SEKHUKHUNE DISTRICT

PHYSICAL SCIENCES P1 GR 11 PRE-JUNE EXAM 2016 MEMO

MARKS : 150

QUESTION 1

1.1 D ✓✓ (2)

1.2 B ✓✓ (2)

1.3 C ✓✓ (2)

1.4 B ✓✓ (2)

1.5 C ✓✓ (2)

1.6 A ✓✓ (2)

1.7 B ✓✓ (2)

1.8 D ✓✓ (2)

1.9 D ✓✓ (2)

1.10 A ✓✓ (2)

[20]

QUESTION 2

2.1

Vector	3 N	4 N	5 N	Resultant
Horizontal Component	+3 N ✓	4 × cos 45° = +2.828 N ✓	0 N ✓	+5.828 N ✓
Vertical Component	0 N ✓	4 × sin 45° = -2.828 N ✓	+5 N ✓	+2.172 N ✓

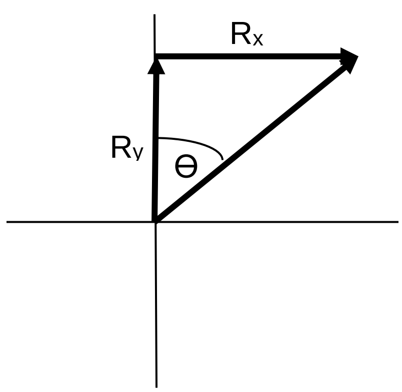
(10)

$R^2 = R_x^2 + R_y^2$ ✓

$R^2 = (5.828)^2 + (2.172)^2$

$R = 6.22N$ ✓

2.2 Sketch not drawn to scale



$\tan\theta = \frac{R_x}{R_y}$ ✓

$\tan\theta = \frac{5.828}{2.172}$ ✓

$\therefore \theta = 69.56^0$ ✓ to the vertical

(3)

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QUESTION 3

3.1 An object continues in a state of rest or moves at constant velocity unless it is acted upon by an unbalanced force. ✓ ✓ (2)

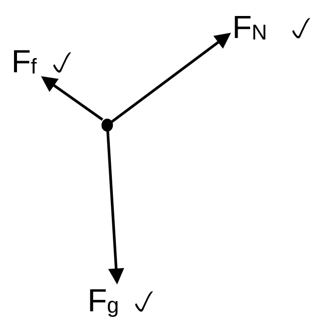
3.2 The force exerted on the car by the brakes cause it to slow down suddenly ✓, but because of inertia ✓ your body continues to move forward with the same velocity ✓. (3)

[5]

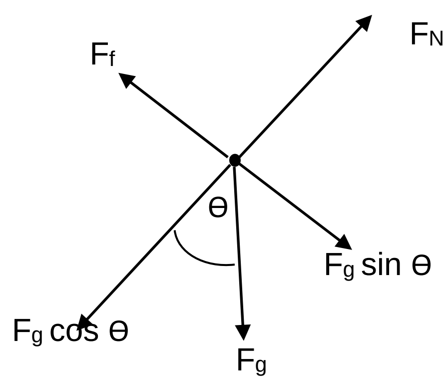
QUESTION 4

4.1 The force perpendicular exerted by the surface on an object. ✓ ✓ (2)

4.2 4.2.1 (3)



4.2.2 The maximum friction experienced by surfaces that are in static contact. ✓ ✓ (2)



4.2.3 $F_f = mg \sin \theta$ ✓ (4)

$F_f = (95.0 \times 9.8)$ ✓ $\times \sin 23.2°$ ✓

$F_f = 366.76$ N ✓

4.2.4 $N = mg \cos \theta$ ✓ (4)

$N = (95.0 \times 9.8)$ ✓ $\times \cos 23.2°$ ✓

$N = 855.72$ N ✓

4.2.5 $F_f = \mu_s \times N$ ✓ (4)

✓ $366.76 = \mu_s \times 855.72$ ✓

$\mu_s = 0.43$ ✓

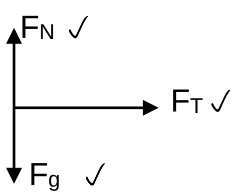
4.2.6 Less than ✓ (1)

[20]

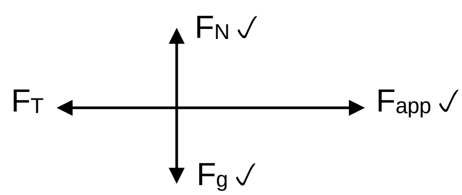
QUESTION 5

5.1 The acceleration of an object is directly proportional to the net force acting on the object, is in the direction of the net force, and is inversely proportional to the mass of the object. (2)

5.2 5.2.1 (7)



0.93 kg block



1.5 kg block

5.2.2 Consider the 0.93 kg block (7)

$F_{net} = m \times a = F_T$ ✓

$0.93 \times a = F_T$ ✓ ……………..(1)

Consider the 1.5 kg block

$F_{net} = m \times a = F_{app} - F_T$ ✓

$1.5 \times a$ ✓ $= 6.4 – F_T$ ✓ ……………….. (2)

(2) + (1)

$0.93 \times a + 1.5 \times a = 6.4$ ✓

Therefore $a = 2.63\ m/s^2$ ✓

5.2.3 (3)

Consider the 0.93 kg block.	Consider the 1.5 kg block
$F_T = ma$ ✓	$m \times a = F_{app} - F_T$ ✓
$F_T = 0.93 \times 2.63$ ✓	$1.5 \times 2.63 = 6.4 - F_T$ ✓
$F_T = 2.45\ N$ ✓	$F_T = 2.45\ N$ ✓

5.2.4 decrease ✓ (1)

5.3 Tap the hammer with the handle end down. ✓The handle of the hammer comes to rest when it hits the floor ✓, but the head continues to downwards until a force acts on it to bring it to rest. The force that acts on it is supplied by the handle, which results in the head being wedged more tightly onto the handle. ✓Since the metal head is heavy, the wedging it onto the handle is big. ✓ (4)

5.4 5.4.1 The force felt from contact with the floor or a scale in an accelerating system. ✓ For example, the sensation of feeling lighter or heavier in an accelerating elevator. (1)

5.4.2 If the elevator is moving in a straight line with a constant speed, its acceleration is zero. ✓ Now, if the acceleration is zero, the net force must also be zero. ✓Hence, the upward force exerted by the floor of the elevator must be equal to the downward force of gravity on you. ✓As a result, your apparent weight is equal to your weight. ✓ (4)

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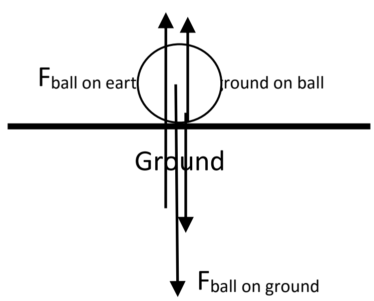
QUESTION 6

6.1 6.1.1 (4)



(One mark per force shown)

6.1.2 The force of the ground on the ball. ✓ (1)

6.2

Mass	**Weight**
1.Measure of the amount of matter in the object./ measure of its inertia ✓	Force with which the object is attracted by earth ✓
2.Scalar quantity ✓	Vector quantity ✓
3.Mass of an object is constant	Weight of an object varies from place to place
4.The SI unit is kg	SI unit is N

(Any two = 4)

6.2.1 Every object on the universe attracts every other object with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. ✓ ✓ (2)

6.2.2 $g = \dfrac{GM_E}{(R_E+h)^2}$ ✓ (4)

$$g = \frac{6.67 \times 10^{-11} \times 5.98 \times 10^{24} \checkmark}{\left((638 \times 10^4)+(0.885 \times 10^4)\right)^2 \checkmark} = 9.78\ m/s^2 \checkmark$$

(Accept $g = 9.77\ m/s^2$)

6.2.3 w = mg ✓ (3)
w = 64 × 9.78 ✓
w = 625.92 N ✓ (Accept w = 625.28N)

6.3 False. ✓ The force of the Earth's gravity is practically as strong in orbit as it is on the surface of the Earth. ✓ The astronauts experience weightlessness because they are in constant free fall. ✓ (3)

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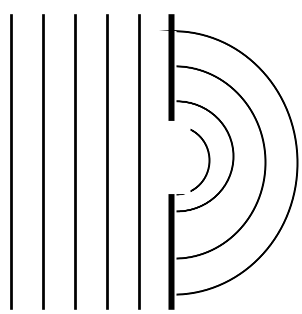
QUESTION 7

7.1 Every point on a wave front acts as the source of secondary wavelets that spread out in the forward direction with the same speed as the wave. ✓ ✓ (2)

7.2 A straight strip (or bar or ruler) is vibrated vertically (or up and down) in water. ✓ ✓ (2)

7.3 Increase the frequency (of the wave or wave source) OR use a shallower depth of water. ✓ ✓ (2)

7.4 (2)



7.5 Less diffraction occurs ✓ ✓ (2)

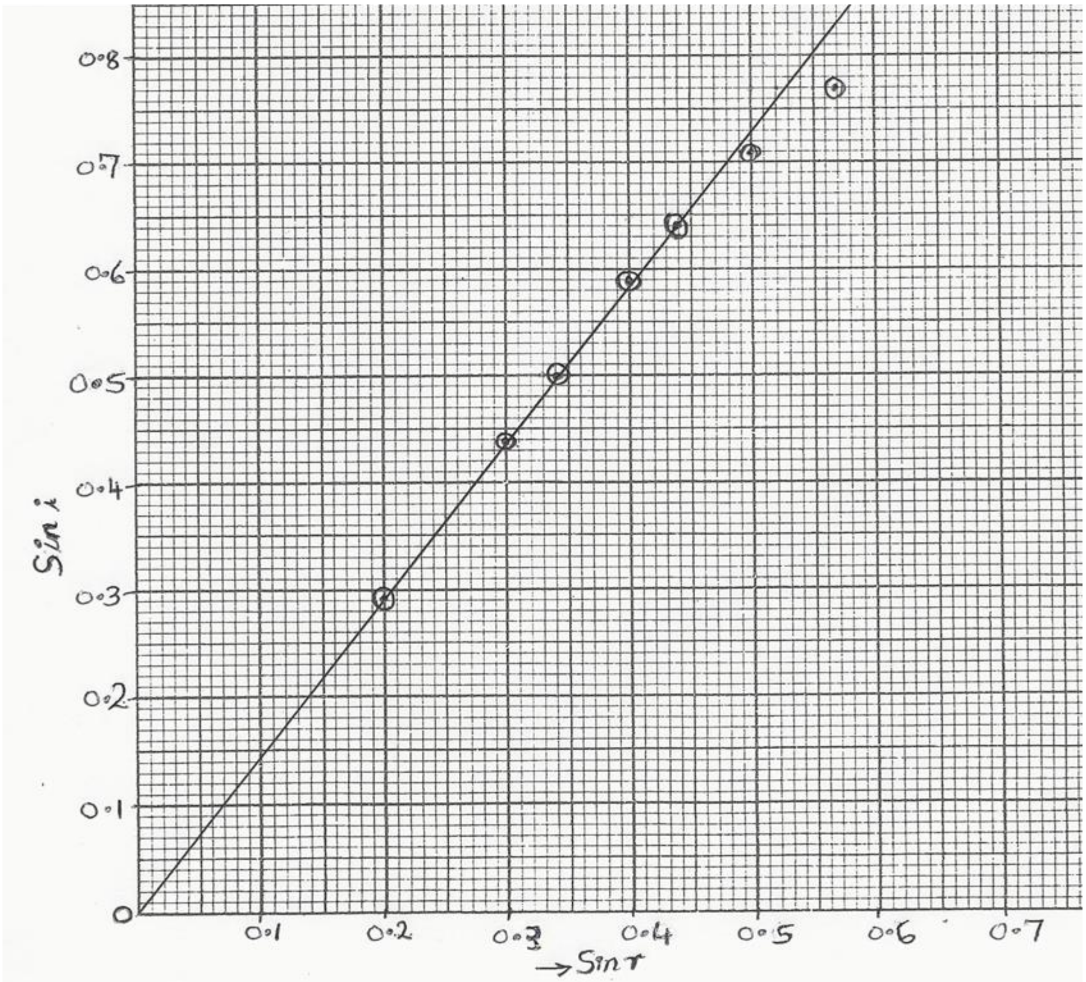
7.6 Wavelength of light much smaller ✓ than the opening of the door. ✓ (2)

QUESTION 8

8.1 To increase the accuracy of the results. ✓ (1)

GRAPH

Sin i X sin r graph Scale: X-axis 2cm: 0.1 and Y-axis 2cm : 0.1



8.2 <u>Marking guide for graph</u>

Suitable title ✓

labelling of two axes without any unit ✓ (minus 1 mark if unit written)

All seven points plotted correctly plotted ✓ ✓ ✓ ✓ (4)

(5 to 6 points correct = 3 marks, 3 to 4 points correct = 2 marks, 1 to 2points correct = 0 mark)

best straight line through the origin ✓

NOTE (7)

- No marks if a sketch graph is drawn
- If the graph drawn is too small (less than half of graph paper)only half of the marks scored must be given.

8.3 A straight line through the origin shows that sin *i* is proportional to sin *r*. ✓ ✓ (2)

8.4 n = gradient = $\Delta Y/\Delta X$ ✓ (4)

= (0.8 — 0) ✓ ÷ (0.55 — 0) ✓ = 1.45 ✓

Note: Check the learner`s graph. They may take two different points from their graph.

[14]

QUESTION 9

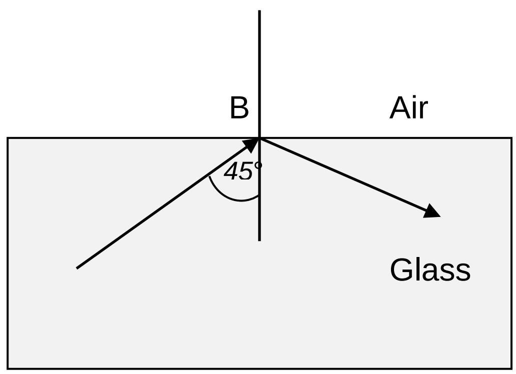
9.1 Critical angle ✓ (1)

9.2 $n_i \times \sin\theta_i = n_r \times \sin\theta_r$ ✓ (4)

$n_i \times \sin 41.8°$ ✓ $= 1 \times \sin 90°$ ✓

$n_i = 1.5$ ✓

9.3 (2)



[7]

QUESTION 10

10.1 Total internal reflection will only occur if the outer medium is of lesser density. ✓ It also prevents damage to the surface of the core. ✓ (2)

10.2 Endoscope, telecommunications, binoculars (any two: one mark each) ✓ ✓ (2)

10.3 Less interference, boosted less often, cheaper raw material, occupy less space, more information carried in the same space, flexible for inaccessible places, do not corrode, etc. (any two: one mark each) ✓ ✓ (2)

10.4 $n = \frac{c}{v}$ ✓ $\Rightarrow v = \frac{c}{n}$ (3)

$v = \frac{3 \times 10^8}{1.44}$ ✓ $= 2.08 \times 10^8$ m/s ✓

[9]

TOTAL [150]