LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL
SENIOR CERTIFICATE

GRADE 11

PHYSICAL SCIENCES: PHYSICS (P1)
HALF YEARLY EXAMINATION
3RD JUNE 2014
MEMORANDUM

MARKS : 150

TIME : 3 Hours

This memorandum consists of (10) ten questions and 9 pages including this cover page.

QUESTION 1

1.1	D	✓ ✓	(2)	1.6	A	✓ ✓	(2)
1.2	B	✓ ✓	(2)	1.7	B	✓ ✓	(2)
1.3	C	✓ ✓	(2)	1.8	D	✓ ✓	(2)
1.4	B	✓ ✓	(2)	1.9	D	✓ ✓	(2)
1.5	C	✓ ✓	(2)	1.10	A	✓ ✓	(2)

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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 ✓

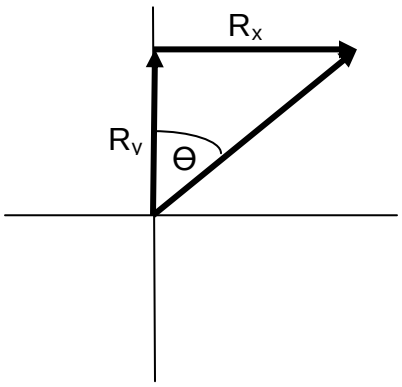
(10)

$R^2 = R_x^2 + R_y^2$ ✓

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

$R = 6.22N$ ✓

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)

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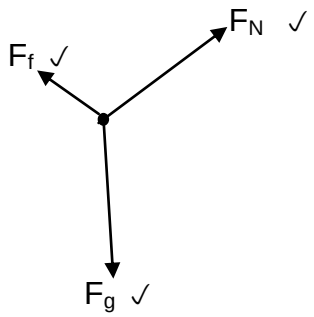
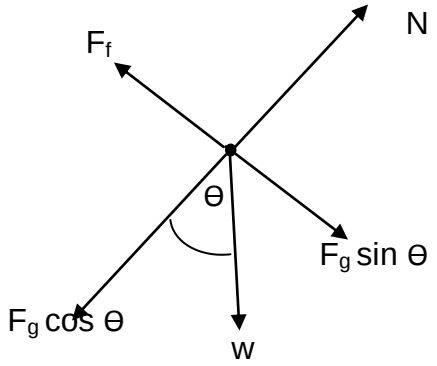
QUESTION 4

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

4.2 4.2.1 (3)



4.2.2 The force that opposes the tendency of motion of a stationary object relative to a surface ✓ ✓ (2)



4.2.3 $F_f = mg \sin \theta$ ✓ (3)

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

$F_f = 366.76$ N ✓

4.2.4 $N = mg \cos \theta$ ✓ (3)

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

$N = 855.72$ N ✓

4.2.5 $F_f = \mu_s \times N$ ✓ (3)

$366.76 = \mu_s \times 855.72$ ✓

$\mu_s = 0.43$ ✓

4.2.6 Less than ✓ (1)

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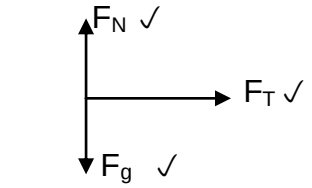
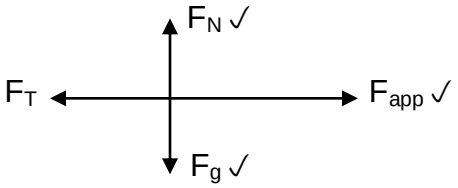
QUESTION 5

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)

$F_{net} = ma = F_T$ ✓

$0.93a = F_T$ ✓ ……..(1)

Consider the 1.5 kg block

$F_{net} = m\,a = F_{app} - F_T$ ✓

$1.5\,a$ ✓ $= 6.4 - F_T$ ✓ …….. (2)

(2) + (1)

$0.93\,a + 1.5\,a = 6.4$ ✓

Therefore $a = 2.63\ m/s^2$ ✓

5.2.3 (3)

Consider the 0.93 kg block.	Consider the 1.5 kg block
$F_T = ma$ ✓	$m\,a = F_{app} - F_T$ ✓
$F_T = 0.93 \times 2.63$ ✓	$1.5 \times 2.63 = 6.4 - F_T$ ✓
$F_T = 2.45$ 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 exerted by the object on the floor of the lift ✓when the lift is accelerating. ✓ (1)

5.4.2 Equal to your weight. ✓ (4)
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. ✓

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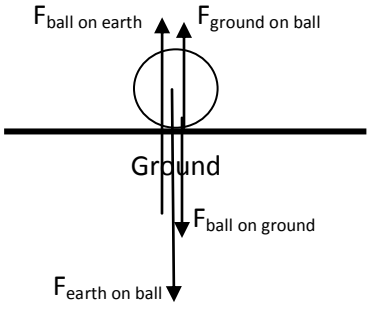
QUESTION 6

6.1 6.1.1 (4)



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

6.2 Mass is the property of matter contained in the body ✓, and it is a scalar quantity. ✓Weight is the force with which the body is attracted by the Earth, ✓ and it is a vector quantity. ✓ (4)

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

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

6.2.3 $w = mg$ ✓ (3)

$w = 64 \times 9.78$ ✓

$w = 625.92$ N ✓

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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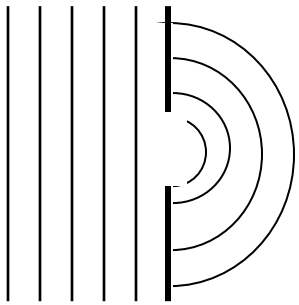
QUESTION 7

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)

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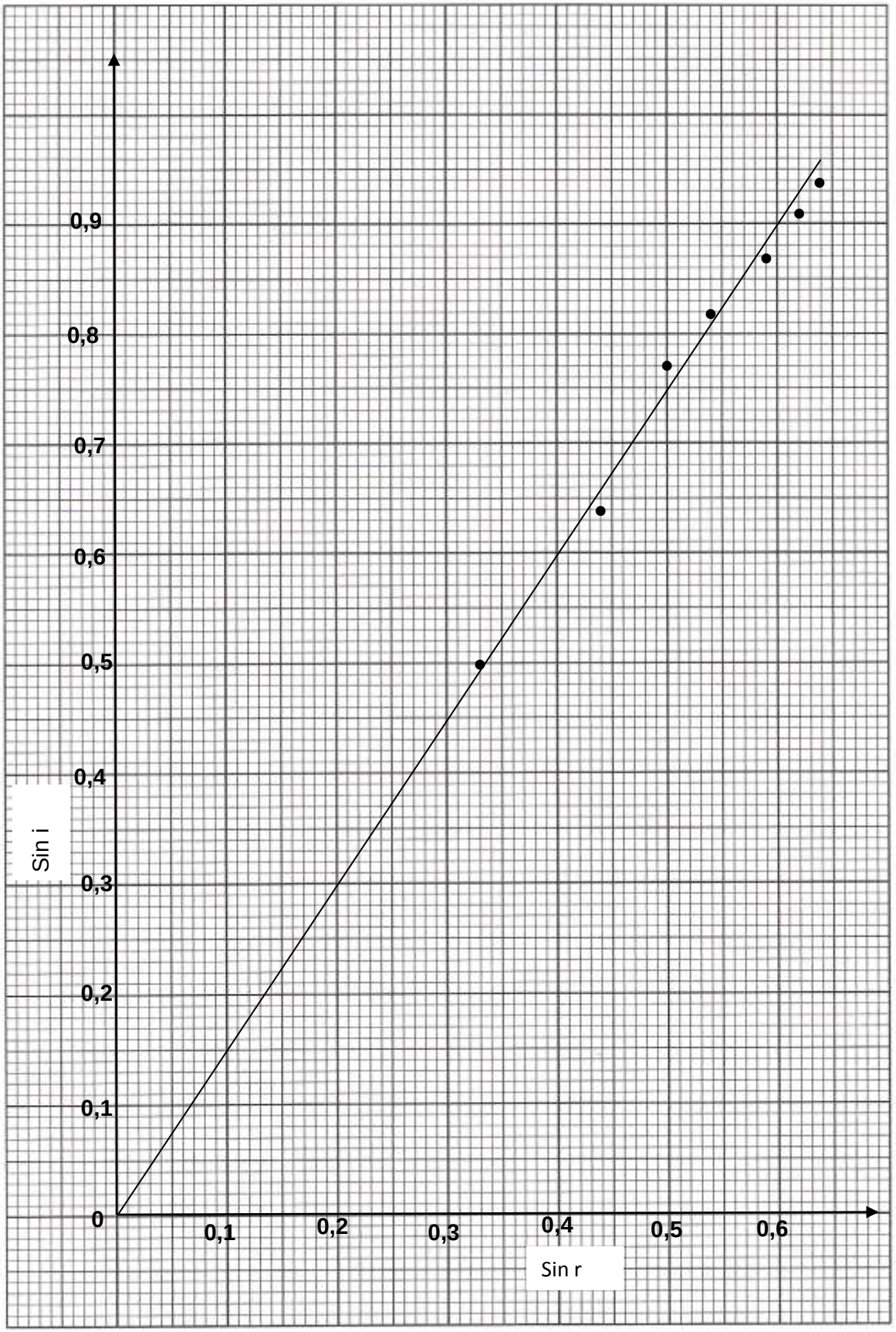
QUESTION 8

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


0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
Sin i
0,1
0,2
0,3
0,4
0,5
0,6
Sin r

8.2 Marking guide for graph (7)

* heading ✓
* labelling of axes ✓
* appropriate scale on both axes ✓ ✓
* points plotted correctly ✓ ✓
* best straight line ✓

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

8.4 $n = \text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$ ✓ (4)

$n = \frac{0.616 - 0.500 \checkmark}{0.903 - 0.766 \checkmark} = 0.847 \checkmark$

[14]

QUESTION 9

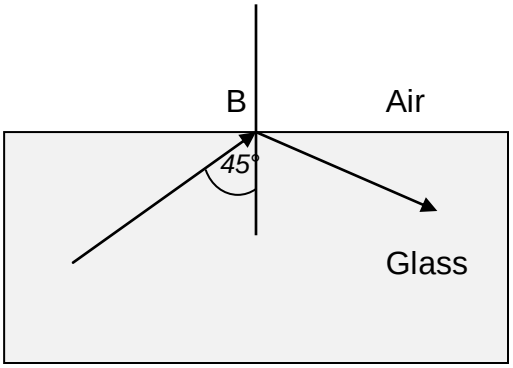
9.1 Critical angle ✓ (1)

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]

GRAND TOTAL [150]