as being positive.

Positive marking from Q6.3.1

$F_{NET\ on\ Sun} = F_{Sun \rightarrow Earth} + (- F_{Moon \rightarrow Earth})$

$= 3{,}522 \times 10^{22} - 1{,}985 \times 10^{20}$ ✓

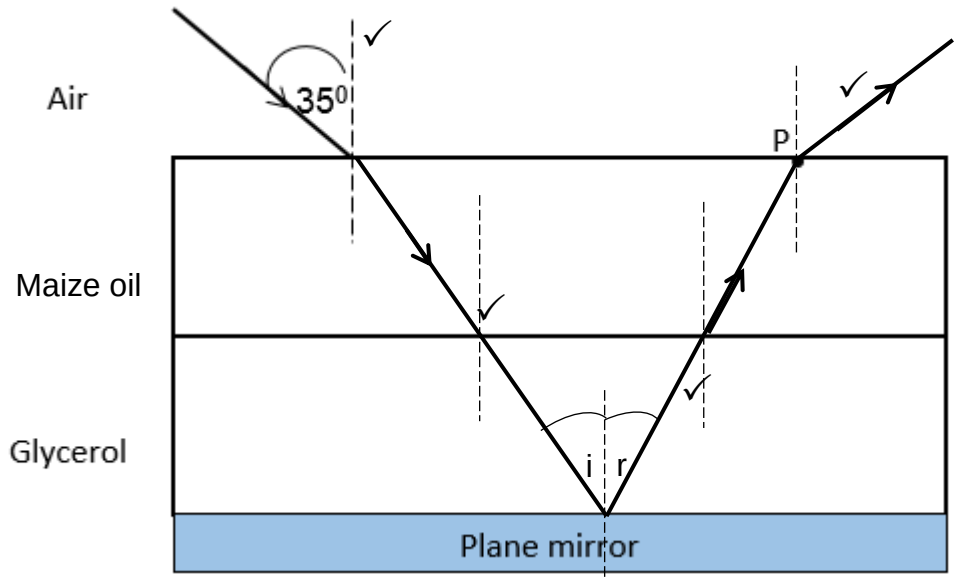
$= 3{,}50 \times 10^{22}$ N ✓,towards the Sun ✓ (3)

[12]

QUESTION SEVEN

7.1 It is the bending of light as it passes from one medium to another of different optical density. ✓✓ (2 or 0) (2)

7.2.1



Marking Rubric : Diagram	
Criteria	Mark allocation
• Refracted ray bending towards normal (Air - maize oil)	1
• Straight line from maize oil to glycerol.	1
• Straight line from glycerol to maize oil.	1
• Ray bending away from the Normal when going from maize oil to air.	1
• All Normal lines are drawn correctly	1

(5)

7.2.2 The ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant. ✓✓ (2)

7.2.3 $n_1 \sin\theta_1 = n_2 \sin\theta_2$ ✓

$1 \cdot \sin 35^0$ ✓ $= 1{,}47 \cdot \sin(\theta_2)$ ✓

$\theta_2 = 22{,}97^0$ ✓ (4)

7.2.4 $n = \frac{C}{v}$ ✓

$1{,}47 = \frac{3 \times 10^8}{v}$ ✓

$v = 2{,}04 \times 10^8 \text{ m·s}^{-1}$ ✓ (3)

7.2.5 $2{,}04 \times 10^8 \text{ m·s}^{-1}$ ✓

Maize oil has the same refractive index as glycerol. ✓ (2)

[18]

QUESTION EIGHT

8.1 Destructive interference ✓ takes place at those points on the screen , this is due to a crest and a trough overlapping at those points out of phase. ✓ (2)

8.2 Diffraction ✓ (1)

8.3 Every point on a wave-front is a source of a secondary wavelet which spreads out in all directions ✓✓ (2)

8.4
- Change the width of the slit ✓
- Move the screen towards or away from the slit ✓

(2)

8.5 A broader central red band ✓ is observed alternating with broader red and dark bands. ✓ (2)

[9]

TOTAL: [100]