GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE EXAMINATION
GRADE 12

2026

MARKING GUIDELINES

TECHNICAL SCIENCES

(PAPER 1)

8 pages

QUESTION 1

1.1	C ✓✓	(2)
1.2	A ✓✓	(2)
1.3	C ✓✓	(2)
1.4	B ✓✓	(2)
1.5	D ✓✓	(2)
1.6	C ✓✓	(2)
1.7	B ✓✓	(2)
1.8	C ✓✓	(2)
1.9	A/D ✓✓	(2)
1.10	A ✓✓	(2)
		[20]

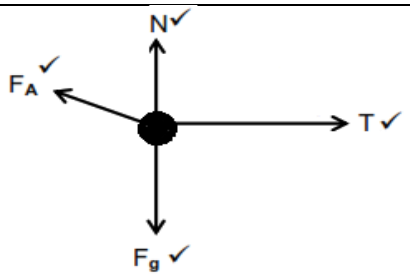
QUESTION 2

2.1	I ✓	(1)
2.2	A ✓	(1)
2.3	H ✓	(1)
2.4	F ✓	(1)
2.5	J ✓	(1)
2.6	E ✓	(1)
2.7	B ✓	(1)
2.8	D ✓	(1)
2.9	M ✓	(1)
2.10	C ✓	(1)
		[10]

QUESTION 3

3.1 The perpendicular force exerted by a surface on an object that lies on that surface.✓✓ (2)

3.2



ACCEPTABLE LABELS:
N/F_N: Normally
Fg/w: Force due to gravity/Weight
F_A: Applied force/300 N
T: Tension/force in the string

NOTE:

One mark for each force represented by an arrow with a correct label.

Penalise (only once) for each of the following:

- No arrows
- There is no dot
- Gap between the line and the dot
- Dotted lines are used
- Additional force is included
- A force diagram is given
- If components is used

(4)

3.3

To the left is positive **OR**	*To the left is positive*
Block B:	Block B:
F_{net} = ma ✓	F_{net} = ma ✓
T = ma	T = ma
T = 17a ✓ …… (1)	T = 17a ✓ …… (1)
Block A:	Block A:
FCosθ - T = ma	FCosθ - T = ma
300Cos25° ✓– T = 12a ✓	300Cos25°✓– 17a = 12a ✓
T = 271,89 – 12a …… (2)	a = 9,3755 m·s^{-2} …… (2) ✓
Substitute (1) into (2)	Substitute (2) into (1)
17a = 271,89 – 12a	T = 17a
29a = 271,89	= 17(9,3755)
a = 9,3755 m·s^{-2} to the left ✓	= 159,38 N ✓
T = 17a	
= 17(9,3755)	
= 159,38 N ✓	

(6)

3.4 Decrease ✓ (1)

3.5 If the string breaks, there will be no horizontal forces ✓acting in on block B and the block will continue to move with a constant velocity ✓. F_{net} = 0 (2)

3.6 Newton's First Law of Motion ✓

An object continues in a state of rest or uniform (moving with constant) velocity unless it is acted upon by a net (resultant) force. ✓✓ (3)

[18]

QUESTION 4

4.1 Momentum is the product of an object's mass and its velocity. ✓✓ (2)

4.2.1 $P_{inital} = m_{trolley}\, v_i + m_{trolley\ 2}\, vi$ ✓
$= \underline{(15)(5)}$ ✓ + $\underline{(12)(0)}$ ✓
$= 75\ kg{\cdot}m{\cdot}s^{-1}$ ✓ (4)

4.2.2 **Positive marking from QUESTION 4.2.1 for OPTION 1**

OPTION 1	OPTION 2
Direction right is positive	*Direction right is positive*
$\sum p_{\text{ before collision}} = \sum p_{\text{ after collision}}$	$\sum p_{\text{ before collision}} = \sum p_{\text{ after collision}}$
$p_i = m_{trolley\ 1\ +\ trolley\ 2)}\, v_f$ ✓	$m_{trolley}\, v_i + m_{trolley2}\, vi = m_{trolley\ 1\ +\ trolley\ 2)}\, v_f$ ✓
$75 = (15 + 12)\, v_f$ ✓	$(15)(5) + (12)(0) = (15 + 12)\, v_f$ ✓
$v_f = 2{,}78\ m{\cdot}s^{-1}$ ✓	$v_f = 2{,}78\ m{\cdot}s^{-1}$ ✓

(3)

4.3

$E_{\text{ before collision}} = ½\, mv^2 + ½\, mv^2$	$E_{\text{ after collision}} = ½\, mv^2$ Both formulae correct ✓
$= ½\,(15)(5)^2 + ½\,(12)(0)^2$	$= ½\,(27)(2{,}78)^2$
$= 187{,}5$ J ✓	$= 104{,}33$ J ✓
Kinetic energy is not conserved ✓, therefore the statement is correct. ✓	

(5)

4.4 The product of the net force acting on an object and the time the net force acts on the object. ✓✓ (2)

Positive marking from QUESTION 4.2.2

4.5

Direction to the wall is positive	*Direction away from the wall is positive*
Impuls = Δp ✓	Impuls = Δp ✓
$= 27\ (-1{,}75 - 2{,}78)$ ✓	$= 27\ (1{,}75 - (-2{,}78))$ ✓
= 122,31 N·s away from the wall ✓	= 122,31 N·s away from the wall ✓

(3)

4.6

Positive marking from QUESTION 4.5	
$F_{net}\Delta t = \Delta p$ ✓	$F_{net}\Delta t = \Delta p$ ✓
$F_{net}(0{,}3)$ ✓ = 122,31 ✓	$F_{net}(0{,}3)$ ✓ $= 27(-1{,}75 - 2{,}78)$ ✓
$F_{net} = 407{,}7$ N ✓	$F_{net} = 407{,}7$ N ✓

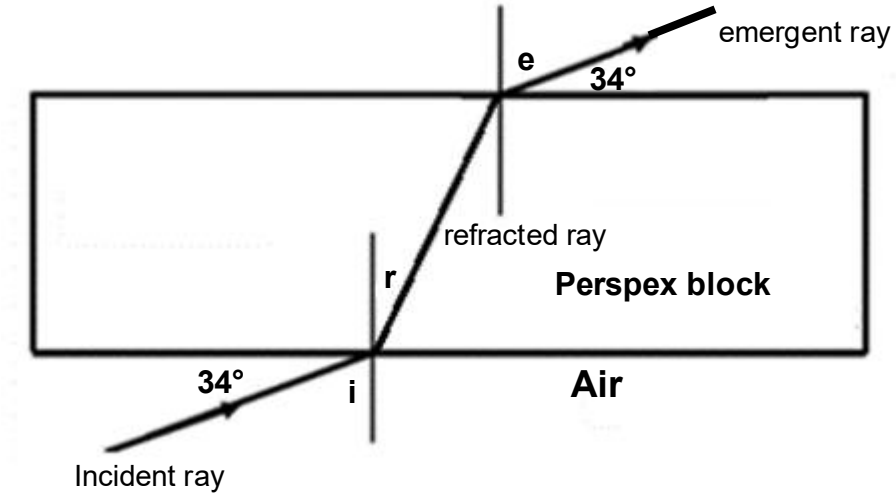
(4)

[23]

VRAAG 5

5.1 The bending of light when it passes from one medium to another. ✓✓ (2)

5.2



Marking Criteria
✓ angle of refraction (r)
✓ refracted ray
✓ angle of emergent (e) / 56°
✓ emergent ray
✓ refracted ray path correct
✓ normal indicated at emergent ray

(6)

5.3 56^{0} ✓ (1)

5.4 Law of Reflection
OR
The change in direction of a wave upon striking the interface between two materials ✓✓ (2)

5.5.1 Reflected ray ✓ (1)

5.5.2 Angle of reflection ✓ (1)

5.5.3 Normal ✓ (1)

5.6 Virtual ✓
Upright ✓
Same size as the object
Laterally inverted
Equal distant from the mirror
(any two) (2)

[16]

QUESTION 6

6.1 A quantum of energy ✓✓ (2)

6.2 E = hf✓
$2{,}32 \times 10^{-1} = 6{,}63 \times 10^{-34}$✓f
f = $3{,}50 \times 10^{32}$Hz ✓ (3)

6.3 Directly proportional ✓✓ (2)

6.4 Wave A ✓ lowest frequency/energy✓ (2)

6.5 Wave D ✓ Gamma rays has the highest frequency, which will be wave E ✓ (2)
[11]

QUESTION 7

7.1 How does the stress in an iron rod change with increasing strain when different masses are applied until fracture? ✓✓ (2)

7.2 Elasticity is a property of the body by virtue of the body regaining its original shape and size when the deforming force is removed. ✓✓ (2)

7.3 Elastic region: the material will return to its original shape and size once the applied force is removed. The deformation is temporary (reversible) ✓

Plastic region: the material undergoes permanent deformation. Even when the force is removed, the material does not return to its original shape ✓ (2)

7.4 200 MPa ✓ = 2×10^8 Pa ✓ (only award 2 marks if final answer is in Pascal.) (2)

7.5

$\sigma = \frac{F}{A}$✓
$195{,}1 \times 10^6 = \frac{1000(9{,}8)}{A}$✓
$A = 5{,}02 \times 10^{-5}$ m²✓

$A = r^2\pi$ ✓
$5{,}02 \times 10^{-5} = r^2\pi$
$r = 3.997 \times 10^{-3}$ m
$d = 8 \times 10^{-3}$ m ✓ (0.008m)

OR

$A = \frac{(\pi)(d)^2}{4}$ ✓
$5{,}02 \times 10^{-5} = \frac{(\pi)(d)^2}{4}$
d = 7,997
$= 8 \times 10^{-3}$ m ✓ (0.008m) (5)

7.6 Stress is directly proportional to strain, within the elastic limit ✓✓ (2)
[15]

QUESTION 8

8.1 The energy of an object due to its motion. ✓✓ (2)

8.2 $E_{m\ at\ X} = E_{m\ at\ Y}$ ✓

$(75)(9,8)(10)$ ✓ + ½$(75)(6)^2$ ✓ = $(75)(9,8)(3,5)$ + ½$(75)v^2$ ✓

$v = 12,78\ m{\cdot}s^{-1}$ ✓ (5)

8.3 The product of the applied on an object and the displacement in the direction of the force. ✓✓ (2)

8.4 $W = FxCos\ \Delta\theta$✓

$= (2000)(7,5)Cos\ 0\ ^0$✓

$= 15\ 000$ J✓ (3)

8.5 **Positive marking from QUESTION 8.4**

$P = \frac{W}{\Delta t}$ ✓

$= \frac{15000}{120}$ ✓

$= 125$ W ✓

$hp = \frac{125}{746}$

$= 0,17$ hp ✓

$(1,68 \times 10^{-1})$ (4)

[16]

QUESTION 9

9.1 Density ✓
Gravitational acceleration
Height/depth
(any one) (1)

9.2 $P = pgh$ ✓

$= (1025)(9,8)(132)$ ✓

$= 1\ 325\ 940$ Pa ✓

$(1,33 \times 10^6)$ (3)

9.3 Decrease. ✓
Diver is moving up to the surface ✓
thus the pressure will decrease on the diver.
Pressure is directly preportional to the depth of the diver. ✓ (3)

[7]

QUESTION 10

10.1 A ✓ Time taken is the longest, oil is the thickest. ✓ (2)

10.2 Viscosity will decrease. ✓ (1)

10.3 Multigrade oil is less sensitive for viscosity changes. At low temperatures (cold mornings/winter), it remains thin enough to flow easily, reducing wear during engine start-up. ✓
At high temperatures (engine running/hot climate), it stays thick enough to provide proper lubrication and protection. ✓ (2)
[5]

QUESTION 11

11.1 $P = \frac{F}{A}$ ✓
$= \frac{150}{\pi(0,2)^2}$ ✓
= 1193,66 Pa ✓ (3)

11.2 **Positive marking from QUESTION 11.1**

$P = \frac{F}{A}$
$1193,66 = \frac{F}{\pi(1)^2}$ ✓
F = 3749,99 N ✓
$m = \frac{3749.99}{9,8}$
= 382,65 kg ✓
Hydraulic lift would not be able to lift the car ✓ (4)

OR

$P = \frac{F}{A}$
$1193,66 = \frac{F}{\pi(1)^2}$ ✓
F = 3749,99 N ✓
$m = \frac{3749.99}{9,8}$
= 382,65 kg ✓
F_g = ma
= 1350 (9,8)
= 13 230 N

OR

$\frac{F_1}{A_1} = \frac{F_2}{A_2}$

$\frac{150}{\pi(\frac{20}{100})^2} = \frac{F_2}{\pi(\frac{100}{100})^2}$

F_2 = 3 749,99 N

Fg = mg

3 749,99 = m(9,8)

m = 382 65 kg

OR

F_g = ma

= 1350 (9,8)

= 13 230 N

$P = \frac{F}{A}$

$=\frac{13\ 230}{\pi(\frac{100}{100})^2}$

= 4 211,24 Pa

11.3 Hydraulic brakes ✓

Hydraulic press ✓
Hydraulics jacks
Dentist chairs
(any 2) (2)

[9]

TOTAL: 150